

Hanoi 2009



CALF REARING practice



CALF REARING practice

Practical manual for small scale Dairy farmer in Vietnam



FOREWORDS

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 “**Calf rearing practice**” 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.

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!





Vietnam Belgium Dairy Project

F11, No 14, Thuy Khue str., Tay Ho dist., Hanoi, Vietnam
 Tel: (+84) 4 3734 4278 * Fax: (+84) 4 3734 4279
 E-mail: vbdairyproject@vnn.vn



Dairy Vietnam

F11, No 14, Thuy Khue str., Tay Ho dist., Hanoi, Vietnam
 Tel: (+84) 4 3734 6426 * Fax: (+84) 4 3734 4279
 Email: info@dairyvietnam.org.vn
 Website: www.dairyvietnam.org.vn ; www.nganhsuavn.org.vn



**Ministry of Agriculture and Rural Development
 Department of Livestock Production**

No 2, Ngoc Ha str. Ba Dinh dist., Hanoi, Vietnam
 Tel: (+84) 4 3734 5443 * Fax: (+84) 4 3844 3811 / (+84) 4 3843 6802
 E-mail: cn@mard.gov.vn



Belgian Technical Cooperation

F7-F9, No 14, Thuy Khue str., Tay Ho dist., Hanoi, Vietnam	Hoogstraat 147 1000 Brussels - Belgium
Tel: (+84) 4 3728 0571	Tel: +32 (0)2 505 37 00
Fax: (+84) 4 3728 0572	Fax: +32 (0)2 502 98 62
E-mail: vietnam@btctb.org	Email: info@btctb.org



**Federal Public Service Foreign Affairs
 Foreign Trade and Development Cooperation Belgium
 Directorate-Generale for Development Cooperation (DGDC)**

Rue des Petits Carmes, 15
 B-1000 Brussels - Belgium
 Tel: +32 2 501.81.11

CHAPTER 1: INTRODUCTION	10
CHAPTER 2: THE ROLE OF GOOD CALF REARING PRACTICE	12
1 Why calf rearing is important	12
2 The digestive system and rumen development	14
2.1 The stomachs of calves and cows	14
2.2 In which stomach milk is digested?	15
2.3 The link between rumen development and profitability	17
2.3.1 The role of starter mix in rumen development	19
2.3.2 The role of hay in rumen development	22
CHAPTER 3: CALF REARING PROTOCOL	24
1 Preparation before calving	24
1.1 The calving area	24
1.1.1 Design and emplacement	25
1.1.2 How to use	25
1.1.3 In between two calving	26
1.2 The calf cage	28
1.2.1 Design	28
1.2.2 Emplacement	29
1.2.3 How to use	30

Authors: Didier Tiberghien, Ngo Tien Dung, Pham Kim Cuong and Raf Somers

Designed by Compass JSC

Tel: (04) 6269 6761

1.3	Other preparations before the calf is born	31
2	Calving down	31
3	Care after birth	33
3.1	Milk	34
3.1.1	Colostrum	34
3.1.2	Milk replacers and fresh milk	39
3.2	Housing	44
3.2.1	From birth till 21 days	44
3.2.2	From 21 days till 6 months	44
3.2.3	Housing from 6 months up to 15 months (mating)	47
3.3	Feeding from birth till heifer	48
3.3.1	Feeding from birth till weaning	48
3.3.2	Feeding: from weaning up to six months	51
3.3.3	Feeding from 6 months up to 15 months (mating)	52
4	Identification (ear-tag, profile) and Dehorning	53
4.1	Ear-Tag and profile	53
4.2	Dehorning	53
5	Health management	54
5.1	Vaccination and deworming	54
5.2	Diarrhea	54
5.3	Esophageal feeder	58
CHAPTER 4:	WEIGHT GAIN AND GROWTH RATES OF THE CALVES	59
1.	Target weight	59
2.	Keep your calf growing: use startermix	61

Chapter 1 . INTRODUCTION



Good calf rearing practices are the foundation of building out a good performing dairy replacement herd.

Farmers should always think from the calf's point of view! That means that the farmer needs to think: "what does my calf need". Calves have different primary needs which need to be taken care of, if you want to raise calves in a good way.

- Feed
- Water
- Environment
- Comfort



The farmer should have a critical eye, observe the calves' behavior and react on the signals the calves give. A good farmer understands what a calf is "telling" him. A farmer needs to observe analyze, improve and react.

"A good calf rearer knows which calf will get sick tomorrow"

Calves need to receive individual attention and care from the early beginning, which means right after birth. Not enough attention has been given by trainers to make farmers aware of the importance of calf care. There is a direct link between good calf care and a higher milk production when the calf becomes an adult cow.

"Good calf rearing practices is having long term ambitions"

The experience learns that in Vietnam calf mortality is often too high and that calves get all sorts of diseases during the rearing period. Obviously this affects the productivity and the durability of the herd.

"A good start is half of the work done!"

In this practical manual we will explain the techniques of good calf management, point out some innovations and give guidelines to raise healthy and high performing calves. Throughout this manual the reader can find "boxes" and notes. The "boxes" are summarizing what has been said in the last paragraph, while the notes give additional information.

Chapter 2.

THE ROLE OF GOOD CALF REARING PRACTICE



1. Why calf rearing is important

“The calves of today are the milking cows of tomorrow!”

This is the state of mind in which farmers have to raise their calves.

- Farmers have to know that by giving their calves individual care and proper attention, they will be able to earn more money
- It has been proven that calves which have been raised in a good way have a higher life time production. Generally spoken, they produce more milk and they live longer
- Good care will also result in healthier calves and less dead calves on the farm. Besides, it will reduce the costs for the veterinarian and the cost for medicine
- Happy calves which are taken care of will develop and grow as expected. A calf that is not growing too fast but also not growing too slow can be inseminated at the right weight and at the age of 15 months. Thus, this will result in an early first calving down (24 months)

In Vietnam calves are given fresh milk up to 90 days for the total volume of 440 liters from birth till weaning. Fresh milk is costly and farmers are actually milking their cows to sell the milk and not to give such a large volume of milk to their calves. So the sooner the calf can be weaned, the more money can be saved.

In this manual alternative techniques will be introduced such as the use of starter mix and milk replacers, in order to wean the calves more rapidly and in order to maximize the economical benefits for the farmers.

Good calf rearing practices **WHY?**

- Good growth
- Healthier calves and less dead calves
- Less costs for veterinarian and drugs
- Increase life time production
- First insemination at 15 months and first calving at 24 months
- Sell more milk and be cost efficient

How can a farmer make more money?

