Reproductive Management in Dairy Farms
Reproductive Management in Dairy Farms

(Second edition)

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The Vietnam Belgium Dairy Project (VBDP) aims to increase the income of the rural population by sustainable growth of the domestic milk production in Vietnam. The project is implemented from 2005-2009 by the Ministry of Agriculture and Rural Development (MARD) with technical assistance of the Belgian Technical Cooperation (BTC).

Comprehensive training of farmers is one of the main activities of the project. The project has chosen for a Training of Trainer system (TOT) in which leading demonstration farmers and/or technicians are trained to become a trainer of a group of dairy farmers. This booklet on “Reproductive Management in Dairy Farms” is a part of a series of booklets that cover the different aspects of Good Dairy Farming Practice. Each booklet is accompanied by flipcharts that can be used during training sessions. All manuals and flipcharts can be downloaded from the Dairy Vietnam Website: www.dairyvietnam.org.vn

Although some knowledge and concepts might be unfamiliar to some dairy farmer in Vietnam, the authors made very short and simple expressions which are accompanied by animated and easy to understand images to intrigue readers and most importantly to convince farmers to follow the instructions in the manual.

We would like to thank all persons who contributed to the completion of this second edition. Special thanks go to Dr. Nguyen Tan Anh and Dr. Berend De Leeuw.

On this occasion, we would also like to express our gratitude and appreciation to the farmers and technicians who follow the guidelines of the manuals and who teach other farmers by using our publications.

Sincere thanks!

_Constructive feedback on any of our publication is always welcome!_
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Why do dairy cows give birth?

When dairy cows give birth:
- milk
- calf
Chapter 1
The Importance of Reproductive Management
Dairy farming is a business. The main income from dairy farming comes from milk.

Milk Production Curve

- Cows start to produce milk immediately after calving. The milk production reaches a peak from week 4 to week 10 after calving, then goes down gradually in the following months.
- The highest yield (average yield / day) can be reached when the cow has 01 calving/year (305 day in milk + 60 days dry).
Chapter 1: The Importance of Reproductive Management

To achieve this, dairy cows should be successfully inseminated within 85 days after calving. However, this is a hard-to-do task. Therefore, farmers and inseminators should work closely together to detect heat and seminate in time in order to shorten calving intervals.

**Cow 1:** Has 4 lactations in 4 years (1 calving/year)
Lactation 1: 4,000 kg/lactation, Lactation 2: 4,200 kg/lactation, lactation 3: 4,100 kg/lactation, Lactation 4: 4,000 kg/lactation.

**Total in 4 years:** 16,300 kg

**Milk production (kg/day in 4 years) = 16,300 / (4 x 365) = 11,16 kg/day**

**Cow 2:** Has 3 lactations in 4 years
Lactation 1: 4,200 kg/lactation, Lactation 2: 4,300 kg/lactation, lactation 3: 5,000 kg/lactation.

**Total in 4 years:** 13,500 kg

**Milk production (kg/day in 4 years) = 13,500 / (4 x 365) = 9,25 kg/day**

**Average milk production/day of cow 1 higher than of cow 2 of 1,9 kg**

- To achieve this, dairy cows should be successfully inseminated within 85 days after calving. However, this is a hard-to-do task. Therefore, farmers and inseminators should work closely together to detect heat and seminate in time in order to shorten calving intervals.
Chapter 1: The Importance of Reproductive Management

Chapter 2

Heat

Note: the Calving Interval is calculated as the interval between 02 successive calvings.

- The longer the calving interval is, the lower the average dairy milk production will be.
- The longer the dry period is, the longer you have to feed a cow that does not produce milk.

Therefore, to shorten the calving interval, farmers should:
- Give good care to the cows.
- Pay attention to heat detection.
- Call the AI technical in time.
- Keep clear records.

Figure 2: Calving Interval
1. What is heat?

