

# Instruction Book

## **VMS Best Practices**







## VMS Best Practices

## Content



1. Introduction
2. The right start
3. Daily routines
4. Milk quality & Animal health
5. Barn layout & Cow traffic
6. Feeding
7. Capacity
8. Grazing
9. Management





# VMS Best Practices

## Introduction

### Chapter 1

Fifty years ago many farmers had a certificate for manual milking! Switching to voluntary milking requires though thorough preparations. The milking goes in automatic mode, but all around needs to be organized in another way, different from what you did before.

- The cows need time to get used to this new machine.
- You as a user need to learn how to work with it.
- Your farm management and daily routines need to change.

#### What is different?

- Cows are milked without your presence.
- Cows are milked several times per day with possibly more irregular intervals.
- Their rhythm of milking, eating and resting will change completely. From all doing all simultaneously (herd behavior) to a more individual way of spending the day.
- You receive much more information about your cows and not anymore in the parlour, but via your PC.
- Your social life improves considerably, but your mobile phone may call you more often at any time of the day or night, because of the never stopping milking.
- You get more time for farm management and optimization (milk quality, feed costs, etc.).
- When keeping the same quota, your total number of cows may be reduced by about 10% in the 2nd year. Less cows means....!
- Or you decided to increase the total number of cows? More cows means....!



## Introduction

- This automation may have resulted in leaving of your employee(s).

Goal of this binder with "VMS best practices":

- Giving you simple practical guidelines from which you can benefit every day and that may improve the profitability of your operation.
- Some trouble shooting guidelines to get again on track if you run into certain problems.
- To make sure you take the time to read it, we have tried to use as many write photo's and drawings as possible and restrict the quantity of text.

**Note!** *In some countries certain recommendations may not be according to local legislation and/or local community opinion.  
The book is written for international use.*



### VMS Best Practices

#### The right start

##### Chapter 2









### Content

- 2.1 What is a good start-up ?
- 2.2 Preparation is key
- 2.3 12-6 months before start-up
- 2.4 6-3 months before start-up
- 2.5 Udder shaving/singeing
- 2.6 Selecting cows
- 2.7 3-1 months before start-up
- 2.8 2-1 weeks before start-up
- 2.9 Feed only - How ?
- 2.10 Basis to start milking
- 2.11 Labour planning
- 2.12 Start milking - 1st week: goals
- 2.13 Fetching of cows
- 2.14 The first weeks/months
- 2.15 Adding new cows to the system
- 2.16 Most common mistakes
- 2.17 Pre start-up check list





### 2.1 What is a good start-up ?



- Short transition (<2 weeks).
- Zero or very low stress for people and the cows.
- No drop in milk production.
- No increase in SCC.
- >95% of cows milk voluntary after 2 weeks.
- Try to get rid of traditional timed routines (milking and feeding) as soon as possible:
  - Milk >2 lactations cows in between the traditional milking times to get them out of their rhythm.
  - Same goes for feeding, feed 2x if you were used to do it once, 3x if you did it twice in the past.



### 2.2 Preparation is key



- Read all manuals, learn the software.
- People involved with the robot(s) should have a good understanding of the management software and basic touch screen operations.
- Good maintenance of "old" milking machine until the end.
- Start only when building or rebuilding is finished.
- Start always with healthy, active cows with good claw health.
- Have a detailed checklist of who does what and when during the start-up phase.
- Avoid planning a start-up during a busy period like harvesting.



## The right start

### 2.3 12-6 months before start-up



- Plan your breeding so that you have regular calving throughout the year:
  - this will help ensure a consistent utilisation of the VMS capacity by avoiding milk production peaks during a limited time of the year.
- Involve your partners (veterinarian, feed company, inseminator, advisors, etc.).
- Plan the construction or renovations needed to accommodate the robot.
- If you are not familiar with computers, start taking lessons!
- Network with other robot users to learn from their experiences.





## The right start

### 2.4 6-3 months before start-up



- Quarter sample every cow to detect possible presence of pathogens.
- Resolve all problem cows before starting up the robot:
  - Especially chronically infected cows with contagious mastitis (Staph Aureus).
- Cows with high SCC should be given special attention:
  - CMT or use the portable DeLaval cell counter DCC to check the SCC of all cows,
  - Check with the vet what is the best action course,
  - Early drying off, treatment or culling?
- Ensure cows have excellent hoof health:
  - Treatment of clinically ill cows,
  - Prevention by regular foot bathing and hoof trimming,
  - Sick cows should not be part of the start-up.





## The right start

### 2.5 Udder shaving/singeing



- Udder hair should be clipped or singed.
- Excessive hairiness of udders can cause difficulties with teat finding and cup attachment - affecting the whole milking performance.
- This should not be done when the cows first enter the milking station in order to minimize stress.
- At the same time, clip tails if needed.

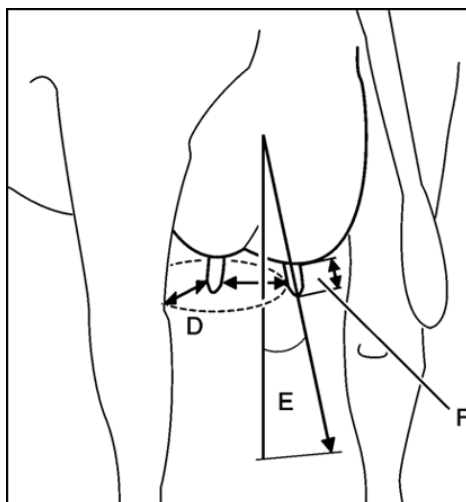
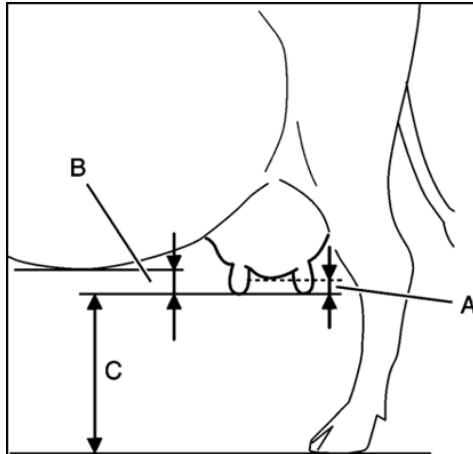


**Note!** In some countries singeing udder hair may not be according local legislation and/or local community opinion.





### 2.6 Selecting cows



- You can use the following guidelines to select suitable VMS cows:
  - In all cases, cows with hind teat that are crossed will not work with VMS.
  - Cows with 1 or more missing teats or with 1 or more teats not to be milked, can be handled by VMS.
- Another method is to bring all cows to VMS and let the VMS do the sorting:
  - You can then judge if VMS can attach them efficiently or not.

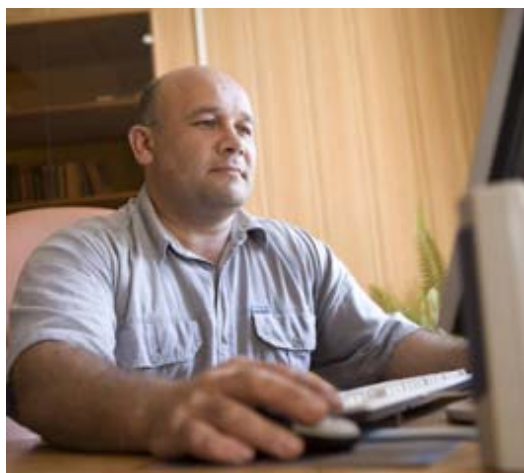
Key	Criteria	Min. mm	Max. mm
A	Distance between udder bottom and rear teat tip	30	
B	Distance between belly and front teat tip	30	
C	Distance between teat tips and floor	270	750
D	Distance between teats or teat and cow leg	15	
E	Oblique angle of all teats in all directions		45 degrees
F	Teat length	30	70
	Teat diameter	15	50





## The right start

### 2.7 3-1 months before start-up



- Read the DeLaval VMS instruction manual and become familiar with:
  - All the safety precautions
  - How to start/restart and shut down the VMS.
  - Switching between automatic and manual mode.
  - How to attach manually.
  - Use of the joystick.
  - Use of the touch screen.
  - Set up of cleaning programs.
  - Learn daily routine.
  - Alarm handling and main alarm codes.
  - How to manage the milk cooling system/milk pick up/cleaning of cooling tank.
  - Understand the VMS status and Cow Monitor windows.
- If you are not familiar with a PC, take a course now!
- Train with the software demo program.



## The right start

### 2.8 2-1 weeks before start-up



- You should now be familiar with the basic functionalities of the robot and its software.
- All herd data and VMS settings entered in the PC (birth date, calving date, ration, etc.)
- Attach all neck collars and transponders.
- Your cows' status:
  - No major hoof health issues.
  - Good udder health status
  - Chronically infected cows are identified and dealt with (*Staphylococcus Aureus*).
  - All udders and tails are clipped.
- Confirm availability of helping hand(s) for the start-up
  - You really need to ensure people are available to help you on start-up day!



## The right start

2-1 weeks before start-up

Feed or No feed ?

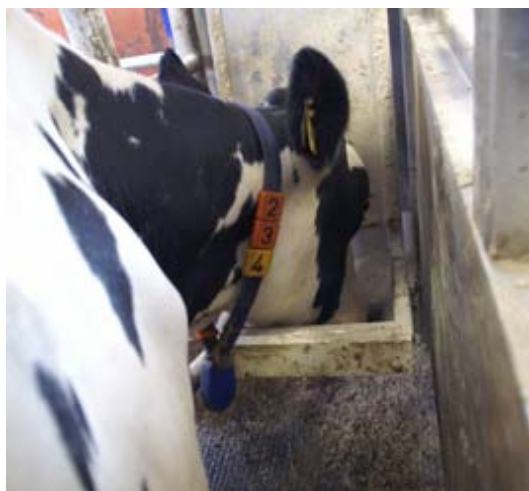
There are 2 different ways to start-up the cows:

### 1. No "Feed only" prior to first milking

- Just start milking.
- Cows are not allowed a learning time. Push them directly in the robot.
- Expect some more stress.
- Cows will take some more time to adjust.
- Maybe better suited for Free Cow traffic systems.

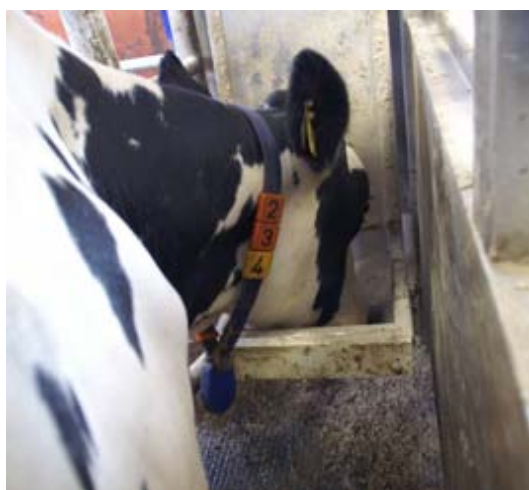
### 2. "Feed only" period

- Cows are given time to get used to the system without being milked.
- Cow will learn the flow routines, the stall confinement and the concentrate feeder function and the robot arm movement (with teat spray).
- Implies that all construction work is finished in the building.
- When possible, we recommend a "feed only" period of 1-2 weeks.





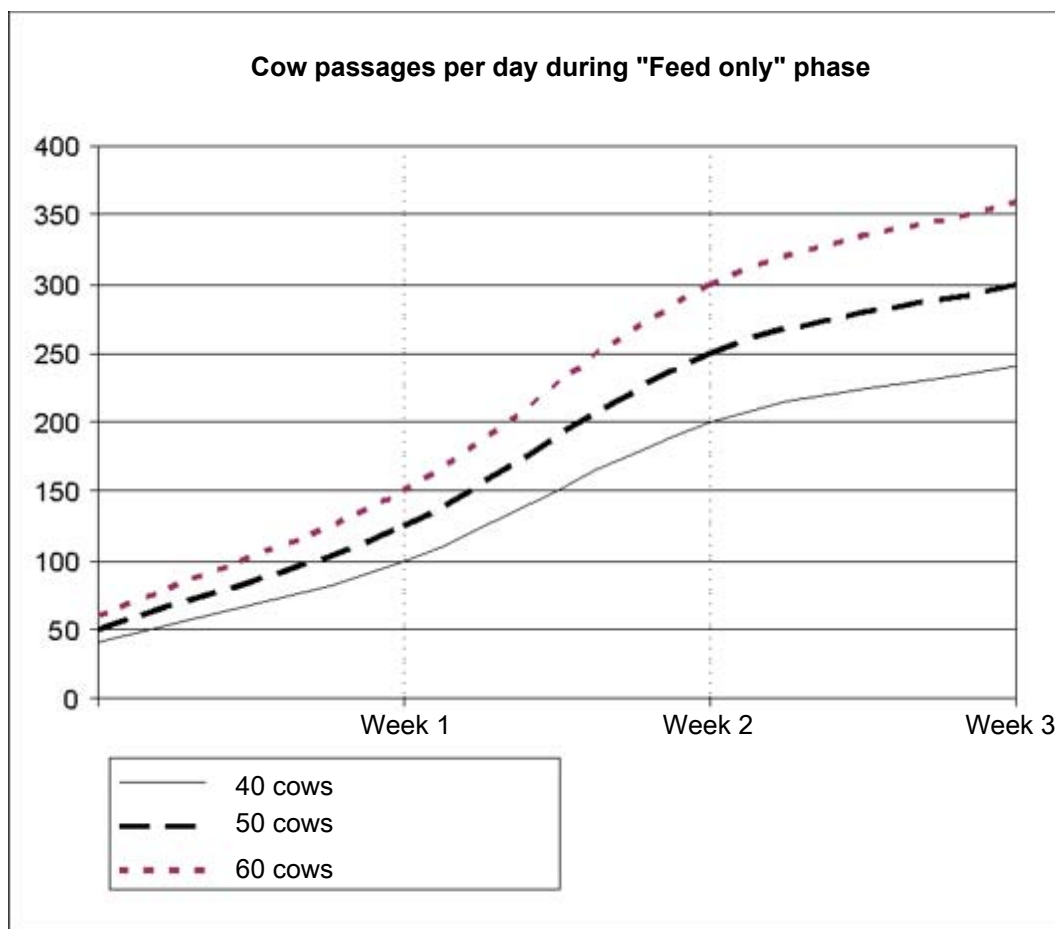
### 2.9 Feed Only - How ?



- The feeding phase may last from 1 to 2 weeks (or more) based on cow adoption and presence available in the barn.
- 1st week: all cows must go at least once or twice through the robot.
- By end of week 2 or 3, cows should go 4 to 6 times per day through the robot.
- In the last days, adjust manger position according to animal size (indexing).
- Train cows on the final cow flow concept.
- If you have a DeLaval smart selection gate, ensure it is set-up to work with feed-only cows.
- 2.5 Kg/cow/day of palatable concentrate in the VMS.

Objectives*	Check
> 4 passages/cow/day	<input type="checkbox"/>
> 90% cons. feed	<input type="checkbox"/>
* essential objective before going to Milking phase	









## The right start

### 2.10 Basis to start milking



- The start of milking implies that all objectives listed in the "Feed Only" phase have been met. If not, delay by a few days.
- Start on a Monday morning to have all week ahead of you.
- Avoid having too many cows at start-up (not more than 60).
  - More cows will demand more work.
- Some people start with a reduced number of cows (30 to 40) and add cows (by group of 5-10) in the following weeks - but this is not always feasible.
  - New cows will learn from the ones already used to the system facilitating the whole training period.
- Avoid starting with cows 30 days or less from drying off.
- Older, low producing cows were noted as the most problematic to learn the new routines.
- Early lactation and younger cows were reported to be much easier to work with.