Wean more early → More milk can be sold

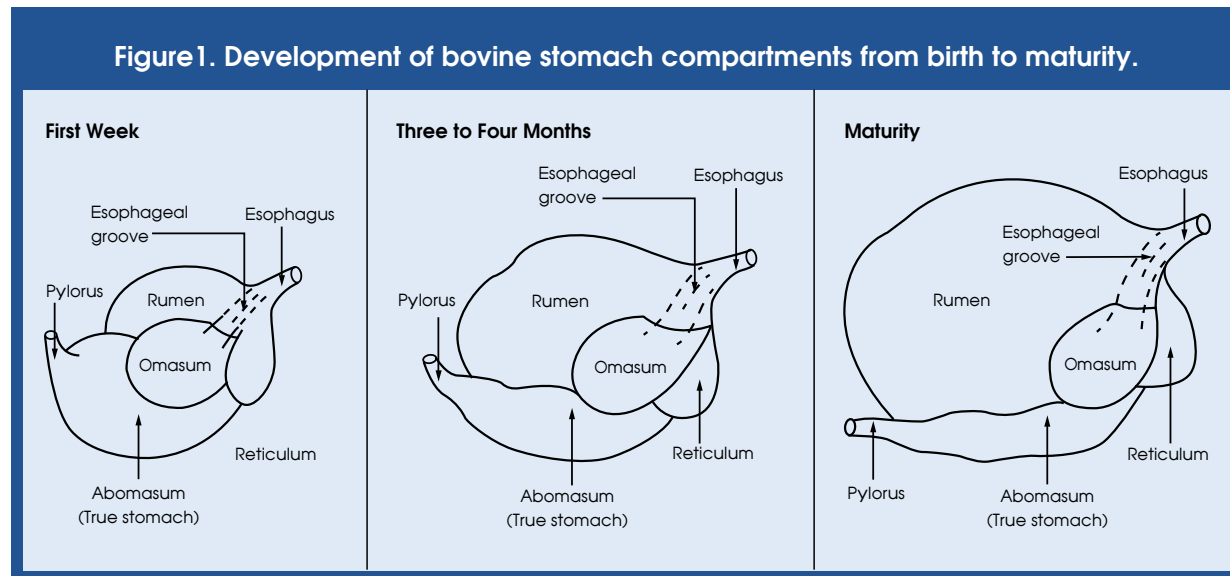
Use milk replacer → More milk can be sold

2. The digestive system and rumen development

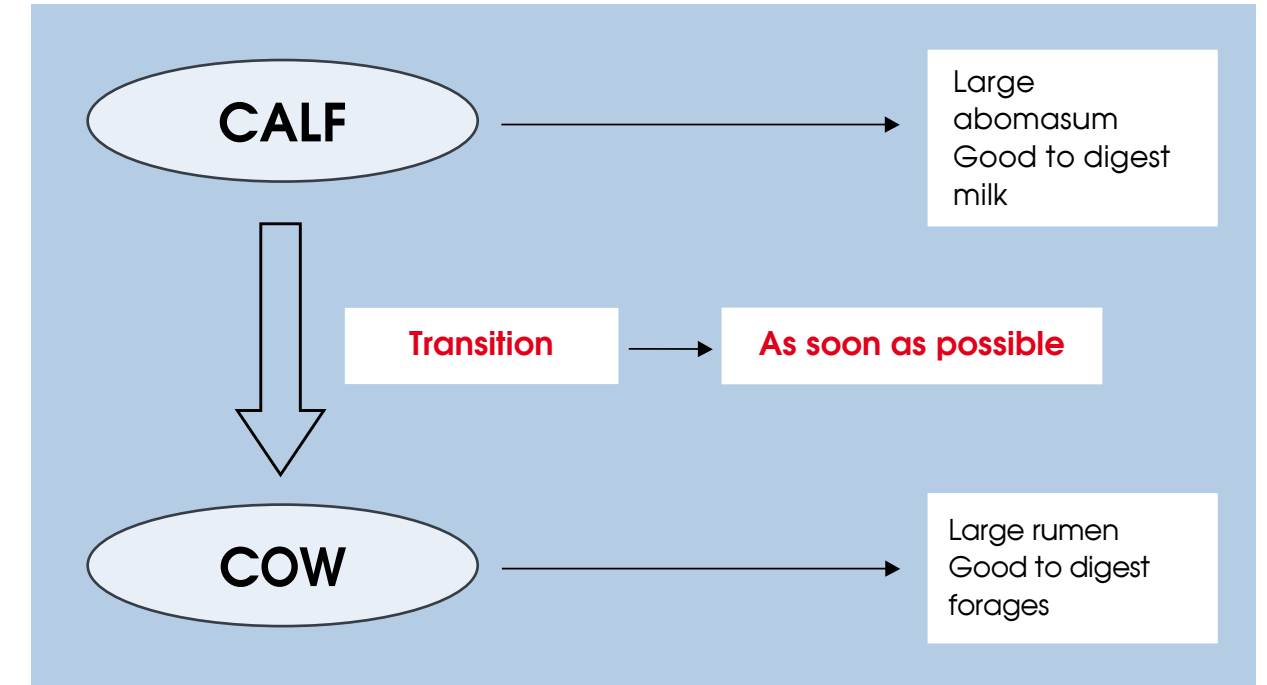
A calf is not born as a ruminant. The rumen only develops when the calf eats solid feed. The sooner the calf becomes a ruminant, the cheaper the rearing costs.

2.1 The stomachs of calves and cows

When a calf is born the four compartments of the digestive track are not fully developed as in a mature cow (cfr. picture). Calves have a large abomasum and the rumen is not developed yet. In adult cows it is the opposite, their rumen is large and the abomasum is small. A developed rumen is necessary to digest forages and structure rich feeds. Consequently, the calf cannot digest forages in its first weeks after birth. That means that the calf mainly depends on expensive milk to fulfill its high nutritional demands, in order to grow and to keep its body temperature up to the mark.



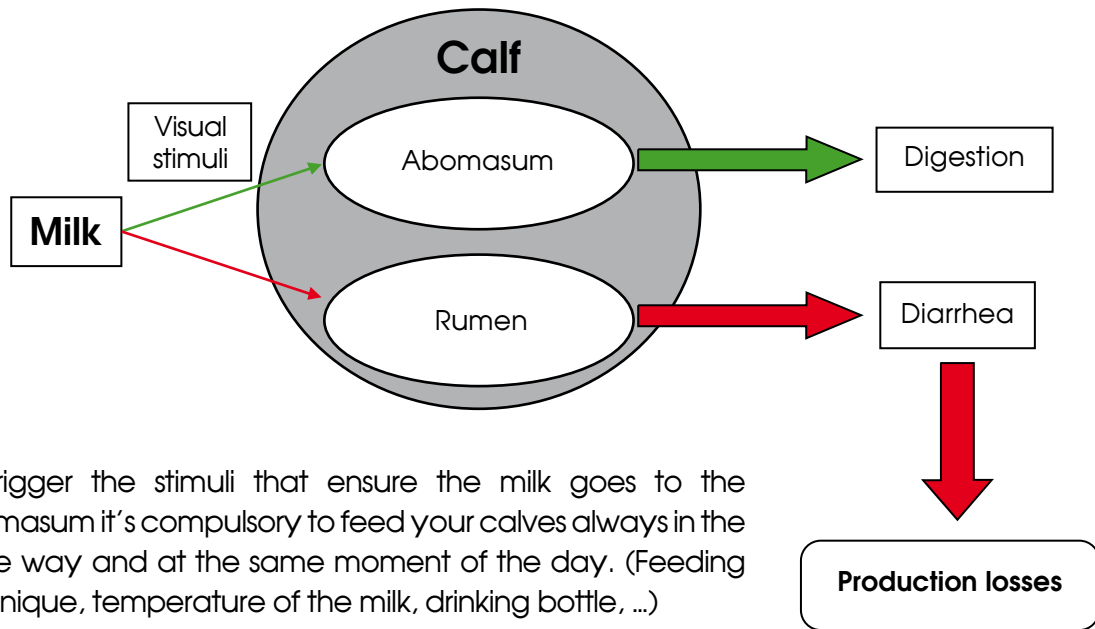
The goal of good calf feeding:



2.2. In which stomach milk is digested?

Milk can only be digested in the abomasum of the calf. So, the trick while feeding milk is to bypass the rumen and ensure that the milk flows straight to the abomasum. The milk bypasses the rumen through an esophageal groove that closes when the calf drinks.

