

Breeding Systems

- A variety of breeding systems depending on the production goals of the operation.
- Breeding goals may be;
 - Lifetime Productivity – focuses on survival, fertility and prolificacy, udder characteristics and milk production, growth rate and ability to maintain body condition
- A producer must be careful when selecting a breeding system.
- A breeding system can cause a rapid improvement within a group of animals or wreck a production system.

Breeding Systems

- Purebreeding
- Inbreeding/Linebreeding
- Outcrossing
- Cross Breeding

Cross breeding

- Crossbreeding is the mating of animals of different breeds.
- Crossbreeding is used in order to take advantage of the different and complementary strong points of two or more breeds and to utilize hybrid vigor.
- An offspring born to a mating of two different breeds is called a **hybrid**.
- The advantages of producing hybrids are;
 - grow faster
 - mature quicker
 - and utilize the superior traits of each breed
- These advantages are referred to as **hybrid vigor** or **heterosis**.

Advantages of crossbreeding

1. Weaknesses can be improved or eliminated by breeding an animal “strong” in a particular trait to an animal that is considered to be lacking or “weak” in that trait;
2. The average productivity of the offspring is increased over either parent;
3. Crossbreds are more fertile than their purebred parents;
4. Crossbreds wean heavier offspring than purebreds; and
5. Crossbreds are more vigorous than purebreds.

- Several crossbreeding methods are in use
- Crossbreeding is the most popular breeding system practiced by commercial livestock operations.
- However, some methods work better for certain species than others.

Different breeding systems;

1. Grading up,
2. Terminal crossing
3. Rotational crossing.

Grading up

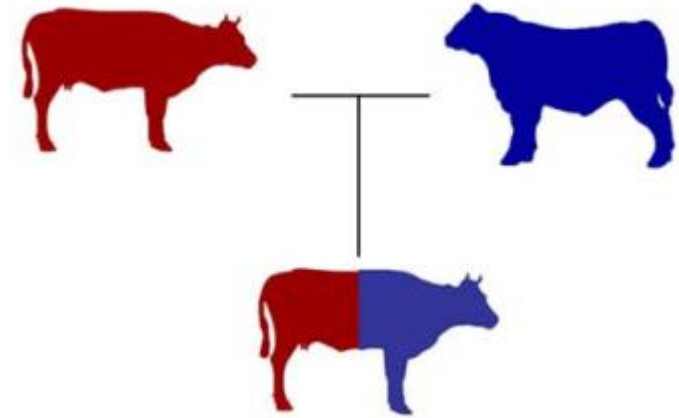
- “Grading up” is the gradual improvement of a breed (local) through repeated matings with an exotic (improver sire).
- The purpose of grading-up is to improve quality, develop uniformity, and increase performance in the offspring.
- If local female used in the grading up process, it will become a member of exotic breed (improver breed) after four matings.
- The offspring after matings are more genetically similar to the purebred sire
- Grading up of local breeds to 100% improver is rarely desirable.

Terminal crossing

- Terminal crossing is the simplest form of crossbreeding.
- The continuous production of F1 stock known as terminal crossing.
- In this system, all offspring are marketed and replacement heifers are purchased from outside.
- Replacement heifers can be purchased and bred to terminal or high growth breed bulls.
- Terminal crossing can be done either using two breeds (two breed terminal) or three breeds (three breed terminal).

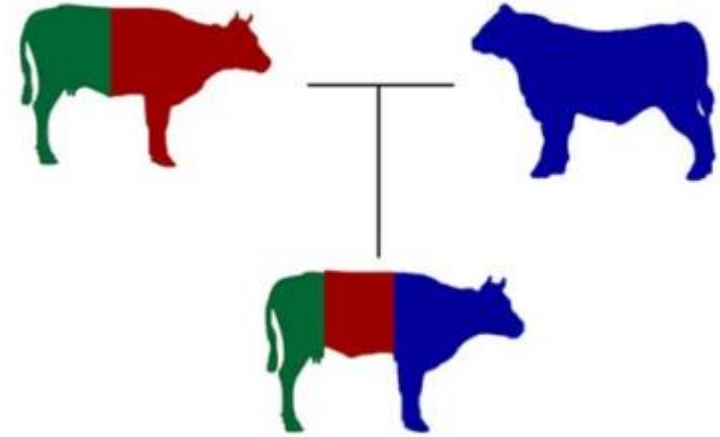
Two-breed terminal crossing

- The system crosses straight bred females with the bulls from another breed and the resulting offspring known as F1.
- All of the offspring from this initial cross are marketed, and replacement heifers are purchased.
- The progeny produced are uniform
- This is not a desirable system because it does not realize any heterosis in the cow since she is straight bred.



Three-breed terminal crossing

- The three-breed terminal system is identical to the two-breed terminal system except that the females are crossbred females (AxB) mated to sires of another breed (T).
- It produces maximum hybrid vigor in the cow and calf.
- Hybrid vigor is realized for both growth rate and maternal ability.



Cross breeding for local breeds

- In cross breeding program, it is important to retain advantages of local breeds;
 - Adaptation to harsh local environment
 - Resistant to diseases
 - higher prolificacy
- Improved breed through cross breeding program has potential for higher production
- To obtain advantages of cross bred animals, it is important to improve management practices

Cross breeding for local breeds

- Genetic gains from cross-breeding come from two sources.
 1. Superior adaptation of local breeds
 2. Better productivity of exotic breed (improver breed)
- The gain is additive – adding some of the characteristics from one breed to another.
- It is hard to maintain hybrid vigour when the offspring themselves go on to mate.

Pure Breeding

- Pure-breeding is the mating of males and females of the same breed or type.
- A purebred flock can be managed as a single flock because all animals are of the same breed.
- Purebreds normally bring a premium for their offspring because of their superior genetics.
- The goal of purebred production is to provide superior genetics to the commercial industry.
- Purebreds are animals with extensive pedigrees that can be traced back through one breed.

Inbreeding

- Mating closely related animals (for example, parent and offspring, full brother and sister or half brother and sister) is inbreeding.

Inbreeding - advantages

- The two parents have closely related genetics and may capitalize on their superior traits.
- Development of highly productive inbred lines of domestic livestock is possible.

Inbreeding - disadvantages

- For example, a producer might try inbreeding to increase milk production.
- In theory, this may seem like a brilliant idea, but if the milk production trait is not expressed by the offspring, the results would be a failure.
- The most obvious effects of inbreeding are;
 - poorer reproductive efficiency
 - Higher mortality rates
 - lower growth rates and
 - higher frequency of hereditary abnormalities.

Outcrossing

- The mating of an individual to another in the same breed that is not related to it.
- This is the most widely used mating system by both commercial and seedstock producers.
- Outcrossing produces a higher level of heterozygosity.
- Outcrossing allows a producer to introduce new genetics while staying within the same breed.