## The right start

### 2.11 Labour planning

#### Who does what ?

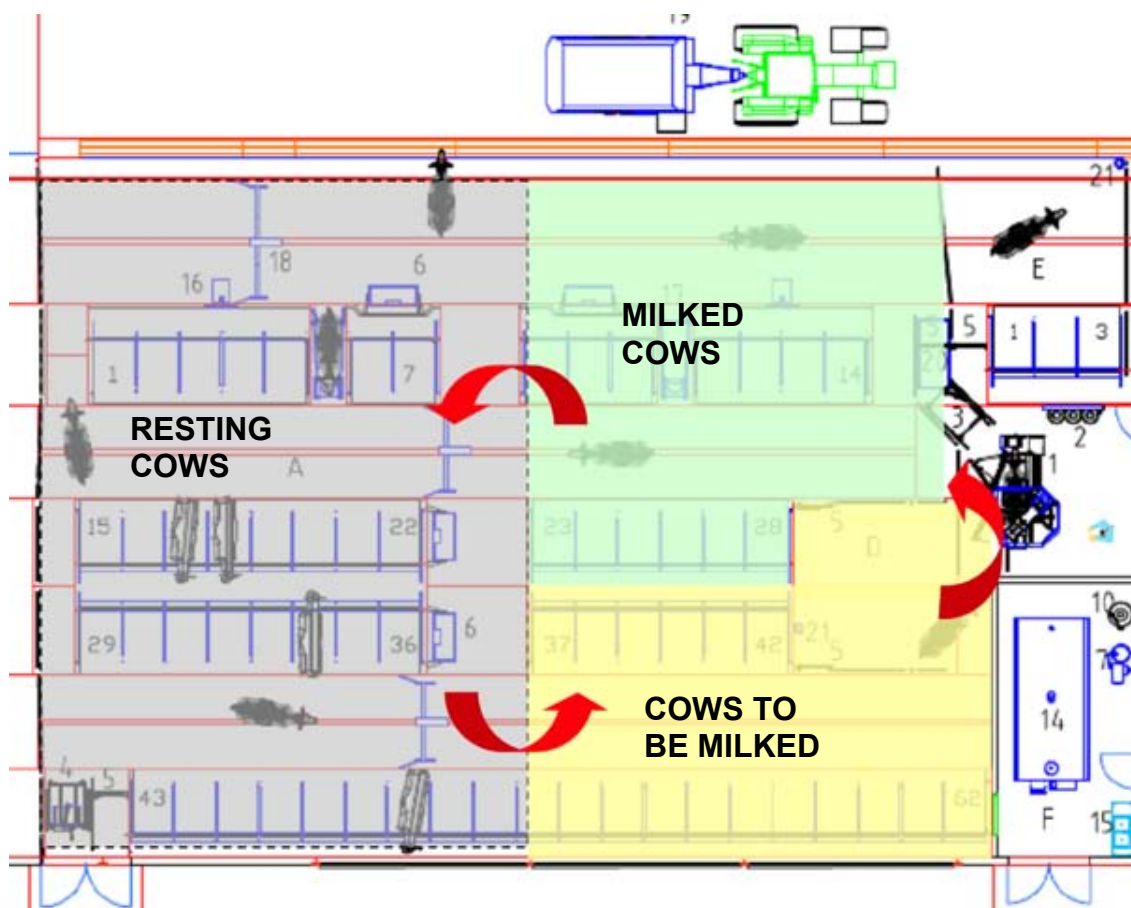
- Ensure to have enough people over 3 days (24/24) to help with the start-up.
- Need 1 person per robot (joystick, touch screen, etc.) and 1 person to push cows.
- DeLaval VMS technician/installer participates for first hours of start-up.
- IDEA: Hire an experienced VMS farmer (or his son - daughter), this works best!
- 5:00 - 7:00: Milk all cows one last time in the parlour:
  - If "free cow traffic", divide your cows in 2 groups as described in the next page.
  - If "controlled cow traffic", follow the instructions on further page.
- 9:00 - 21:00: Farmer "touches the button" = learning by doing.
- 9:00 - 21:00: 1st shift (cow fetching and system settings).
- 21:00-9:00: 2nd shift.
- And so on for 2-3 full days and nights.
- **The VMS owner should sleep at night!**





### Start Milking - For Free Cow traffic

- Divide your herd into 2 groups:
  - Group 1: cows that will be milked; place them in the yellow area.
  - Group 2: cows that will be staying in the resting area (grey area).
- When Group 1 is milked (they should all now be in the green area "milked cows"), bring Group 2 in the "yellow area". Move "milked cows" to resting area. Milk all Group 2 cows.
- You will have to push each group at least twice per day -or better three times- through the robot.
- Make sure that the resting group has access to feed and water.
- Use one way gates and/or temporary fences (to create a guided cow traffic concept) during the first days.
- When at least 75% of the cows attend the robot on their own, merge both groups and remove temporary gates (usually after 3-4 days).
- Check the cow status regularly in the PC and bring late cows (>12 hours) to the robot.







### Start Milking - For all "controlled" traffic

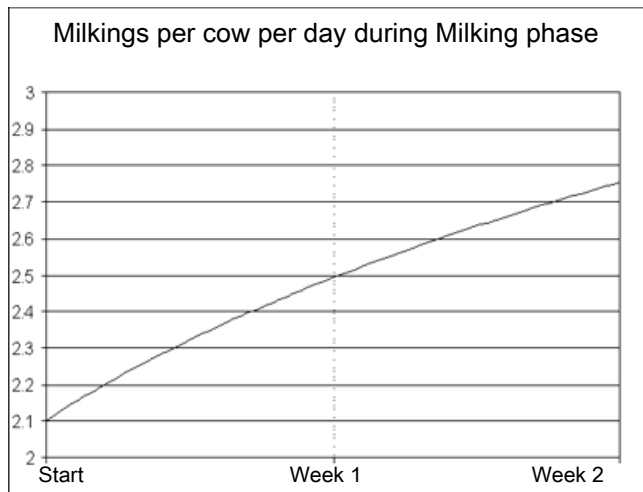
- This page is for those who have chosen a "Controlled" cow traffic such as DeLaval Feed First or any cow traffic using a DeLaval smart selection gate.
- After the "Feed Only" period (highly recommended), your cows should be familiar with the traffic concept.
  - During that time, cows have learned the passage through gates, the robot stall, the feeding in the robot and/or feed stations.
- Milk all cows in the parlour early in the morning before start-up
- In a feed First barn, simply "empty" the feeding area by pushing all cows through the smart selection gate.
  - The gate will sort the cows that need to be milked.
  - Repeat this every 4 - 6 hours.



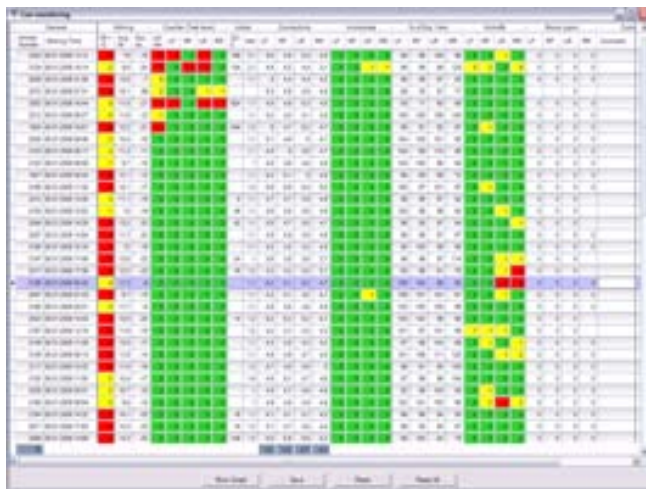


## The right start

### 2.12 Start Milking - 1st week: Goals



- **Goal:** >2.5 milkings/cow/day at end of 1st week.
  - Minimum daily milkings = 2 milkings per cow and day.
  - This will require some fetching time for the first few days.
- Less than 10% of the cows should have a milking interval greater than 12 hours.
- Fetch cows with interval >12 hours.
- Maintain feeding a minimum of 2,5 kg/cow/day in VMS of good quality concentrate pellets.
- 3X daily monitoring of screens "VMS status" and "Cow Monitor".
- Visually check incomplete milked cows.
- After 3 days, check the Mastitis Detection Index (MDi) in the cowmonitor software and take appropriate actions.





### 2.13 Fetching of cows

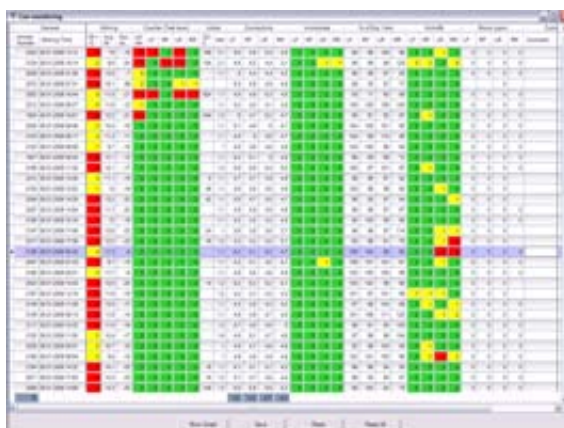
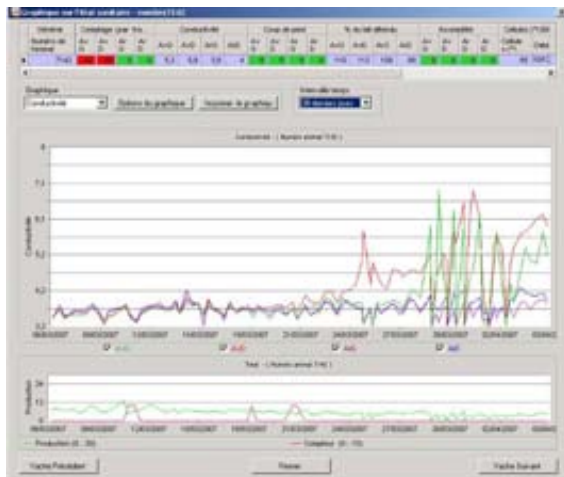


- The number of cows to fetch depends on few variables:
  - Cow traffic concept,
  - Nutrition/ration,
  - Herd Hoof Health,
  - Feeding strategy.
- What is a normal fetching rate?
  - Feed First: 0-1% of cow.
  - Other "controlled" traffic: up to 5%.
  - Free cow traffic: usually 10%, but can go up to 15%.
- When to fetch cows?
  - Try using irregular fetching times.
  - Only fetch the really late ones, not the ones late by 2-3 hours.
  - Fetch cows leaking milk.
  - Chronic offenders may be on your cull list when the opportunity comes.
- Do not become hostage of late cows. Cows that never learn should be culled.
- **Remember:** access to feed is the cow's main incentive.



## The right start

### 2.14 The first weeks/months



System level milk permission settings

Give milk permission:

	Days in Milk Period #1	Days in Milk Period #2
Young animals	100 (not after previous action, or the expected yield exceeds 14)	100 (not after previous action, or the expected yield exceeds 14)
Older animals	100 (not after previous action, or the expected yield exceeds 12)	100 (not after previous action, or the expected yield exceeds 12)

Young/Older animals

Animal is Young up to lactation 1

Animal is Old from lactation 2

Days in Milk

Period #1 ranges from day 1 to day 10

Period #2 ranges from day 01 to day 09

- After 3 weeks, reset the "milk quality calculation" data (or when the cow traffic is stabilised).
  - Too many interferences during the start-up phase.
  - Data will be reliable after 9 milkings.
  - Cows with MDi = 1 are OK.
  - Cows with MDi value => 2 require immediate attention.
- Fine tune cow milking permission settings.
- Try to reach regular milking intervals, specially for early lactation cows.
- Regular intervals favour higher yields and lower SCC (Somatic Cell Count).
- Check cow traffic efficiency.
  - Number of passage per gate when the cow must pass through a smart gate to access the feed table.
  - Goal: 6 to 8 passages to the feed table.
- Target for concentrate feed consumption to be between 90 to 95% on a 24 hours average.
- Quality feed must be available 24 hours.
- Define your own management reports in the software.
- Exchange ideas and experiences with other herdsmen, or with a VMS expert. Join VMS farmer club meetings, organized by DeLaval.





## The right start

### 2.15 Adding cows to the system



- Heifers can be trained (Feed only) during 3-5 days.
  - Add them to the herd as "Feed Only" cows.
  - Give them concentrate and eventually spray the teats with disinfectant so they learn the presence of the arm.
- After calving, you can milk them in the VMS (divert colostrum + rinse) or milk them with a good bucket milking machine.
- 1st milking of the heifer in the VMS should be done under supervision.
- Cows with previous VMS experience can be milked without supervision.
  - Use the auto-teach function.
  - Ensure to have the correct VMS settings (colostrum milk separation for example).

**Note!** Each time a new cow is added to the herd, it will take time for her to find her natural rank. Always think about this when changing or moving cows from one group to another. The lesser the better.



## The right start

### 2.16 Most common mistakes



- Not trusting the VMS. Too many interference from herdsman with the VMS.
  - Your robot is just a milk harvesting tool.
  - Most people involved with the farm operation focus too much on the technology and less on the real issue.
- The real issue = cows + farm management.
- Dedicate your attention and energy to the right things!
- Let the machine do its work!
- Too short preparation time.
  - Manuals not read.
  - Poor knowledge of software.
- VMS means a total change in farm management. Do not keep the old management regime (feeding, cow handling, milking).
- Chronically ill cows have not been culled before start-up.
- Feed not available at all time (even during the night!)
- Don't panic when a mistake happens, or a cow has a long milk interval.
- Do not become hostage of late cows. If you keep fetching them, they will learn to wait for you!
- Cows that never learn should be culled.



### 2.17 Pre start-up check list




### DeLaval VMS pre start-up check list

*Please complete this check list before starting milking cows with VMS*



System check	Yes	No
Has the VMS milking system been fully checked and tested by a DeLaval technician?		
Has the milk cooling system been carefully adjusted?		
Is the VMS room finished?		
Is the cow barn finished and fully functional for cow comfort and cow traffic?		
Does the hot water system has enough capacity to support cleaning the whole system?		
The water quality has been tested (need potable water to clean the system)		
Do you have enough stock of supplies (teat dip, detergent, filters, liners, oil...)		
Do you have the right quality and quantity of concentrate to feed in the VMS>?		
Documentation, training and safety		
Have all instructions manuals been delivered by DeLaval?		
Have the instructions manuals been read and understood by the operator?		
All farm personnel involved with the VMS have been trained on the basic operations.		
All farm personnel have understood the safety procedures in the instruction manual.		
The cows		
Have all chronically ill cows and high SCC cows been identified and treated/culled?		
Transponders are attached to each VMS cow		
All the cows are entered in the herd management program		
Do you have a complete list of cow numbers and transponder/activity tag numbers?		
Cow have been trained for 1 to 3 weeks (Feed Only) before start-up		
All cows udders and tails have been clipped		
Service and support		
Confirmed booking with people needed to help at start-up		
A preventive and emergency service agreement has been contracted with DeLaval		



## The right start

Service and emergency phone numbers have been provided by DeLaval		
Alarm handling system is operational and set-up with all phone numbers to call		
<b>Others</b>		
It might be wise to install a generator, always do so if you have frequent power cuts		





### VMS Best Practices

#### Daily routines

##### Chapter 3



Consistent routines will increase your labour efficiency





### Content

- 3.1 First thing in the morning & in the evening
- 3.2 At every visit to the barn
- 3.3 Check once per day - Cows
- 3.4 Check once per day - System
- 3.5 Check once per week - Cows
- 3.6 Check once per week - System
- 3.7 Routines every...
- 3.8 Summary





## Daily routines



### 3.1 First thing in the morning and in the evening

#### Cows

- Fetch incomplete milked cows and overdue cows for milking.
- Supervise the milking of incomplete cows, adjust settings if necessary.
- Check feed consumption last 24h.
- Walk through the barn:
  - check cows
  - clean the cubicles and alleys
  - adjust bedding material
  - check water bowls



#### System

- Have a look on the system messages / **alarm list** and act accordingly.
- Clean the VMS room and station components, such as camera, milk tubes, teat cups, air-inlets, magazine, gripper, manger, floor.
- Clean the waiting area if necessary.
- Change the milk filter(s).