The closure of the groove is a reflex stimulated by visual stimuli that are associated with feeding. If the milk flows to the rumen and not to the abomasum, the milk can not be digested. Consequently it will start rotting and cause diarrhea.



To trigger the stimuli that ensure the milk goes to the abomasum it's compulsory to feed your calves always in the same way and at the same moment of the day. (Feeding technique, temperature of the milk, drinking bottle, ...)



Copying the natural behavior of calves while feeding them reduces the risk that milk ends up in the wrong stomach. By using a drinking bottle and feeding the milk at the right temperature you imitate the natural drinking circumstances.

2.3 The link between rumen development and profitability:



"Rumen development is the key point of economical calf rearing. Consequently, the rumen needs to develop as soon as possible"

Milk is very expensive and the less milk is given to the calves the more money can be saved. The rumen of the calf needs to be more or less developed before milk feeding can be stopped. The sooner the rumen develops the more money can be saved.

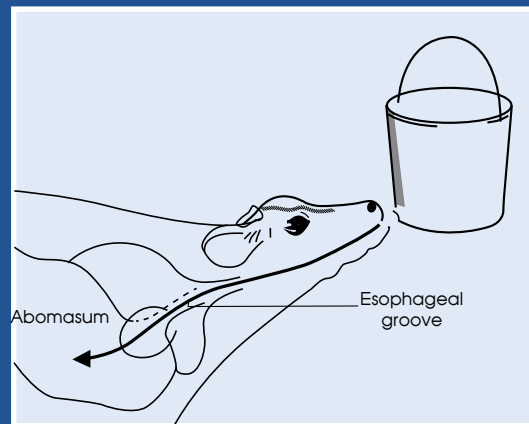
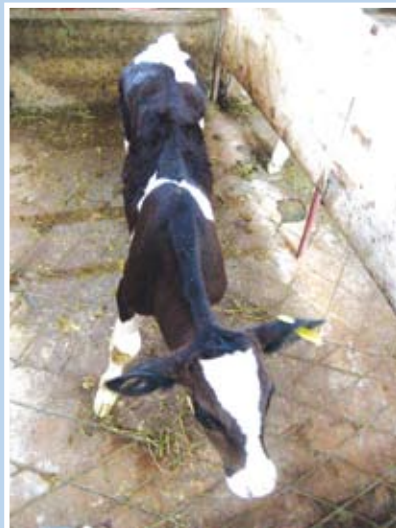


Figure 2. Muscular folds of the reticulorumen form the esophageal groove and direct milk to the abomasum.

How can we develop the rumen as soon as possible?

- Provide **starter mix** at 3 days after calving.
- Provide **high quality hay** 4 days after calving.



Training picture: Manager what do you see?

The development of the rumen is poor. Try to assess the reasons of the the poor rumen development and try to solve the problem. A farmer should think critically and build up his reasoning from the calf's point of view. Is this a problem that only occurs for one calf or does the farmer always has that problem?

- If it's only one calf than it might be that the calf has been sick or that it is not eating enough starter mix
- If this is a general problem you should also think about environmental factors like calf comfort, barn constructure,...



The development of the rumen needs to be evaluated as the key parameter in calf rearing.

Assesing and evaluating the condition of the rumen needs to be done weekly. At the same time the farmer can check and evaluate the health of the calves and if they grow appropriately.

2.3.1 The role of starter mix in rumen development:



Note: Which startermix can be used?

Unfortunately farmers have to order large amounts of starter mix before feeding companies are willing to make it. Thus as a small scale farmer in Vietnam it is difficult to procure starter mix that is specially designed for calf rearing.

Overall requirements for starter mix:

The starter mix is adapted to the needs of the calf and is specially composed by feeding companies

- Pelleted
- Crude Protein preferably 18 %
- Fresh and attractive
- Palatable
- High digestibility
- No urea

- An alternative solution could be concentrate for piglets, which is widely available in Vietnam. If concentrate for piglets is not available you can still use regular concentrate for cows. Although the content in crude protein is lower (about 14 - 16 % C.P) which is less favourable
- Never mix the starter mix and the milk together: Starter mix should end up in the rumen, while milk should end up in the abomasum of the calf. If the starter mix is mixed with the milk it will bypass the rumen and end up in the abomasum

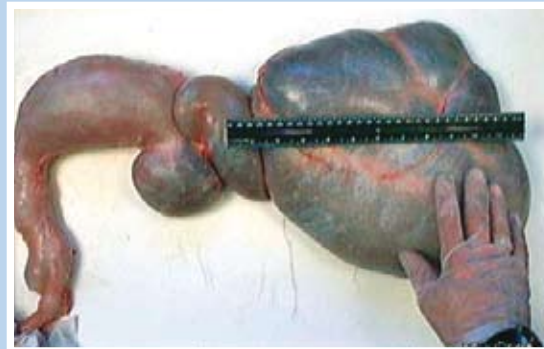
Note:

- When the intake of solid feeds increases, the calf consumes more water. Always provide enough fresh, cool and clean water, also during the night.
- Store the starter mix in a dry, cool place away from animals and insects (mice, rats, flies,...)

Rumen development: milk vs. starter mix



Rumen development of a calf of six weeks old only fed on milk



Rumen development of a calf of six weeks old fed with milk and starter mix

The rumen of the calf that is fed with only milk is considerably smaller than the calf fed milk and grain. The grain-fed calf has a healthy, darker colored rumen which stands for a proper development of the rumen.

Training picture: Manager what do you see?



- Three buckets are attached in front of the cage and they are easy to access for the calf.
- The buckets are clean and obviously cleaned regularly to avoid deposits and contaminations with bacteria.
- Water, hay and starter mix are provided. The water seems fresh, clean and tasty to drink. But the starter mix that is provided is not pelleted. Pelleted starter mix is indispensable to develop the rumen of a calf.

2.3.2. The role of hay in rumen development:



Both, starter mix and hay are important in stimulating the development of the rumen. Although the availability of starter mix is the more crucial, the role of good quality hay can not be denied. It preferable to feed hay instead of fresh grass. Hay contains more structure which will stimulate the locomotion of the rumen and build up the muscular layer of the rumen. Hay rather than fresh grass has a bulk function, so the rumen will be able to increase in volume.

Which hay can be used?

- High quality
- Fine stemmed
- Not dusty
- Palatable, attractive
- Good structure
- High digestibility



Natural grasses



Guinea grass



Avena



Australian mix

“Hay for calves should always be of high quality!”

An example of good quality hay is fine stemmed alfalfa which is rich in proteins and supplies the required structure the calf needs to develop its rumen. Nevertheless, alfalfa is difficult to buy in Vietnam. As an alternative farmers can make hay of:

- Australian mix
- Avena
- Guinea grass
- Natural grasses

→ These grasses can be used to make calf hay on the condition that they are cut in a young stage.

CALF REARING PROTOCOL

1. Preparation before calving

“Calf rearing starts at the moment of calving down!”

To avoid contaminations and to reduce the risks of infection from cow to calf, it is important that the calving is regulated in a fixed protocol. This calving protocol has two main purposes.

