Class 5 : Breeding- importance of cross breeding. Signs of estrous cycle-Artificial insemination-merits and demerits.

CROSS BREEDING:
This is mating of animals from the two different established breeds
Eg.: Jersey (b) x Kangayam (c) : Jersey (c) x Holstein Friesian (b). The cross bred animals will exhibit the mixture of qualities of both the parents breeds. The progeny will improve in production performance and will exhibit marked disease resistance characteristics of the native breed and is well adapted to withstand local climatic condition. 62.5% of exotic blood & 37.5% local blood – ideal.

Jersey x local breed.- F₁. 50% ND(c) x J (75%) + 25% ND – F₁ 50 J 50 ND x 100 J (B) So cross breeding is also taken up to evolve new breed.

<table>
<thead>
<tr>
<th>Age at maturity</th>
<th>Economic traits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age at 1st calving : Age in days of the cow or buffalo on the date of 1st calving.</td>
<td></td>
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<tr>
<td>2. Lactation Length : Days in milk from the date of calving to the final drying off or cessation of milk (305 days)</td>
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<tr>
<td>3. Lactation Yield : Milk yield in Kgs from the date of calving to the date of drying (corrected to 305 days)</td>
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<td>4. Dry period : Days from the date of drying to the date of calving</td>
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<tr>
<td>5. Inter calving period : Days from the date or one calving to the date of next calving (1st, 2nd)</td>
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<tr>
<td>6. Peak yield : The highest daily yield in Kgs during lactation period</td>
<td></td>
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<tr>
<td>7. Average Fat% : Average Fat %</td>
<td></td>
</tr>
<tr>
<td>8. Service period : The interval between calving and subsequent service resulting in conception</td>
<td></td>
</tr>
<tr>
<td>9. Breeding efficiency : Measured as the No. Services/Conception</td>
<td></td>
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</table>
Breeding: Production of off springs / young ones

Scientific breeding is needed to get better performance in livestock – milk – meat – wool – Egg

Inbreeding: mating of closely related animals in the same breed such as brother – sister mating

ii. parents off spring mating- when the mates have common ancestors -with in 4 generations
this results in inbreeding

Advantage: A pure line of a particular breed can be maintained

Dis advantage: Loss of vigour, size, production fertility problems

Out breeding: Mating of unrelated animals in the same breed but with no common ancestor for a minimum of 4-6 generations.

Grading: Grading is a farm of out crossing, where in bulls of a distinct breed are bred on non descript cows from generation to generation, so that in course of time a populations essentially resembling the breed from which the Bulls are used.

Non descript cow x Jersey Bull

F₁ 50% ND + 50% Jersey x Jersey Bull

F₂ 25% ND + 750% Jersey x Jersey Bull

F₃ 12.5% ND + 87.5% Jersey x Jersey Bull

After 5-6 generations the off springs will have 96.9 & 98.3% of the hereditary characters of ‘Pure Breed’

So grading is a process by which a few ‘Pure Breed’ sires can rather quickly transform local variety of animals into a ‘Group’ resembling the pure breed.

Economic Traits

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Local</th>
<th>Exotic</th>
<th>Cross breed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at maturity</td>
<td>33 Months</td>
<td>15 months</td>
<td>18-24 months</td>
</tr>
<tr>
<td>Age at 1st calving</td>
<td>42 months</td>
<td>24 months</td>
<td>30 months</td>
</tr>
<tr>
<td>Lactation yield</td>
<td>12000 Kg.</td>
<td>3000-6000Kg.</td>
<td>2100-2400</td>
</tr>
</tbody>
</table>

Agrilearner App / Whatsapp Group:- 6201733962
Lactation period | 180-210 Days | 305 days | 240 – 270 days
Dry period | 90-120 days | 60 days | 75 days
Inter calving period | 18 months | 12-13 months | 13-14 months

**Oestrus cycle**

**Proestrum:** (2 days) Period of building up growth of graffian Follicle which helps for the nourishment of ovum fluid contains hormone called ‘oestrogen’. It causes changes in uterus, blood supply.

**Oestrum:** (1 day) During which the female is ready to receive male.

**Metoestrum :** (4 days) Implantation of the embryo takes place C.L. takes place. Prevents the growth of graffian follicle thereby arrests oestrus cycle.

