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Horse breeding

Horse breeding is reproduction in horses, and particularly the human-directed process of selective breeding of animals, particularly purebred horses of a given breed. Planned matings can be used to produce specifically desired characteristics in domesticated horses. Furthermore, modern breeding management and technologies can increase the rate of conception, a healthy pregnancy, and successful foaling.

The male parent of a horse, a stallion, is commonly known as the *sire* and the female parent, the mare, is called the *dam*. Both are genetically important, as each parent genes can be existent with a 50% probability in the foal. Contrary to popular misuse, "colt" refers to a young male horse only; "filly" is a young female.

Horse Breeds:

1. **Arabian**:
    - One of the oldest and most famous breeds.
    - Originated from the Arabian Peninsula.
    - Known for a distinctive head shape, high-set tail, and spirited nature.
    - Excel in endurance competitions, but also used in dressage and show jumping.
2. **Thoroughbred**:
    - Originated in England in the 18th century.
    - Tall, elegant horses bred for racing.
    - Long, lean legs and a powerful stride.
    - Used in eventing and polo.

3. **Quarter Horse**:
    - Developed in the United States in the 17th century.
    - Known for speed and versatility, popular in rodeo events.
    - Used in western pleasure riding and trail riding.
4. **Appaloosa**:
    - Originated in the United States with the Nez Perce tribe.
    - Distinguished by spotted coat patterns.
    - Used in western pleasure riding, trail riding, and barrel racing.
5. **Andalusian**:
    - Known as the Pure Spanish Horse, originating in Spain.
    - Elegant appearance with a muscular build.
    - Used in dressage, jumping, and driving.
6. **Paint Horse**:
    - Originated in the United States in the 20th century.
    - Recognized for colorful coat patterns.
    - Used in western pleasure riding, trail riding, and team roping.
7. **Clydesdale**:
    - Originated in Scotland, known for massive size and strength.
    - Used in parades and heavy work like logging.
8. **Mustang**:
    - Descended from horses brought by Spanish explorers to North America.
    - Known for hardiness, endurance, and independence.
    - Used in trail riding and endurance racing.

9. **Shetland Pony**:
    - Originated in the Shetland Islands of Scotland.
    - Small size and hardiness make them ideal as children's ponies and for driving.

10. **Friesian**:

- Originated in the Netherlands.
- Known for dramatic appearance with a long, thick mane and black coat.
- Used in dressage, driving, and pleasure riding.

				
Arabian	**Thoroughbred**	**Quarter Horse**	**Appaloosa**	**Andalusian**
				
Paint Horse	**Clydesdale**	**Mustang**	**Shetland Pony**	**Friesian**

Maturity sexual in Mares and Stallions:

- **The Mare**

Fillies usually attain sexual maturity at 12 to 15 months of age, but some reach puberty as early as 9 to 10 months and others as late as 18 months. Estrus, or heat, which is the period of the reproductive cycle when the mare ovulates and can conceive, is governed by rather complex hormonal effects.

- **The Stallion**

Although most stallions begin to produce sperm as early as 12 to 14 months, most are at least 15 months or older before they can successfully breed. Few stallions are used at stud before two years of age and most stallions acquire full reproductive capacity at around three years of age.

This is not to say that a younger stallion is incapable of breeding earlier than an age of 12 months, and care must be taken to separate young stallions from fillies or mares before they reach sexual maturity to prevent unwanted pregnancies.

Estrous cycle of the mare:

The estrous cycle in mares regulates their reproductive readiness and prepares them for conception. It generally occurs during spring and summer, triggered by increasing daylight, and lasts 19-22 days, with an average of 21 days. As daylight decreases, mares enter anestrus (reproductive inactivity), which prevents winter pregnancies and ensures foaling occurs in favorable conditions.

Phases of the Cycle

1. Estrus (Follicular Phase):
    - Duration: 5-7 days.
    - Mare is sexually receptive.
    - Estrogen secretion increases, and ovulation occurs in the final 24-48 hours.
2. Diestrus (Luteal Phase):
    - Duration: 14-15 days.
    - Mare is not receptive.
    - Progesterone is secreted by the corpus luteum to maintain non-receptive behavior.

On average, 16% of mares may have double ovulations, increasing the chance of twins without affecting the cycle duration. Hormonal changes throughout the cycle prepare or prevent conception effectively.

The equine estrous cycle and reproductive hormones play a critical role in regulating the mare's reproductive system. Here's a summary of the key hormones involved:

1. **Melatonin**:
    - Secreted by the pineal gland
    - It decreases with increased day length, allowing the hypothalamus to release GnRH.
2. **GnRH (Gonadotropin-releasing hormone)**:
    - Released by the hypothalamus
    - It triggers the pituitary gland to release LH and FSH.
3. **LH (Luteinizing Hormone)**:
    - Peaks about 2 days following ovulation.
    - Stimulates follicle maturation and estrogen production.
    - Decreases slowly after ovulation and remains low during diestrus.
4. **FSH (Follicle-stimulating Hormone)**:
    - Initiates the development of ovarian follicles.
    - Peaks about 10 days before ovulation and is regulated by inhibin.
    - Multiple FSH waves can occur in a single estrous cycle.
5. **Estrogen**:
    - Produced by the developing follicle.
    - Induces behavioral changes in the mare, making her more receptive to mating.
    - Prepares the cervix, uterus, and vagina for conception.
    - Peaks 1–2 days before ovulation.
6. **Inhibin**:
    - Released by the mature follicle just before ovulation.
    - Inhibits FSH secretion to prevent the growth of immature follicles.

