INTRODUCTION TO ARTIFICIAL INSEMINATION

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In natural mating a bull mounts a cow & ejaculates his semen in her vagina
INTRODUCTION

In A.I. Semen is collected from a bull in an artificial vagina

Artificial Vagina

Semen is kept frozen until it is ready to use

When the cow is in heat, A. I. man inseminates semen into the reproductive tract using A.I. Pistolet

ON HEAT

STANDING TO BE MOUNTED

A.I. 12 hrs after STANDING TO BE MOUNTED
INTRODUCTION

Artificial vagina
Semen collection
spermatozoa
Evaluation & processing of semen
Semen straw
So... **DEFINITION** of A.I is...

**DEPOSITION OF SPERMATOZOA IN THE BODY OF THE REPRODUCTIVE TRACT USING A.I. PISTOLET**
Advantages:

No direct contact between bull & cow. This means:
- less disease transferred. (Prevention & control of venereal disease)
- Fewer injuries from mating
WHY USE A.I.

Advantages:

Semen from one bull can be used for inseminating many cows: This means: More calves from one bull
SEMEN HANDLING
WHY USE A.I.

Advantages:

You can take semen from a bull in one place .....and Transport it to cows in other place

(WIDE VARIETY OF BULL SEMEN – WORLDWIDE)
WHY USE A.I.

Advantages:

RAPID AND ECONOMIC IMPROVEMENT OF LIVESTOCK
WHY USE A.I.

Advantages:

You can produce the cross breeds you want
WHY USE A.I.

Advantages:

A.I. may be cheaper than keeping a herd bull

BEST BULL AT A FRACTION OF COSTS
WHY USE A.I.

Advantages:

CONTROLLED BREEDING REMOVE UNPRODUCTIVE BULLS
WHY USE A.I.

Advantages:

IDENTIFICATION AND RECORDING – CALVES AND COWS
DISADVANTAGES OF A.I.

ESTRUS DETECTION
DISADVANTAGES OF A.I.

AI RUIN BULL MARKET
DISADVANTAGES OF A.I.

LOWER CONCEPTION RATE
SEMEN COLLECTION

ARTIFICIAL VAGINA
SEMEN COLLECTION
PERCENTAGE MOTILE

• X 400

• Good Sample range 70 – 90 %
EQUILIBRATION

- At ambient temperature
- Cold handling cabinet + 4°C
- Cool room
RACKING
PREPARATION FOR FREEZING

• 1-2 mm above liquid nitrogen
• Vapour adjusted at 120 c/130 c (mini straw)
• 150 c/160 c (medium straw)
STROGE OF SEMEN (SEMEN BANK)
SEMEN HANDLING
EQUIPMENTS

- Liquid Nitrogen Tank
  - Mother tank
  - Field tank

- Water bath
  - Warms water to 35-37°C

- A.I. Kit

- Flask (with thermometer)

- Reproduction records
Flask with thermometer

Pistolet – barel, plunger, lock ring

Forcep

Scissor

Rectal GLove

Lubricant

Antiseptic

Tissue paper
A.I. EQUIPMENTS

- Liquid Nitrogen Container
- A.I. Kit
  1. Mini pistolette with sheaths
  2. Medium pistolette with sheath
  3. Straw with tweezers
  4. Clean, sharp scissors
  5. Arm length gloves
  6. Talcum powder
  7. Thawing flask & thermometer
  8. Paper towel
- Record book & semen inventory
LIQUID NITROGEN CONTAINER
LQUID NITROGEN CONTAINER CONSTRUCTION

cap
vacuum
outer case
Inner wall
vapour
Straws (inside goblet)
Liquid nitrogen absorbent material
bucket handle
goblet lifter
straw
Goblet

storage/hire/mother tank
Bucket(short)
Remove straw from goblet in the field tank

Use forceps to remove straws
PLACE STRAW IN 35°C - 37°C FOR 30 SECONDS.
DRY THE STRAW

REMOVE STRAW FROM THAWING SOLUTION & DRY
WITH TOWEL OR TISSUE PAPER
Handle straw only by the end to avoid temperature shock to the sperm
PLACE STRAW INTO INSEMINATION GUN

- Place with manufacturer end first
- Plunger automatically pushed out
- Hold straw vertically & tap laboratory end with scissors
  - air bubble goes far up toward the lab, plug
- Hold loaded gun vertically at eye level & with scissors make horizontal cut 90° to long axis through air bubbles
- At least 1 cm of the straw should protrude from the end of insemination gun
• Take the sheath & place over the barrel handle only split end - keep clean
• Holding the lock ring above tapered section, push the sheath on tapered section and through the lock ring until the end of the straw
• Twist the lock ring & push it to tapered section to lock the sheath into position
• Push the plunger in until is just visible at the end of the sheath
A.I. TECHNIQUES

RECTO-VAGINAL TECHNIQUE

In the recto-vaginal technique, an insemination instrument is inserted into the vagina and guided through the cervix by a gloved hand in the rectum.

This method of insemination is the most efficient in terms of results, labour and hygiene.
INSEMINATION OF THE COW

THE POINT OF THE GUN MUST BE INTRODUCED AT 30° BELOW THE HORIZONTAL TO PASS ALONG THE TOP OF THE VULVA.

This avoids the entrance to the urethra which lies on the floor of the vagina.
Gently move the gun forward until a distinct grittiness is felt indicating that the cervix has been reached.