- Heat is the period of acceptance for mating in cows
- Heat occurs only in non-pregnant heifers and cows
- The period of receptivity lasts between 6 to 30 hours
- The average interval between two heats is 21 days, but it can vary from 18 to 24 days

2. What is causing heat

- In non-pregnant cows, the ovaria are producing the eggs and sexual hormones
- Every 21 days, a mature egg is released from ovaria. Just before releasing the egg, hormones are released that cause the heat signs

Note: A hormone is a substance produced by an organ in the body and released in the bloodstream that gives signals to certain organs to increase or decrease a certain activity
3. Signs of Heat

Heat detection calls for the observation of changes. The changes can be classified in:
- Changes of the vulva
- Changes of the behavior of the cow

Changes in the vulva
- Pink and swollen vulva. Clear mucous discharge is visible

Note:
- Mucous discharge should be distinguished from pus (unclear, bad smell)
- High pregnant cows can sometimes also have clear mucous discharge

Observation

1. Observation
2. Signs of changes

3. Observation
4. Signs of changes
5. Observation
6. Signs of changes
7. Observation
8. Signs of changes
Changes in behavior

Observation of changes in behavior

Dairy cows in heat show signs of seeking or following bulls or other cows. For good heat detection, cows should be let to roam freely at least 30 minutes in the morning and 30 minutes in the afternoon. If a farmer has just a few cows, he/she can work together with other farmers.

Figure 3: Frequency of heat

- Note: Heat occurs more during the night than during the day. (the reason is not known). At right there is more quietness in the stable and also the temperatures are lower.

Heat detection should also be done in the early morning, late afternoon or even during the night.
Change of behavior

- Bellows frequently
- Is nervous and restless
- Behaves otherwise and fight other cows
- Refuse social contact with other cows
- Sniff vulvas or urine of other cows
- Turns in circle or press her chin on the back of other cows
- Mount on other cows
- Allow other cows to mount her (standing heat)
- Cow eat less and produce less
- Frequent peeing

1. Fussing
2. Excited

3. Frequent peeing
4. Bellowing
5. Refuse others coming for flirting or mounting
Chapter 2: Heat

Cows eat less and produce less

Mounting other cows

Vulva sniffing

Cows eat less and produce less

End of heat

- At the end of the heat, some blood might appear on the vulva
- Cows return to a normal status
- Vulva returns to normal, fine wrinkles appear like in a non-heat period
4. Heat Detection

Good heat detection starts with good routine!

- Regular time to look for heat
  - Changes in the vulva
  - Changes in behavior
- Always take record when symptoms are observed
- Check the records to know which cow will come in heat (18-24 days heat interval)

What should we do when cow are found in heat?

- Do full recording in farm record

You can choose to record:
- On a board in the barn (write it down in a book afterwards)
- In a cow file (one file per cow)
- In a heat recording book (one file for the herd)

Which system you use is not important, but you should know when any cow was in heat!
Possible reasons for no heat

No heat observed

1. There is really no heat:
   A) No ovulation and no heat
      - Ovarian disease
      - Reproductive organ disease
      - The cow has recently calved and the reproductive cycle has not started again.
      - Hormonal imbalance. This is often due to

Inform inseminator

Heat detection

1. Heat detection
2. Inform inseminator
Chapter 2: Heat

- Poor nutrition
- Heat stress
- The cow is pregnant

B) There is ovulation, but the cow does not show heat signs (silent heat). This can occur in the first cycle after calving

2. There was actually heat:
- Farmer did not see it
  - Insufficient heat detection
  - Very short heat period (<6 hours), possible in the night
- The farmer did see it, but did not record and forgot about it

Chapter 3

Artificial Insemination

Improve feeding can influence cow's productivity and body conditions.
Definition

Artificial Insemination (AI) is a technique by which semen is introduced artificially into the body of the uterus at the time of heat in an attempt to cause pregnancy.
Advantages of AI

- It provides opportunity to select high quality bulls
- It minimizes the risk of spreading reproductive diseases
- It reduces the costs and the risks of keeping bulls at the farm

Artificial insemination

- The quality of the bull and the semen is checked
- Frozen semen can inseminate thousands of cows per year
- Frozen semen can be stored for years and can easily be transported
- Semen of dead or that are far away bulls can be used for insemination

Natural service

- A bull is the best possible heat detector
- Fertility rates are mostly better
- A bull can service only 01 cow per time

How to do AI?

