Reproduction Management is the first in a series of management manuals published by Veepro Holland. Through these manuals Veepro Holland aims to provide you with useful management information. Dairy cattle world-wide need to receive proper guidance to fully realise their potential.

Veepro Holland hopes that this manual may widen your knowledge about fertility and consequently contribute to an improvement of the reproduction results in your herd.

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Veepro Holland
Fertility is a factor which has a great effect on the economy of dairy farming. Fertility is, to a large extent, influenced by management. This means that the individual dairy farmer or herd manager plays a very important role in fertility control. In order to achieve the best possible reproduction results, sound management abilities are required.

A useful parameter for determining the quality of the reproduction management should contain all important fertility features. The parameter used in this manual for this determination is the calving interval. The calving interval is the period between one calving and the next. Important fertility aspects, such as the pregnancy rate after first insemination, the number of inseminations per conception and the number of days from calving to conception all have their influence on the length of the calving interval.

The calving interval itself does not explain which part of the herd reproduction management needs improvement. A further study of how the calving interval is realised needs further discussion before any conclusions can be drawn. In this manual we will look further in detail for possible backgrounds of non-optimal calving intervals. Knowing the importance of good reproduction management to dairy herd profitability makes these backgrounds certainly very interesting. Any improvement in herd reproduction management means one step further towards sound and more profitable dairy farming.
IMPROVING THE REPRODUCTION RESULTS

To improve the reproductive performance of the herd, one should consider all possible ways to achieve optimal results. This may involve many different managerial factors, which are all interrelated. Seven of these factors are discussed.

1. HEAT DETECTION

Heat detection has a major influence on the length of the calving interval. An optimal calving interval can be achieved only if the herdsman maintains a healthy, properly fed herd in which each mating is carefully planned. Planning starts months before the contemplated mating and therefore it is very important to have a well-planned and properly executed heat detection programme. There are a number of factors which make heat detection less easy, notably:

- the length of the oestrus cycle varies from 18 to 24 days;
- heat signs often occur over a shorter period only;

ECONOMIC RESULTS

Better reproduction results improve the economic results of the herd in two ways:

- a higher total life-time milk production of the cows;
- a higher number of calves per year.

An additional advantage of a larger number of calves means that the selection opportunities within the breeding herd will increase further and consequently a higher income can be realised by selling calves or heifers.

In figure 1 an example is given for two cows: A and B. The two cows are identical, except for their reproductive performance. It clearly shows that cow A is the more economic one: she produces both more milk and more calves than cow B in a three-year period.

Research has revealed that the best possible average calving interval is about 365 days. This goal is not always achievable under all circumstances. But regardless of the conditions, it is always a challenge to strive for a calving interval of about 365 days.

Figure 1 Milk production of two cows with different calving intervals
- the sexual behaviour of cows in heat varies;
- the duration of heat varies from cow to cow, especially in maiden heifers;
- sexual activity tends to be greatest between 6 pm and 6 am and mainly depends on the ambient temperature.

The intensity of sexual behaviour depends on the number of cows in heat in a group. The signs of heat are obviously shown better when more cows are in heat at the same time. Loose housing without slippery floors and enough space is an advantage in detecting heat signs. Heat can be divided into three different stages. The signs of heat that may be shown will be described for each stage.

**Early heat period**

A sexual mature, non-pregnant cow comes in heat every 18 to 24 days. It starts with the development of an ovum in the ovary. At this stage the cow shows early signs of heat. The length of this period varies from 6 to 24 hours. Signs of early heat are:

- **not standing when mounted**;
- attempts to mount other cows;
- sniffing at other cows;
- looking for the company of other cows;
- chin resting;
- being restless;
- being extra attentive;
- a wet and slightly swollen vulva;
- bellowing.

**Standing heat period**

Early heat changes into standing heat. The length of this phase of heat ranges from 6 to 18 hours. It is shorter under tropical conditions than under more temperate conditions.

The signs of heat are:

- **standing while being mounted**; this is the clearest sign of heat;
- mounting other cows;
- chin resting;
- frequent bellowing and restlessness;
- attentiveness, ‘ear play’;

Bellowing and sniffing at other cows are signs of heat.
- bending backbone, loin part downward and sacrum upward;
- regular sniffing at reproductive organs of other cows;
- red and swollen vulva and clear mucous discharge;
- ruffled tailhead due to mounting;
- less appetite and generally less milk;
- slightly higher body temperature;
- glistening mucus on tail and hindquarters.