- Protect the calf against possible contaminations
- Give a good start to the lactating cow

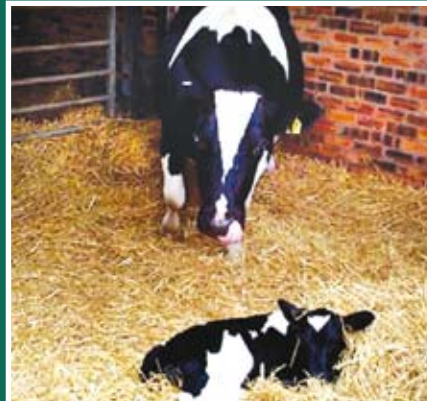
1.1 The calving area

“A healthy calf from a healthy cow should be born in a healthy environment!”

A suitable calving area is important for the cow (to avoid injuries, infections of the uterus,...), for the calf (to avoid infections with E. coli, salmonella, Para tuberculosis from the other cows in the barn) and for the farmer (to have enough space to assist with the calving).



A good example of a calving area. Comfortable for the cow and for the farmer, lots of straw, enough space to assist the calving, a relaxed environment, a dry and hygienic area.



A newborn calf in the calving area that is being licked dry by the mother cow.

Requirements for a good calving area:

1.1.1 Location and Design

- Calm place
- The calving area should be easy to clean and easy to disinfect
- The design of the calving area should be thus that there cannot be physical contact with the other cows
- The ventilation and the light in the calving area need to be sufficient
- The surface of the calving area needs to be at least 10 m². Ideally the dimensions are 3 x 4 m (12m²)
- Fresh, cool and clean water needs to be accessible all the time

1.1.2 How to use

- The calving area needs to have a generous coating of rice straw (on the floor) in order to improve the calving and prevent the cow from slipping
- Make sure that the calf is protected against draft, especially during the winter
- The cow needs to enter from 12 to 24 hours in advance, and stay from 24 to 48 hours after calving down in the calving area
- If possible, don't use the calving area for other purposes. Avoid using the calving area to house sick cows, in order to avoid cross contaminations of diseases
- The cows need to be cleaned (washed), before entering the calving area. It doesn't make sense to prepare the calving area as hygienic as possible, and then still bring in dirty, unwashed cows

1.1.3 In between two calving

In between two calvings, the calving area needs to be cleaned

- Remove all the straw and the manure
- Clean with water
- Disinfected thoroughly with a 3 - 5% formalin solution
- Let it dry out completely
- Put in new straw

Note:

- The location and the design of the calving area should ensure the easy removal of the manure
- On big farms, where cows can calf down at the same time, it's necessary to have several calving areas. The number of calving areas depends on the calving pattern of the farm

Training picture: Manager what do you see?



This could be a suitable calving area. There is enough space, if the separations are removed. The rice straw and manure can be cleaned easily. But the main comment on this calving area is the lack of hygiene. If this place is not cleaned thoroughly and disinfected accordingly it can never be justified as a calving area. Further more this calving area is not ready to receive a cow that is going to calf down. A good calving area should be ready at any moment to bring in a cow that is going to calf down.

Calving area: WHY?

- For the calf: avoid infections and safety
- For the cow:
 - avoid infections
 - avoid injuries
 - relaxed calving down
 - good start of lactation
- For the farmer: comfort

Requirements for the calf cage:



1.2 The calf cage

The calf will stay the first 20 days of its life in a calf cage, after that it will be moved into an individual pen.

1.2.1 Design:

- Dimensions: Length*width*height (incl. feet): 110 cm*75 cm*105 cm
- The floor can be made of wood or plastic. The direction of the floor lattice should be crosswise in comparison with the length of the cage. The space in between two floor boards should be: 1,5 to 2 cm
- The cage should not stand on the floor but need to be provided with feet. The height of the feet should be: 30 cm
- No sharp edges can be found inside the calf cages, to avoid injuries
- In the front of the cage three baskets are needed. One for water, one for starter mix and one for hay. The baskets should be attached on the cage and they must be easily accessible for the calf



- Distances of the straight bar (top to down) in the left and right sides is about 15cm
- In the back side of the cage is the gate to enter and remove the calf

Note:

Please do not use an iron net (4 x 4 cm) as floor. It often causes injuries to the calf's legs

1.2.2 Emplacement:



- Contact with other cows should be avoided. Therefore the cages need to be placed in a barn where no other cows are present. The space in between the cages needs to be at least 50 cm
- Physical contact should be avoided, but the calf needs to see the other calves
- The calf cage needs to be placed in a well ventilated space, but not in a drafty environment

1.2.3 How to use:

- Provide sufficient bedding (straw) in the calf cage
- In order to avoid draft at the calf's level, a wooden plate can to be attached on both sides of the calf cages

Training picture: Manager what do you see?



The calf looks healthy and strong but it has a problem with the navel. This could be the result of not disinfecting the navel properly after birth

Training picture: Manager what do you see?



This calf cage is not suitable for young calves.

- The space in between the bars of the cage is too narrow. The calf can stuck his leg and get injured or even break its leg.
- The floor of this cage is also not up to the requirements, because the space in between the wooden floor panels is not enough to drain the urine.
- The rice straw will remain too wet to keep the calf dry. Especially during the winter times it's important to avoid lung problems. The feet of the cage should also be higher.

1.3 Other preparations before the calf is born:

- Make sure starter mix is available (cfr. Chapter 2.3.1 The role of starter mix in rumen development)
- Make sure hay is available (cfr. Chapter 2.3.2 The role of hay in rumen development)
- Make sure milk replacer is available (cfr. Chapter 6 fresh milk and milk replacers)

2. Calving down



- From 12 to 24 hours before the calving the cow need to be brought to the calving area. Wash the cow before entering the calving area.



- Pay attention to hygiene in general:
 - Always wash your hands before helping with the calving.
 - Wash off the rectal-vaginal area before the cow calves down.
 - Give the cow some tranquility during the calving, especially for heifers.
 - Assist to the calving if it is really necessary (difficult calving, complications). E.g. if the positioning of the calf is back to front.

Training picture: Manager what do you see?



The calf is born in unhygienic circumstances. The calf is not born in a calving area. The cow is dirty. There is a high risk that the calf will be contaminated with diseases and have diarrhea in its first weeks after birth.

Note:

Specific attention is required from the farmer, in order to notice when the cow is about to calf down. Of course, an adequate recording system is an indispensable and crucial tool in this process.