7. **Progesterone**:
    - Maintains pregnancy if conception occurs.
    - Prevents estrus behavior and prepares the uterus for implantation.
    - Levels rise during diestrus and decrease when the corpus luteum degenerates.
8. **Prostaglandin**:
    - Released by the endometrium 13–15 days post-ovulation.
    - Induces luteolysis, causing the corpus luteum to shrink and progesterone levels to drop.
9. **ECG (Equine Chorionic Gonadotropin) / PMSG (Pregnant Mare Serum Gonadotropin)**:
    - Secreted by endometrial cups after conception.
    - Peaks around 60 days and decreases after about 120 days of gestation.
    - Stimulates fetal gonad growth.
10. **Prolactin**:
    - Stimulates milk production.
11. **Oxytocin**:
    - Facilitates uterine contractions during labor and milk letdown after birth.

These hormones work in concert to regulate the estrous cycle, support pregnancy, and prepare the mare for foaling and postpartum lactation.

Breeding and Gestation in Horses:

1. **Breeding Timing**:
    - In the wild, horses typically breed and foal in mid to late spring. For domesticated horses, especially those bred for competitive purposes like racing, it is ideal for them to be born as close to January 1 (Northern Hemisphere) or August 1 (Southern Hemisphere) as possible to gain a size and maturity advantage when competing.
    - Barn managers may use artificial lighting to simulate longer days, encouraging mares to come into estrus earlier than they would in the wild.
2. **Mating Behavior**:
    - A stallion determines a mare's readiness by approaching with a high head, nicker, nip, and by sniffing her urine.
    - During copulation, the stallion usually ejaculates after 6 to 8 pelvic thrusts.
3. **Gestation Process**:
    - Once fertilized, the oocyte remains in the oviduct for about 5.5 days before descending into the uterus. The embryo is referred to as a blastocyst by the time it enters the uterus.
    - The gestation period lasts approximately 11 months (320–370 days).
    - Early in pregnancy, the conceptus is mobile and settles in the uterus around day 16 (fixation).
    - Ultrasound can detect the embryo and heartbeat by days 21 and 23, respectively.
    - By day 70, the sex of the fetus can be determined using ultrasound.
    - The most significant growth happens in the last 3 months of pregnancy, contributing to 60% of the fetal growth.
    - Colts are generally carried for about 4 days longer than fillies.

Health Management:

- **Vaccinations**: Mares receive vaccinations against diseases like Rhinopneumonitis (EHV-1) to prevent miscarriage and other conditions prevalent in the region. Pre-foaling vaccines are recommended 4-6 weeks before foaling to enhance the immunoglobulin content in the colostrum.
- **Deworming**: Deworming is done a few weeks prior to foaling as the mare can be a primary source of parasites for the foal.
- **Exercise**: Mares can be ridden or driven during most of their pregnancy but exercise should be moderated, particularly in the later stages when the mare is heavily in foal. Exercise in excessively high temperatures should be avoided due to the risk to pregnancy maintenance.

Nutrition:

- **Early Pregnancy**: Nutritional requirements don't increase significantly in the early months since fetal growth is slow. Mares may receive supplemental vitamins and minerals, especially if forage quality is poor.
- **Late Pregnancy**: The last 3-4 months of gestation see rapid fetal growth, significantly increasing the mare's nutritional requirements. Energy needs are similar to those of a horse in full training during this period. Trace minerals like copper are particularly important during the tenth month for proper skeletal formation.
- **Feeding**: Pregnant and lactating mares require a balanced diet with increased protein, calories from extra fat, and essential vitamins and minerals. Overfeeding, especially in early gestation, should be avoided to prevent complications during foaling or issues for the foal.

Foaling:

- Mares due to foal are often separated from other horses to monitor them more closely. Foaling stalls are used to protect the mare and foal, particularly in colder climates or major breeding farms.
- Mares prefer to foal alone, usually at night or early in the morning. Labor is often quick, typically lasting no more than 30 minutes with full delivery taking about 15-20 minutes.
- After foaling, mares lick their foals to clean them and aid in blood circulation. The foal should stand and nurse within the first hour. The foal's navel is dipped in antiseptic to prevent infection, and an enema may be given if needed.
- A veterinarian should be on call, and first aid supplies should be prepared in case of complications. The placenta must be passed promptly; a retained placenta can cause serious issues. Some mares may eat the placenta instinctively.

Foal Care:

- Foals develop rapidly and will begin eating hay, grass, and grain alongside the mare around 4 weeks old. By 10-12 weeks, they require more nutrition than the mare's milk can provide.
- Foals are typically weaned at 4-8 months of age, although in the wild, they may nurse for up to a year. The foal and dam may be separated initially but are usually pastured with other horses within a few weeks.