

HEAT DETECTION GUIDE

More successful pregnancies, less uncertainty – learn to identify heat and inseminate at the right time.



**SUCCESSFUL
HEAT DETECTION**



**TIMELY
INSEMINATION**



**IMPROVED
RESULTS**



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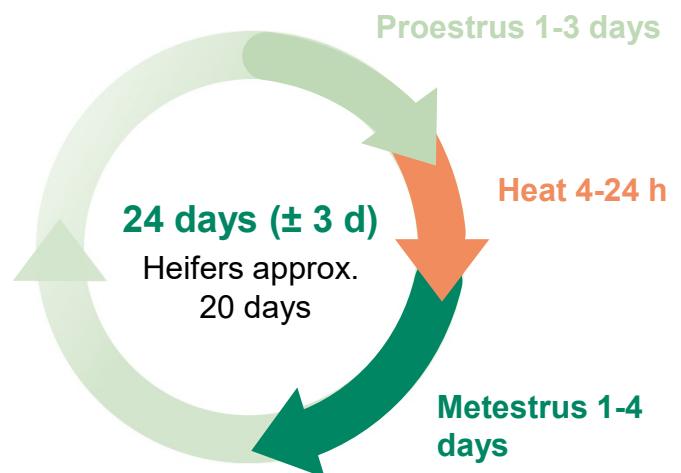
INTRODUCTION TO HEAT DETECTION

Heat detection is the cornerstone of a successful artificial insemination (AI) program. Accurate heat detection requires careful monitoring. Heat can be detected by observing the behavioral and physical signs of heat or by using heat detection technologies.



Estrous cycle

- A normal estrous cycle lasts approximately 24 days (± 3 days).
- Estrous cycle in heifers lasts for approximately 20 days.
- Health, body condition, stress, temperature and yield can affect the intensity of heat.
- High yield can reduce the duration of heat and the intensity of behavioral signs.



When to start detecting heat?

COWS



Start observing for signs of heat **1 month** after calving

The first insemination is typically performed **45–80 days** after calving, once the uterus has recovered and normal estrous cycle has resumed.

HEIFERS



Start observing for signs of heat at the age of **12 months**

The goal is for a heifer to calve at the age of **23–25 months**. Heifers should be inseminated when they have reached the appropriate liveweight and body condition. Reaching optimal body condition is more important than reaching a certain age.

KEY CONCEPTS



Calving interval is the time between two consecutive calvings. The target calving interval is 365–380 days.



Calving to first service interval is the number of days from calving to the first insemination. The target is 65–80 days. A minimum of 45 days is recommended.



Non-return rate is the percentage of cows that did not return to heat after insemination. The target is over 63%.



Number of services per conception (SPC) is the average number of inseminations required per conception. The target is <1.7 for heifers and <2.0 for cows.



100-day in-calf rate is the percentage of lactating cows that become pregnant within 100 days of calving. The target is >50%.



Silent heat/suboestrus is a heat period in which the cow shows no obvious signs of heat, even though she is cycling.



Sex-sorted semen is sorted according to sex, allowing the production of heifer calves with a success rate of 90%.



X-sorted semen is used on cows with a high breeding value to produce more heifer replacements.



Y-sexed semen is used on cows with a lower breeding value when replacement heifers are not needed.



SpermVital –semen extends sperm viability for up to 48 hours, making the timing of insemination less critical. It can also be used for cows with fertility issues.



Double insemination refers to performing two inseminations during a single heat cycle if the cow continues to show signs of heat.

