BEING MENTOR
EMAIL: bm.publicationwing@gmail.com

Artificial Insemination

By: Danial Saif & Fellows
DVM (3rd Semester)
UVAS (Narowal Campus)

Artificial insemination (AI) is basically the introduction or placement of semen in the vagina or cervix of the females using methods other than the sexual intercourse. This method is successfully used in different animal breeds with desirable features. However, this technique is also practiced in humans (couples with unexplained cause of infertility).Artificial insemination is one of the group of techniques known as "assisted reproductive technologies" (ART), in which the offspring are produced by facilitating the meeting of gametes (sperm & oocyte).AI has been used in many of the domestic species in order to produce animals with desired characteristics.AI is the most commonly used ART during the 20th century, which has revolutionized the livestock industry.

In artificial insemination there are three basic steps that are followed to successfully perform the technique. These steps include the collection and storage of semen, estrus detection in female animal and insemination.

Collection of semen is performed either naturally, in which the semen is collected through vaginal washing after mating, or by the artificial methods. Artificially the semen is collected either by using the "artificial vagina", such as in bulls, or by the manual practices, like in dogs etc.
After collection the semen is stored using different methods keeping in mind the type of breed. Generally, the semen is stored at low temperature (freezing), which increases the life span of sperms by slowing down their metabolism. Semen can also be preserved by a method known as cryopreservation (in which the sperms are stored using liquid nitrogen for a longer time period).

Next step is to detect the estrus in female, this task is usually accomplished by the males of the same species. But due to the lack of male animals in the livestock units, this job is undertaken by the husbandry personnel, which identifies the females showing mating signs.

The cows show well-developed mating behaviour like increased activity or restlessness, chin resting, vulvar swelling, vocalization and mounting other cows. Sheep and goats can easily be identified by the vaginal discharge and the swelling of vulva (with usually increased male-seeking behaviour). Estrus in mares can be identified by the behaviour exhibited towards teaser males.

But the frequency and intensity of showing the mating behaviour may vary from specie to specie.
There are differences in the deposition of semen in females. For example, in primates and ruminants, the semen is deposited in the vagina. But in other animals like pigs, camels, dog and horses, the semen deposition is intrauterine. This task is accomplished using an insemination rod, which passes through cervix allowing to deposit semen in the uterus. But in some animals like in sheep and goats, the tightly folded cervix makes the task of passing the catheter difficult.

However, the advantage of depositing the semen in uterus helps sperms to travel less and reach the oocyte early. This makes a chance of successful pregnancy.
This technique has a lot of advantages, like AI can be used to increase the production gain and genetic development by using semen of high genetic merit males for the superior females. It can be used to protect animals from contagious or infectious diseases, which spread when animals are in close contact.

AI can be used for breeding in different geographical regions at different times. When AI is linked with other reproductive technologies such as sperm sexing and sperm cryopreservation, then it becomes a powerful tool. And its great benefit is that AI can be used for the conservation of the endangered species and rare breeds.
The picture has a dark side also.AI has a few demerits too, like some animals called "shedders" shed viruses in their semen. Moreover, an increased use of AI has caused loss of fertility in the dairy cattle and horses. Also, focusing on some of the specific individuals can cause loss of genetic variations.

But to conclude the debate, the merits of AI are far more than that of its demerits.AI has caused revolutionary progress in livestock unit during the 20th century. Also, the research is ongoing on this technique to develop other methods such as sex sperm determination, sex selection that will, surely, bring a revolutionary change in the history of AI.

In animals, AI is entering a new era, where the development of useful techniques will help improving the quality of sperms in the doses of AI as well as to increase the longer survival of sperms during cryopreservation.