**Regular observation**

Most cows show the signs of heat better during the cooler periods of the day. Good detection results will be obtained when the cows are observed three times a day, preferably:

- in the morning, before and after milking;
- in the afternoon, before and after milking;
- in the evening around 10 o’clock.

**Late heat period**

After the period of standing heat some cows continue to show behavioral signs of heat. This period is called the late heat period and can last for 12 to 24 hours.

Signs of the late heat period are:

- **not standing when mounted;**
- the cow is sniffed by other cows and is sometimes sniffing other cows;
- clear mucous discharge from vulva;
- dry mucus on tail.

About two days after the end of heat, cows may show a bloody mucous discharge from the vulva. This can be of help in case of unclear or doubtful signs of observed heat. The next heat period should then occur about 19 days (21 - 2) after the bloody discharge.

Additionally, all other possibilities of detecting cows in heat should be used. The time required for good heat detection depends upon the:

- experience of the person in charge;
- number and breed of cows;
- environment of the cows.

Generally, at least 20 minutes are needed each time to do a good heat check. In larger herds in very hot climates it may be wise to keep the cows also under surveillance at night.

**Good recording**

One of the most useful aids in heat detection is good record keeping. Good systems for proper fertility recording are, for example: a cow calendar, a herd fertility and health monitor chart and indi-
individual cow records. Even an ordinary calendar can be very useful. All data relating to the cow’s reproductive status should be recorded, i.e. calving date, ease of calving, date of heat, insemination date, name of sire, fertility disorders and their treatment, etc. They also indicate when cows can be expected to be in heat, which cows need special attention and which cows should be inseminated when in heat. For instance, when a cow is seen in heat, this should be marked on the calendar or chart for a close observation of the cow three weeks later.

There are also some computerised herd management and recording systems available. These software programmes assist in the daily herd management, daily action lists, herd performance monitoring and problem analysis, and are often flexible enough to be useful for many types of dairy facilities. However, the success of computer information depends mainly on the daily input of information by the dairy farmer. Complete records are essential to achieve optimal values.

Which recording system is best depends on, among others, herd size, the system of management and preference of the dairy farmer. Important questions to be asked when choosing a recording system are:

- is the system user-friendly?
- how much time does the system require?
- does the system monitor all cows through out a lactation?
- is it easy to look up individual cow information?
- does the system provide action lists for day-to-day use?
- can the system provide a continuous and up-to-date feature of herd performance?

It is important to take these questions into consideration before selecting a system, because a system can be successful only if the dairy farmer enjoys working with it.

Additional heat detection methods

There are special features available to assist the dairy farmer with heat detection, such as paint-filled or pressure-sensitive devices glued on the tailhead of the cows, a chin-ball marking device for a teaser bull or a pedometer. A pedometer is strapped around the cow’s leg, measuring the activity of the cow. When a cow is in heat, she is more active than usual.

These aids cannot take over the dairy farmer’s job, but can be used in addition to visual observation. Other indications may be a sudden decrease in milk production or feed consumption. Clear visual observation remains the most reliable indicator, however.
2. INSEMINATING AT THE RIGHT TIME

Inseminating a cow at the end of the standing heat period or at the start of the late heat period ensures the best results, as is illustrated in figure 2. Inseminating when the cow is still in early heat is useless. Where the insemination is done by an AI technician, all cows which were seen in heat in the morning, should be inseminated later that day. Cows that are still in heat the next morning, should be re-inseminated. When heat is first seen in the afternoon or evening, insemination can safely be postponed until the next morning (AM-PM rule). Where farm staff carry out the inseminations, cows should be served about 12 hours after they were first seen in heat.

- the conception rate will be very low;
- calving intervals of less than 365 days are not advisable.

To achieve the best pregnancy results, a cow must be in perfect physical condition. This means that a cow must be fed according to her nutritional needs and must not have any health problems.

In order to maintain an average calving interval of one year, the average cow should be pregnant 90 days after calving. Therefore, cows should generally be inseminated for the first time between 50 and 75 days after calving.

This usually means the second or third heat after calving.