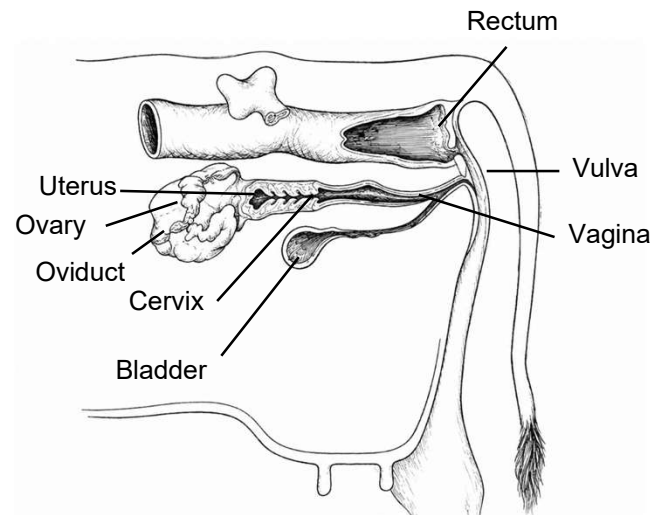


Embryo transfer (ET) may be considered as a last resort for valuable cows with low reproductive rates.

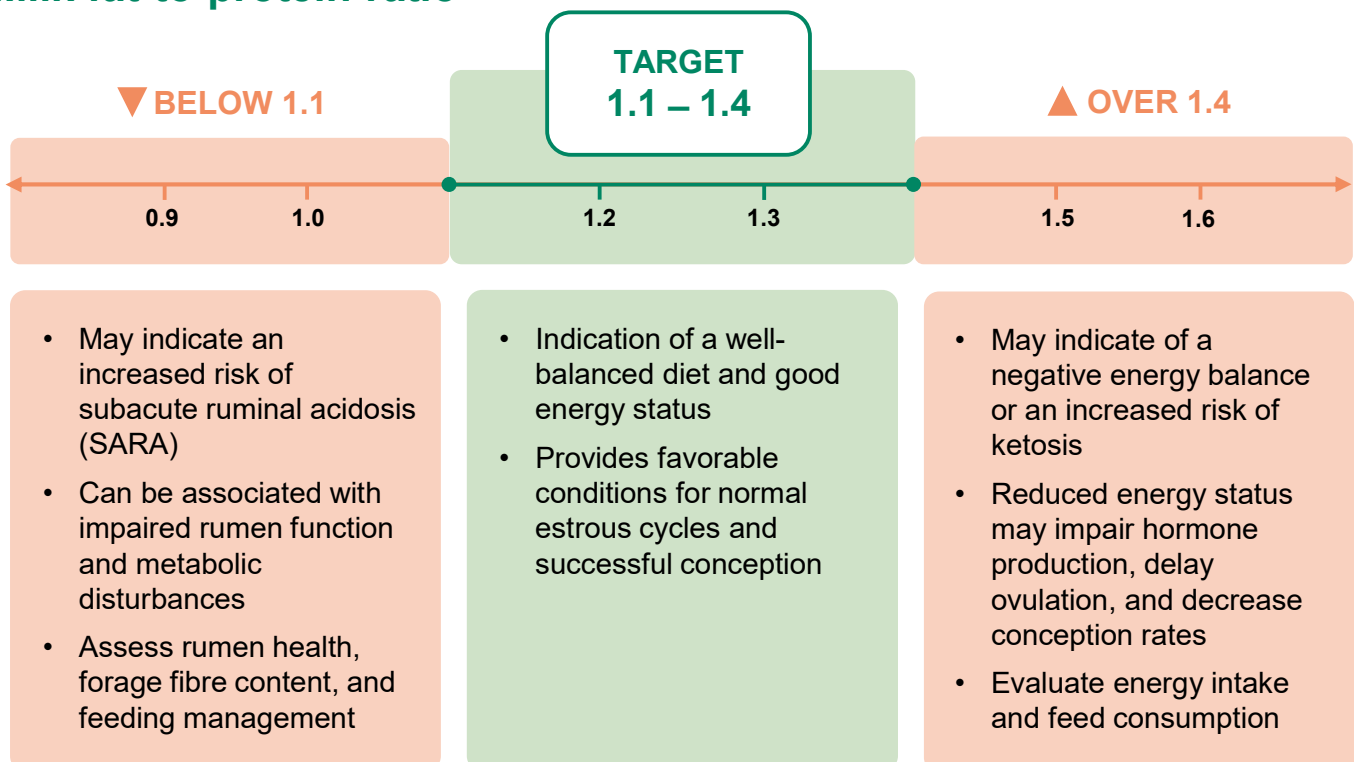
FACTORS AFFECTING FERTILITY

Why is fertility important?