**Diestrum :** (14 days) Further development of uterus takes place. If the animal has not conceived involution of uterus take place.

**Symptoms of Heat:**

**OPTIMUM TIME FOR CROSSING**

Egg/ova from ovary – released about 12-18 hours after the onset of symptoms of heat. Ovum will survive up to 16 hours after the release. Sperm live for 12-14 hours.

Morning signs of heat are exhibited – AI done in the evening : 12 hours delay.

**Proestrum:** This marks the animal – coming in heat.

GF – Ovary – growing – increased
secretion of follicular fluid – Estradiol - increase No.of Cilia – increased Vascularity of uterus – increase in thickness of Epithelial wall of vagina.

The vaginal wall adjustment is well filled to prevent possible damage to the wall when coitus occurs.

**Oestrum**: This is the period of desire.

‘Graffian Follicle’ – Ripe or very turgid

This period is brought to an end by the rupture of the follicle (or) ovulation. Vulva becomes swollen. Vulva and Vagina – congested

**Met Oestrum**: This is the period when the organ returns to normal non congested condition.

During this period the cavity of the GF from which ovum has been expelled becomes recognized and forms a new structure known as C.L.

1. It prevents the maturation of further graffian follicle
2. It is essential for the implantation of the fertilized egg.
3. It is intimately concerned which the development of mammary gland.

**Diestrum**: Longest part of estrus cycle

Implantation – uterine milk – for the nourishment of the embryo prior to implantation. Absence of pregnancy – returns to normal and thus the cycle continues.

**ARTIFICIAL INSEMINATION**.

Artificial insemination is the deposition of male reproductive cells (sperm) in the female tract by mechanical means rather than “Natural Service”

**ADVANTAGES**:

1. Increases usefulness of superior sires to extra ordinary degree.
2. Services of Superior Sires are greatly extended.

If the sires are used for Natural Service the animal can serve only 50-60 animals/year but under Artificial Insemination the amount of semen secreted by the animal can be used to satisfy the requirements of 1000 animals per year

**DILUTION OF SEMEN**

Average of Sperm/mL : 1000 million
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total volume of semen/2 ejaculate</td>
<td>6 mL</td>
</tr>
<tr>
<td>No. of motile Sperms</td>
<td>90 %</td>
</tr>
<tr>
<td>Total number of motile sperms</td>
<td>5400 million</td>
</tr>
<tr>
<td>Expected wastage during processing (i.e.) filling and sealing</td>
<td>10 %</td>
</tr>
<tr>
<td>Net no. of sperms available</td>
<td>5400-540= 4860</td>
</tr>
<tr>
<td>Minimum No. of sperms required / dose</td>
<td>30 Million</td>
</tr>
<tr>
<td>@ this rate no. of doses that could be prepared</td>
<td>4860 /30 = 160 doses</td>
</tr>
<tr>
<td>So, total no. of doses that can be prepared / week</td>
<td>160 x 52 weeks = 8320 doses.</td>
</tr>
<tr>
<td>Frozen semen required / dose</td>
<td>1 mL</td>
</tr>
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</table>

3. No need to maintain Breeding Bull. The frozen semen can be stored in the Liquid Nitrogen-196°C.

4. Semen can be quickly and easily transported by air to different continents.

5. Spreading of diseases is absolutely NIL.

6. Overcomes the difficulty of size and weight between Dam and Sire.

7. Increase the rate of Conception because in the artificial insemination the semen is being deposited in the mid cervix.

8. Outstanding animals located apart can be mated.

9. Helps in better record keeping.

10. Old and heavy sizes bulls, injured / disabled sires can be used.

**MERITS:**

1. Semen can be stored in the frozen state, so progeny can be obtained even after the transfer, WHY even after death of bull-15-20 years. (atomic, radioactive, X-ray unit)

2. Semen is expanded and no. of animal can be crossed.

3. Frozen semen can be transported to destination once in a month from the semen bank.

**DISADVANTAGES:**

1. Some bulls semen may not freeze well.
2. If inferior bull semen is frozen and used – Extensive damage is caused.
3. Maintenance of frozen semen bank is not economical for a small area of operation.
4. Requires well trained technical personnel’s and special equipments and hygienic measures are to adapted in preparation.
5. Improper cleaning of instruments and unsanitary condition may lead to lower fertility and may be nucleus for the spreading of diseases.