NORTH WEST DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT AGRICULTURAL DEVELOPEMNT SERVICES

TITLE: BREEDING SYSTEMS IN BEEF CATTLE

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Introduction

- Animal breeding is a division of animal science that addresses the evaluation of the genetic value of domestic livestock.
- Animal Breeding is simply the application of genetic principles to enhance or improve the production efficiency in farm animals.
- A breed is a group of domestic animals with a homogeneous appearance, behavior, and other characteristics that distinguish it from other animals.

Types of breeding System

- Breeding systems can be divided into two basic groups: straight breeding and cross breeding. Straight breeding is the mating of animals of the same breed. Crossbreeding is the mating of animals of different breeds.
- Straight-breeding (Pure-breeding) is the mating of males and females of the same breed.
- The goal of purebred production is to provide superior genetics to the commercial beef industry.

Inbreeding system

- Inbreeding - Mating of animals that are closely related genetically (for example, parent and offspring, full brother and sister or half brother and sister).
- Technically, inbreeding is defined as the mating of animals more closely related than the average relationship within the breed or population concerned.
- Development of highly productive inbred lines of domestic livestock is possible. Inbreeding will be useful to identify and cull undesirable recessive genes.

Effects of Inbreeding

- Although occasional high performance animals are produced, inbreeding generally results in an overall reduction in performance.•
- Effects of inbreeding are poorer reproductive efficiency including higher mortality rates, lower growth rates and a higher frequency of hereditary abnormalities.
- Increased inbreeding is accompanied by reduced fertility, slower growth rates, and greater susceptibility to disease. As a result, producers must try to avoid mating related animals.

Types of Inbreeding System

- Line breeding is the mating of not too closely related animals together, if you were to draw a straight line from the original relative, both would be linked to the line. The animals might be distant cousins or share a relative three or four generations back.
- Close breeding is the most intensive form of inbreeding because the two animals share more than one close relative. Include mating half brothers and half sisters or even brothers and sisters. It is the most risky of the inbreeding systems. Inferior genetics and even deformities

Cont.

- Inbreeding increases both homozygosity and capacity to stamp their characteristics on the offspring).
- Undesirable traits appear with increasing level or frequency as the intensity of inbreeding increases.
- Inbreeding• Full brother-sister mating 25%• Half brother sister mating 12.5%• Father-daughter 25%• Granddam-grandson 12.5%.

Outcrossing

- The mating of an individual to another in the same breed that is not related. Outcrossing allows a producer to introduce new genetics while staying within the same breed.
- This is the most widely used mating system by both commercial and seed stock producers.
- A mating can be considered outcrossing system if the individuals involved do not have a common ancestor in the past generations (about four to six generations).

Outcrossing

- The genetic effects of outcrossing are opposite to those of inbreeding. Whereas inbreeding increases homozygosity (inherit same forms of a particular gene), outbreeding system tends to make more pairs of genes heterozygous (inherit different forms of a particular gene).

Crossbreeding

- Mating of animals of two or more different breeds is known as crossbreeding system. Crossbreeding is mainly used for commercial production.
- 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. Properly utilize the strong points of different breeds. A well designed crossbreeding system utilizes these breed differences in a strategic manner
- to improve the efficiency of meat, wool, and milk production over purebreeding.

Crossbreeding

- All breeds have strengths and weaknesses.
- No one breed excels in all relevant traits. Thus, production can be increased when mating systems place breeds to maximize their strengths and minimize their weaknesses.
- Heterosis or hybrid vigor is an advantage in performance of crossbreds compared to the average performance of the parental breeds

Heterosis

- Improvement in performance observed over the average of two breeds when they are mated.

  Example: Breed A = 230 kg. Weaning weight.

  Breed B = 188 kg. Weaning weight.

Average performance of Parents = 209

Crossbred calves = 220

% Heterosis = [(220-209)/209]x100 = 5.3%

- Heterosis tends to be highest in traits with low to moderate heritability (example fertility, pre wean growth).

Breed complementarity

- Breeds were developed in specific regions with certain characteristics were fixed.
- Combining breeds that differ in their strengths allows one to take advantage of these characteristics.

- For example a breed that is high in maternal traits may lack muscling or carcass quality, while another breed excels in these traits.
- To take advantage of breed complementation, breeds with good maternal ability and milk production would be used in a dam line and be mated to large framed, fast growing terminal sire breeds.

Effective Crossbreeding System

- Match cows to environmental resources (feed)
- Meets the end product target
- Number of breeding pastures?
- Will replacement heifers be raised or purchased? (Health & cost issues)
- Are you willing to keep records
- Developing a plan and choosing a system and breeds is an important first step towards capturing the benefits of crossbreeding in your herd.

Conclusion

- Farmer must pick the breeding system that best fits the goals of his or her operation.
- This is determined by how the producer plans to market the offspring.
- Typically a producer uses either the straight breeding or crossbreeding system
- Many crossbreeding systems are difficult to accomplish in a small herd.

- Choice of a system should also depend on the level of management commitment you are willing to make and the size of your herd.
- Similarly, selection of breeds depends on various factors, including feed resources as well as availability of breeding stock.

Thank you

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