Good fertility is essential for efficient and profitable dairy production. Reproductive success relies on healthy animals, appropriate management practices, accurate heat detection, and well-timed insemination. Effective reproductive management leads to higher conception rates, optimal calving intervals, and improved herd productivity. It also reduces the number of repeat inseminations and involuntary culling, helping cows remain productive for longer while increasing the overall efficiency and profitability of the dairy farm.



Milk fat-to-protein ratio



Milk fat-to-protein ratio reflects the cow's energy status and has a direct influence on hormonal function, estrous cycle, and fertility.

FACTORS AFFECTING FERTILITY

Fertility is influenced by several key management factors. Body condition, nutrition, water availability, rest, lighting, and stress - all affect hormonal function and reproductive performance. Proper management of these factors help optimize fertility and overall herd productivity.



Body condition score

- Target body condition score (BCS) at calving: 3.0–3.25
- Avoid cows becoming too thick or thin
- Cows should not lose more than 0.5 BCS after calving



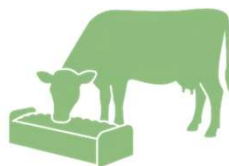
Rest

- 10–12 h of rest each day
- Adequate rest supports milk production and fertility
- Comfortable lying areas help reduce stress



Nutrition

- Energy deficit during early lactation can reduce conception rates
- Key nutrients for fertility: Se, Zn, and Mn
- Ensure all animals have adequate access to feed



Lighting

- 16–18 hours of light
- 6 hours of darkness
- Appropriate lighting improves milk production and reproductive performance



Water intake

- Cows may drink up to 150L of water per day
- Clean drinking water supports animal health
- Adequate water intake promotes feed intake



Stress

- Stress may disrupt hormonal function and estrous cycle
- Common stressors: diseases and pain
- Optimal ambient temperature: $-5^{\circ}\text{C}..+18^{\circ}\text{C}$



ESTROUS CYCLE: STAGES AND HORMONAL REGULATION

PROESTRUS

During proestrus, follicle-stimulating hormone (**FSH**) promotes the growth of ovarian follicles. Within 2–4 days, one follicle becomes dominant and will ovulate. As the dominant follicle grows, it produces increasing amounts of estrogen. The rising estrogen concentration triggers the onset of behavioral and physical signs of estrus, including the production of clear and elastic cervical mucus.