If the gun is caught in a vaginal fold it may be necessary to push the cervix away to straightened out the fold.
CHECK GUN PLACEMENT

INDEX FINGER SHOULD NOT BE PLACED ON TOP OF SOFT WALL OF UTERUS.

the finger may push the sharp tip of the gun into the uterus and cause it to bleed.
UTERINE BODY DEPOSITION

DEPOSIT half TO two third OF SEMEN IN THE UTERINE BODY
MID-CERVICAL DEPOSITION

DEPOSIT THE REMAINING SEMEN IN THE MIDDLE OF CERVIX
DUAL PLACEMENT OF SEMEN

SPERM REACHES OVUM QUICKLY

SPERM REACHES OVUM SLOWLY

UTERINE BODY DEPOSITION

MID SERVICIAL DEPOSITION

SEMEN REPOSITED IN THE SERVIX SURVIVES LONGER. DUE TO ITS SLOW RELEASE FROM CERVIX, SPERM FERTILISES OVUM RELEASE LATER THAN NORMAL

SPERM FERTILISES OVUM THAT RELEASE EARLIER THAN NORMAL
Passing insemination gun too far through cervix reduce fertility: All semen to be in one horn, remove the chance of sperm migrating to both oviduct
INCORRECT SITE OF SEMEN DEPOSITION

The use of force to overcome difficulty in passing the inseminating gun through cervix is a frequent cause of laceration.
INCORRECT SITE OF SEMEN DEPOSITION

BLADDER INSEMINATION

WRONG ANGLE
POOR SEAL

- Gun tip
- Straw
- Sheath
- Plunger
- Manufacturer plug
- Oblique cut
- Poor seal
- Semen leakage
PHYSIOLOGY OF REPRODUCTION
Fig. 10 The organs of reproduction in the cow.
1.0 The Estrus Cycle

- When Heifer becomes sexually mature
- ovaries function in a cycle activity
- estrus period cycle 17-24 days (21 days)
Stage of heat

Estrus ➔ metestrus

Proestrus ↔ Diestrus
Stage of heat

★ Estrus (heat, sexual desire)

- period of sexual activity, female permit mating
- duration: 6 - 30 hrs (heifer 15, cows 18hrs)
Stage of heat

- **metestrus** (after heat)
  - day 1-5 of cycle
  - not permit mounting
  - 50% cow, 90% heifer - metestral bleeding
  - corpus luteum begins to develop
Stage of heat

- Diestrus (between heat)
  - day 5 - 19
  - complete lack of sexual desire
Stage of heat

 chá Proestrus

• day 19 - 21

• period for preparation of sexual activity
2.0 Fertilization

1. ovulation
   - occur 12 - 24 hrs after heat
   - LH breaks follicle to release ovum
2.0 Fertilization

2. ovum transport
- eggs caught by fimbriae of the infundibulum moves into fallopian tubes
- beating action of cilia in oviduct
- cilia movement remove excess cumulus
- muscular contraction of oviduct assists transport
2.0 Fertilization

3 sperm transport
- in uterus by cervical mucus
- reach oviduct 2 - 4 minutes
- rapid due to contraction of uterus & oviduct
2.0 Fertilization

4 capacitation

- 5 - 6 hrs in female tract
- remove membrane to expose enzymes of sperm which facilitates penetration of the eggs
2.0 Fertilization

5 penetration

- Enzyme allow sperm to reach nucleus
- Enzyme stimulate chemical reaction to dissolve layer of egg
2.0 Fertilization

6 fertilization

- male & female gamete unite to form zygote
- at 1/3 down of fallopian tubes
- 30 chromosome from ovum + 30 chromosome from sperm = 30 pairs chromosome in zygote
- wall of egg impervious to prevent polyspermy
3.0 Pregnancy

- Gestation period 280 days
- divided into 3 stages
3.0 Pregnancy

1. zygotic (0-day 12-14)
   - within 15 to 30 hrs zygote divides
   - day 4-5, reach uterus horn, 16-32 cells (morulla or blastulla)
   - Zona Pellucida disintegrate day 8
   - Blastocyst is formed, innercell - adult animal, trophoblast - placenta & embryonic membrane, fluid is pumped into cavity by action of trophoblast
3.0 Pregnancy

2 Embryonic (day 12 to 42-45)

- day 14, trophoblast attaches uterine wall
- elongation to form chorion
- uterine milk nourishes the embryo
- day 35, implantation begin, chorion invades endometrial curuncles to form cotyledon
- day 40, head, heart, limbs present
3.0 Pregnancy

3. Foetal (day 45-48 to calving)

- organs continue to differentiate
- rapid increase in weight in last 60 days
4.0 Parturition

Signs of approaching parturition

- udder enlarges 1 - 4 weeks before calving
- production of colustrum
- white stringly vagina mucus become profuse
- mucous plug in cervix liquefies
- cow moves to a quiet spot
- heifer become restless & lose appetite
- pelvic ligaments relax, makes tail set higher within 24 -48 hrs before calving
- vulva swells up - 6 times its normal size
4.0 Parturition

2 Stages of parturition

- Stage 1 - longitudinal & circular muscle of uterus contract to force fetal membrane through dilating cervix
- Stage 2 - contraction increase in frequency. Fetal membrane and feet approach vulva.
  Abdominal contraction push fetus out
- Stage 3 - Fetal membrane expelled within 8 hrs
fetus

ACTH

cotyledon & uterus

Prostaglandin

calf

parturition
decrease progestrone
destroy CL
THANK YOU