- Does the concentrate dispenser work properly?
- A complete system cleaning should take place 3 times per day.



### 3.2 At every visit to the barn

Keep your eyes (and ears) open!

#### Cows

- Is there enough feed on the table? (No feed = no cows moving = less milk).
- Check number of cows queuing.
- Force cows leaking milk to stand up.

#### System

- Check the work of the robot arm on the actual milking.
- Is there a new sound? Many problems you can hear before you can see them.
- Check the number of incomplete milkings.
- Have a look at the system messages / **alarm list** and act accordingly.







## Daily routines

### 3.3 Check once per day

#### Cows

- Check number of overdue cows. Is there a “new” cow who is overdue? Perhaps she is limping!
- Check all cows with an AMD-notification. (**Note!** A CMT-test can be done out of the MS!).
- Keep an extra eye on cows the first week after calving (e.g. traffic).
- Analyse all incomplete milkings – *changed udder form, teats drying off, kick-offs, hairy udder, dirty udder and teats* – adjust settings or teat positions.
- Do the **learning** cows already visit the MS on their own?
- **Clean the cubicles, force lying cows to stand up, add fresh bedding material.**
- Clean the water troughs





### 3.4 Check once per day

#### System

***Follow the full milking process of one cow to see if everything is working all right!***

- Is the vacuum level correct?
- Is the rear-plate following the cow?
- Listen for possible air-leakages.
- Is the teat cleaner working properly?
- Is the teat disinfection pump functioning?  
Check the disinfectants level, too!
- Is the cleaning shelf functioning?
- Is the floor cleaning working properly?
- Have a look into your machine room.







### 3.5 Check once per week

#### Cows

- Adapt the concentrate settings to milk yield and milking frequency of the individual cows.
- Is the milking permission still fitting to the milk yield of each cow?
- Are your cows visiting the feed table frequently? (How often do they visit the MS or the selection gates?)

**Try to have fixed days for certain activities / work.**

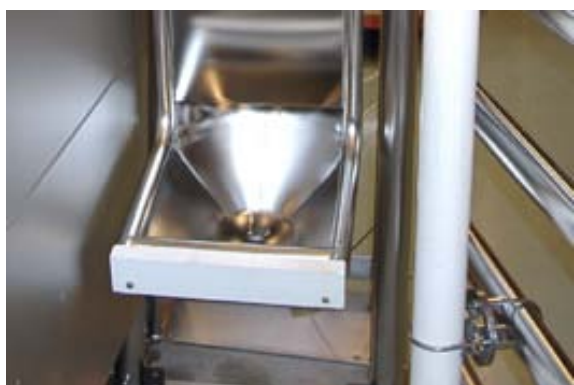




### 3.6 Check once per week

#### System

- Is the vacuum pump lubrication functioning (oil level, filter)?
- Did you exchange your liners when your PC reminded you last time?
- Are there enough cleaning detergents in stock?
- A service needs to be done? Fix a date with the DeLaval **technician**.
- **Check cleaning monitor.**
- Have a look at the fill level of your concentrate silo.
- Is the milk tank cleaned properly?
- Clean the VMS room and the complete system thoroughly (*manger, camera, milk tubes, teat cups, magazine, gripper, floor, rear-plate...*).
- VMS management SW start.



**Try to have fixed days for certain activities / work.**



### 3.7 Routines every...

#### ... 3 weeks

- Change liners

#### ... 2 months

- Shave or flame the cows that you know need a shave.

**Note!** In some countries udder flaming may not be according to local legislation and/or local community opinion.  
The book is written for international use.

- Take your time to check the hoofs of your cows. Only cows walking easily will visit the MS frequently.

#### ... time you buy new concentrates

- Calibrate the concentrate dispensers.

**Try to have fixed days for certain activities / work.**





## Daily routines



### 3.8 Summary

- Consistent routines will increase your labour efficiency.
- Give routines to your cows, too. It will make it easier for them to find their own rhythm.
- Try to have fixed days for certain activities / work.
- At every visit of the barn, keep your eyes (and ears) open. The earlier you see (small) changes to the worse, the easier you can correct them.
- Try to meet your service intervals. Your system should run 24 h every day!!



### VMS Best Practices

#### Milk Quality and Animal Health

##### Chapter 4









## Milk Quality and Animal Health

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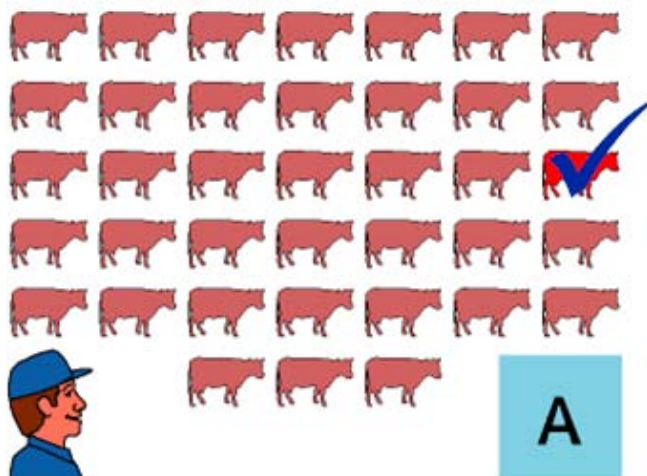
### Content

- 4.1 About mastitis
- 4.2 Contagious Mastitis
- 4.3 Environmental Mastitis
- 4.4 Interpretation of Coliform count in milk
- 4.5 Finding problem cows
- 4.6 Reducing high SCC
- 4.7 Using Cow Monitor
- 4.8 Managing antibiotic treatment
- 4.9 Free Fatty Acid in the milk
- 4.10 Managing elevated bacteria counts
- 4.11 Check points in case of high bacteria counts
- 4.12 Attention to daily routines

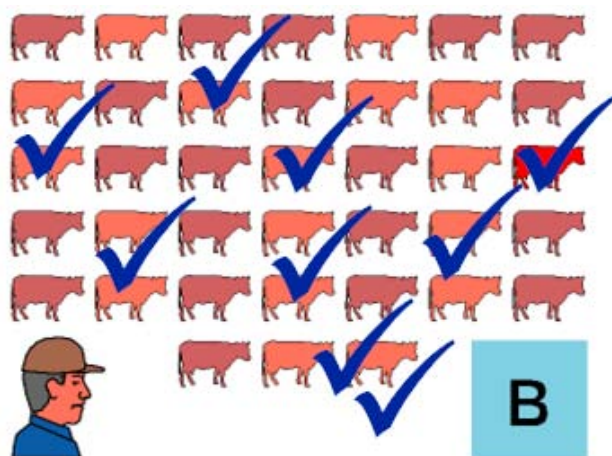




## Milk Quality and Animal Health



A: Clinical mastitis



B: Sub-Clinical mastitis

### 4.1 About mastitis

Mastitis is the inflammation of the secretory tissue of the mammary gland. Incidence is directly related to the type and number of bacteria present on the teat end.

At up to 200 Euros per case in average, mastitis is one of the most costly disease. It is better prevented than cured.

- Costs associated with mastitis.
- Significant reduction of milk yield, discarded milk.
- Treatment costs (medicines and others).
- Veterinarian costs.
- Culling and replacement costs, loss of good genetic.
- Extra labour costs.

### Two Major Types of Mastitis

- Clinical: "Visible" Mastitis , change in :
  - the cow (sick, fever, dehydration, do not eat...)
  - the udder (swollen, red, hot), reduced yields
  - the milk (flakes)
- Sub-clinical (invisible Mastitis):
  - detected by presence of elevated somatic cell count,
  - possibly indicated by high quarter conductivity levels.

### 2 Types of Mastitis Causing Bacteria

- Contagious Mastitis
  - Staphylococcus Aureus
  - Streptococcus Agalactiae
- Environmental Mastitis
  - Coliforms,
  - Escherichia coli,
  - Klebsiella,
  - Pseudomonas,
  - Environmental Strep,
  - Streptococcus dysgalactiae,
  - Streptococcus uberis.



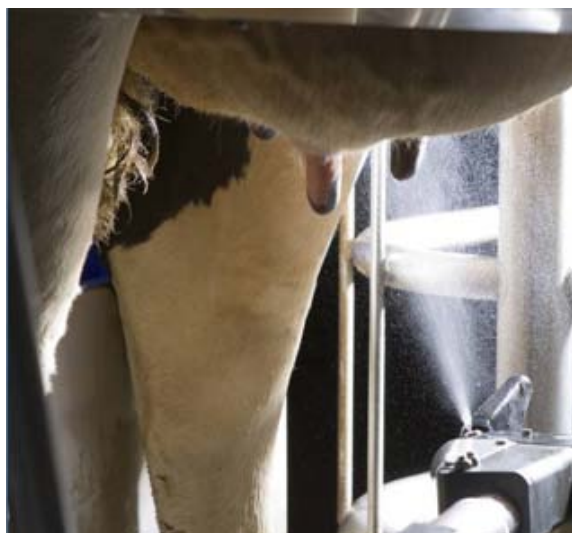
## Milk Quality and Animal Health

### 4.2 Contagious Mastitis

- Contagious organisms can only live and reproduce inside the udder.
- Introduced in the herd by purchasing infected cows.
- Prevention is key (closed herd, biosecurity, use of VMS approved teat spray, well functioning VMS, backflush of milking equipment between cows).
- Lower the bacterial population at teat end by teat spraying all cows at the end of milking (various options in VMS software). Teat skin must remain soft and supple to provide the best defence against bacteria. Bacteria tend to develop more easily in cracked dried teat skin.
- Use a DeLaval VMS approved teat spray. These products have been tested for their efficacy against mastitis and provide optimum skin care.

#### Preventing Staph aureus:

- Very difficult to achieve  $SCC < 400.000$  when Staph aureus is present at the farm.
- A cow will not be considered infected after 3 negative test results performed within a week time.
- Affected cows might be milked in VMS but we strongly recommend to put them in a special separate group.
- Cull chronic cows ( $> 3$  times high cell count) or isolate physically every affected cow.
- Check treated cows 14 days after treatment (cell count, CMT, conductivity). Cull recidivists.
- Dry cow therapy for all cows.
- As a general rule, we strongly recommend that no Staph aureus cow be mixed with the rest of the VMS herd.
- Avoid that infected cows share the cubicles of fresh cows.





### Milk Quality and Animal Health

#### 4.3 Environmental Mastitis

- Primary source is the environment, the surroundings of the animals. Risk increase when weather is hot and humid.
- Higher risks during dry period and first 10 weeks and last 10 days of lactation. Rate of infection increases with each succeeding dry period

#### General rules of prevention

- Verify that the VMS teat cleaner is cleaned and performs optimally. Teats should be cleaned and dry before milking.
- The VMS teat cleaner is efficient at removing spores/bacteria and dirt from the skin. We strongly recommend not to shut it off.
- If allowed, use the VMS pre-milking spray option followed by the normal teat cleaning procedure
- In case of wet and muddy condition, consider increasing the teat cleaning time (parameter in the VMS software)
- Proper ventilation is critical to help remove humidity. Bedding management is also key. Cows should rest on clean and dry bedding. Regular cubicle maintenance is necessary.
- Barn must be ventilated Provide cows with a clean, stress-free environment

Pay special attention to the cleanliness of maternity pens (clean & dry box stall)





### Milk Quality and Animal Health



Environmental Streps thrive on straw

Klebsiella is common in wet and green sawdust or shavings.

- Sawdust must be dry and not warm.
- Cull chronic Klebsiella cows.

Strep uberis: hygiene in the barn (also dry cows)

- Cull chronic cows (> 3 times high cell count)
- Treat the other cows, check the treated cows > 14 days after treatment (cell count, CMT, conductivity).
- Cull recidivists.
- Dry cow therapy all cows.

Coliforms thrive on wood shavings

Special notes for herds housed on “straw packs”.

- A straw pack can be a challenge from an environmental mastitis point and thus requires good care.
- Regular maintenance is a must and the yard must be cleaned out frequently (every 1-3 weeks)
- Straw must be clean and dry (no moulds!)
- Excess straw can overheat => Coli problems
- Walking alleys must be scraped to avoid cows spoiling the bedding

Good ventilation is also a must to control humidity





## Milk Quality and Animal Health

### 4.4 Interpretation of Coliform count in milk



- The major source of Coliform bacteria in bulk tank milk is transportation on the udders from the environment. The coli count provides an indication of the effectiveness of the teat cleaning procedure before milking. This is directly related to the cleanliness of the cows' environment. Well designed and managed cubicles will provide a clean and dry resting environment for cows. Teats will be less exposed to harmful bacteria.
- The coli count can also be used as an indication of the milking system sanitary status (incubation from dirty spots in the system).
- A complete system cleaning shall take place 3x per day and consider also to clean the camera + teat cups + tubes manually.

### Levels of Coliform count in milk

- Excellent <10 per ml of milk; excellence in both pre-milking hygiene and equipment sanitation.
- Warning if <100 per ml of milk, considered acceptable for raw milk for pasteurization.
- Action needed >750 per ml of milk. General indication of poor milking and cow hygiene (milking wet and dirty teats). Counts in excess of 1,000 suggest incubation in milk handling equipment. Coliforms will also incubate in residual films left on milk contact surfaces.



## Milk Quality and Animal Health

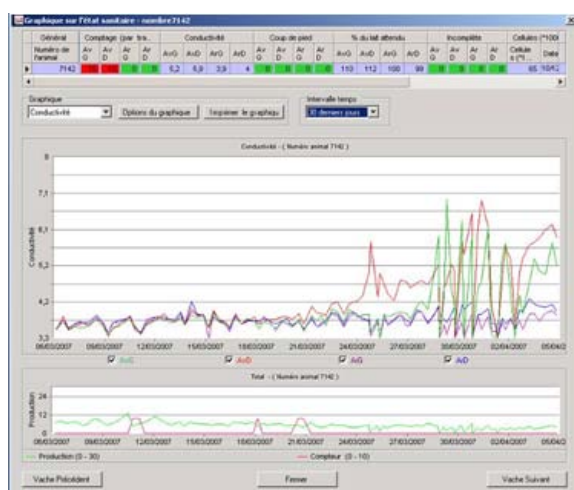
### 4.5 Finding problem cows

Use one or a combination of the following tools:

- DeLaval Online Cell Counter OCC (VMS option) provides an accurate cell counter for every cow at every milking, automatically.
- Conductivity alerts in VMS software (Cow Monitor). The data is presented at udder and quarter level. Facilitate the detection of sick quarters.
- Mastitis Detection index (MDi). This index is calculated after each milking and gives you an indication of the health level of each cow. If index is close to 2, the cow needs your attention!
- Monthly sampling brings you in most countries also cow individual SCC data
- DeLaval DCC – manual cell counter. Can be used to get an accurate cell count for a specific quarter.
- Official cell count records, CMT test.