Navel dipping right after birth



Navel dipper and iodine

3. Care after birth:

Immediately after calving down the calf must be:

- Removed from the cow and dried off with straw or towels
- The navel must be disinfected immediately after birth with a solution of 7% Iodine. A teat dip cup can be used to disinfect the navel.
- Clean away the mucous from the nose and the mouth
- Make sure that breathing is initiated, especially after a difficult birth. This can be done by tickling on the calf's nose, by pouring cold water over the calf's head or by holding the calf upside down
- Examine the calf for injuries and birth defects.
- Peel off the hoof
- Put the calf in the calf cage and provide the calf cage with a thick layer of rice straw, in order to keep the calf dry and warm. Renew the rice straw regularly in order to keep the calf dry (at least every two days).
- Make sure that the calf is properly identified. Obviously this is important for the data recording

3.1 Milk



3.1.1 Colostrum

Role of colostrum:

- First of all, feeding colostrum is very important to protect the calf against infections in the intestines and in the lungs
- Secondly, it provides the nutrients and energy to fulfill the needs of the calf during its first days

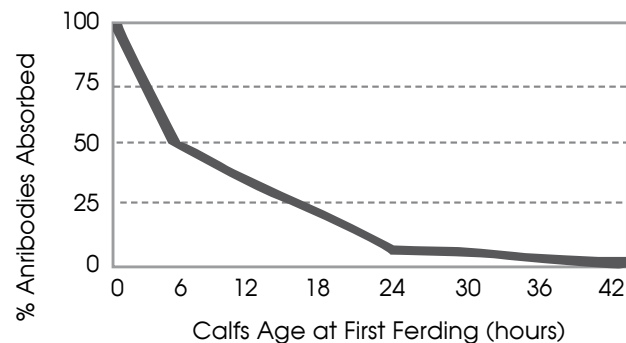
Feeding colostrum:

"Inappropriate colostrum feeding is one of the main reasons of calf diarrhea and production losses"

The four key points in terms of colostrum feeding are **Fast, Frequently, Much and Fresh.**

① Fast:

Building up the passive immunity of the calf depends on the adsorption of antibodies in the calf's blood. Six hours after birth the ability of absorbing the antibodies through the calf's intestines is already reduced with 50%.



② Frequently:

The volume of the calf's abomasum is limited. So, in general it's better to feed the calf three times 1,5 liter than two times 2 liter.

③ Much:

The calf should be fed enough colostrum in order to build up a maximum immunity.

④ Fresh:

The colostrum of the first milking has the highest quality.

How to feed the colostrum:

- Use the drinking bottle. (Cfr. Bottle feeding techniques).
- The temperature of the colostrum is essential (39 - 40°C). Thus it needs to be provided immediately after the milking.
- 8 - 10% of the body weight of the calf (at birth) needs to be fed within the 12 hours after birth.
- The first meal need to be given 30 minutes after birth (1,5 to 2 l).
- The second meal need to be fed after 6 to 9 hours.
- Colostrum must be fed from day 1 till day 3 (8 - 10 % of the birth weight/day).
- Normally the calf will be fed two times a day. But never force the calf to drink
 - If it cannot drink the amount of colostrum in two times, it should be fed in 3 or 4 times
 - If too much colostrum is fed at once, the colostrum will flow back to the rumen and starts to rot. This should be avoided at any time because it will cause diarrhea and production losses

Note:

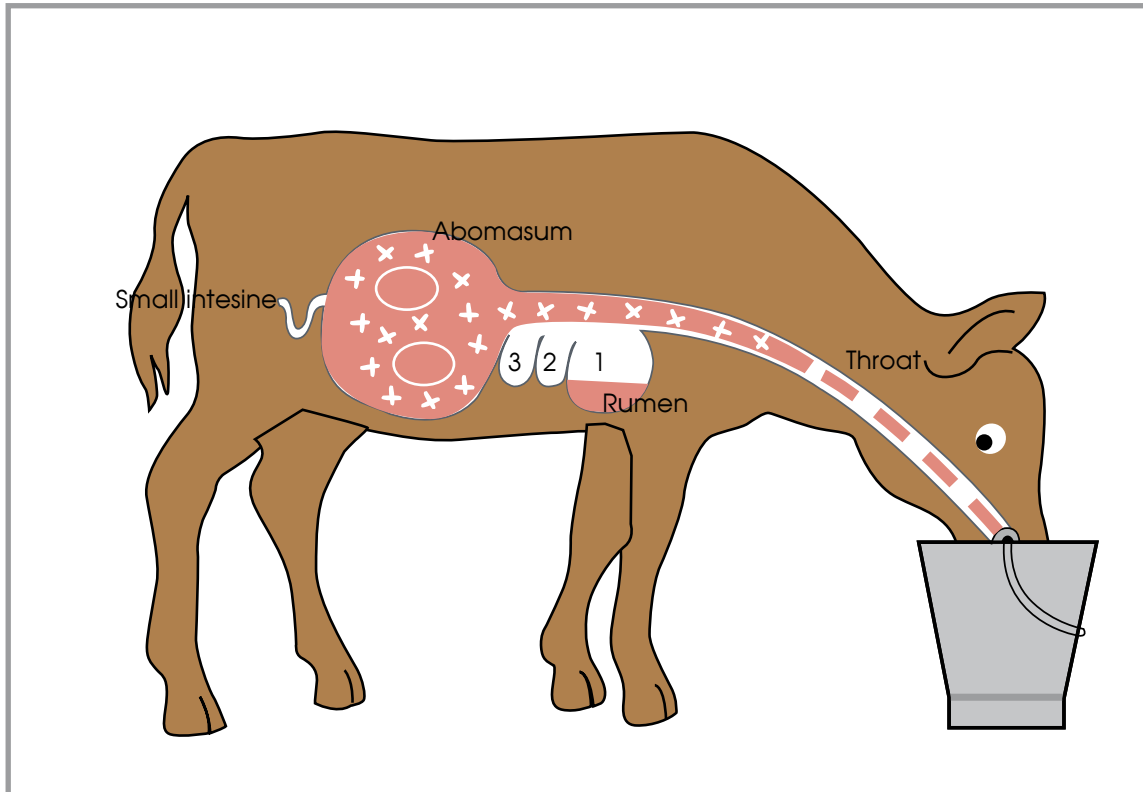
- The cow needs to be milked immediately after giving birth to the calf
- The highest quality colostrum is this from older cows, because they have already encountered different diseases
- If the cow doesn't have colostrum right after it calved down, the colostrum from other cows or refrigerated or frozen colostrum can be used
- Store and use colostrum
 - Store colostrum in refrigerator for 1 week
 - Warm up the colostrum in a warm water bath of 40-45°C until it has a temperature of 40°C
 - Colostrum can also be frozen and kept in the freezer for 2 to 3 years at -20°C. Colostrum can be frozen in portions of 1 to 2 liter. Defrosting the colostrum needs to be done in a warm water bath of 40-45°C ("Bain-marie"). The antibodies are disintegrating at temperatures of 50°C
 - Always label the colostrum properly with the identification number of the cow and specify when the colostrum has been milked (e.g. cow N^o 5643, colostrum of the 4th milking, 2 day after birth)



Bottle feeding technique:

- When you provide colostrum the overall hygiene of the drinking bottle is very important. So, clean the bottles after every use
- Use the colostrum immediately after milking
- Provide the milk as it is shown in the picture. Try to copy the natural drinking position of the calf in order to stimulate the enclosure of the esophageal groove
- Pour out the milk little by little and not too violently, in order to let the milk flow through the esophageal groove that goes straight to the abomasum

Training picture: Manager what do you see?



The drinking position of the calf is not natural. The risk that the oesophageal groove is not closing is higher compared to a more natural drinking position. If the milk flows to the rumen, it will start rotting and cause diarrhoea.

3.1.2 Milk replacers and fresh milk:

Feeding colostrum is necessary from birth up to the fourth day. After this period the calf can be fed milk replacers instead of whole milk.

① Why using milk replacers:



Milk replacers are cheaper: The main reason why milk replacers are interesting is because they are much cheaper than whole milk although they contain all the required nutrients for the calves.

