

## Artificial insemination in horses

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**Pic: - artificial insemination in mare performed by veterinary doctor**

Artificial insemination (AI) technique is being widely used in domesticated animals worldwide for rapid genetic improvement besides its several associated advantages like easy transport of semen and semen storage for years by cryopreservation, and control on spread of venereal disease transmission. The initial research on AI technique was started in horses and dogs, with first commercial application of AI in horses in Russia at the end of 19<sup>th</sup> century. But, in subsequent years, invention of combustion engine drove AI research towards its use in other farm animals which had comparatively greater earning potential. Development of AI in horses was further limited owing to have poor post thaw sperm motility and wide individual variation in stallion semen freezability besides implication of rule by the horse breed registries.



Recent increase in interest for use of AI in horse is influenced by economic reasons, inspired with success in other species, horse breed registries allowing foals born through AI, realization for advantages of AI and new development in semen cryopreservation technology. AI in horses is usually performed either with fresh, chilled or frozen semen and the technique can be learned easily. For better results of AI in horses, attention is required to see reproductive competence of the recipient mare, proper handling of semen and the timing of insemination.

### **Preparation of semen for insemination**

When the recipient is ready for AI, the frozen straws is picked up from the shipping /storage container and dipped in pre warmed water at 37°C for 30 second for thawing. It is then soaked with tissue paper, cut and loaded in a 5 ml sterile syringe. Usually, eight to ten straws of 0.5 ml are thawed and cut to make an insemination volume of 4-5 ml to have sufficient number of progressive motile sperm (400-500 million) per insemination.

### **Insemination techniques**

Unlike recto-vaginal method of AI practiced in bovines, AI in horses is complete vaginal technique. The inseminator introduces his gloved arm after proper lubrication and thumb placed over the end of the insemination catheter into the mare's vagina. The inseminator palpates the cervix on the ventral surface of the vagina and gently introduces the index finger through depression in the center of the cervix. Then, using the finger as a guide, insemination pipette is placed into the uterus. It is important not to force the pipette at any point, as damage to endometrium may occur. Once, the pipette introduced into the uterine body, the plunger of the syringe loaded with diluted semen is slowly pressed to deposit the semen. Before removal of the pipette, the syringe may be unhooked and re-hooked so that 2 cm<sup>3</sup> of air may be introduced behind the semen in order to clear the pipette of the remaining semen. Care should be taken not to introduce an excess air into uterus and a very small portion of the semen should remain at the very end of the pipette when it is removed from the uterus.

### **Time of insemination**

As ovulation approaches, the follicle feels very soft in per-rectal examination. The irregular shape of ovulating follicle with an ovulation points and size reaches between 45 to 55mm can be seen using ultrasound scanner. This helps in predicting the ovulation time and to decide the time of AI. Optimum time to inseminate the mare with fresh, chilled and frozen semen is 24 to 48 hrs before ovulation, 12 to 18 hrs. before ovulation and 6 hours before to 6 hours after ovulation, respectively.

### **Frequency of insemination**

Two or more AI with frozen semen per cycle usually results in higher pregnancy rates as compared to mares inseminated only once. Insemination needs to be repeated at every other day when chilled semen is used or daily with frozen semen unless palpation or scanning of mare's ovaries is undertaken.

### **Dose and site of insemination**

Usually, eight to ten straws of 0.5 ml are thawed and cut to make an insemination volume of 4-5 ml to have sufficient number of progressive motile sperm (400-500 million) per insemination. A total of 300 million progressively motile sperm per dose is also recommended for frozen-thawed semen. Post-



thaw sperm motility in frozen semen samples should have at least 30% or more progressively motile sperm to be considered acceptable for AI in mares. Standard practice is to place semen in the uterine body. However, deep intrauterine AI with only 5 to 100 million progressively motile sperm may achieve an acceptable pregnancy rate.

### Factors influencing success of AI

Method of semen handling, post thaw sperm motility percent and sperm concentration in the inseminate, timing and frequency of insemination per estrous cycle are the major concern of AI in horses besides the reproductive competence of the recipient mare. The mare should be free from disease and with clear uterus, present a good vulvar confirmation with good body condition score. AI technique requires skilled technician besides involvement of costly equipment's and intensive monitoring of estrus mare for right time of insemination.

### Benefits of Artificial Insemination in Horses

- Can be artificially inseminated with high specific quality stallion semen, frozen semen produced by good stallions can be made available even where specific (excellent quality) stallions are not available.
- Travel is not required during the mare's estrous cycle.
- Infectious diseases can spread during natural intercourse. There is no risk of infectious diseases spreading through artificial insemination.
- In horses the cost of natural insemination is very high and the cost of artificial insemination is very low.
- Where specific (specific quality) stallions are not available, frozen semen can also be made available

### Possible disadvantages

Chilled and frozen semen AI has a lower pregnancy rate than the natural covering. AI in horses may spread disease and abnormalities through semen if proper monitoring check is not employed. The excessive use of few elite stallions over a limited population may limit genetic pool.

### Conclusions

The advantages of AI in horses overshoot the disadvantages. Many factors that limit use of AI in horses can be addressed by further research, applying appropriate regulation and training of personnel to avoid slippery slope of the AI technique. The AI techniques proved to be very useful for faster genetic multiplication of an elite/purebred horses, increasing the population of endangered horse breeds, embryo transfer, insemination in group of estruses synchronized mares, use of sex sorted semen besides control on spread of venereal disease transmission and the foals produced at comparatively cheaper rates. Storage of frozen semen for an indefinite period aid new dimensions to AI technique which is being implicated for international semen trade to inseminate mares across the boundaries and *ex situ* germplasm conservation for posterity.



### References

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