Subject: Animal Husbandry

Topic: Artificial Insemination

Theme: Animal Improvement

Class: SS3

LEARNING OBJECTIVES

At the end of the class, students must be able to:

- Explain the term artificial insemination
- Outline the steps and methods used in inseminating animal
- Carry out artificial insemination practices

ARTIFICIAL INSEMINATION

This is the introduction of semen into the reproductive tract of the female by a method other than natural mating. The semen containing spermatozoa are carefully handled, diluted and stored in freezer at a temperature of 196^{o}c in liquid nitrogen until it is required for use.

For artificial insemination to succeed, the semen which has been stored is introduced into the female reproductive tract during breeding cycle (the heat period) so that fertilization will occur.

Artificial insemination is only possible in animals whose heat period is easily observable, because spermatozoa are only viable for few hours after introduction in to the female reproductive tract.

ADVANTAGES OF ARTIFICIAL INSEMINATION

i. It is easier and less expensive than natural mating since the farmer is saved the expense of maintaining a herd of male animals.

ii. It is easier and cheaper to import the semen of exotic breeds rather than the male animals themselves.

iii. It makes it possible to use the best male animal to a large extent.

iv. It is possible to service many females of different sizes leading to the production of many offspring.

DISADVANTAGES OF ARTIFICIAL INSEMINATION

i. It requires expertise which may not be readily available

ii. Difficulties in detecting heat in female animals may limit the success of artificial insemination.

iii. In-breeding effects may show up if only a few bulls are used in a particular environment.

iv. If the handling procedure is inadequate (i.e. improper timing of breeding in the oestrus cycle), the pregnancy rate may be very low.

Artificial insemination (AI) is the **process of collecting sperm cells from a male animal** and manually depositing them into the reproductive tract of a female.

Methods used in Artificial insemination:

- Semen collection

- Dilution of semen

- Storage of semen

- Inserting semen into the cervix of the cow

SEMEN COLLECTION METHODS AND EVALUATION

Various methods of collection of semen have been devised from time to time. The older unsatisfactory methods have been gradually replaced by the new modern techniques.

SEMEN COLLECTION METHODS AND EVALUATION

There are three common methods;

- Use of artificial vagina

- By Electro-stimulation method.

- By massaging the ampullae of the ductus differences through rectal wall.

- The ideal method of semen collection is use of artificial vagina which is safe for sire and the collector also.

Artificial Vagina Method

The artificial vagina has the following parts:

- A heavy hard rubber 2" lose, open at both ends with a nozzle for air and water in and outlet.

- Inner sleeve of rubber or rubber liner.

- The semen receiving cone or rubber cone.

- Semen collection tube made of glass or plastic graduated in CC and its fraction correct to 0.1 CC

Process

Insulating bag : Before using for semen collection, all the parts are washed thoroughly and sterilized properly, and assembled as artificial vagina, the rubber liner is inserted into the hose; inverting both ends back by folding back from either side opening, and fastening with rubber bands.

Now the space between the hard rubber hose and inner rubber liner forms a water tight compartment. The nozzle at one end of the hose can be fixed.

The water jacket of the Artificial vagina is filled with hot water at a temperature of 45°C (113°F) by opening the nozzle.

The graduated semen collection tube is fixed to the narrow end of the artificial vagina hose, and fastened by a rubber band.

The inner side of the rubber liner on the anterior side of the artificial vagina is lubricated with sterile jelly to a length of 3 to 4 inches.

Air is blown through the nozzle into the water jacket, to create pressure in it, and the same is exerted to the rubber linear, to simulate natural vagina.

The temperature of the artificial vagina is to be checked, at each collection, and it should simulate natural vagina at mounting time.

If it is too cold ejaculate may not be there after a thrust, or even if ejaculate is there; it may be contaminated with urine, and becomes unfit for use

Semen Collection Method

The cow or dummy is secured in service create. The artificial vagina assembled is held at 45° angle from the direction of penis, and the thrust is at that angle. The artificial vagina is held with the left hand by a right-handed person; and when the bull mounts the cow, the sheath of the bull will be graphed by the operator, directing the gland penis into the artificial vagina, and then the bull gives a thrust to ejaculate.

Dilution

The semen after collection is taken into the laboratory and examined under a microscope for foreign bodies, sperm density .i.e. number of sperm in 1 cc of semen, and sperm viability.

It is then diluted and extended with egg yolk, pasteurized or homogenized milk, citrate or glycerol up to twenty times the original volume.

The operator should evince care so as not to touch the exposed past of the penis. After the bull dismounts, the artificial vagina is taken off from penis and the air vent is opened to release the pressure from the jacket.

The water from the jacket is also drained by opening the nozzle. This allows the ejaculate to flow from the cone to the semen collection tube. The semen collection tube is detached from the cone, plugged with cotton wool, and taken to the laboratory for examination.

The rubber cone and the semen collection tube can be protected from external contamination or heat or higher, by covering with an insulation bag with zip.

Semen Storage

The discovery that bull semen could be successfully frozen and stored for indefinite periods has revolutionized AI in cattle.

In 1949, British scientists discovered that addition of glycerol to the semen extender improved resistance of sperm to freezing. Glycerol acts to remove water from the sperm cell prior to freezing and prevents the formation of cellular ice crystals which would damage the sperm.

There are two methods of freezing and storing semen: dry ice and alcohol (-100 degrees F) and liquid nitrogen (-320 degrees F).

Frozen semen can be stored indefinitely if proper temperature is maintained. Fresh, liquid semen can be successfully stored for 1 to 4 days at 40 degrees

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There-are different methods of insemination in different species of animals i.e.

-Speculum method,

- Vaginal method

- Recto vaginal method

Recto Vaginal Method

In cattle the safe and best method of insemination is “Recto vaginal method of insemination”.

Cow which is in heat is well controlled placing it in a Travis.

The inseminator will get ready by wearing a plastic apron, gumboots and gloves.

The semen straw after thawing (keeping the semen straw in warm water for a minute to convert the frozen semen into liquid and the sperms become motile) is loaded in a sterilized A.I. gun covered with a plastic sheath.

The artificial vagina method is most widely used today for the collection of bull semen.

The bull is allowed to mount a teaser cow and ejaculates when the penis is directed into the artificial vagina.

Spectrum Method

In this method, spectrum is placed in the vagina of the cow, which provides passage outside to the site of insemination, then inseminating tube is passed through the speculum and semen is deposited at the cervix.

Vaginal Method

Hand is passed through the vagina and the inseminating tube is guided by hand to the site of insemination and semen is deposited. Here there is a risk of contamination and injury of female genitalia.

The massage method: The ampulla (sack like enlargement of the duct) are massaged by the stripping technique, the second finger of the hand is run between the ampulla and the index and third fingers are placed on the outer side of the ampulla.

Electroejaculation (EE) is a **reliable method of obtaining a semen sample from sire males**. This method is usually used in young bulls, rams, and bucks not trained to the use of artificial vagina in order to obtain a semen sample for a breeding soundness examination. This technique involves restraining.

Insemination of a cow procedure

The operator carries out the following actions in the process of insemination:

- Washes and disinfects his/her hands

- Inserts one hand into a plastic glove which covers the arm,

up to the shoulder

- Lubricates the glove to facilitate easy entry of the hand into the rectum

- Collects a straw of semen from the flask

- Inserts the gloved hand into the rectum to locate the cervix

- Deposits semen into the cervix by the use of the catheter

Evaluation

i. Explain the term artificial insemination

ii. Outline the steps and methods of artificial insemination

Iii. Carry out artificial insemination process

Thank You
For Watching