ESTRUS

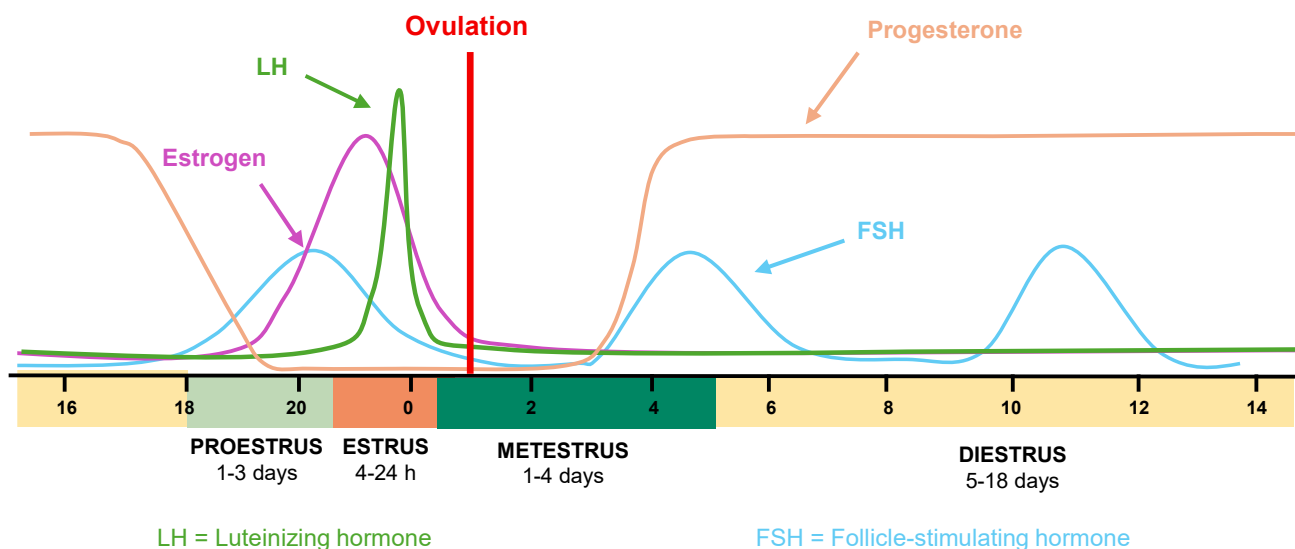
Estrus is the period during which the cow stands to be mounted. Peak estrogen levels trigger the release of luteinizing hormone (**LH**). The resulting LH surge initiates ovulation, during which a mature oocyte is released from the dominant follicle into the oviduct. Ovulation occurs approximately 24–30 hours after the onset of estrus. The optimal time for artificial insemination is approximately 4–16 hours after the onset of estrus, allowing sperm sufficient time to reach the oviduct and mature before ovulation.

METESTRUS

During metestrus, the ruptured follicle begins to develop into a corpus luteum immediately after ovulation. The corpus luteum produces progesterone, and its concentration rises rapidly. As progesterone levels increase, signs of estrus disappear and the cow no longer stands to be mounted. At the same time, progesterone prepares the uterus for a potential pregnancy.

DIESTRUS

During diestrus, progesterone levels remain high. If the cow does not become pregnant, the uterus begins to produce **prostaglandin F₂α** toward the end of diestrus, causing the corpus luteum to regress. As progesterone levels decline, a new estrous cycle begins. If the cow becomes pregnant, progesterone levels remain elevated, supporting fetal development in the uterus.



TOOLS AND TECHNOLOGY

Several tools are available to support heat detection by helping to identify estrus, record observations, and determine the optimal time for insemination.

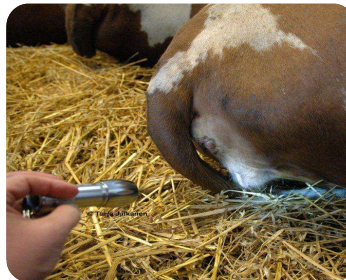
1. DETECT

Activity monitor



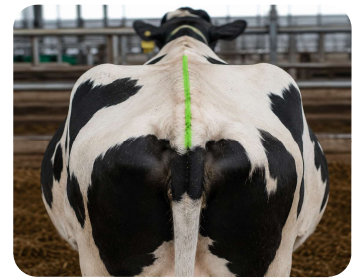
Monitors the cow's activity level and helps detect estrus based on increased movement and mounting activity.

Flashlight



Improves the visibility of cervical mucus and facilitates estrus detection in dimly lit conditions or on dark-colored animals.

Tail paint



Apply paint/chalk between the hook bones and the base of the tail. If the paint has been rubbed off, it indicates that the cow has been mounted.

Progesterone testing

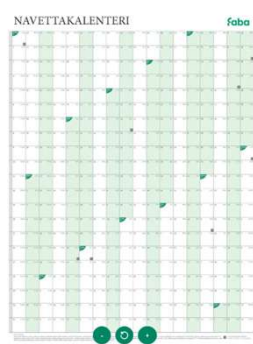
Measures progesterone concentration in either milk or blood. Progesterone testing helps determine the stage of the estrous cycle. The goal in heat detection is to determine whether the cow is in proestrus, standing estrus, or metestrus.



