

# Unit B: Understanding Animal Reproduction

## Lesson 2: Understanding Natural Animal Reproduction

# Terms

- Anestrus
- Artificial insemination
- Breed
- Breeding
- Closebreeding
- Copulation
- Crossbreeding
- Diestrus
- Estrous cycle
- Estrus
- Fertilization
- Gestation
- Grade animal
- Grading up
- Heterosis
- Hybrid vigor
- Inbreeding
- Insemination
- Lactation

# Terms cont.

- Linebreeding
- Metestrus
- Natural insemination
- Outcrossing
- Ovulation
- Parturition
- Proestrus
- Progesterone
- Puberty
- Purebred
- Reproduction
- Reproductive efficiency
- Semen
- Straightbreeding
- Zygote

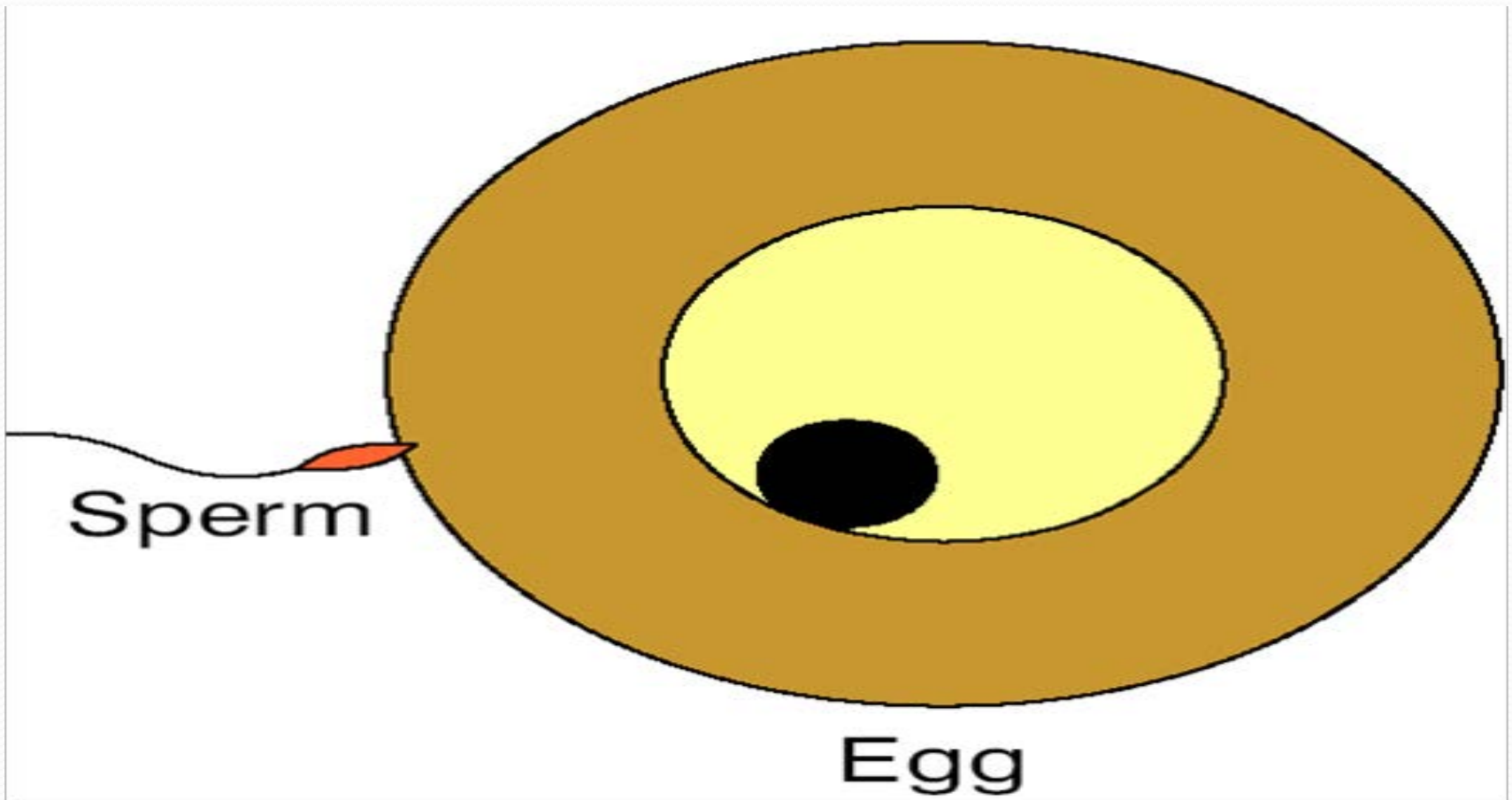
# What are some of the basics of animal reproduction?