Semen collection

- Healthy bull
- High fertility
- High genetic potentials
Chapter 3: Artificial Insemination

Semen quality check (evaluation)
- Volume of semen V (ml)
- Activity A (%)
- Concentration C (tr/ml)
- Rate of abnormal sperm cells

Treatment and storage
- The semen is diluted
- The semen put in a straw
- The semen is frozen
- The semen is stored in liquid nitrogen (-196°C)

Transport of frozen semen to insemination site.

Skillful inseminators are required
Chapter 3: Artificial Insemination

Selection of semen
Improve genetics

The straw with the semen is defrosted and warmed before the insemination.

When the cow is in heat, the inseminator introduces the semen into the cow’s uterus with specialized tools.

When to do AI?

When the cow is in heat.

Note:
- The hardest task in AI is to determine the time for insemination (see Chapter 2 - Heat detection). After insemination (natural service or by AI), the cow will get pregnant if sperm goes to the right place, at the right time.
- From 10-12 hours after heat time, eggs will be released and survive for about 6-12 hours. Meanwhile, sperm can survive in uterus for about 24 hours. Therefore, the rule of morning-afternoon should be followed.
**When to Service a Cow in Heat**

- **Coming into heat**: 8 hours (0 - 24h)
- **Standing heat**: 16 hours (3 - 30h)
- **Going off heat**: 8 hours (2 - 24h)

<table>
<thead>
<tr>
<th>Artificial Insemination</th>
<th>Too early</th>
<th>Good</th>
<th>Best</th>
<th>Good</th>
<th>Too late</th>
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</tbody>
</table>

**Natural Service**

<table>
<thead>
<tr>
<th>Artificial Insemination</th>
<th>Too early</th>
<th>Best</th>
<th>Too late</th>
</tr>
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<tbody>
<tr>
<td>0</td>
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**Application of the morning-afternoon rule**

- If the cow is in heat in the morning, inseminate her in the afternoon.
- If the cow is in heat in the afternoon, inseminate her in the next morning.

**Note:** If a cow inseminated the day before is still in heat, inseminate her again.
Data recording

Farmers and inseminators record the data in order to predict the next heat to inseminate of the right time and to determine which semen should be used.

What do farmers and inseminators record?

Farmers should record the date and the signs of heat.

Data recording book

<table>
<thead>
<tr>
<th>No</th>
<th>Ear-tag</th>
<th>Date of heat</th>
<th>Sign</th>
<th>Next heat period</th>
<th>Note</th>
</tr>
</thead>
</table>

Inseminators should record full data in their books and farm record books:

- Cow ID (ear-tag)
- Date of heat
- Date of insemination
- Semen ID
- Date for pregnant diagnosis
- Next heat period

<table>
<thead>
<tr>
<th>Heat</th>
<th>Insemination</th>
<th>Pregnant diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear-tag</td>
<td>Date of heat</td>
<td>Semen ID</td>
</tr>
<tr>
<td>DAG6468</td>
<td>18/5</td>
<td>BD 5111</td>
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<td>...</td>
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<td>...</td>
</tr>
</tbody>
</table>
Causes of low conception rates

In fact, even when the heat is well detected and the insemination is done in time, the conception rate is not 100% (for AI, it is ≤ 60% after 01 service; for natural service it is 80%). In good farms, the number of services/conception is 1.7-2.5.

Example

In 1 farm, 30 insemination were done in 15 cows in 1 year
15 cows now are pregnant, this gives a service/cow: 30/15 = 2 and conception rate of 15/30 = 0.5 (or 50%)

Low conception rates may be due to:
- Improper timing of service
  - Insemination too early in the heat period
  - Not servicing a cow that is in heat
  - Servicing a cow that is not in heat

Note: Conception rates in heifers are usually better

- Low quality semen: Improper storage of semen
- Unskillful inseminator
Cow’s conditions
- Reproductive diseases
- Hormonal disorder
- Obstructed oviducts
- Anatomical defects
- Early embryonic death (cow becomes pregnant but pregnancy is not maintained)

To get high conception rate
Farmers and inseminators should do their jobs well.