2. RECORD

Herd calendar

A traditional tool for recording estrus, insemination, calving, and breeding records. A three-week cycle makes it easier to estimate when the next heat is expected and calculate the expected calving date.



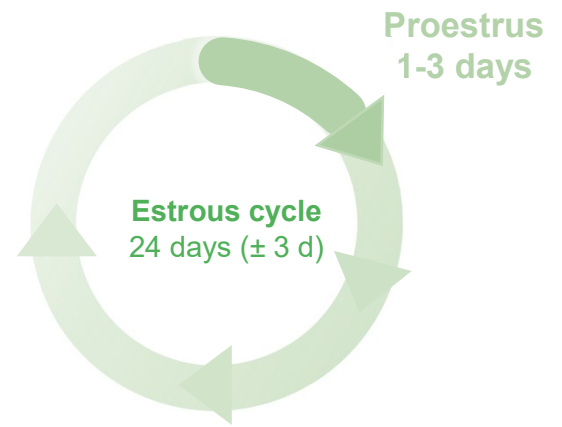
FabaMappi

A herd management app that provides up-to-date records of inseminations, pregnancy examinations, treatments, and animals that are due for service or are approaching their expected calving date.



PROESTRUS 1-3 days

During proestrus, the cow begins preparing for ovulation. The first signs of heat start to appear.



What happens in a cow?



- The corpus luteum regresses, and progesterone levels decline
- Estrogen levels increase
- Physical signs of estrus begin to appear as estrogen levels rise
- Behavior begins to change

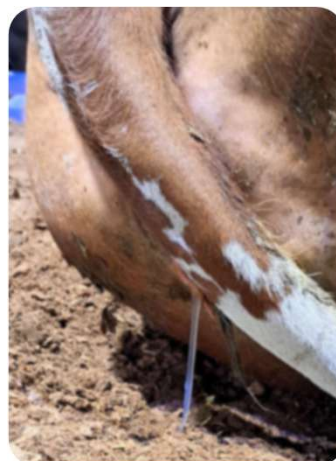
How to recognize proestrus?



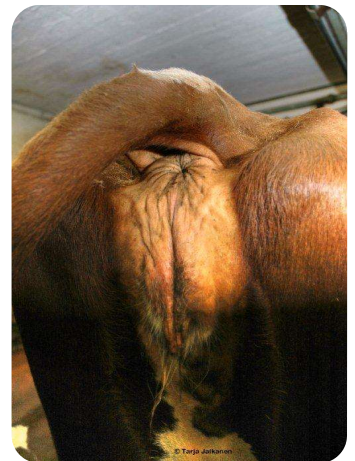
A cow in proestrus may mount other cows but does not yet stand to be mounted.



The cow vocalizes, nudges, and sniffs other cows. It may show restlessness, increased activity and even retain milk.



The mucus is thick and cloudy. A flashlight makes it easier to observe.



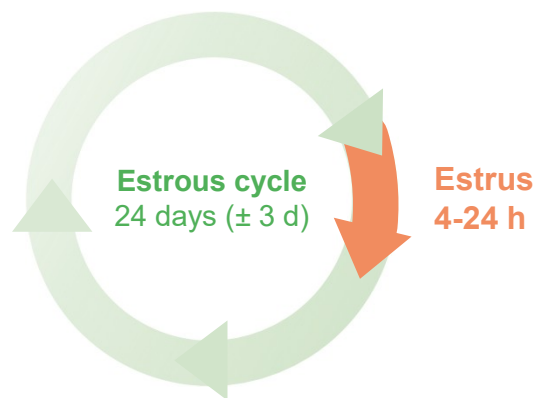
The vulva is red and swollen. The cow may arch its back when its hindquarters are touched.



Do not inseminate during proestrus. Thick, cloudy mucus indicates that the cow is not ready yet for insemination. Observe the cow several times a day, especially early in the morning and late in the evening when behavioral signs are most apparent.