- ***Reproduction*** is the process by which offspring are produced.
- The offspring are of the same species and have traits similar to their parents.
- In learning about animal reproduction, there are several basic concepts that a producer must understand.

- The placing of sperm in the reproductive tract of the female is called **insemination**.
- **Natural insemination** is the process of the male depositing **semen**, the fluid containing sperm, in the reproductive tract of the female. This occurs during copulation or mating.
- **Copulation** is the sexual union of a male and female animal.
- **Artificial insemination** involves a technician collecting semen from a male and placing it in the reproductive tract of a female.

- **Breeding** is promoting animal reproduction so the desired offspring result. A **breed** is a group of animals of the same species that share common traits.
- **Reproductive efficiency** is the timely and prolific replacement of a species. This is the difference between success and failure in animal production.

# Basic Animal Reproduction



# What happens in the various phases of the estrous cycle?

- The *estrous cycle* is the time between periods of estrus.
- *Anestrus* is the absence of cycling. Anestrus is often related to the number of hours of light in a day.



- **Estrus**, also know as heat, is the period when the female is receptive to the male and will stand for mating. The length of estrus varies between species.
- **Ovulation** is when a mature ovum is released by the ovary. The number of eggs ovulated varies between species.

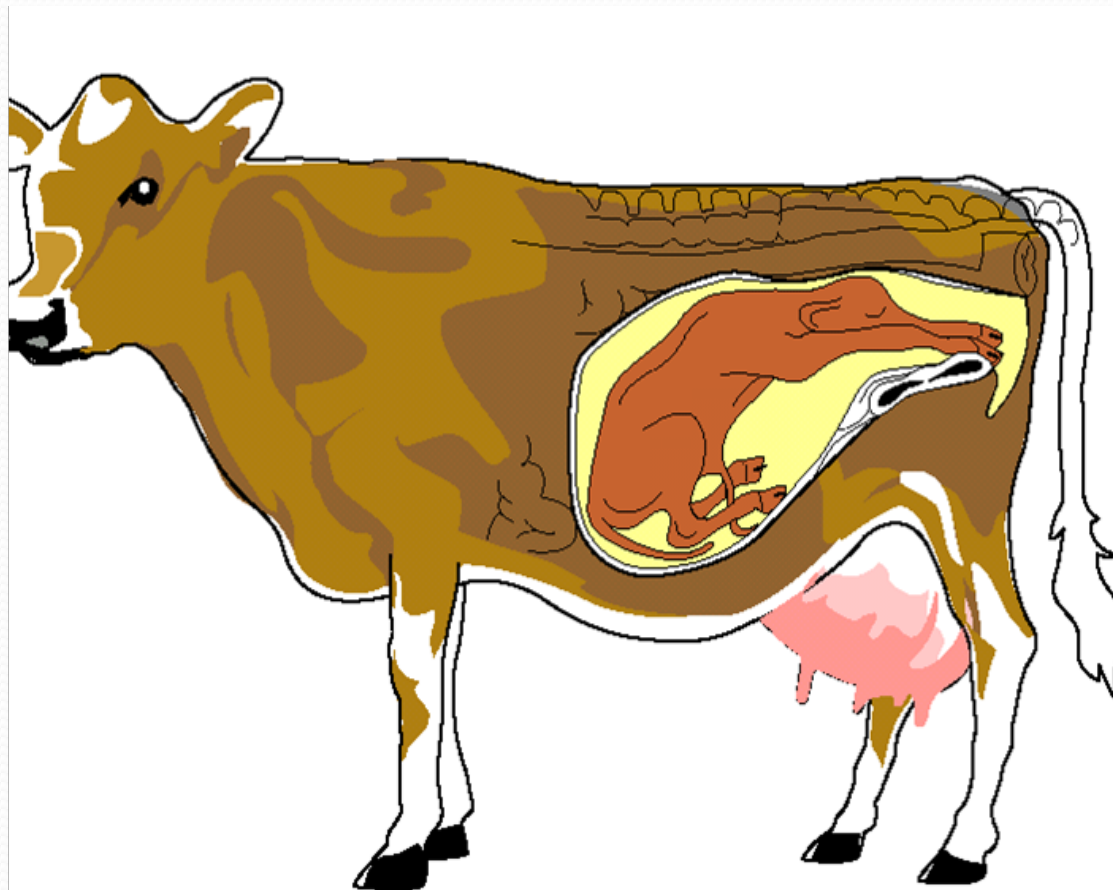
- **Metestrus**—The period following estrus.
- **Diestrus** –the period in the cycle in which the system assumes pregnancy.
- A fully functional corpus luteum releases high levels of progesterone.  
**Progesterone** is the hormone that maintains pregnancy. This is when the uterus is prepared for pregnancy.
- **Proestrus** begins with the regression of the corpus luteum and a drop in the hormone progesterone.