Use the VMS software to make the work easier

- Check Cow Monitor a minimum of two times a day (focus on red cows).
- If you want to be alerted when a cow is found with high SCC, blood or a high MDi value, ask the VMS to send you a text message.
- If you have a separation area after the exit of your VMS, you can ask the VMS to separate abnormal cows based on blood, conductivity,
- MDi or even cell count. This will make it easier and faster to work on these cows.





### Milk Quality and Animal Health

#### 4.6 Reducing high SCC



- Keep good records. You need to record the time, the cow number, the cause, the treatment, the success or failure. This will help you identify if cows clean up well or if they become chronically ill.

##### **Rule of 3's:**

- All cows with 3 elevated SCC's in a row need your attention.
- Sample (laboratory analysis) cows with 3 consecutive SCC >500,000. You need to know what bacteria is causing this.
- Consider culling chronically infected cows (more than 3 times per lactation) or proceed with (early) dry cow therapy (especially the "millionaires").
- Have a bacteriological examination done for every cow showing clinical signs and make a treatment plan.
- Separate sick cows from the herd to avoid further contamination (especially with contagious mastitis). Use the VMS software to separate the cows in a special area (if barn was designed for that).
- Use the VMS Cow Monitor software to follow your cows. Check conductivity data every day. Check the milk of high conductivity cows.
- If not using the automatic online cell counter (OCC) for VMS, have your herd checked every month. For reliable cow cell count data, sample for 24 hours as milking interval influences cell count.



### Milk Quality and Animal Health



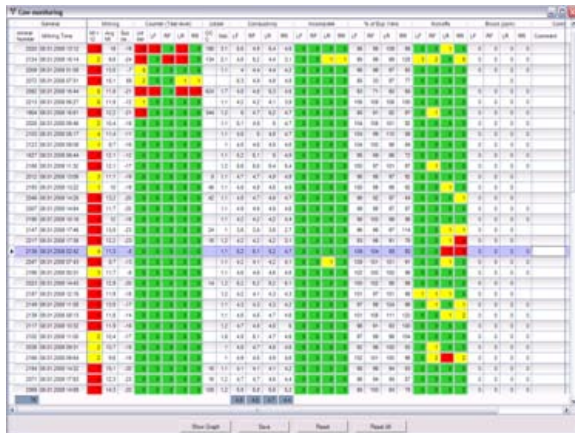
- Irregular milking intervals have a tendency to increase SCC. To ensure regular intervals consider the following:
  - Number of feeding events per day, space at feed table for the cows, feed available 24 hour per day. Pushing of late cows.
  - Shave udders (lesser complete milkings).
- Use the milk divert function. You can have the most undesirable milk automatically diverted from the main tank. By temporarily diverting the milk from the highest SCC cows, you can reduce the average bulk tank cell count.





## Milk Quality and Animal Health

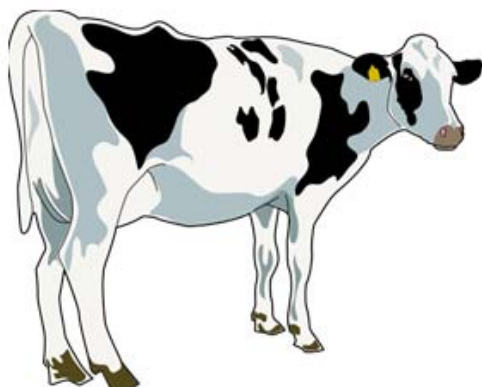
### 4.7 Using Cow Monitor



- Cow Monitor is a special application in the VMS software that provides a complete milking process overview. This programme is designed to provide information and early warnings with the goal to maintain and improve system performance, milk production, and animal health.

#### Interpretation of the Cow Monitor colours

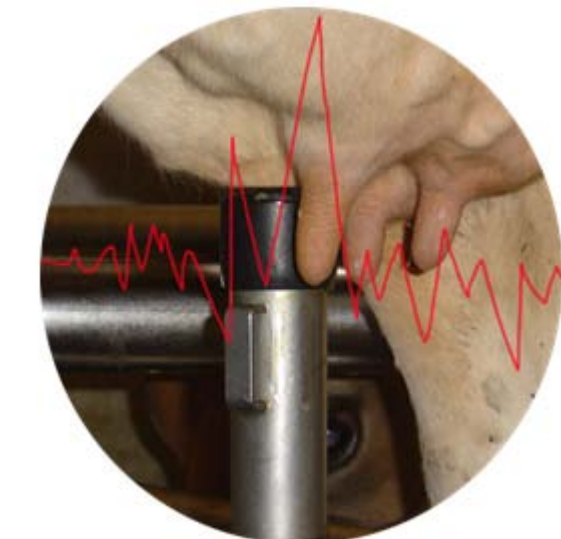
- Red – at last milking session the counter was increased. Usually this means something is not going normally. Requires special attention.
- Yellow – last milking the counter was not increased, but it has been increased at earlier milkings. This is a sign that things are improving.
- Green – no increase since last reset of counter. Does not require special attention.
- It is recommended to reset the cow counter only when the cow has been checked (not sick).



#### How does Cow Monitor help you?

- By monitoring milk yields per quarter – and the variations with expected yields.
- By monitoring milk conductivity per quarter
- By monitoring blood level in milk per quarter
- By monitoring milking performance
- The system may indicate to the farmer whether the milkings have been successful or not. –Unsuccessful milkings could have been caused by udder conformations difficult to attach teatcups to, or to animal behaviour leading to kick-off of teat cup(s).
- By monitoring milking intervals.

Cow monitor provides information at





## Milk Quality and Animal Health

two levels: cow level and quarter level.

### Cow level information

- **OCC values.** If your VMS is equipped with an Online Cell Counter, you will get an accurate somatic cell count measurement for every cow, at every milking.
- **Mastitis Detection index (MDi)**
- **Udder counter:** this counter gives you a quick overview on all abnormality found at udder level.
- Thresholds for Udder counter are set in Animal Info > VMS Cow > Automatic Diversion
- **Milking intervals:** evaluate your cows' behaviour. Automatic milking leads to more or less frequent milkings with more or less irregular milking intervals. Cow Monitor provides alerts if the milking interval increases above 12 hours (red) and the minimum milking frequency of two times milking per day is at risk.
- Counts all milking intervals that are longer than 12 hours for the last 9 milkings provided they occurred within 15 days back.
- Average Milking Interval for the last 3 days
- Success MI: Hours since last successful milking



### Quarter level information

- **Quarter conductivity**
  - VMS measure conductivity per quarter and thus provides a tool to indicate a possible quarter inflammation. An alarm is given if the conductivity exceeds either a fixed or a relative threshold value.
  - The measured value can be between 3300 to 7000  $\mu\text{S}/\text{cm}$ . A normal measurement ranges from 3500 to 5500  $\mu\text{S}/\text{cm}$ .
  - Quarter conductivity is relevant as an add-on information to yield. High conductivity values can indicate the





### Milk Quality and Animal Health

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presence of an acute clinical mastitis cases. it is however not as precise when trying to find chronic individuals.

- Conductivity can be used to automatically divert the milk
- Use conductivity divert based on differences between the two lowest average and the highest, e.g. as from 125%.

- **Blood level per quarter**

- Measured in ppm (parts per million) which shows concentration of blood in the milk
- When a visual change of colour is seen, the milk is regarded as non-consumer milk. (1000 ppm when compared to "clean" milk)
- Causes for blood in milk:
  - Udder injuries, mastitis, clinical cases may have elevated blood levels in the milk, milking is too aggressive.
  - Monitored via Counter (teat level)

- **Expected yield**

The system provides information about the expected and actual milk production of each cow on total udder and on udder quarter level. Alarms will be given if the milk yield starts to fall significantly below expected yields.



### Milk Quality and Animal Health

#### 4.8 Managing antibiotic treatment



- First of all: register the treatment for the cow(s) into your PC, before you give the drug. Applies also to treatments done by the veterinarian.
- It is best to remove treated cows from the VMS herd (keep them in a special group, milked by a separate machine (bucket milker for example).
- Keep good records of drying off treatments: apply a withholding period if the dry off period is shorter than expected.
- Remember that excretion periods may vary with the kind of drug. Read the label or ask your vet.
- To prevent prolonged excretion of residues, cows should be milked at least 2x per day.
- Milk from untreated quarters must not be delivered (sent to the main tank), because transfer of antibiotics between quarters may occur.
- A treated cow milked in VMS must have her milk set to the divert line and must be followed by an appropriate system cleaning before the next cow is milked.
- You can reduce the risk by milking treated cows before the main system cleanings.
- Check if the milk from auto-separation cows really ends up into the divert buckets.
- Verify the success of treatment: check the cow's treated quarter with the help of a CMT or DeLaval portable cell counter DCC before you allow the milk to go again to the bulk tank.



## Milk Quality and Animal Health

### 4.9 Free Fatty Acid in the milk

- Lipolysis results from the enzymatic hydrolysis of milk fat, causing an accumulation of free fatty acids (FFA), which are responsible for the rancid flavor of milk. The causes behind too high FFA-levels are quite complex and not yet fully understood. Most often, elevated level of FFA in milk are related to a combination of machine effects and cow effects.

#### Machine effects:

- Blind milk pumping (air pockets),
- Excessive air inlet,
- Incorrect or overused liners,
- Excessive stirring in the cooling tank, or too early start of stirring, before it's covered with milk.
- Freezing of the milk in the bulk tank,
- Excessive stirring in the cooling tank,
- Inlet in the bulk tank.

#### Cow effects:

- Low cow condition = more sensitive to sickness = possible higher FFA.
- Low energy in total ration, or feed not always available at the bunk.
- Cows with high fat % milk have higher FFA's.
- One study showed increased levels when access to sufficient feed and water was restricted.
- Stress may increase lipolysis too.
- Too short milking intervals, specially during late lactation. Late lactation cows (5-7 kg/milking) should only be milked twice a day.



Milking		
Ml > 12	Avg MI	Succe ss MI
5	11,8	14
5	12,7	14
2	9,4	4
6	12,9	12
0	9,4	8





### Milk Quality and Animal Health

#### Main points to check

- Milking intervals of late lactation cows (max 2x per day)
- Verify that the milk is not freezing in the tank – especially in the hours after tank cleaning.



## Milk Quality and Animal Health

### 4.10 Managing elevated bacteria counts



#### • Water supply

- Insufficient hot water: by far the cause of most elevated bacteria counts.
  - 1) lack of capacity to supply enough volume of hot water?
  - 2) Hot water temperature is not high enough.
- Check the temperature alarms in the VMS cleaning monitoring program. The hot water must have a minimum temperature of 85°C. At the end of the cleaning cycle, a return water temperature lower than 45 °C is a source of concern
- The water supply must be of high quality (check hardness, iron, heavy metals, pH, germs)

#### • System cleaning and detergents

- Always ensure that the detergent cans are never empty.
- Verify that the correct amount of detergents are added.
- Use “VMS approved” products.
- Their specifications meet the rigorous demands of the VMS system.
- It is highly recommended to run a full system cleaning 3 times per day. 2 cleanings per day is possible, but only if all other factors are optimal!
- Exchange the VMS milk filter(s) in time, preferably before cleaning.
- Check the pre-cooler for debris and obstructions.
- Check the cleaning of the cooling tank (also tank outlet valve).
- Check for possible broken valves, faulty attachment of teat cups in the cleaning jetters, blockages in the cleaning system.
- General hygiene in cubicles, udder and teat cleanliness plays an important role.

#### • Settings for idle milking times

- When VMS does not milk for more than 30 minutes, run a short cleaning. If VMS is idle for more than 60 minutes, run a full system cleaning.

- **Regular maintenance** and timely replacement of parts in contact with milk.





### Milk Quality and Animal Health

#### 4.11 Check points in case of high bacteria counts

Here is a list of various points that can be checked to troubleshoot elevated bacteria counts.

- Check levels of detergent the cans – empty?
- Contaminants in detergent drums?
- Verify chemical concentrations
- Check shelf life of products
- Ensure detergents are stored in the right conditions (not too hot or cold)
- Check detergents strength with a chemical test kit
- Blocked or punctured pick up detergent tubes
- Detergent pumps – are they working?
- Water quality (hardness, bacteria, buffers,...)
- Hot water temperature – beginning and end of cycle
- If water temp too low at end of cleaning cycle, consider insulating the lines.
- Is there enough hot water to sustain all demands at all time?
- Check cleaning time for each cycle.
- After a maximum idle time of 20 min., the system should run a long rinse.
- Milking cups should be clean (auto rinse works OK?). Do they seal properly during system cleaning?
- Liners, gaskets and rubber membranes in contact with milk – changed in time? Signs of aging?
- Is the teat cleaner cup clean and free of debris (inside).
- Check teat cleaning process including back flush of cup.







### Milk Quality and Animal Health



- Is teat cleaning intensity adapted to cow cleanliness level?
- Receiver group – check inside. Check sprayer nozzles (blockage?)
- Sanitary trap – is it clean?
- Pneumatic and manual valves – are they in the right position?
- Check milk filter (indication if cows are clean and if teat cleaner does the job).
- Check milk meters for debris.
- Check vacuum level – is it correct during the cleaning cycle?
- Check vacuum sensors for tear or debris.
- Check VMS milk pump impeller.
- Delivery lines must be cleaned and free from deposits (top of milk lines).
- Verify cleanliness of buffer tanks (bottom).
- Check plate cooler for debris in the plates.
- If instant cooler installed, is the milk coming out cold?
- Any milk staying in the buffer tank for an extended period of time?
- Check the proper functioning of the cooling tank.
- After a maximum idle time of 20 min., the system should run a long rinse.
- Are we diverting the right milk to the right place?
- Are the air inlets working properly?
- Is the stall platform clean?



## Milk Quality and Animal Health

### 4.12 Attention to daily routines

Many milk quality issues can be prevented by implementing simple daily routines in your schedule.



