**Method of Artificial insemination**

The successful use of artificial insemination (AI)as a means of animal breeding relies upon three major premises: firstly, that spermatozoa can survive outside the body; secondly, that they can be reintroduced into the female genital tract in a way that results in an acceptable conception rate; and thirdly, that the fertile period of the female can be identified.

**AI OF CATTLE**

Cows are inseminated just into the uterine body. Insemination into the cervix produces a lower fertilization rate, while insemination deeper into the uterus runs the risks of either inseminating into the uterine horn contra lateral to the ovulation site, or scoring the endometrium with the tip of the insemination catheter. Reduced fertility is the consequence of both of the latter two errors.

The standard technique of insemination is to grasp the cervix through the rectum with the left hand. A catheter tip in which a straw of semen has been inserted is then passed into the vagina and manipulated into and through the cervix by the right hand. This technique, the rectovaginal method of insemination, requires considerable practice for success. The vulval lips are opened by downwards pressure from the arm in the rectum, while the circular folds of vaginal mucosa are obliterated by pushing the cervix forward. The catheter is initially inserted pointing upwards at an angle of about 30° to avoid entering the urethral meatus or fossa, and is then moved horizontally until it engages in the external os of the cervix.

The left hand squeezes the anterior vagina on to the caudally protruded external os of the cervix, thereby obliterating the fornix of the vagina and facilitating entry of the catheter into the cervix. Entry into the external os is accompanied by a characteristic ‘gritty’ sensation. The catheter is then introduced through the convoluted cervical canal by manipulation of the cervix through the rectal wall. One finger is placed over the internal os of the cervix, so that the tip of the catheter can be palpated as it emerges from the cervical canal As soon as the catheter has emerged, deposition of semen into the uterine body begins, In this way, semen should be equally distributed between the two uterine horns.

Penetration of the cervical canal of heifers is difficult at estrus, and virtually impossible at other stages of the estrous cycle; such animals are therefore often

beyond the capabilities of inexperienced inseminators.

However, the cervix of parous cattle can, with greater or lesser difficulty, be traversed at most stages of the estrous cycle and early pregnancy. It is therefore imperative that it is known whether an animal is likely to be pregnant before insemination is attempted, for abortion can be induced if an insemination catheter penetrates the fetal membranes or if infection is introduced into a pregnant uterus by poor insemination hygiene.

**AI OF SHEEP**

The sheep is less amenable to artificial insemination than is the cow, since estrus cannot readily be detected without the presence of rams, insemination is less straightforward and ovine semen is less easy to freeze than bovine semen. In Eastern Europe, South America and Australia, AI is widely used in sheep-breeding programs, but its use is much less widespread in Western Europe and North America, mainly due to the high costs of handling and inseminating sheep compared with the costs of natural service.

However, the most important limitation of the use of AI in sheep is in the method of insemination, since it is difficult to achieve an intrauterine insemination because the cervical canal of the ewe is so tortuous. Since intracervical AI results in both a lower conception rate and a lower number of lambs born per ewe than with natural service,

 A number of methods of insemination have been devised that try to circumvent the cervix. All of these attempt, with varying success. for insemination. The methods in widespread use

are:

●intravaginal

●intracervical

●laparoscopic intrauterine.

Vaginal insemination deposits semen into the cranial part of the vagina, without attempting to locate the cervix. This method requires large numbers of spermatozoa per insemination and is not really amenable for use with stored semen.,

so intravaginal insemination is best suited to use after estrus detection during the natural breeding season. The ideal timing of insemination is before ovulation, i.e. 12–18 hours after the onset of estrus.

Intracervical insemination is best achieved with the hindquarters of the ewe elevated. After cleaning of the perineum, the vagina is opened with a duck-billed speculum and the cervix located.

The insemination catheter is then inserted as far as possible into the cervix. The conception rate is highly correlated with the depth of penetration.

The method of direct intrauterine, laparoscopic insemination was developed to overcome many of the difficulties of intravaginal and intracervical insemination. In this method, ewes are restrained in a cradle and laparoscopy is performed close to the udder, whereupon the uterus is located and semen injected into the uterine lumen. The semen can be introduced to the uterus via a simple pipette or by the use of specialized Insemination equipment. Conception rates to frozen semen inseminated by this method are higher than for intracervical insemination.

Laparoscopic intrauterine insemination of ewes is the most significant development in sheep AI, for it circumvents many of the problems of the traditional methods.

**AI OF HORSES**

Unless palpation of the ovaries of the mare is undertaken to determine the timing of ovulation, AI needs to be performed every other day throughout estrus.

Insemination is best performed with the mare restrained in stanchion. After applying a tail bandage and cleaning the perineal area, a hand is inserted into the vagina and the cervix located. The index finger is inserted into the cervix and an insemination catheter passed through the vagina, then alongside the index finger and so into the uterus.

Sperm numbers required for acceptable fertility with frozen-thawed semen are of the order of 100–200million motile sperm.