Farmers can sell more milk: Farmers should think like businessmen, which mean decrease amount of fresh milk for calf, increase quantity of milk to sell.

Example: The price of fresh milk of 7200 VND/ kg, the price of milk replacer is a half so that increases income from fresh milk sell to factory.

② How to prepare milk replacers:

There are different kinds of milk replacers. Each milk replacer is slightly different. To make milk replacers it's necessary to follow the protocol described on the bag.

Although the protocol for making the milk is not the same for the different milk replacers, the key points of preparing milk replacers are the same. Two things are very important: the proportion of water to milk powder and the temperature of the milk.

Note:

- Hygiene is important to avoid diarrhea! Make sure that all the materials are cleaned properly after use and ready for the next feeding
- Store the milk powder in a dry, cool environment away from any rodents or insects (rats, mice, flies,...)
- Always feed milk in the same way (feeding technique) at the same time of the day (morning and evening) and at the same temperature
- The presence of milk replacers in fresh milk is easy to detect by the processing companies. The taste of the milk changes, the density changes and even the smallest amount of milk powder in the milk can be detected by fluorometry measurement. Thus, never try to sell fresh milk mixed with powder milk to the milk collection point. The consequences can be severe.



Dụng cụ để pha sữa

Proportions:

The proportion milk powder to water is always indicated on the label of the bag. E.g. 1/7 or 1/8. A proportion of 1/7 means that with for 1 kg of milk powder you need 7 kilograms of water (or 7 liters) to make 8 kg of milk replacer. Always respect these proportions carefully.

Use a precise measuring beaker for measuring the water and a small weighing scale (2 kg) to weigh the milk powder.



Temperature:

- The temperature of the water should always meet the requirements. To check the temperature of the water a thermometer needs to be used to make sure it's up to the mark
- Always use sanitized water to make milk replacer. Disinfect your water by boiling the water for a few minutes. After that you can let the water cool down until the required temperature to make the milk

Mixing:

- Pour warm water in a bucket
- While stirring the water put powder milk into the bucket
- Mix well until the powder is diluted
- Feed the milk replacer immediately to the calf, to avoid reduction of the temperature
- The temperature of milk replacer should be 39 - 40°C
- Use a bottle to feed the calf

How to prepare milk replacers:



Step 1: Weigh the right amount of milk powder on a precise weighing scale.



Step 2: Take the corresponding amount of hot water by using a measuring beaker.



Step 3: Pour out the milk powder little by little and mix it through the water.



Step 4: Check if there are no lumps or rests of powder in the milk.



Step 5: Feed milk replacer to the calf by milking bottle.

3.2. Housing



An example of an individual pen. Each pen is separated. Three buckets are available for water, hay and starter mix. Unfortunately, there is no rice straw nor rubber mat on the floor. This decreases the comfort for the calf.

3.2.1 From birth till 21 days:

- From birth up to the age of 21 days the calf will stay in a calf cage. (Cfr. Care after birth)
- When calves are housed individually they can be followed up more closely for feed intake and for health
- By housing the calves individually, farmers will also be able to anticipate more quickly to any problem that may occur.

3.2.2 From 21 days till 6 months:



Nuôi bê theo nhóm

- If there are different calves, it's recommended to house them in individual pens
- Group housing is an option, but it has some disadvantages
 - Calves can not be monitored as well as in individual pens
 - Housing them in group increases the risk of cross contaminations when one of them gets sick
 - Furthermore at that age (and especially under restricted feeding regimes) navel sucking can be a problem

Requirements for individual pen:

Design:

- Dimensions: At least 1,5 x 2 meter
- An area to lay down (with rice straw) on one side and a feeding area on the other side
- Three buckets (containing water, concentrate and hay) need to be attached on the pens

Emplacement:

- The calves need to be separate from each other; physical contact between the calves should be avoided
- Calves still need to see each other, especially when they are eating. When calves see another calf eating it stimulates them to eat

How to use:

- Do not bind the calf but let it roam around freely in his pen.
- Provide a generous layer of rice straw on the floor; it keeps the calf warm, dry, clean and it increases the comfort. It reduces stress and decreases the risk of sick calves, especially during the winter
- Refresh the rice straw regularly.

What do you see in this picture?



- Keep the calves in group
- Lack of feeds and drinking water
- No rice straw in the floor

Note:

- As an alternative for straw, rubber mats can be used to increase the comfort
- Calves don't need to be cleaned too often. Once a week is more than enough. If straw is provided the calf will keep itself clean. In that case, there is no need to clean the calves at all
- The floor of the pens only needs to be cleaned once a week. After cleaning, let the floor dry before new rice straw is put in. When a calf moves to the group housing facilities (4 - 6 months) the individual pen needs to be disinfected with formaline
- When the pens are cleaned by a water hose, always spray away from the feeding trough to avoid contamination of the feed

What do you see in this picture?



These calves are young calves of an age inferior to 6 months. They should be able to roam around in their pens for a healthy growth (muscles and bone strength). The floor is too wet which is favourable for infections

- A solution is to put rice straw on the floor. Another solution could be the use of rubber mats, but they are more expensive and bacteria cummlate under the mats if they are not cleaned accordingly. In this situation it is unlikely that the calfs wants to lay down when they are not eating.
- They get semi-dried high quality grass, but the grass is not chopped. This will result in a lower grass intake.
- No water is available.

3.2.3 Housing from 6 months up to 15 months (insemination):

- Calves are staying in an individual pen till the age of 6 months, after that they are moved to grow out facilities. In this period group housing is recommended
- Let your calves roam around freely

3.3. Feeding from birth until heifer

3.3.1 Feeding from birth till weaning

- Colostrum and milk replacer
 - Feed colostrum for at least three days (cfr. feeding colostrum).
 - From the 4th day on the calf should be fed with milk replacer. (cfr. milk replacers and fresh milk).
- From the first day on the calf is provided with cool, clean, fresh and tasty water (also during the night). Refresh the water regularly to avoid standing residues in the buckets. These residues can cause diarrhea
- Provide feed ad libitum from the 3rd day
 - High quality hay needs to be available at all times (ad libitum feeding).
 - Starter mix (pelleted) is fed ad libitum until weaning.

The aim of early calf rearing

- Is to develop the rumen of the calf as soon as possible.
- Starter mix is the key in the development of a cow's rumen. So, the sooner the calf starts eating the starter mix, the sooner the calf can be weaned.
- If the calf does not start to eat the starter mix at the 5th day, the calf needs special care and need to be hand fed! From the 7th day on a measurable intake of starter mix should be noticed. Always provide enough starter mix of a good quality. So, refresh the starter mix in order to keep it attractive for the calf.
- The amount of milk replacer that needs to be fed depends on the type of milk replacer and the age of the calf. Please follow the product label carefully. The weaning date also depends from product to product. Follow the protocol on the label carefully.