Farmers should
Do good farm management including:
- Feeding and water
- Hygiene
- Animal welfare
- Avoid heat stress
- Enough light in the stable (be able to read a newspaper without problems)

Detect heat and call inseminators in time

Inseminators should be:
- Skilful
- Ensure good storage of semen
- Inseminate at the right time
Chapter 4

Pregnancy and Calving
1. Pregnancy diagnosis check

*There are 02 ways to check conception:*

- **Heat detection:** If the cow does not come in heat after 18-24 days after the insemination
- **Pregnancy check by rectal palpation:** 65-70 days after insemination (a skillful inseminator can do this after 45 days)

**No signs of heat**

- 18 to 24 days after the insemination farmers should observe if the cow is whether or not coming into heat. If the cow is pregnant, there will be no sign of heat

![Diagram](image)
Embryonic death
- The embryo dies at a young stage
- You will not observe anything, but the cow will come in heat again

Abortion: abortion is the expulsion of fetus out of cow’s body before the end of the pregnancy. The rate of abortion is about 3%-5%, the main reasons are:
- Infectious diseases
- The insemination is done when cow is already pregnant
- Physical injuries
- The cow eats feed which contain toxins

Pregnancy period
The average pregnancy period of cows is 280 days (ranging from 270 to 290 days). During her pregnancy, the cow is not in heat.

Rectal palpation
Rectal palpation is only done by a technician (inseminator or veterinarian) only. In the early days of pregnancy, diagnosis via rectal palpation can be done but does not provide accurate results. From 70 days after insemination, technicians can diagnose pregnancy, the accuracy of results is good.

Note: In most cases, the cause of abortion is unclear
Calving

Calving is the expulsion of the calf and placenta.

Signs of calving

- The enlargement of the udder due to the production of colostrum

- Relaxation of the pelvic ligaments, swelling of the vulva, mucous discharge
  - The cervix dilates and which allows mucous to come out
  - The cow delivers the calf a few hours after cervix dilates completely
Calving process: 03 stages

1. Dilation of the cervix:
   - This stage lasts: 2-3 hours for mature cows
   - 4-6 hours for heifers

2. Delivery of the calf
   - The calf is expelled through the uterus. At this stage, the calf may still be in the water bag. When the water bag breaks, the head passes through the birth canal, the rest of the body demands little extra efforts to be expelled. This stage lasts 2-10 hours

   Note: a common mistake is to assist by pulling the forelegs of the calf, this is not necessary in normal cases.

3. The expulsion of the placenta
   - The placenta is expelled from the uterus. After the delivery of the calf, uterine contraction are still continuing for a period of time. Normally after 5-6 hours, expulsion is completed
   - Call a veterinarian if the placenta still retains after 6 hours

Note: Many farmers refuse to inseminate the cow in the period of 10 - 60 days after calving, because the cow is in the top of its milk production. This is one of the biggest mistakes you can make as a dairy farmer!

Cows should have one calf per year. The insemination and the pregnancy do not influence the milk production
Post calving

- The uterus shrinks and restores in size
- Head can return as early as 10 days after calving
- 90% of cows are in heat at least once within 60 days after calving

**Note:** The 1st insemination should take place between 10 and 60 days after calving

Post calving complications

1. Difficult calving

Experience and judgment is necessary to decide when to assist calving. If after 1 or 2 hours of intense pushing, the calf’s forefeet do not appear and the cow is exhausted, assistance should be provided.

