



Assisted and Artificial Breeding Techniques

Around the world, huge advances have been made in the field of canine reproduction. There are now a number of assisted and artificial breeding options available to breeders, and veterinary specialists in the field of reproduction that can assist breeders in resolving fertility issues and obtaining successful matings.

Opinions on the ethical use of artificial breeding technologies vary widely. In some countries, there are rules in relation to the use of artificial or assisted breeding techniques, and certain procedures and technologies are banned in some countries. This is in an attempt to ensure that the breeding population remains healthy and that we continue to actively select for animals that can both mate and whelp a litter naturally.

Despite the differing opinions, there are many advantages of this technology, especially in a country such as Australia. Our strict quarantine laws and our relatively small dog population has traditionally made it very challenging for breeders to maintain genetic diversity within their breeding stock.

The importation of stud dogs has always been very costly, with compulsory quarantine periods and complex certification requirements. Generally, only highly dedicated breeders have undertaken the drawn out process of bringing new blood into the country.

Modern advances have opened up the possibility of using genetic material that has been collected and stored in such a way that the male does not have to be present for a mating to occur. Canine breeding technologies allow breeders to access males that would otherwise not be available for consideration. This provides opportunities to expand the gene pool, address existing or emerging health problems and continue to improve the soundness of their breed.

Artificial insemination using fresh semen

Artificial insemination using fresh semen is probably the most commonly used assisted breeding technology. Most veterinarians (and many experienced breeders) are able to successfully collect semen from a stud dog and, using a special pipette, transfer the semen from the collection vessel through the vulva, depositing it directly into the bitch's vagina.

This method can be used where there are physical limitations that prevent a breeding – maybe the stud dog is older and finds natural matings physically challenging, or perhaps he has sustained an injury that prevents or makes it difficult for him to mount a bitch. This method can also be used where there are issues with the bitch that make a natural mating difficult to achieve, such as a vulval stricture, or vaginal hyperplasia.

Although this method can be used to 'get around' many physical issues, it is important to consider if the reason for the breeding difficulty may have a hereditary component. Breeding from these animals may lead to a breeder producing a whole line of pups that have the same issue, rather than selecting away from the problem.

A stud dog that cannot perform a natural mating due to extremes of size or weight, poor conformation or due to respiratory restrictions should not be bred from on health grounds. Bitches with serious reproductive abnormalities or temperament issues that prevent them from breeding naturally should also be removed from your breeding program.





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Artificial insemination using frozen or chilled semen

Normally, canine semen can only survive outside the body for a very short time, meaning a mating needs to take place in 'real time' for a successful outcome. Luckily, there have been methods developed that allow semen to remain viable for a longer time, allowing it to be shipped across the country, or across the world.

Although 'chilled semen' is used extensively in the United States, its use in Australia is less common. Chilled semen has a life span of approximately 2 to 4 days, allowing the male to be collected, and then the semen shipped via courier to the bitch for insemination. The timing of the collection and shipping is critical to its success, so any delays in transport or processing will render the sample worthless.

Instead, most breeders looking to ship semen long distances chose to use frozen semen. The semen is collected from the stud dog and then spun in a centrifuge to help separate it into its various components. The sperm rich fraction is then mixed with a special 'extender' solution that helps to nourish and protect the sperm whilst frozen.

The sample is separated into doses called 'breeding units' and rapidly chilled and then frozen. It is then stored (either as pellets or straws) in a canister containing liquid nitrogen. When the time is right, the semen is then gently thawed and inseminated into the bitch.

Frozen semen can be stored indefinitely as long as it remains at the correct temperature. This means that a male can sire a litter long after he has died. Although the technology is still relatively new, there are litters that have been born from 30 and 40 year old semen.

Timing a frozen semen mating

Frozen semen is considered far more 'fragile' than fresh semen. After all, it has been collected, centrifuged, mixed with extender, frozen and then thawed before the time of insemination. Frozen semen also has a much shorter lifespan inside the bitch than fresh semen. For these reasons, the timing of a frozen semen insemination is far more critical than a natural mating.

If you are planning on using this type of technology, you will need to discuss the process with your reproductive veterinarian (this is not a service that regular veterinarians offer) well ahead of time. The usual procedure is to notify them as soon as your bitch comes into season.

They will want to plot a 'progesterone curve', so you will need to be prepared for several blood tests to be taken as your bitch progresses through her season. Initially, this may be every 2 to 3 days but will become daily as she approaches ovulation.

Because the timing is so critical, most vets will be very specific as to when the mating needs to occur – timing it not just to the day, but even the time of day.