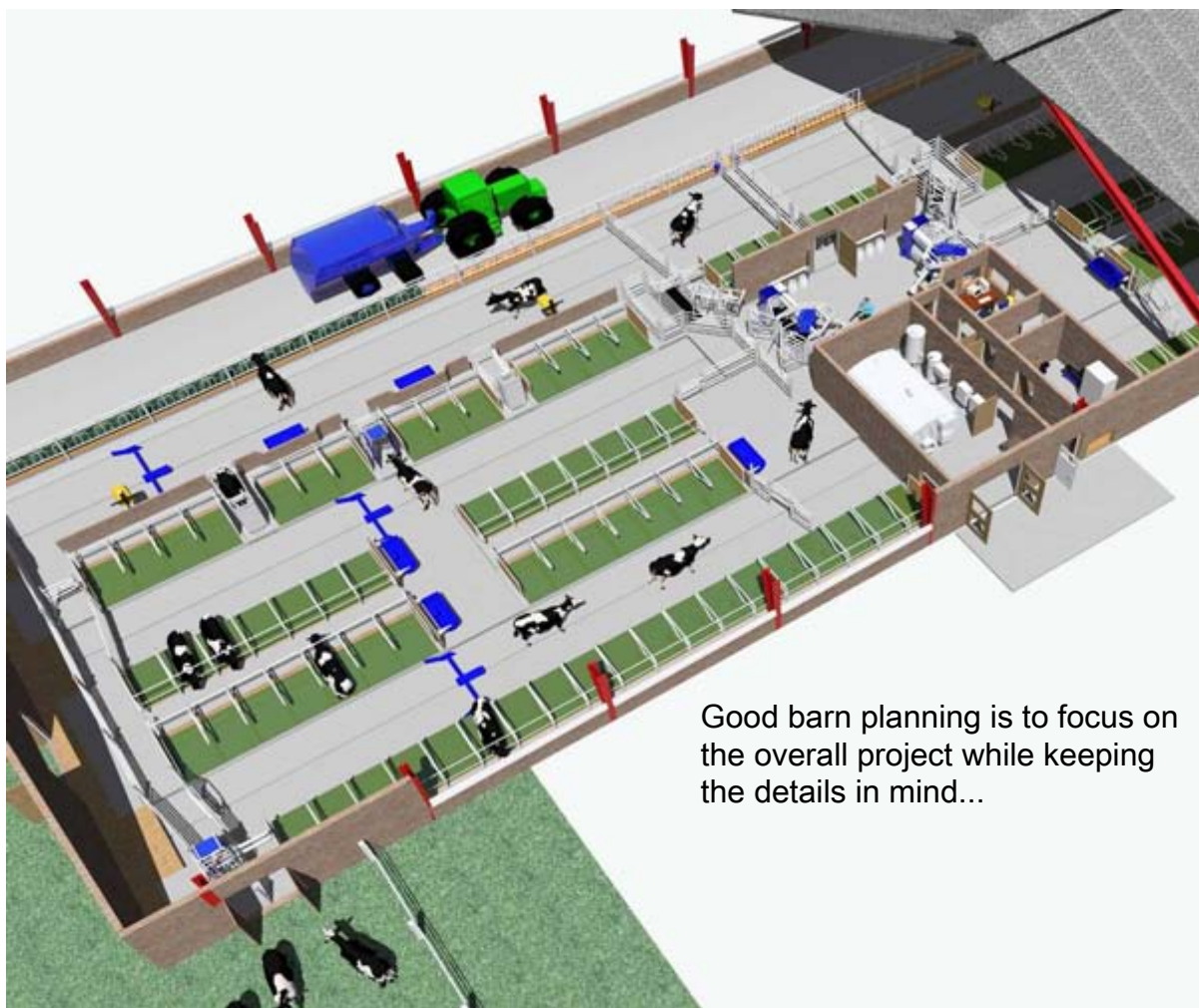
- System check
  - Check rubber parts/liners.
  - Check that air holes are open.
  - Regular cleaning of the camera.
  - Ensure that the teat spray works.
  - Check detergent and teat disinfection supply.
  - Cleaning with the hose.
  - Change milk filter every 8 hours, but at least twice a day.
  - Ensure hot water is available for cleaning ( $>85^{\circ}\text{C}$ ).
  - Check potential alarms in cleaning monitoring software.
  - Check that all cups backflush properly between each cows.
  - Is the camera cleaning sponge due for replacement?
- Cow performance check
  - Variables to check: Milkings per cow, per day and 7 days average. Milking intervals.
  - Average milkings per cow per day should be between 2,5 and 2,7.
  - List of cows with less than 2 milkings per day = 0 (unless very late lactation cows).
  - Every cow with incomplete milking must be milked again within 4 hours.
  - Check cows that are difficult to attach – adjust system settings if necessary.
  - Incidence goal for clinical mastitis: Ideal goal would be 1% of the herd per month.
  - Incidence goal for sub-clinical mastitis: less than 10% new infections per month.
  - Less than 20% of cows with SCC  $> 250,000$
  - Max 10% of 1st lactation cows with SCC $>250,000$
  - Max 10% of cows with SCC  $> 500,000$
  - Udders are cleaned and shaved – no long hair.
- Barn, cow environment check.
  - Clean the feeding table regularly to prevent mould growth.
  - Cubicles Hygiene – clean and dry bedding for all cows.
  - Clean walking areas.
  - Proper barn ventilation.



### VMS Best Practices

#### Barn planning

##### Chapter 5







### Content

- 5.1 Good barn planning...
- 5.2 Cow traffic - Forms of cow traffic
- 5.3 Cow traffic - Alleys
- 5.4 Cow traffic - Gates and selection
- 5.5 Cow traffic - Place for the milking station
- 5.6 Cow traffic - Waiting area
- 5.7 Cow traffic - Crossovers
- 5.8 Eating / Drinking - Feeding Table
- 5.9 Eating / Drinking - Feeding Stations
- 5.10 Eating / Drinking - Water
- 5.11 Welfare / Health - Free Stalls
- 5.12 Welfare / Health - Straw Bedding
- 5.13 Welfare / Health - Foot Bath
- 5.14 Welfare / Health - Cow Brush
- 5.15 Welfare / Health - Ventilation
- 5.16 Room Concept
- 5.16 Manure Equipment
- 5.17 Light
- 5.18 Comfort all day long







5.1 Good barn planning..... is to focus on the overall project while keeping the details in mind...

### Cow traffic

- Forms of cow traffic
- Alleys
- Gates and selection
- Placement of milking station
- Waiting area
- Separation area

### Eating / Drinking

- Feeding table
- Feeding stations
- Water

### Welfare / Health

- Free stalls
- Foot bath
- Cow brush
- Ventilation

### Room concept

- Machine room
- Milk tank room
- Office

### Manure equipment

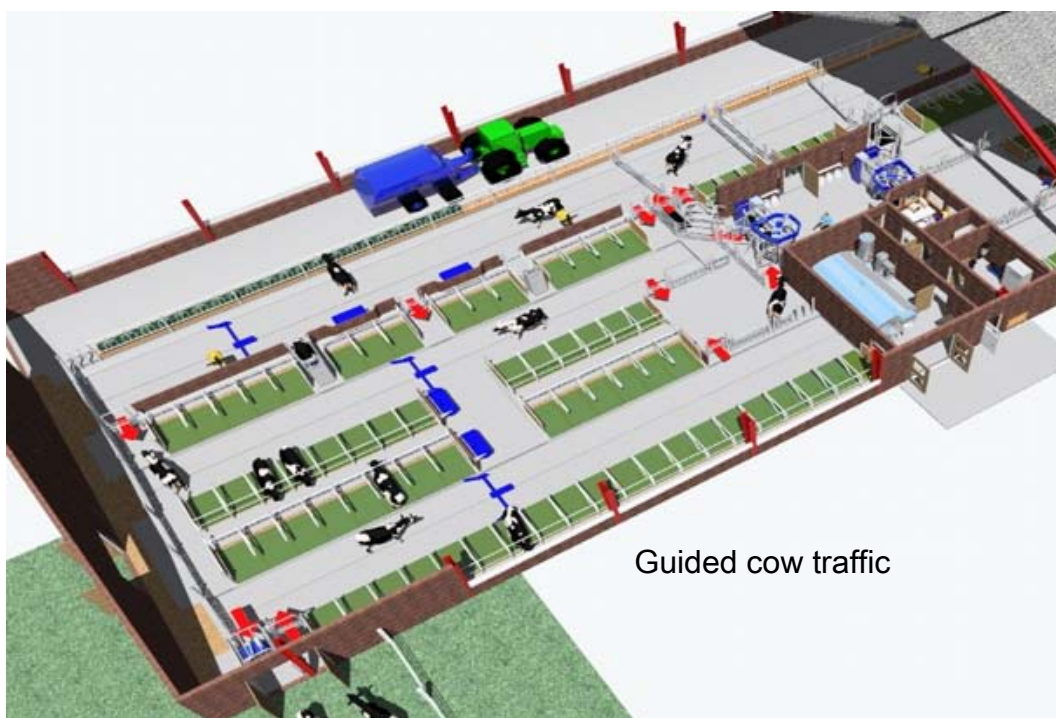
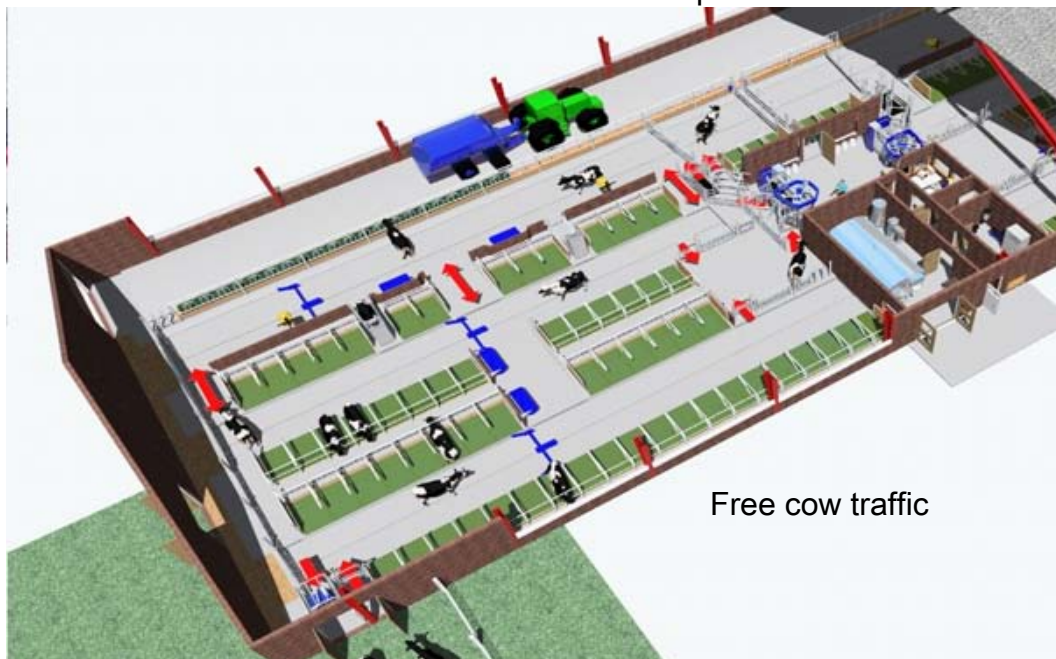
### Light



## Barn planning

### 5.2 Cow traffic - Forms of cow traffic 1

Your possibilities





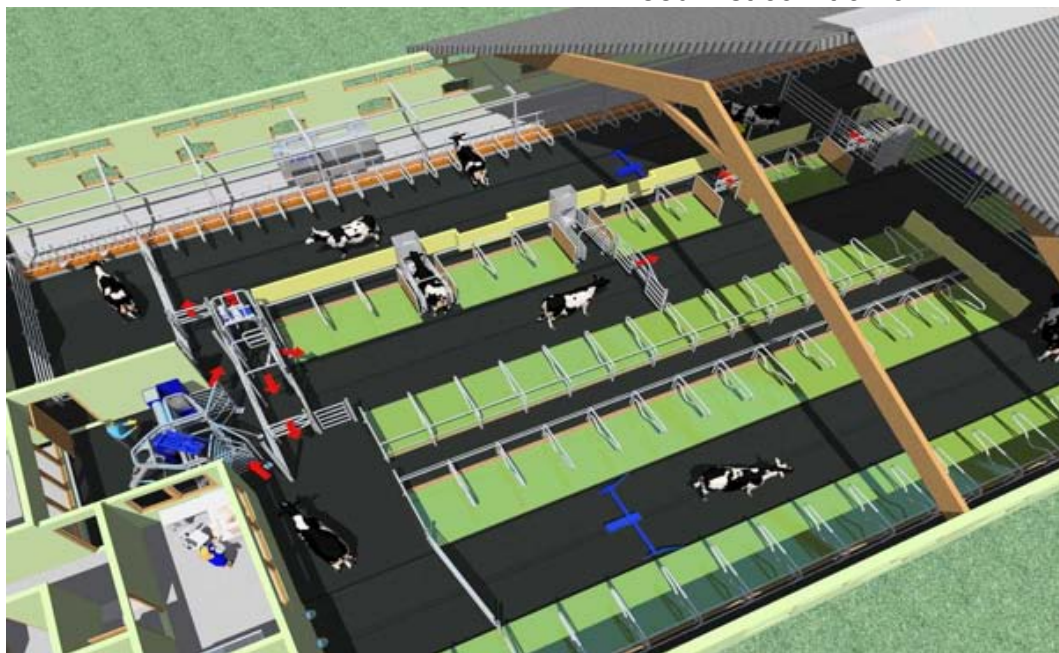
## Barn planning

Cow traffic - Forms of cow traffic 1

Your possibilities



Feed first cow traffic



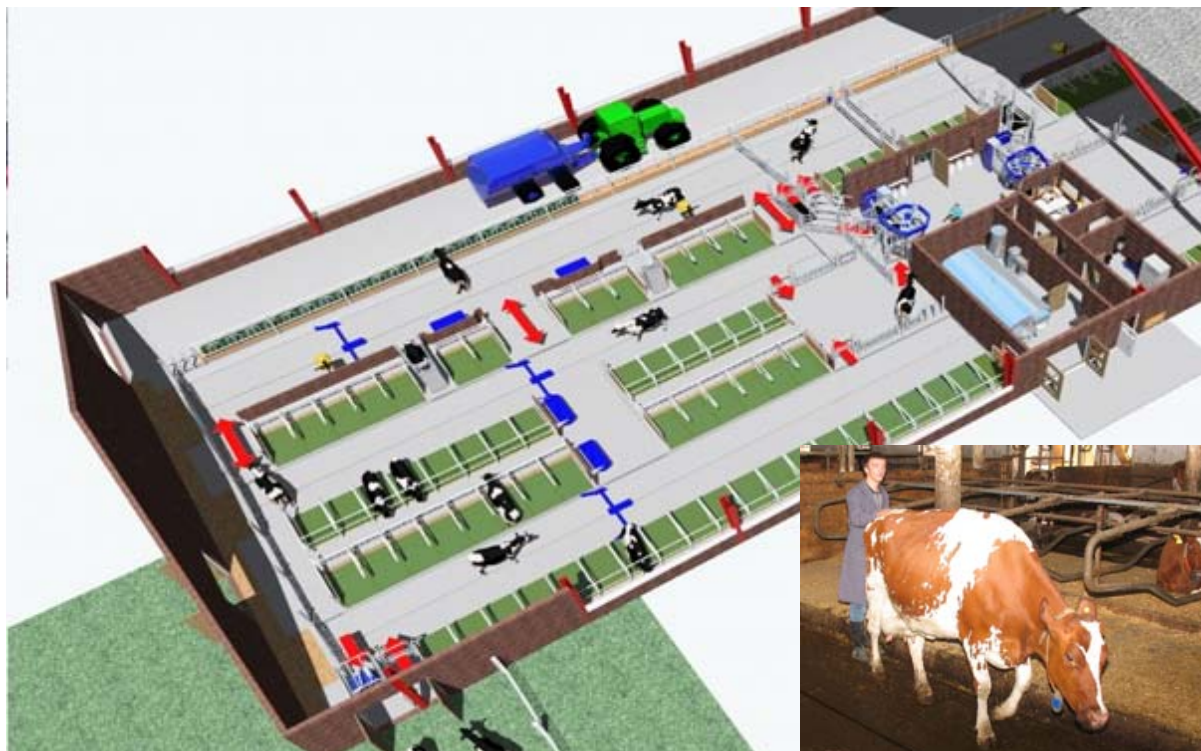




## Barn planning

### Cow traffic - Forms of cow traffic 2

#### Free cow traffic



#### PROS

- Gives your cow the possibility to reach feed whenever they like
- Less risks of cows blocking passages or gates
- Is cheap (at first view)