If the farmer does not have experience in dealing with difficult calving, a technician should be called immediately.

a. Causes of difficult calving

- Weak pushing
- The calf is too big
- The position is abnormal
- The calf is death

b. How to deal with difficult calving: call the veterinarian or skilful farmer

- Wash and disinfect your hands, arms and the cow’s vulva
- Disinfect equipment
- The position of calf should be checked before you start pulling the calf out. Traction should only be applied as the cow pushes

**ABNORMAL CALF POSITIONS**

Note:

The 1st insemination should take place between 10 and 60 days after calving
Chapter 4: Pregnancy and Calving

2. Retained placenta:
- Retained placenta accounts for 5% to 30% and mostly after a difficult calving.
- When the placenta is retained, a veterinarian should be called:
  - The placenta should not be removed manually because it can harm the uterus.
  - Medicines should be used to avoid infection and stimulate uterus contraction.
- Prevention of retained placenta is a critical part of reproductive management. It includes:
  - Proper hygiene during calving.
  - Proper nutrition during the dry period.
  - Frequent roaming.
3. Infections

Infections are caused by microorganisms.

Symptoms

- Mucous liquid comes out from vulva, this is normal till 15 days after calving and it can vary from water clean to red to even brown and green, as long as it does not stink or is thick yellow and unclear it is not a problem
- The cows get fever only in 10% of the cases
- Not eating
- Not starting up in production

Infection can lead to infertility

Call the veterinarian immediately

Caring of a newly born calf

Make sure the calf is breathing

- Clear the nose and mouth
- Put cold water in the head of the calf
- If necessary hang calf upside down
- Put calf in dog sitting position, which gives both breast side the opportunity to inhale easily
- Turn the calf from one side to the other to make the fluid from the lungs come out

Disinfect navel cord

- Use a bandage to stop the bleeding of the navel cord only when absolutely necessary touch the umbilical cord with your fingers
- Use iodine solution (7%) to disinfect, pot dip or blue spray
- Check the navel cord for infection (hurt, swelling) 2 days after calving

Call the veterinarian if necessary
**Colostrum milk**

- Colostrum contains antibodies that help build up immunity against diseases.
- The newly born calf should be fed colostrum as soon as possible, not later than 1 hour after calving.
- The volume of abomasum of the newborn calf is only 1.5 litter. So the amount of colostrum fed at one should not exceed 1.5 kg. Otherwise it will cause diarrhoea.
- The amount of colostrum fed should be 10% of the body weight at birth.
- The temperature of the colostrum is very important, so feed colostrum immediately after milking.

**Note:**

- The left over of colostrum can be stored in the refrigerator for 1 week perfectly in the freeze compartment. Before it is used, it need to warmed up in a bainmarie (39°C).
- Direct heating will destroy the proteins.

**After** birth, the calf should be removed from the mother cow.

Keep the calf in individual, clean and dry cage and hutch.

- Ear tag immediately after birth.
- Dehorn 20-30 days after birth.
- Remove extra teats.
Chapter 5

Reproductive management
To ensure good reproductive management on the farm, technicians and farmers should work together.

**Farmers:**
- Ensure good dairy farming practice
- Observe heat in time
- Call inseminators and veterinarians in time

**Inseminators:**
- Should be skillful
- Semen should be of high quality
- Ensure good storage of semen

If everything above is fulfilled, every 12 months, cow will have 1 calf.
The signs of heat are easy to see when:
- The cow is healthy and free from reproductive diseases
- The cow is not injured
- The cow does not suffer from stress (incl. heat stress)
- Feeding is sufficient and balanced
- The cow doesn’t have difficult calving
- The cow can roam freely

Many farms in Vietnam:
- Cows often suffer from heat stress
- Feeding for dairy cows is not balanced in nutrition
- Cows are very skinny
- Cows are restricted within barns 24/24 hours

For these cows it can be difficult to show heat and get pregnant.