Insemination with frozen semen

Because it is so fragile, frozen semen is placed directly into the uterus (rather than deposited in the vagina). This means it does not have to travel the full length of the reproductive tract to reach the egg, conserving its energy stores. With the transit time reduced, frozen semen insemination takes place often a day or two after a natural mating, or fresh semen AI would be scheduled.



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Frozen semen can be inseminated in several ways:

» Surgical insemination

When inseminated surgically, the uterus is accessed through an incision in the abdomen. The uterus is gently lifted, and the semen is injected through a catheter into the top of the uterine horn on each side. This method allows the veterinarian to examine the uterus visually but requires a full anaesthetic, so it is not without risks.

» Trans-cervical insemination (TCI)

This method involves using a 'scope' to navigate a catheter through the cervix into the uterus. The scope is inserted into the bitch's vagina with her awake and standing. An experienced operator can pass the catheter quite quickly, but the opening to the cervix can be tricky to access. This method does not require an anaesthetic but relies on the bitch remaining still during the procedure.

Because of the need for an anaesthetic, many veterinarians feel surgical insemination is an unacceptable risk for the bitch, and will refuse to use this method. Surgical insemination is also banned in many European countries, and progeny from this type of insemination cannot be registered.

In Australia, both methods are currently used, and the choice will be based on the reproductive veterinarian's preferences and experiences. If you have a strong preference for one method over the other, you may need to choose to use a particular practice or veterinarian that regularly uses that method.

Preparing for a frozen semen mating

There are a number of things that you will need to do well ahead of time to make sure that everything is in place before your bitch comes into season:

1. Speak to the veterinarian that you plan to use – they will want to make sure that you understand what is involved, and walk you through the timeline. You will need to have several progesterone tests done. If you live a long way from their clinic, you may be able to have the early samples collected by your regular vet.
2. Make sure that the semen you plan to use is moved to the clinic performing the insemination well ahead of time. Semen is moved in smaller vessels called 'shippers'. These need to be charged with liquid nitrogen so the semen remains at the correct temperature during transit. Although shipping is relatively simple, it can take a few days to organise, so don't leave it to the last minute!
3. Make sure that the semen has been registered, and that you have a stud agreement in place with the owner of the semen. When semen is collected and frozen, it is not automatically registered. The same applies to imported semen; it needs to be registered on the Dogs Australia database. You will need to make sure that the appropriate paperwork has been lodged with Dogs Victoria (or another ANKC state controlling body) and the semen that you plan to use is registered. That way, there will be no delays in registering your litter.
4. Finally, make sure that the inseminating veterinarian completes the required paperwork at the time of the insemination. This will need to accompany your litter registration paperwork when it comes time to register your puppies.



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Importing frozen semen

If you plan to access a sire from another country, you may need to go down the path of importing semen. Although this can be a very costly and time consuming process, it does offer you the opportunity to select the very best sire for your bitch, regardless of where he lives.

You will have to make sure that the semen complies with the Australian Import requirements and that it is coming from an approved country. You can access a full list of requirements by visiting the [Australian Department of Agriculture website](#).

The import requirements may mean that the owner of the stud dog will have to arrange for their stud dog to undergo a number of tests as well as the actual collection of the semen. There are several Australian companies that specialise in importing and clearing semen shipments through customs who can assist with the process if you need.

You may get lucky and find the owner already has semen stored that complies with all of the requirements and can be released for shipping immediately. If not, the various tests and veterinary health checks will need to take place, both before and after the actual collection. This can be a drawn out process, so you need to plan well ahead.

Important!

*It is important to note that the requirements for pre and post collection testing changed a number of years ago and it may be that semen collected prior to the rule changes may **not be eligible** for import. There are strict rules to prevent any exotic diseases from entering Australia, so any semen shipments will be checked to ensure they comply.*

Stud agreements

You should always have a written stud agreement with the owner of the male you intend to use, regardless of how the conception will take place.

Stud agreements traditionally outline the cost of the stud fee, when it needs to be paid, and what happens if the bitch does not fall pregnant.

Important!

Regardless of whether you plan to do a natural mating, use fresh or frozen semen, you also need to do your 'due diligence' to ensure that the male you plan to use is registered, is eligible for breeding, and that his owners meet the required membership of their kennel club or controlling body.

If you are using frozen semen, there will still be a stud fee, but there also needs to be a written agreement documenting who is responsible for any costs relating to collection, storage, pre and post collection testing, registration or shipping of the semen.

Where more than one breeding unit is released to the owner of the female, there needs to be agreement on what happens to any unused semen, whether it can be used in future, any additional stud fees that need to be paid, and whether it can be sold.

If you are contemplating using artificial insemination techniques, speak to other breeders or your mentors to learn more about their experiences. They will also be able to give you recommendations for reproduction veterinarians nearby.