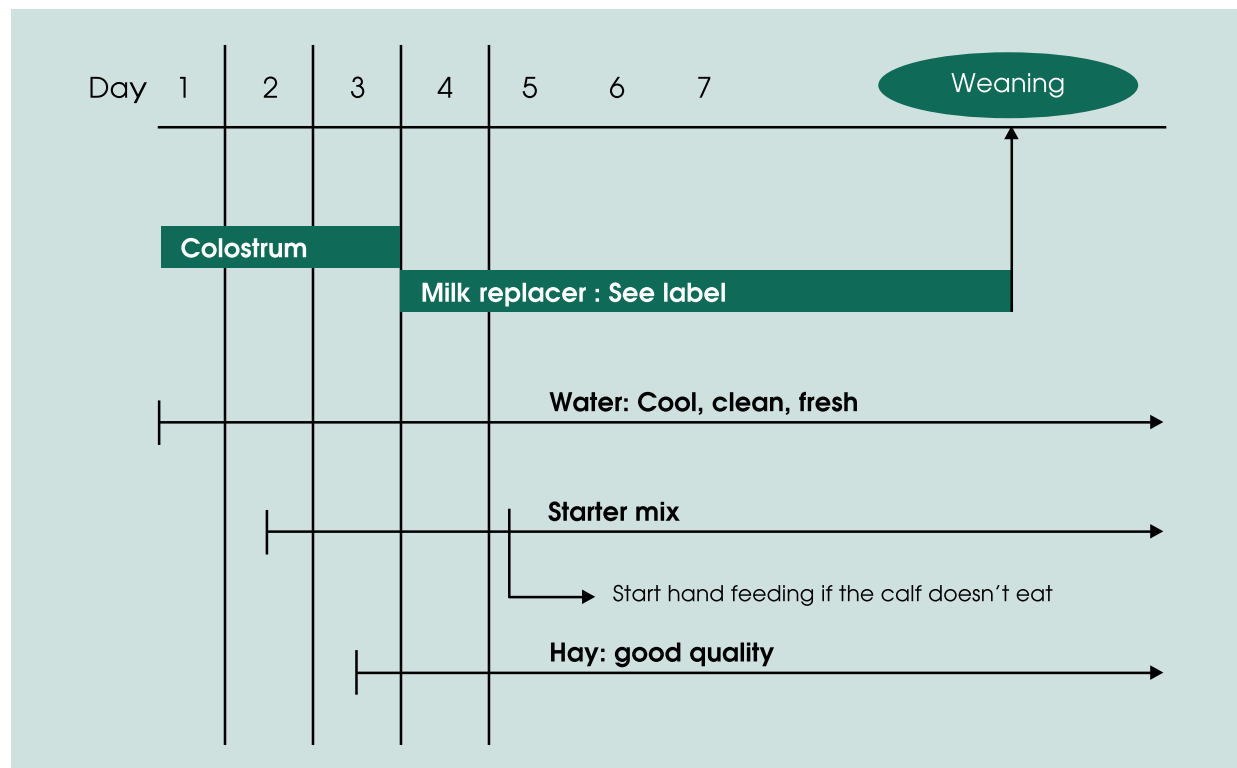


Hand feeding the calf by putting two fingers in the mouth and putting the starter mix into the mouth.

Note:

- Rearing calf in the cage until 21 days
- Never feed urea in this period

Overview: Feeding practices from birth until weaning



Alfalfa hay



High quality grass



Starter mix



Mineral lick block

3.3.2 Feeding: from weaning up to six months:

The calf is weaned so the feeding of milk is stopped. But the rumen of the calf is not fully developed yet. It usually takes 4 - 6 months before the rumen is completely developed

- **Water:** ad libitum
- **Hay/Fresh forages:** ad libitum
 - High quality
 - Different kinds (Australian mix, Guinea, Avena, Para grass)
 - Semi sundry the forages to increase the intake
 - Alternate the feeding of fresh and semi-dried forages
 - Chop the forages to increase the intake
 - Forages and starter mix can be mixed together to increase the intake
- **Starter mix:** ad libitum until 2kg
 - Pellet
 - Crude Protein content of 18% up to 4 months.
 - After 4 months Crude Protein content of 16 % (unless the forage quality is extremely poor)
- **Provide mineral lick blocks**

Note:

- The highest quality of hay should be maintained up to 6 months (fine stemmed, not dusty)
- The rumen of the calf is still not fully developed. So, never feed urea in this period. Only adult cows with fully functioning rumens can get urea
- Feeding silage is also not recommended in this period

3.3.3 Feeding from 6 months up to 15 months (mating):

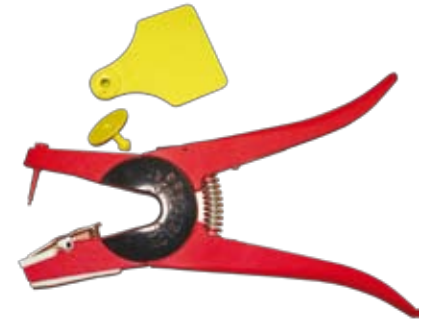
In this period the rumen of the calf should be fully developed and the calf is able to consume adult cow's feeds.

- **Water:** ad libitum
- **Hay:** ad libitum
- **Fresh grass:** ad libitum
 - High quality
 - Different kinds (Australian mix, Guinea, Avena, Para grass).
 - Semi sundry the forages to increase the intake.
 - Alternate the feeding of fresh and semi-dried forages .
 - Chop the forages to increase the intake.
 - Forages and starter mix can be mixed together to increase the intake.
- **Starter mix:**
 - Crude Protein content of 14-16%
- **By products:**
 - All kind of crop residues can be fed as a by products.
 - Molasses can be added on top of the forages to increase the palatability.
 - Silage can be fed.
- **Provide mineral lick blocks**

4. Identification (ear-tag, profile) and dehorning

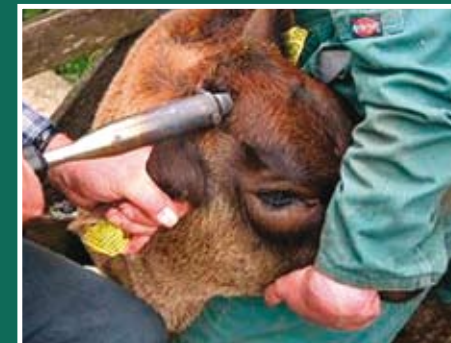
4.1 Ear-Tag and profile:

Immediately after birth calves need to be identified by giving them an ear tag. Even if the cow is not registered in the national breeding program the use of ear tags is important for data recording purposes. Keep track of the production (milk weight), reproductive management (heat, breeding date), diseases and treatments.



4.2 Dehorning:

Adult cows with horns can be dangerous for the farmer and might injure other cows. Therefore, calves need to be dehorned before they reach the age of one month and preferably at the age of one or two weeks. Dehorning can be done from the moment the horn buttons can be felt. An electric dehorner is the easiest way to dehorn the calf. Always call the vet to dehorn the calf. The calves need to be anaesthetized before dehorning.



Dehorning of a young calf

5. Health management

5.1 Vaccination and deworming

Vaccinate your calves in time. Ask the vet for the vaccination programme in order to follow up by yourself when and which vaccinations need to be done.

Deworming needs to be done on a regular basis. Discuss with your vet which is the most suitable way to do it your farm.

5.2 Diarrhea

Diarrhea is the first reason of calf mortality in unweaned calves (50 - 60%).



Signs of diarrhea:

- Loss of water in the faces, inconsistent manure
- Combined with other signs
 - Sunken eyes
 - Dry mouth and nose
 - Loss of appetite
 - Loss of body weight
 - Inactive calf

Reasons for diarrhea:

- Bacteria, Virus
- Contamination by other calves with diarrhea
- Improper feeding management
 - Not enough colostrum was fed or colostrum was fed too late to the calf
 - Bad hygiene of the calf cages, individual pens or feeding equipment (milk bottle, preparation tools)
 - Contamination of the milk replacer with bacteria
 - Feeding milk replacers at irregular times or irregular amounts
- Dirty environment

Diagnosis:

- All calves should be observed twice a day to observe abnormalities (coughing, foot problem, diarrhea...)
 - Observe each calf's milk drinking.
 - Observe each calf individually.
- When a calf shows abnormalities
 - Calf needs to be isolated immediately to avoid infecting other calves.
 - Calf should be treated as soon as possible.