ESTRUS (HEAT) 4-24 h

This stage is also known as **standing heat**. Signs of heat are at their peak. Careful heat detection helps to identify the optimal time for insemination and improves the likelihood of pregnancy.



What happens in a cow?

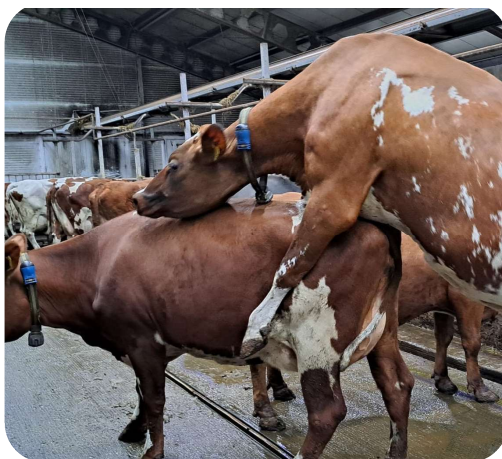


- Estrogen levels peak
- The cow stands to be mounted by other cows
- Ovulation occurs approximately 30 hours after the onset of estrus, after which signs of estrus begin to decline

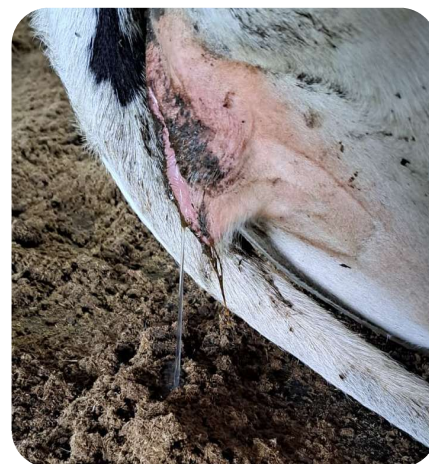
How to recognize heat?



The mucus is clear, stretchy, and watery. It can be stretched between fingers without breaking.



The cow stands still while another cow mounts it. This behavior is commonly known as standing heat.



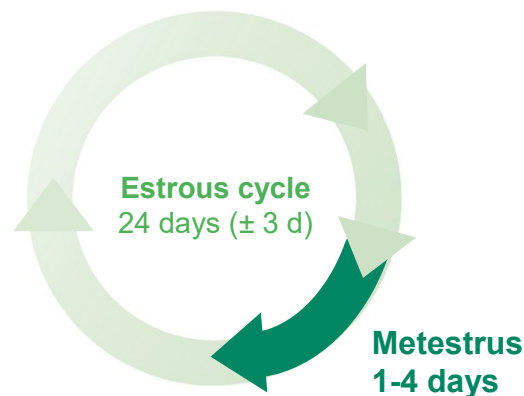
The mucus is clear and stretchy. This is the optimal time for insemination.



The optimal time for insemination is 4–16 hours after the onset of estrus, allowing sperm sufficient time to reach the oviduct and mature before ovulation. When using sex-sorted semen, inseminate approximately 8 hours after the onset of estrus. Deposit semen within 20 minutes of thawing for conventional semen and within 5 minutes for sex-sorted semen.

METESTRUS 1-4 days

During metestrus, the signs of estrus begin to subside. Progesterone levels rise as the corpus luteum develops, preparing the uterus for pregnancy. Progesterone levels remain high throughout diestrus and decline only at the end of the luteal phase if the cow does not become pregnant.



What happens in a cow?



- Estrogen levels decline
- Progesterone levels rise
- Signs of estrus begin to disappear, and the cow becomes calmer
- Blood-tinged discharge may occur 1–3 days after estrus

How to recognize metestrus?



The mucus becomes thicker and cloudier.



The cow becomes calmer. It may still mount other cows but no longer stands to be mounted.



Blood-tinged discharge may occur 1–3 days after estrus. This does not indicate whether the cow became pregnant or not.