What are the phases of reproductive development in the life of an animal?

- **Puberty** is the time at which animals reach a level of sexual development that makes them capable of reproduction. Puberty in female animals is the age of the first estrus with ovulation. Puberty in males is the first ejaculate with fertile sperm.

- **Fertilization** is the union of a sperm and an ovum or egg. The sperm penetrates the ovum and pairs of genetic material are formed. The fertilized ovum is called a **zygote**.
- **Gestation** is the period of pregnancy. It begins with conception and lasts until parturition or birth. The length of gestation varies between species.
- **Parturition** is the process of giving birth.
- **Lactation** is the production of milk. Hormones that trigger the onset of lactation also play an important role in parturition.

# Gestation Phase of Reproductive Development



What are some of the common breeding systems used in livestock production?

- **Straightbreeding** is mating animals of the same breed. There are several variations of this system. Some of the most common are:
  - Purebred Breeding—A **purebred** is an animal of a breed in which both parents of the animal must have been purebred.
  - **Inbreeding** is the mating of related animals. This increases the genetic purity of the stock produced.

# Inbreeding Types

A represents the male. B represents the female.

- **Closebreeding** is the most intensive form of inbreeding, in which the animals being mated are very closely related and can be traced back to more than one common ancestor.

First Mating	A × B
First Generation	$\frac{1}{2}A$ $\frac{1}{2}B$

Second Mating	A × $\frac{1}{2}A$ $\frac{1}{2}B$
Second Generation	$\frac{3}{4}A$ $\frac{1}{4}B$

The offspring in the second generation have received  $\frac{3}{4}$  (75%) of their genetic inheritance from Sire A because he appears closer in the pedigree to the offspring than he does in linebreeding. The offspring have received only  $\frac{1}{4}$  (25%) of their genetic inheritance from Female B.



# Inbreeding Types

A represents the male. B and C represent the females.

- **Linebreeding** refers to mating animals that are more distantly related and can be traced back to one common ancestor.

First Matings	A × B	A × C
First Generation	$\frac{1}{2}A$ $\frac{1}{2}B$	$\frac{1}{2}A$ $\frac{1}{2}C$

Second Matings	$\frac{1}{2}A$ $\frac{1}{2}B$ × $\frac{1}{2}A$ $\frac{1}{2}C$
Second Generation	$\frac{1}{2}A$ $\frac{1}{4}B$ $\frac{1}{4}C$

The offspring in the second generation have received  $\frac{1}{2}$  (50%) of their genetic inheritance from Sire A because he appears twice in their pedigree. They have received only  $\frac{1}{4}$  (25%) of their genetic inheritance from each of Females B and C.



# Grading Up

- ▣ **Grading up** is the mating of purebred sires to grade females.
- ▣ A **grade animal** is any animal not eligible for registry as a purebred.
- ▣ This is done as less expensive way to improve the quality of animals on a farm or ranch.

$A_1$ ,  $A_2$ , and  $A_3$  represent purebred sires of a given breed.

$G$  represents a grade female.

First Matings  $A_1 \times G$

First Generation  $\frac{1}{2}A_1 \frac{1}{2}G$  (50% purebred, 50% grade)

Second Matings  $A_2 \times \frac{1}{2}A_1 \frac{1}{2}G$

Second Generation  $\frac{1}{2}A_2 \frac{1}{4}A_1 \frac{1}{4}G$  (75% purebred, 25% grade)

Third Matings  $A_3 \times \frac{1}{2}A_2 \frac{1}{4}A_1 \frac{1}{4}G$

Third Generation  $\frac{1}{2}A_3 \frac{1}{4}A_2 \frac{1}{8}A_1 \frac{1}{8}G$  (87.5% purebred, 12.5% grade)

# Cross Breeding

- ***Crossbreeding*** is the mating of two animals from different breeds.
- The resulting offspring is a hybrid. This generally results in improved traits in the offspring.
- Superior traits that result from crossbreeding are called **hybrid vigor** or **heterosis**.

# Review/Summary

- What are the four periods of the estrous cycle?
- What are important four factors when incubating eggs?
- What are three of the breeding systems discussed in this lesson?