#### CONS

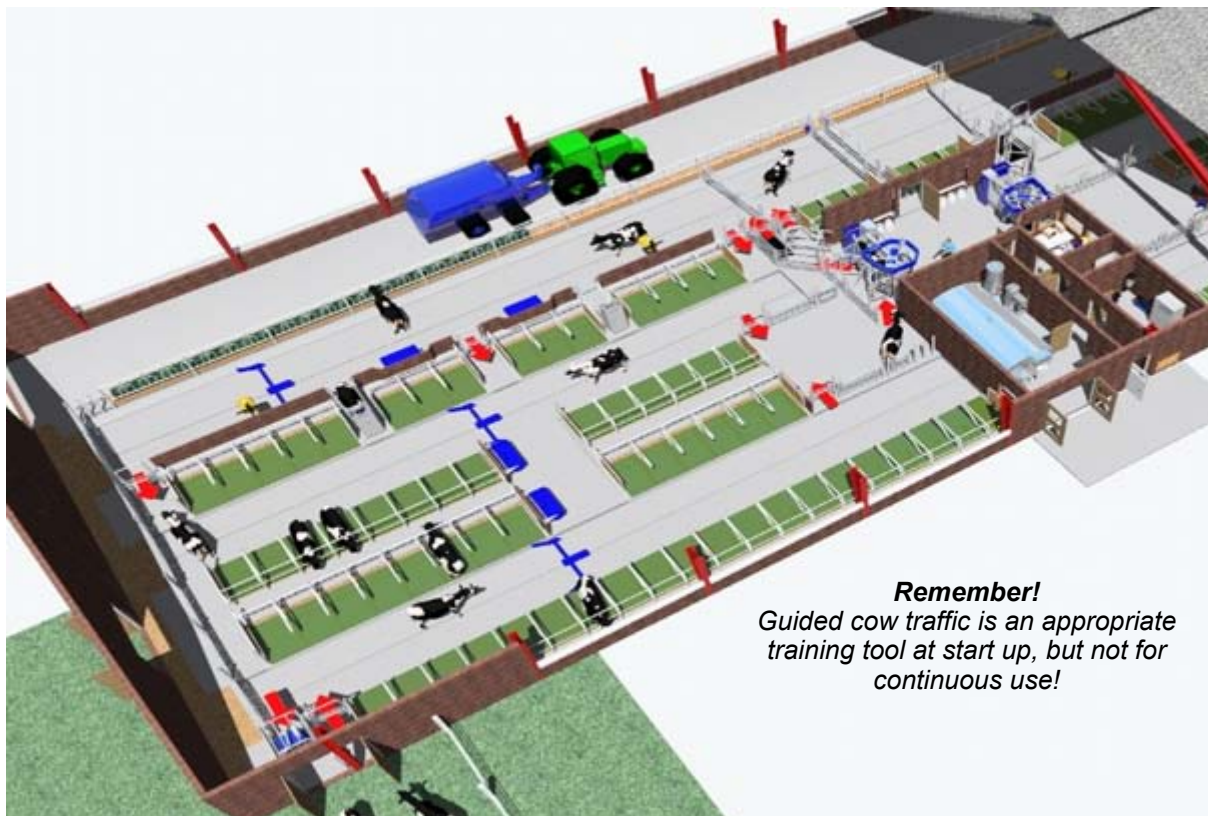
- More cows to fetch to reach a regular milking interval:
  - high labour input!
- Cows may visit the milking station without being milked:
  - decreases the capacity.
- High amounts of concentrates needed to motivate your cows to visit the milking station (especially at the end of lactation).
- Longer and more irregular milking intervals



## Barn planning

### Cow traffic - Forms of cow traffic 3

#### Guided cow traffic



#### PROS

- Only few cows to fetch
- Is cheap (only one way gates)

#### CONS

- To reach feed your cows have to visit the milking station:
  - can decrease feed intake.
- Cows have to visit station without being milked:
  - decreases the capacity.
- Feeding and resting should be separated (does not fit to 3 row barn).
- More cows waiting in front of station:
  - low ranked cows may have difficulties (access to feed is restricted!),
  - not suitable for more than 40 cows.



## Barn planning

### Cow traffic - Forms of cow traffic 4

#### Semi free cow traffic



#### PROS

- Cows have individual access to the feeding area.
- Your cows can reach feed if they have no milking permission:
  - shortcut via smart gate for the ones that want to eat and do not need to be milked yet.
- You can decide for each individual cow how free or forced the cow traffic should be.
- Only few cows to fetch.

#### CONS

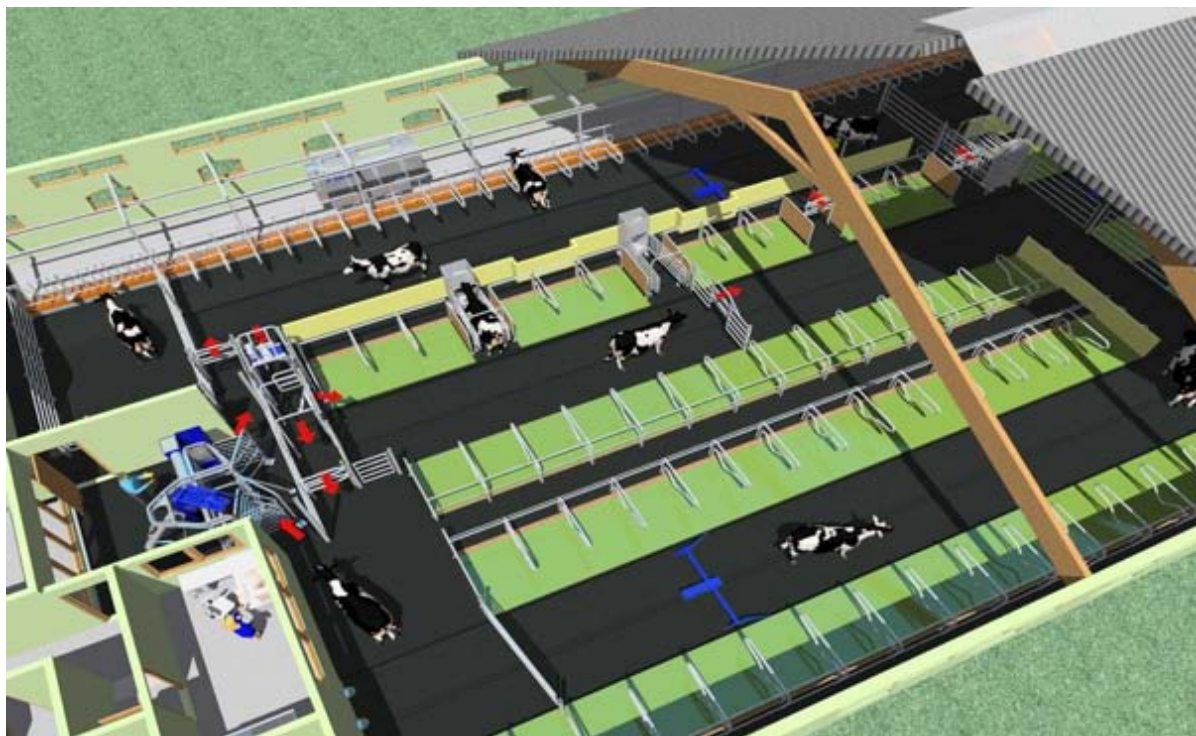
- Additional costs for Smart-gates.
- Cows may visit the milking station without being milked:
  - decreases the capacity.
- Works best, when resting area can be separated from feeding area.





### Cow traffic - Forms of cow traffic 5

"Feed First"



#### PROS

- Gives your cows the possibility to reach feed whenever they like.
- No cows without milking permission in the milking station:
  - increases the capacity.
- Cows present themselves up to 15 times per day at the selection gate, resulting in:
  - regular milking which is good for udder health
  - less cows to fetch
  - less labour

#### CONS

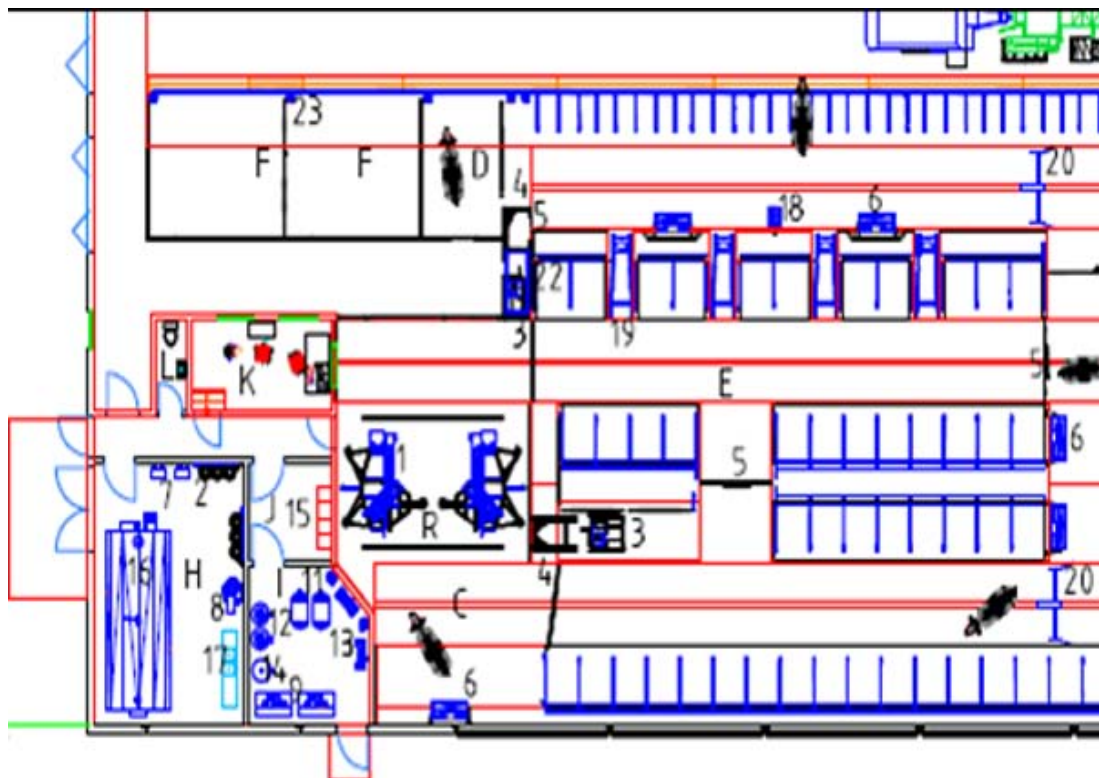
- Additional costs for selection unit.
- Works best, when resting area can be separated from feeding area.
- Submissive cow possibly have to stay for long time in the waiting area.  
That problem can be reduced with help of a VIP lane or a waiting area split into two sections



## Barn planning

Cow traffic - Forms of cow traffic 6

Pre-selection



### PROS

- No capacity loss, due to refusals.
- Cows not to milk can go straight to the food.

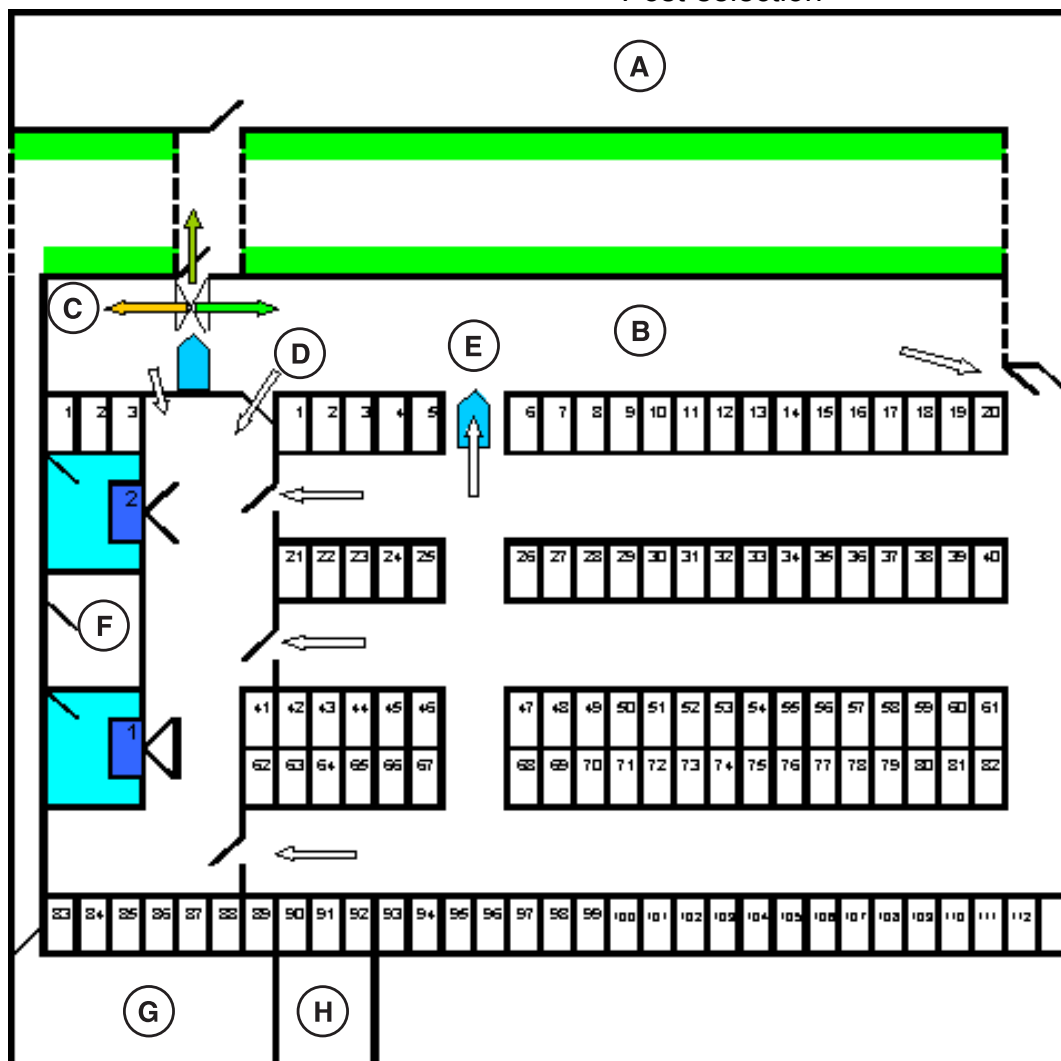
### CONS

- Additional costs for selection unit.
- Works best with a feed station area.
- Submissive cow possibly have to stay for long time in the waiting area.



### Cow traffic - Forms of cow traffic 7

Post-selection



B = High production group  
A = Low production group  
C = Separation  
D = 3 Way post selection

E = Smart gate  
F = Office  
G = Milk tank room  
H = Machine room

- You can have two production groups.
- The high production group can also go directly via the smart gate to the feed rack.



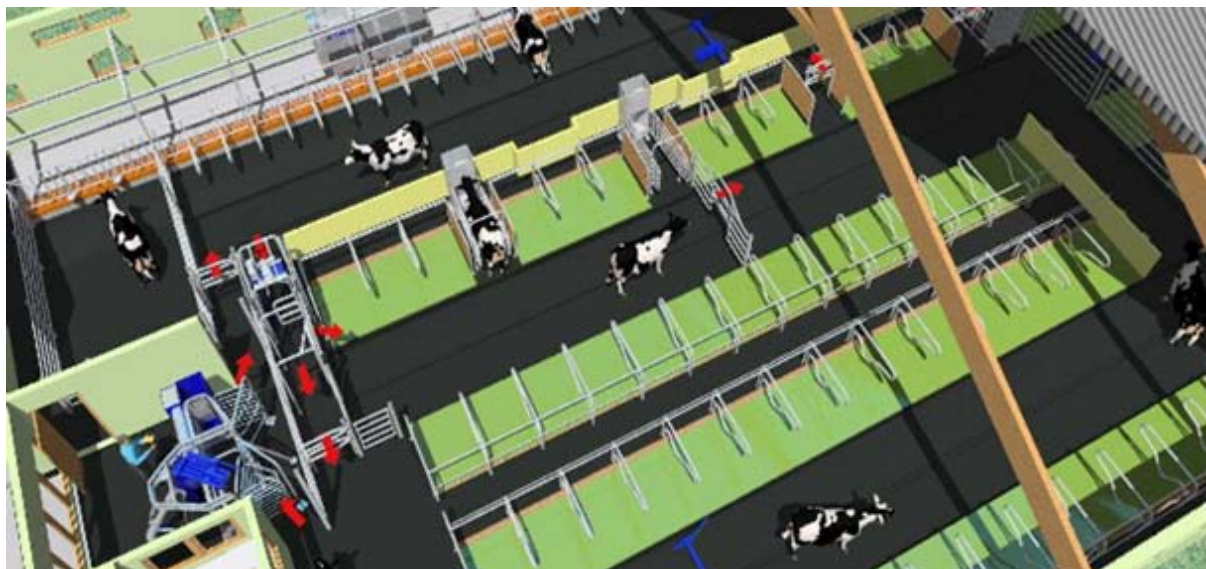
## Barn planning

### Cow traffic - Forms of cow traffic 8

Chose your way...