Metestrus bleeding occurs as estrogen levels decline rapidly, causing small blood vessels in the uterine lining to rupture. Not all cows show this discharge. It does not indicate whether the cow is pregnant—it simply confirms that the cow has recently been in estrus. The next estrus can be expected in approximately three weeks.

DISCHARGE IN PREGNANT COWS

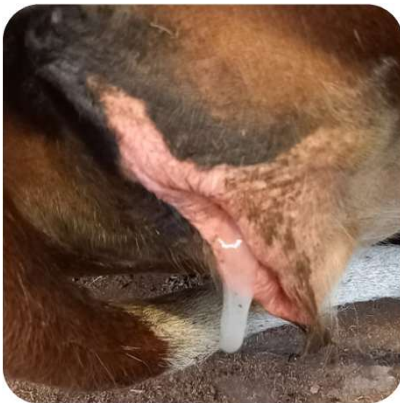
Pregnant cows may also produce vaginal discharge. It is typically thick and cloudy. Recognizing normal pregnancy-related mucus helps prevent unnecessary insemination.



What happens in the cow?



- Progesterone levels remain high to maintain pregnancy
- Uterus provides a favorable environment for embryonic development
- The cow no longer exhibits estrus behavior



Pregnancy-related mucus is thick, cloudy, and non-stretchy - unlike discharge during estrus.

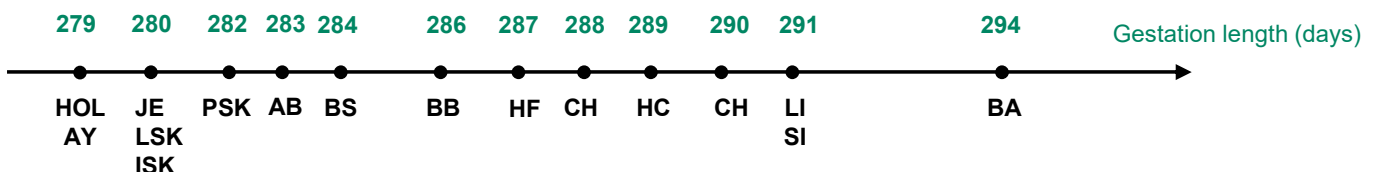


Check the tail as well, as mucus may adhere to it.



Normal pregnancy-related mucus approximately 3 months before calving.

Average gestation length by breed



Monthly pregnancy checks help to identify non-pregnant cows in time to return to service. Pregnancy can be reliably confirmed by an ultrasound approximately 30 days after insemination.

UTERINE INVOLUTION

Following calving, the uterus undergoes a natural cleansing process that typically lasts for 3–4 weeks. Vaginal discharge is initially bloody but it gradually becomes thicker and grey. As uterine involution progresses, discharge becomes thinner and more transparent.



Normal uterine involution

- The placenta is expelled within 12h after calving.
- Uterine discharge may continue for several weeks.
- The uterus returns to its normal size within 3–4 weeks.

Supporting recovery

- Ensure adequate silage intake and calcium supplementation.
- Provide appropriate pain management if necessary.

When should you be concerned?