Figure 2 The optimum time for insemination

<table>
<thead>
<tr>
<th>POOR</th>
<th>FAIR</th>
<th>GOOD</th>
<th>EXCELLENT TIME TO BREED</th>
<th>GOOD</th>
<th>FAIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0hrs</td>
<td>5hrs</td>
<td>10hrs</td>
<td>15hrs</td>
<td>20hrs</td>
<td>25hrs</td>
</tr>
</tbody>
</table>

Coming into oestrus   Stands to be mounted   Going out of oestrus

First observation of standing oestrus

Source: Adas Dairy Herd Fertility

3. INTERVAL FROM CALVING TO FIRST INSEMINATION

Although advancing the date of first service after calving will also advance the average date of conception, it is not wise to serve the cows as soon as possible after calving because:

- all cows need time to restore body reserves in early lactation;
- first-calf heifers require time to establish themselves in the herd before a new pregnancy is proceeded to;

As regards high-yielding cows or cows with fertility problems, such as a retained placenta or endometritis, it may be advisable to postpone the first insemination for a while. Cows which do not show heat within about 60 days after calving should be checked by a veterinarian.

4. REPEAT BREEDERS

Unfortunately not all inseminations result in a successful pregnancy. Sometimes a cow does not conceive at all after several inseminations.
The first insemination should take place between 50 to 75 days after calving. It also happens that cows conceive well, but sometimes the embryo or foetus dies after conception. The loss of a conception during the first 42 days of pregnancy is called embryo death, and foetal death between 43 and 151 days of pregnancy. After this period we speak of an abortion. Embryo loss can happen without any clear visible sign.

It is very important that heat detection is continued after a cow has been inseminated. Especially when no heat signs have been observed 3 weeks after insemination, one may think that the cow is in calf. However, at this time this is not certain yet. Therefore, continued observation should take place at intervals of 3 and 6 weeks after insemination. If the cow comes back in heat (repeats), she should be inseminated again to avoid losing time and money. Cows without any signs of heat should be pregnancy-tested by a veterinarian about 6-8 weeks after the last insemination in order to be absolutely certain that the cow is in calf. This may prevent disappointments. If a cow is not pregnant after several inseminations, one should consider culling the cow. If there are more cows with such problems, it is advisable to contact the veterinarian.

He can detect the cause of these problems, which often are of a managerial nature. The milk production determines whether a cow should be culled or re-inseminated. The choice between giving a cow another chance or culling it because of its reproductive problems should mainly depend on economic considerations, e.g. the milk production and the breeding value of the cow should be taken into account. Problem breeders can be early identified by means of accurate recording and regularly scheduled visits of a veterinarian.
5. QUALITY OF INSEMINATIONS

The person performing the inseminations has a great influence on the pregnancy rate. The best results will be obtained by an experienced AI technician. In hot climates, where cows have a shorter heat period, AI service should be available during the whole day.

Under these circumstances, owner insemination (Do-It-Yourself) often gives better results. However, proper training in AI techniques is essential to obtain optimal results. Monitoring the individual results of the technicians performing the inseminations helps to evaluate and improve the pregnancy results.

Next to the performance of the AI technician, the quality of the semen also has a major influence on pregnancy rates. There is a considerable difference in quality of semen from different bulls. Furthermore, in order to get good pregnancy results, semen should be stored in a regularly tested storage tank.

6. NUTRITION

Good nutrition means the provision of sufficient energy, proteins, minerals and vitamins. Providing a well-balanced ration does not only result in more milk, but also in better reproductive performance. In early lactation, when the milk production is at its peak, it is very hard to adjust the daily dry matter intake to the nutrient requirements of the cow, especially a high-yielding cow.
A cow’s dry matter intake develops slowly during early lactation, and as a consequence an energy deficit per day is common at this time. This deficiency can be made up by mobilising the body reserves, mostly fat and a little protein. Therefore it is important for the cow to have the required level of nutrition during the preceding lactation and dry period. Cows that are (too) fat at calving seem more likely to get problems at calving and to develop insufficient dry matter intake in early lactation compared with cows calving at the right condition.

If the diet of the cows does not contain sufficient green roughage or contains a high level of by-product feeds, deficiencies of vitamin A, phosphorus, copper, cobalt, iodine and/or selenium may arise. This may cause problems in high-yielding cows. It is important that cows continuously have access to good quality minerals of the required composition. Feeding rations with sufficient and good quality roughage, and formulated for correct levels of protein, energy, minerals, vitamins and trace elements will normally result in a short period between calving and first heat.