Cow traffic	Free	Guided	Semi free	Feed first
Regular milkings	-	+	++	++
High milking frequency	-	++	+	++
Few cows to fetch	--	++	+	++
Few visits without milking	+	-	+	++
Few queues in front of robot	++	-	+	+
Frequent roughage intake	++	-	+	++
Low cost	++	+	-	-

++ = very positive, + = positive, - = negative, -- = very negative, 0 = neutral





### 5.3 Cow traffic - Alleys 1

Your cows need space

Wide alleys and less (or no) blind alleys will help your cows...

- To move without stress (especially submissive and lame ones).
- To go feed often.
- To feel well.

*Pay attention to the additional space required for water!*



Alley	Width (m)
- Cubicles - wall	240 - 260
- Cubicles - cubicles	260 - 280
- Feed alley - wall	300 - 320
- Feed alley - one row, two rows, three rows or four rows	380 - 400



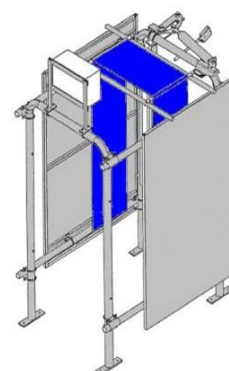


## Barn planning

### 5.4 Cow traffic - Gates and Selection 1

Use your possibilities

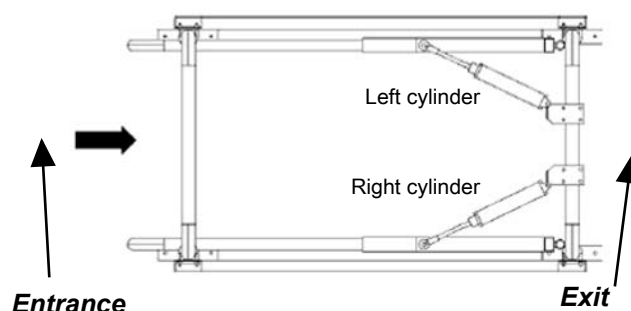
#### Smart gates



- Feed first
- Semi free cow traffic
- Access to pasture

#### Separation gates

- Feed first cow traffic
- Selection into selection area
- Separation into feeding groups after milking
- Selection back into waiting or resting area after an unsuccessful milking.



*Three-way separation gate, viewed from above*





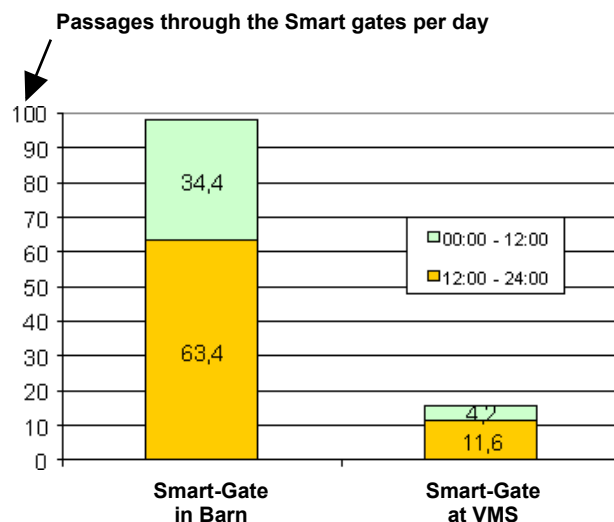
## Barn planning

### Cow traffic - Gates and Selection 2

Keep the details in mind

**Try to put yourself in the position of your (weakest) cows**

- Exit should not be in a corner :
  - dominant cows can block it.
- Pay attention to the design of the exit of gates (see "Where to place one way gates").
- A 3-row barn or feed-first cow traffic :
  - cows that do not like to be milked or are low ranked will stay in the feeding area.
- Cows use a smart gate in the barn more often than if positioned next to VMS (semi free cow traffic).





### Cow traffic - Gates and Selection 3

#### Separation Gates

##### In general

- Two or three ways possible
- Needs a unit to identify the cow:
  - VMS milking station or
  - Smart Gate
- Located maximum one cow length after identifier unit (milking station or Smart Gate)

##### If possible

- The exit should not be in a corner:
  - can be blocked easily by a dominant cow



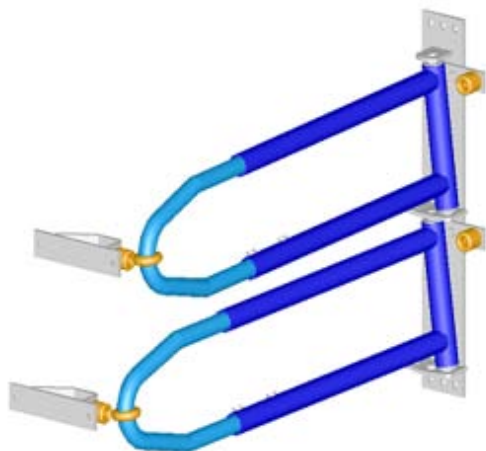


### Cow traffic - Gates and Selection 4

#### One Way Gates

**A gate that can be opened easily in the wrong direction by most of your cows, is not worth its money!**

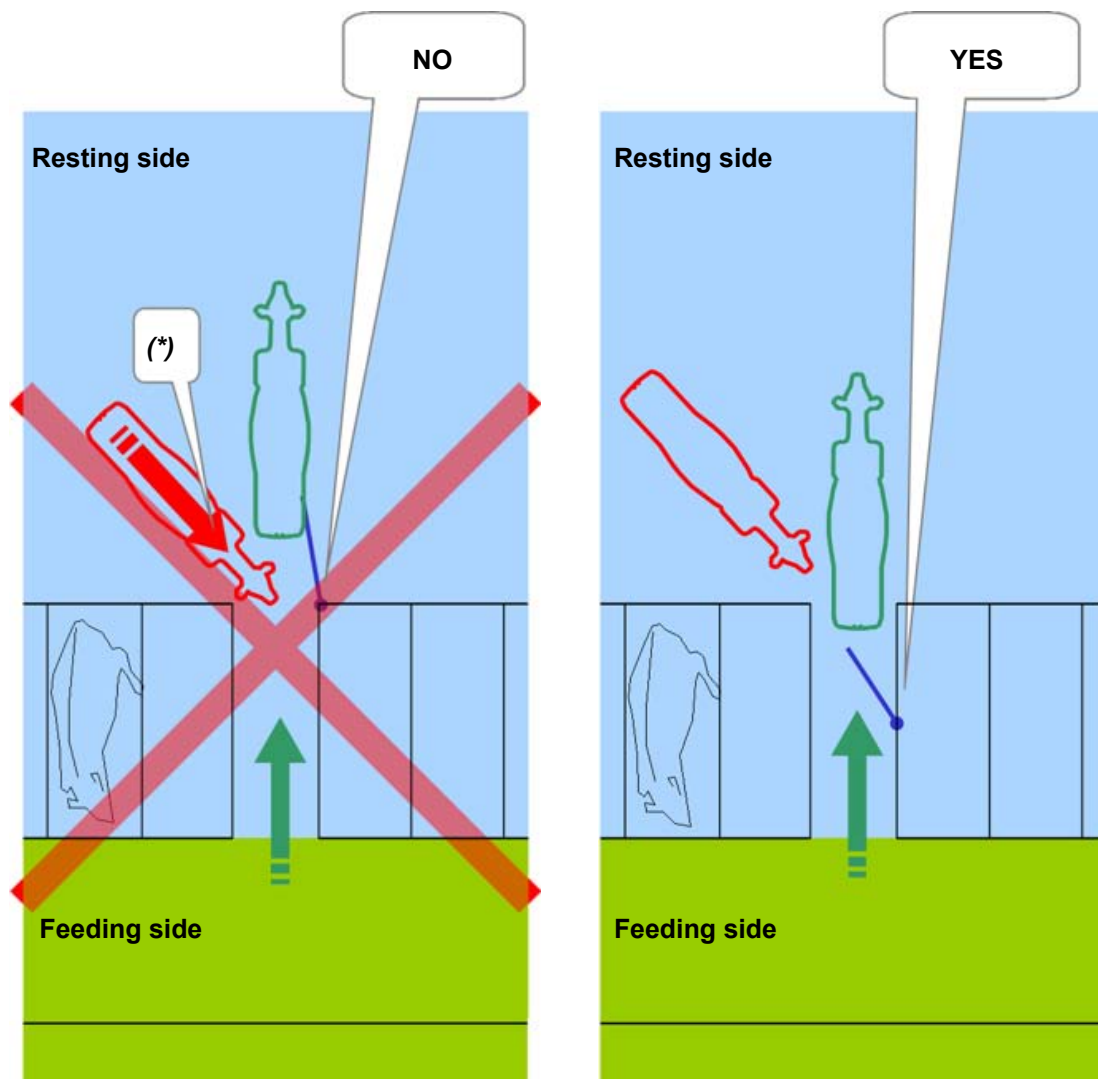
- Slanted bar, gravity closure
- Rubber wrapped (reduces noise)
- 1 bar at 40" or 2 at 32 and 48"
- 2 panel hinged with center gap (saloon style)
- "Portal one way gate" (see picture)
- "Wall mounted one way gate" (see drawing)
- After milking cows should not lie down for 30-60 minutes to give the teat opening the time to close:
  - put one way gate at end of the barn (Semi free cow traffic).





### Cow traffic - Gates and Selection 5

Where to place one way gates?



(\*) A cow may be able to enter through the gate after a cow passes



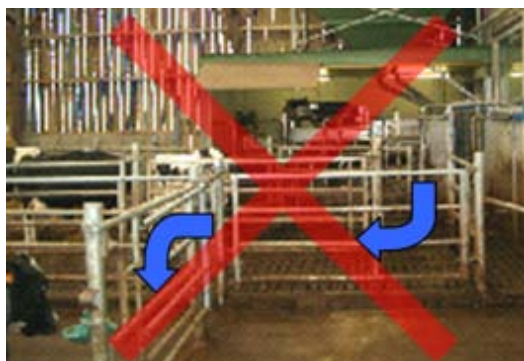
## Barn planning

### 5.5 Cow traffic - Place for the milking station 1

Choose carefully

#### In general

- Separated from machine room
- In a room with 3 walls and a ceiling:
  - easy-to-clean milking side
  - can be closed easily with plastic strips during winter
- Clean and easy access for you:
  - keeps the VMS room clean
  - it is comfortable for you
- Easy entry and exit for your cows:
  - entry side clearly visible
  - straight line entry
  - exit at 0 to maximum 60° turn
  - no attractions close to the entry or exit (e.g. water trough, concentrate feeder, brush)
  - exit lane with a one way gate 3 m. or more from the station.







## Barn planning

### Cow traffic - Place for the milking station 2

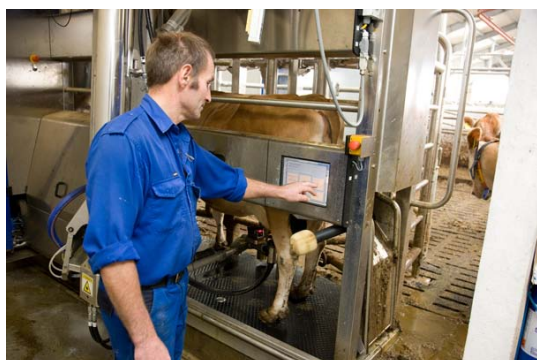
Choose carefully

**If possible**

- Close to tank room:
  - short milk lines
- Slatted floor at entrance to VMS:
  - clean access for your cows
  - keeps the milking station clean
  - less cleaning to do
- Short distances for you:
  - office preferably nearby
  - it's comfortable for you

**To think about...**

- VMS room with pit for easier udder access:
  - Most would build a 20-30 cm deep pit.
  - Few would plan a deeper pit or no pit at all .
- Remember that one day you may like to expand your barn!!!







## Barn planning

Cow traffic - Place for the milking station 3

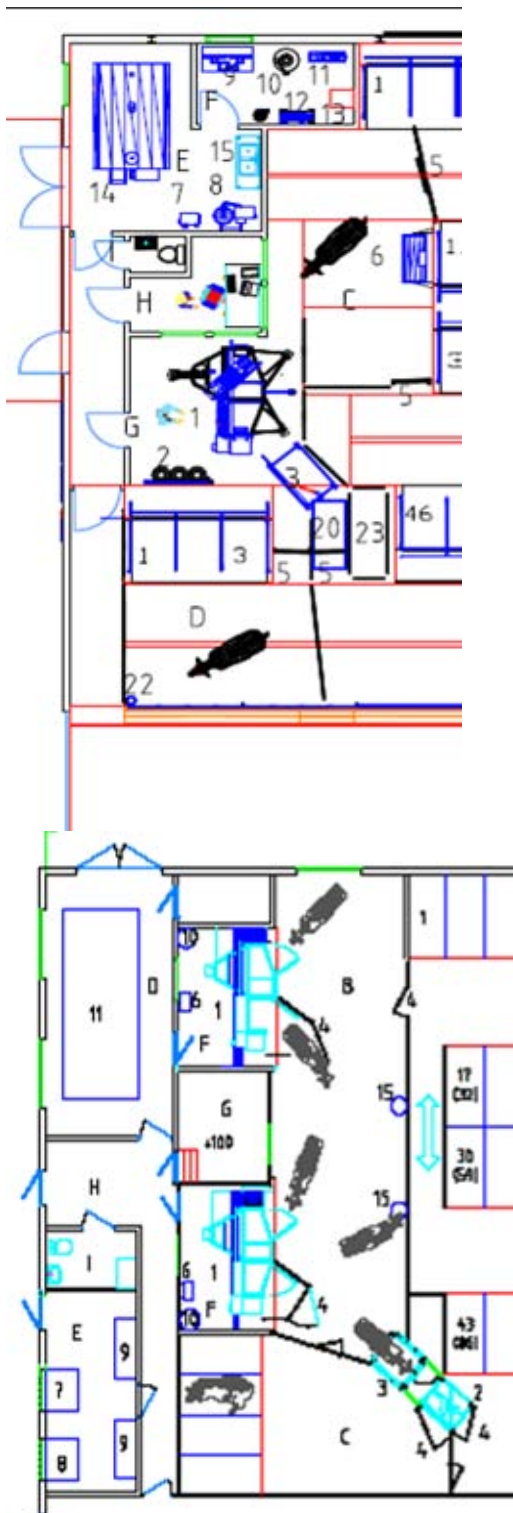
Your possibilities...