A healthy strong calf of a few days old. The calf is very attentive and active. The fur of the calf is shiny and coherent. Look at the ears of the calf to notice the healthy condition. Another sign of a calf in good health is when it stretches when it gets up.

Prevention and treatment:

- Prevention: Apply good feeding management.
- Keep the barn clean
- Treatment:
 - If calves with diarrhea lose too much water, electrolyte solutions can be used. The electrolyte should be administered according to its label
 - In case of diarrhea, the vet always needs to be informed in order to find out the cause and treat the calf accordingly



A weak calf of a few days old. The hair is not uniform and stands up which is not a good sign. The calf has not much appetite and needs to be hand fed. The eyes of the calf are sunk in the skull. All of this are signs of the bad condition of the calf.



What is the problem with this calf?

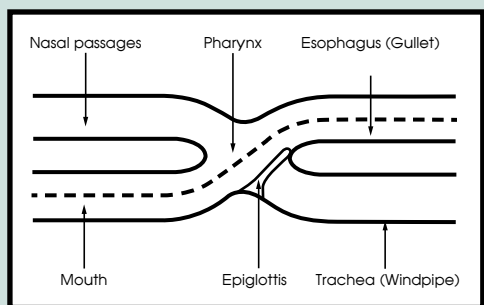
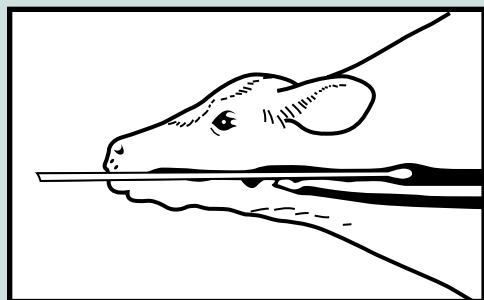


This calf clearly has diarrhea. The reason for the problem is difficult to find out based on this picture only. You need to assess the situation:

- Does the calf eat, are there differences in the feeding schedule?
- Does the calf have fever?
- Are other calves sick?
- Do you see any other symptoms, was there any abrupt change in the environment of the calf, ...?

Note:

- Prevention by good calf rearing practices and individual care are more important than needles and drugs!!
- Diarrhea = Production losses



Position of esophageal feeder in relationship to the trachea

5.3 Esophageal feeder

- Esophageal feeders are used when a calf is too weak to drink by itself or it doesn't want to drink colostrum (about 10% of the body weight before 12 hours)
- If the calf doesn't want to drink colostrum after six hours it's necessary to call the vet and feed the calf colostrum by using the esophageal feeder
- The use of an esophageal feeder is also recommended to feed electrolyte solutions in severe cases of diarrhea if the calf doesn't want to drink the electrolytes by itself. This inexpensive piece of equipment is very useful and can save the life of weak and sick calves

Note:

Always call the vet if a calf needs to be fed by esophageal feeder. If the esophageal feeder is put in the trachea instead of the esophagus, the fluid will go to the lungs!!



Chapter 4.

WEIGHT GAIN AND GROWTH RATES OF THE CALVES

1. Target weight

Calves need to have the right weight at first insemination (15 months)

The growth rates of the calves are mainly determined by feeding, management practices (health, comfort...) and genetics. The aim is to let the cows have their first calf at 24 months of age.

Calves that are too thin or too fat at the moment of first insemination are less likely to have good fertility rates and will get pregnant less easily. A calf should weigh in between 270 and 320 kg at the moment of first insemination.

Calves should grow at an average rate of 700 grams/day in the first year and 600 grams/day in average in the second year.



In the table on the next page you find the relation between chest circumference and weight

Estimation of the calf weight :

The weight is estimated by measuring the calf's chest

- Measure just behind the front legs and the shoulder blades
- The calf needs to stand horizontal and "square"
- You still need to be able to move two fingers in between the skin and the rope

Circumference (cm)	Weight (kg)
75	41
80	49
85	58
90	68
95	79
100	90
105	103
110	117
115	132
120	149
125	167
130	186
135	206
140	228
145	251
150	275
155	301
160	329
165	358
170	389
175	421
180	455
185	491
190	528
195	568
200	609
205	652

Note:

- The figures above give a good indication of the expected weight at 15 months. Nevertheless given the lack of data in Vietnam and due to the differences in breeds it's difficult to have exact figures. The figures above are estimations and are based on the averages between Holstein-Friesian cows and Jersey cows
- For purebred Holstein-Friesians the target weight is estimated between 300 and 360 kg at the age of 15 months with a minimum of 280 kg to ensure a reasonable success

2. Keep your calf growing: use startermix



Figure 4. Relationship between weight gain and starter mix intake

In Vietnam calves are usually raised only by feeding milk. When a calf is only fed milk it grows too slow and it is unlikely to have an appropriate weight at moment of first insemination.

The figure 4 shows the low growth rates of calves fed on milk compared to calves fed on milk and starter mix. If calves growth too slow and are too thin at the age of 15 months the first calving will not take place at the age of 24 months. This decreases the cost effectiveness of the farm. In other words money is lost!

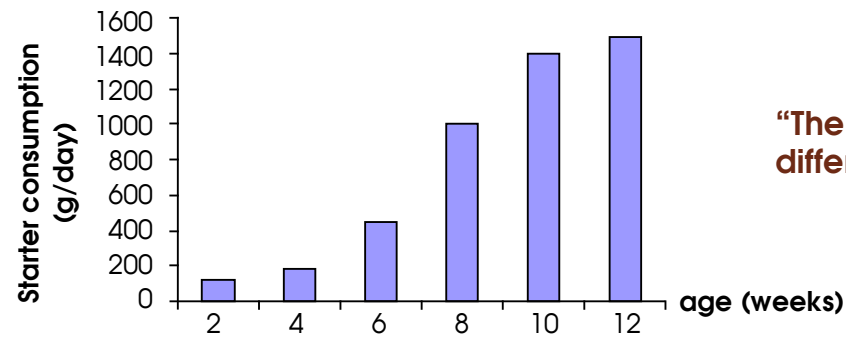
“Keep your calves growing through feeding starter mix”

IMPORTANT: Farmers have to keep track of the development of the calf

- Follow up the amount of starter mix fed.
- Assessing its bodyweight regularly.

If the calf is too thin --> feed more starter mix

If the calf is too fat --> feed less starter mix



“The intake of starter mix at different ages”

Picture 5. The intake of starter mix at different ages

Summary:

- The goals of rearing calves is to have the ideal weight at first insemination
- Monitor the weight and the growth rate of the calf by feeding starter mix

Composed and Published by



DỰ ÁN BÒ SỮA VIỆT BỈ
VIETNAM BELGIUM DAIRY PROJECT

Distributed by





CALF REARING practice

Authors:

Didier Tiberghien

Ngo Tien Dung

Pham Kim Cuong

Raf Somers

Designed by

Compass JSC

Tel: (04) 6269 6761