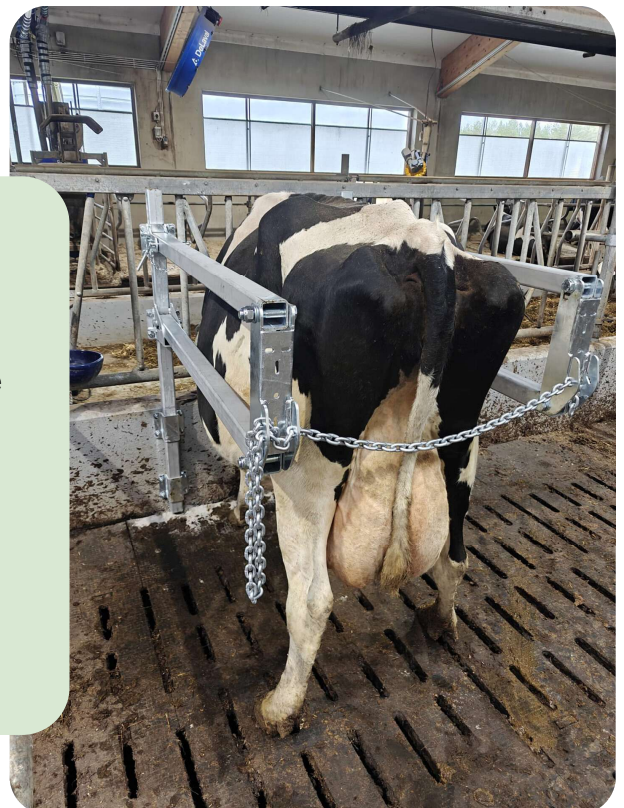
- Vaginal discharge has a foul odor.
- The cow has a fever or appears unwell.

Choosing a safe handling facility

Use handling facilities that provide a safe working environment for both the cow and the inseminator. Restrain the cow by its head to prevent sideways movement, and keep other animals away during the procedure. Use a raised platform if needed to maintain a comfortable working position.



Learn more here!
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REPRODUCTIVE DISORDERS

Abnormal discharge, irregular estrous cycles, or repeated unsuccessful inseminations may indicate an underlying reproductive disorder. Early detection helps to ensure a timely diagnosis and treatment.

Common reproductive disorders

Disorder	What to look for
Inactive ovaries	No signs of estrus when expected
Prolonged estrus	Estrus lasts longer than normal
Ovarian cysts	Estrous cycles are irregular or absent
Metritis	Abnormal uterine discharge



Inflammatory discharge is cloudy and may contain pus. Do not inseminate cows with abnormal discharge.



Uterine prolapse. The uterus has prolapsed from the vagina. Do not inseminate affected cows.



In cows with ovarian dysfunction, discharge may appear brown and contain blood.

When should you contact a veterinarian?

- No signs of estrus when expected
- Estrous cycles are abnormal or irregular
- The cow fails to conceive despite repeated inseminations
- Abnormal or foul-smelling discharge



CHECKLIST

1. OBSERVE ACTIVELY

Observe cows several times a day to better detect behavioral and physical changes associated with estrus. Use an activity monitor to support estrus detection.

2. DETECT SIGNS OF HEAT

Observe changes in cervical mucus throughout the different stages of the cycle. Standing heat is the most reliable indicator of a cow in heat. The intensity of heat-related signs may vary between individuals.

3. ACCURATE BREEDING RECORDS

Record all estrus observations, inseminations, and pregnancies. Use a herd calendar or FabaMAPPI to keep reproductive records up to date.

4. INSEMINATE AT THE RIGHT TIME

Inseminate 4–12 hours after the onset of estrus, when mucus is clear and stretchy. Proper timing is essential for successful insemination.

5. CONFIRM PREGNANCY

Regularly monitor inseminated cows and perform pregnancy checks. Pregnancy can be reliably confirmed with an ultrasound approximately 30 days after insemination.



When using sex-sorted semen, inseminate at the end of estrus, approximately 8 hours later than with conventional semen.

TOOLS



FabaMAPPI

Keep all breeding records conveniently available on your phone.



ACTIVITY MONITORING

Help detect heat, even when there are only subtle signs.



FLASHLIGHT

Makes cervical mucus and other signs of estrus easier to observe.



TAIL CHALK

A rubbed off chalk mark indicates that the cow has been mounted.



Helping dairy farms succeed

Successful estrus detection relies on regular observations, careful record-keeping, and good timing. Properly timed insemination supports good fertility and improves herd productivity. Faba offers expert services to help optimize your herd's reproductive performance.

- **Artificial insemination services**
- **Embryo transfer and other services**
- **Pregnancy checks and postpartum examinations**
- **Reproductive consulting**
- **Ultrasound services**
- **Insemination and health records**

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