7. HYGIENE

Good hygiene, especially around calving is essential. Cleaning of the cow’s vulva, birth-ropes and your hands before the calving process and having a clean, disinfected pen for the cow to calve will normally be sufficient. If these things are neglected, uterine inflammation (endometritis) may occur. It affects the cow’s subsequent fertility and it will take longer before the uterus is ready for another pregnancy. Endometritis can be diagnosed by a white mucus discharge from the vulva. It can be treated by a veterinarian, but on the other hand, the uterus may also clean itself naturally when the cow returns into heat.
SUMMARY

For profitable dairy farming it is important to strive for optimal reproductive performance, thereby aiming at a calving interval close to 365 days. In order to achieve these results, the herd reproduction management should be at a high level. Good management is the best guarantee for good results. The basic guidelines for good reproduction management are:

1. practise frequent heat detection, at least three times a day and at least 20 minutes each time;
2. record all data relating to the cow’s reproductive status, predict heats by making use of these records and observe the cow closely at those dates;
3. cows that are seen in heat and are eligible for insemination should be inseminated about 10-15 hours later;
4. most cows should be inseminated for the first time 50-75 days after calving, which is usually the second or the third heat;
5. cows which have been inseminated should be checked for heat at intervals of 3 and 6 weeks after the last insemination;
6. pregnancy diagnosis 6-8 weeks after the last insemination by a veterinarian will give absolute certainty about the cow being in calf;
7. inseminations should be carried out by a trained AI technician;
8. aim at the right body condition at calving;
9. especially in early lactation, cows should be fed well-balanced rations of high-quality roughage and concentrates with the required minerals available at all times;
10. maintain high hygienic conditions at calving.
REFERENCES FOR FURTHER READING

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- Measuring and Improving Reproductive Efficiency of Dairy Herds in the Lower Latitudes, Perdok, MSc dissertation University of Reading, England
- Practical A.I., van Bragt, de Vries, and El Dessouky
- Oestrus Management for Artificial Insemination, Taurus Co-op, Irene, South Africa
Dairy Training Centre Friesland (DTC-Friesland) is established by various Dutch farmers’ organisations and controlled by the Ministry of Agriculture. The Centre conducts a variety of international training-programmes and courses. We also provide consultancy and management services.

All courses have a strong practice-oriented character based on the training concept of **learning by doing**. The practical training is very intensive; one instructor deals with groups of six students and for subjects like milking even with three students only.

DTC-Friesland offers training in the following subjects:

- **Dairy Husbandry**
  * machine-and handmilking, milking machines, milk hygiene
  * feeding, ration-calculation, feedplans, quality of feedstuffs
  * fertility management, heat detection
  * breeding, use of A.I., culling, body conformation
  * housing, tying/cubicle systems, hygiene
  * health, mastitis control, hoofcare
  * calfrearing
  * farm economics
  * farm administration

- **Forage production**
  * pasture management
  * foddercrops
  * silage making
  * farm machinery

- **Milk processing**
  * manufacture of cheese, butter, yoghurt, ice-cream, etc.
  * milk collection and payment systems
  * marketing
  * management of a dairy unit

- **Sheep-husbandry**
- **Dairy goat husbandry**
- **Intensive beef-production**
- **Horse-keeping and animal traction**
- **Teaching-methodology**

Visits to farmers organizations, A.I.-stations, Health and Extension service etc. are integrated in the courses to provide a good picture of the dairy sector in the Netherlands.
AD HOC COURSES

Our major activity is the organization of ad hoc courses on request, preferably for groups of a multiple of six participants. These training programmes are tailor-made and completely designed according to the requirements of the client. The courses deal with one or more of the earlier mentioned subjects. Duration of the courses varies from 1 week to several months.

The courses are conducted in English. For some special subjects training can be provided in French, Spanish or German as well. If facilities are available locally, our staff is prepared to conduct courses abroad as well.

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This course is especially designed for persons in charge of a large-scale dairy enterprise, and includes all aspects involved in managing a dairy herd. The course offers a good opportunity to refresh one’s knowledge and learn about recent developments in dairy-farm management. The course is conducted annually in September/October. However, for groups of at least six persons it can be organized at any time during the year.

TRAINING FACILITIES AND STAFF

The centre has four farms, each with a different management system. One farm is especially equipped for international courses. The total stock at the four farms includes 250 dairy cows, 50 fattening-bulls, 45 dairy-goats, 85 sheep and 12 Friesian horses. Additionally, the centre maintains close relations with twenty neighbouring farms which are used for practical training. Our staff consists of fifty dedicated and well-qualified trainers. All have up-to-date knowledge of modern dairy-farm management, and over 70 man-years experience is present in various dairy development projects throughout the world.

ACCOMMODATION

A newly constructed hostel provides full board and lodging in single or double bedrooms. The hostel provides an international kitchen, and many recreational facilities. Social excursions are organised during the weekends to enable the students to get acquainted with the Dutch culture.

For more detailed information on the activities of DTC Friesland, please contact:

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