Raising cows with more than 90% HF blood (HF, F4, F5...) is difficult in most regions of Vietnam. These cows suffer more from heat stress than F1 (50% HF) and F2 (75% HF)
- In hot and humid condition, HF cow will show less heat signs this might result in long calving interval
- Areas like Lam Dong and Moc Chau are more suitable to raise HF cows
### Some reproductive management indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Goal</th>
<th>Limit</th>
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<tbody>
<tr>
<td><strong>For individual cow</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Age at first calving</td>
<td>Month</td>
<td>&lt; 24</td>
<td>&gt; 30</td>
</tr>
<tr>
<td>Calving Interval</td>
<td>Month</td>
<td>&lt; 12</td>
<td>&gt; 14</td>
</tr>
<tr>
<td>Return to heat after calving (1st heat)</td>
<td>Day</td>
<td>&lt; 40</td>
<td>&gt; 60</td>
</tr>
<tr>
<td>No. of insemination per conception</td>
<td>Number</td>
<td>&lt; 1.7</td>
<td>&gt; 2.5</td>
</tr>
<tr>
<td>Days of dry period</td>
<td>Day</td>
<td>50 - 60</td>
<td>&lt; 45 or &gt; 70</td>
</tr>
<tr>
<td>Days between calving and conception</td>
<td>Day</td>
<td>&lt; 85</td>
<td>&gt; 140</td>
</tr>
<tr>
<td><strong>For herd</strong></td>
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</tr>
<tr>
<td>Average calving interval</td>
<td>Month</td>
<td>&lt; 12</td>
<td>&gt; 14</td>
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<tr>
<td>Heat after calving</td>
<td>Day</td>
<td>&lt; 40</td>
<td>&gt; 60</td>
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<tr>
<td>Insemination after calving</td>
<td>Day</td>
<td>&lt; 45</td>
<td>&gt; 60</td>
</tr>
<tr>
<td>% Cows return to heat within 60 days after</td>
<td>%</td>
<td>90</td>
<td>&lt; 90</td>
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<tr>
<td>calving</td>
<td>Number</td>
<td>&lt; 1.7</td>
<td>&gt; 2.5</td>
</tr>
<tr>
<td>Rate of heifers get pregnant after 01 service</td>
<td>%</td>
<td>&gt; 65</td>
<td>&lt; 60</td>
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<tr>
<td>Rate of mature cows get pregnant after 01</td>
<td>%</td>
<td>&gt; 50</td>
<td>&lt; 40</td>
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<td>service</td>
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<td>&lt; 10</td>
<td>&gt; 10</td>
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<td>Rate of mature cows have to do 03 services</td>
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<td>50 - 60</td>
<td>&lt; 45 or &gt; 70</td>
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<tr>
<td>Days of dry period</td>
<td>Day</td>
<td>85 - 110</td>
<td>&lt; 140</td>
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<tr>
<td>Interval between calving and next pregnancy</td>
<td>%</td>
<td>&lt; 10</td>
<td>&gt; 45</td>
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<tr>
<td>Rate of cows with interval between calving</td>
<td>%</td>
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<tr>
<td>and next pregnancy &gt; 120 days</td>
<td>%</td>
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#### The importance of data recording

Farmers should do data recording in order to get critical reproductive data for themselves and the technicians.

Farmers should record data into recording books and cow files.

If farmers and technicians record all the reproductive data carefully, problems will be identified and solutions can be found efficiently.
Full data recording allows:
- Identify the time when the cow will get in heat and when it will calve
- Identification of the day the cow should be dried off
- Calculation of technical criteria

Criteria of the dairy herd should be applied at the farm, district or province level or for the herd in the region that the inseminator serves.

**Farm indicators will be calculated**
- For a farm
- For a region
- For an inseminator

**Key indicators:**

**For heifers: Age at the first calving**
- Ideally < 24 months and limit not more than 30 months
- Heat detection and insemination should start from 12 months
- Heifers should be at least 350kg when inseminated

**For cows: Day between calving and insemination**
- 1st insemination should take place within: Ideally before 45 days after calving and limit not later than 60 days after calving
- Day between calving and pregnant: Successful insemination should take place: Ideally before day 85 after calving and limit not later than 140 days after calving

"the cows were inseminated on 12 March. It is 5 April today. Is there any cow in heat again?"

Great. My cow got pregnant"

"No"
DUẤN BÒ SỮA VIỆT BỈ
VIETNAM BELGIUM DAIRY PROJECT