### At the end of the building

- Excellent clean and short access to the station
- No obstruction for cross ventilation
- Also good with free cow traffic

### Tandem at end of building

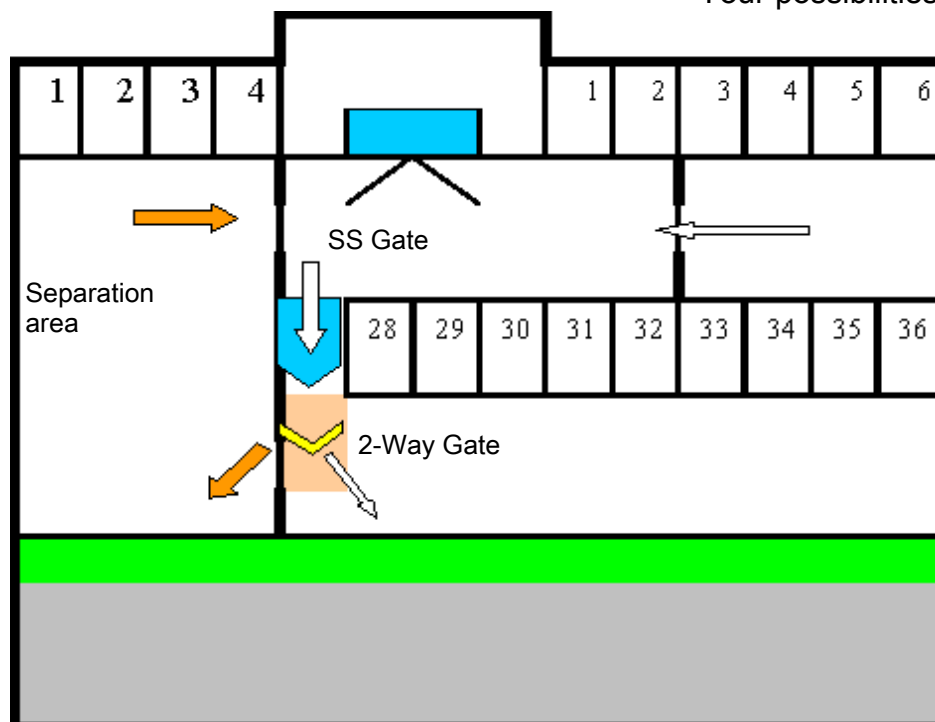
- Excellent clean and short access to (all) stations(s)
- No obstruction for cross ventilation
- Also good with free cow traffic
- Same side (2x Left station) entry, visible and accessible
- Auto milking of separated cows
- Cows could block the exit smart gate,
- Cows that are milked might try to visit the 2nd VMS, looking for concentrate residues,
- Somewhat lower total capacity, compared to 2 parallel positioned VMS's.





Cow traffic - Place for the milking station 4

Your possibilities...



**Along a side wall in row of stalls:**

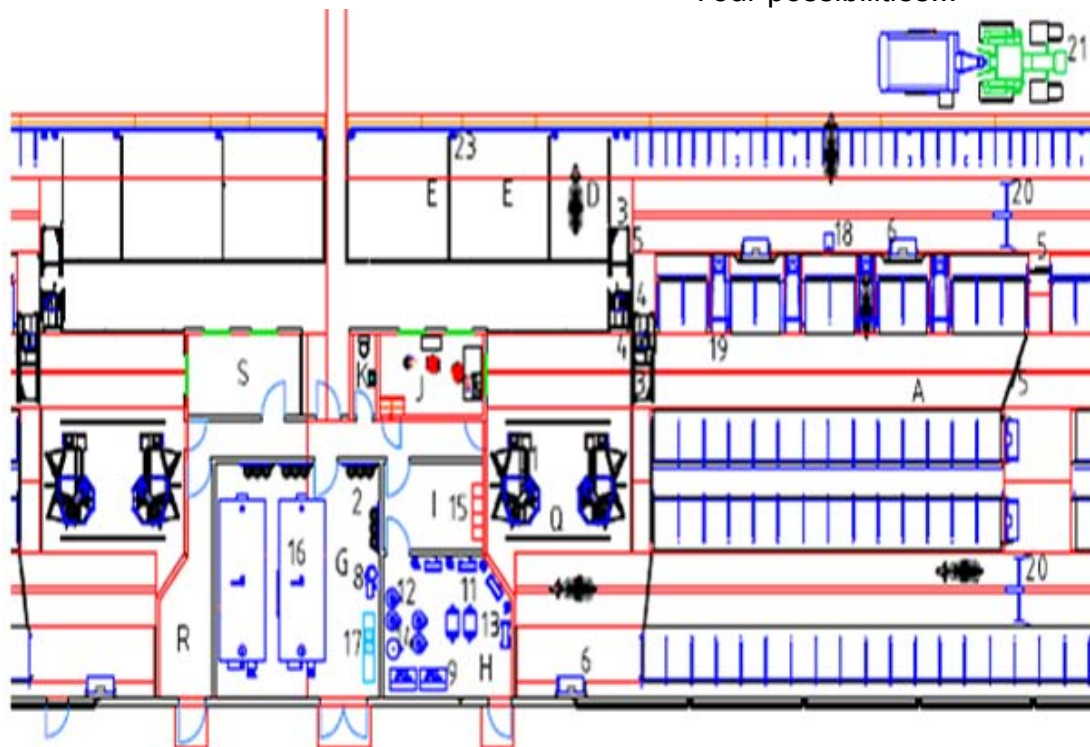
- No obstruction for tunnel ventilation
- Auto milking of separated cows possible
- Clean access to VMS room



## Barn planning

Cow traffic - Place for the milking station 5

Your possibilities...



### In the crossover

- For bigger farms
- All stations and tank room as well as office close to each other:
  - the bigger the more ergonomics become important.
- Good cow entry and exit
- Clean access via a bridge
- You can use step stones to create clean access to next VMS room
- Smart gate + 2-Way gate can separate any cow coming from one of 2 grouped stations



## Barn planning

### 5.6 Cow traffic - Waiting area 1

As pleasant as possible

#### Size

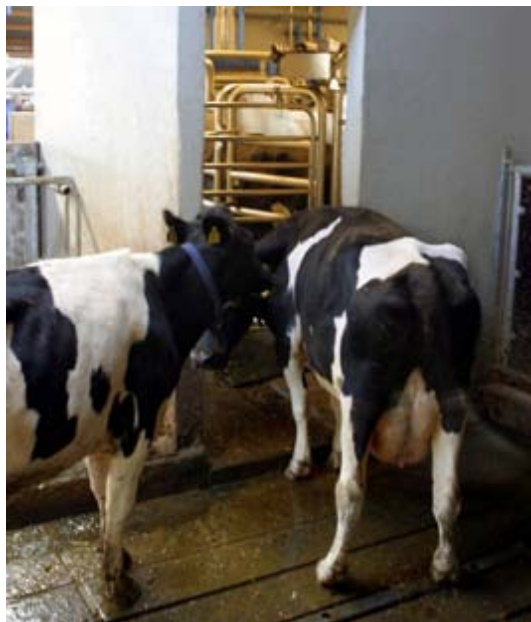
- Minimum: 1.5 m<sup>2</sup> for each of 10% of the lactation cows.
- Larger is better (15 m<sup>2</sup>)
- At least 3 m. wide, so cows can turn easily when pushed

#### Floor

- Preferably slatted floor, manually scraped:
  - clean hoofs = clean VMS
- No scraper, it may create stress

#### Wellness

- Do not forget the water
- Well ventilated and enough light
- Cow brush:
  - only if waiting area is large enough (> 20 m<sup>2</sup>)
  - not too close to entrance of milking station
- No free stalls in waiting area





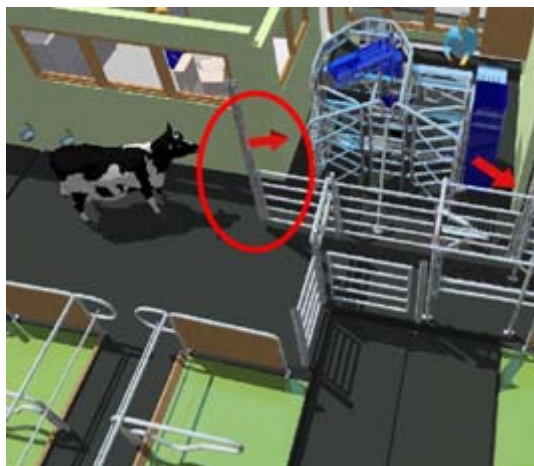
## Barn planning

### Cow traffic - Waiting area 2

As pleasant as possible

#### Access

- Cows do not like being disturbed while waiting:
  - arriving cows should enter the area behind the waiting cows
  - if your entrance to the barn is via the waiting area, it should be behind the waiting cows
- Cows like being protected at the entrance of the milking station:
  - barrier should have half the length of a cow (see picture).
- No one way gates at entrance or open when not needed:
  - submissive cows cannot leave the waiting area when a dominant cow enters
  - they "remember" this situation
  - less visits of the waiting area
  - better: temporary gate
- Avoid narrow entrance to the waiting area:
  - low ranked cows will have less fear to enter







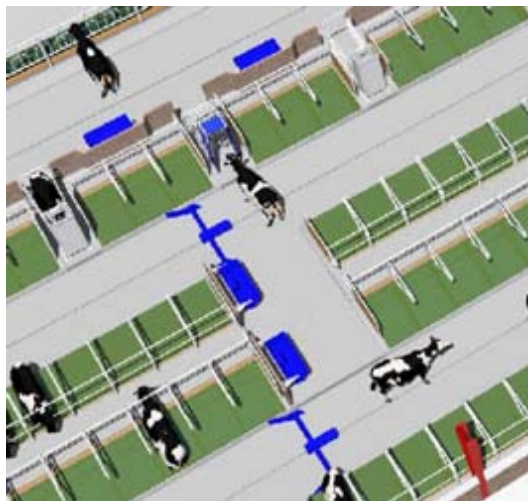
### 5.7 Cow traffic - Crossovers 1

#### In general

- Max. 20 - 25 cubicles in a row between cross alleys.
- When scraped alleys are used:
  - elevated cross alleys
  - elevation 100-200 mm.
- Cross alleys must be crowned:
  - auto runoff of fluids

#### If possible

- No dead ends
- With Semi free cow traffic, crossover should be opposite to the Smart gate:
  - straight easy access to the feeding table for any cow, coming from any direction.
- With Feed first cow traffic crossover should be opposite to the one way gate:
  - straight easy access to the feeding table for any cow, coming from any direction.







## Barn planning

### 5.8 Eating / Drinking - Feeding Table

#### In general

- All feed areas should be shaded:
  - to protect cows from the sun, rain or snow
  - to increase the bunk life of your fodder

#### To think about...

- Rubber mat in the standing area:
  - will allow cows to stand comfortably for longer periods of time
- Feeding cubicles:
  - keep you cow's feed dry and healthy
  - prevent pushing away submissive cows
- Sloped feed barrier:
  - reduces pressure on cow
  - less pain
  - cow Comfort
- Head locks
  - eased cow treatment
  - not needed for all places





### 5.9 Eating / Drinking - Feeding Stations

#### In general

- The number of feed stations is related to the quantity of feed that you like to distribute (more when mealy feed is used).
- Avoid installing feeding stations next to VMS exit corridor:
  - cows waiting the feeding station block those that exit the VMS.
- In Feed first setup the feed station area should not be too small. Take all space up to the next cross over.





## Barn planning

### 5.10 Eating / Drinking - Water 1

#### Where to install water troughs

- Cows like to drink after milking:
  - if the exit lane of the robot is long enough, you can install an additional water trough here.
- Cows like to drink when they eat. Water should be:
  - easily accessible
  - within 15 meters from the feeding table
  - not restricted by any gates
- Avoid installing water troughs next to the exit of the milking station:
  - drinking cows will block exit
- Cows always should have easy access to water:
  - do not try to force your cows to go for milking by giving them no water in certain areas
- If water troughs are installed close to cubicles, prevent water from being squirted into the cubicles (see pictures):
  - reduced incidence of mastitis and other diseases





### Eating / Drinking - Water 2

#### Requirements for installation

- Do not install water troughs or bowls too low:
  - 600-800 mm over floor level
  - reduced risk of manure pollution
- Cows prefer a large, calm drinking surface from which they can drink quickly and without stress:
  - install water troughs if possible
  - if you install bowls, they should offer at least 20 l. per minute
  - plan at least 1 bowl for 5 cows.
- Water temperature is best at 15 to 17°C:
  - increases milk yield



#### Did you know ?

High-yielding cows need more than 150 litres of fresh water every day.

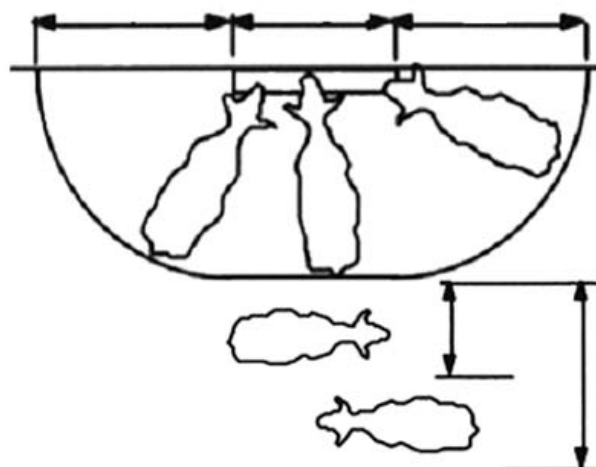


## Barn planning

### Eating / Drinking - Water 3

Your cows need space

- Make wide crossovers if you plan water troughs in that crossover!
  - pictures show too narrow crossover with one way gate and water
  - dominant cows can block the passage
- Plan 3 to 4 m. around the water troughs, if possible:
  - reduces pushing and shoving
  - important for submissive cows to drink without being afraid



Graves, 1995





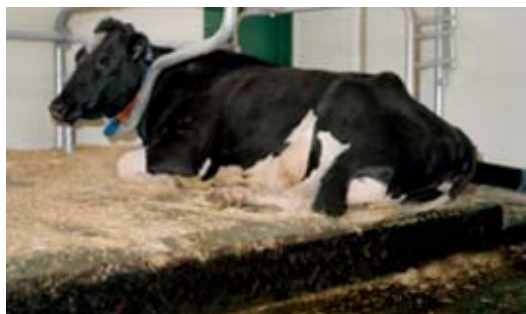
## Barn planning

### 5.11 Welfare / Health - Free Stalls 1

As comfortable as possible

#### In General

- Your cows need a soft, non slippery surface and enough space to lay down and rise up in a natural way.
- The divider should only guide the cow and not disturb her.
- Cows should not stand in the stalls, they should lie straight and not diagonal.
- Stalls have to stay clean and dry.
- Partition wall at the end of each row next to a crossover:
  - protect cows (e.g. against manure splashes)



#### Did you know?

A cow lays down to rest and rise up afterwards ~ 8 times per day.



### Welfare / Health - Free Stalls 2

#### Dimensions

##### Width

- 1.15 - 1.20 m is best
- Should be increased up to about 1.25 m next to a closed wall:
  - to compensate for the lack of space sharing.
- Not too wide ( $>1.20$  m):
  - your cows won't lie straight
  - more work for cleaning the rear of the beds

##### Length

- Total length: 2.50 - 2.60 m:
  - can be reduced to 2.30 m when cow can thrust her head under the lower rail into the adjacent cubicle space.



#### Did you know?

Dairy Cows rest 12 hours per day in periods of ~ 1.5 hour. They walk and stand (milking) for ~ 8 hours and eat for ~ 4 hours.



## Barn planning

### Welfare / Health - Free Stalls 3

#### Dimensions

##### Neck rail

- About 1.60 m distance to the curb (measured horizontally) and 1.15 m (+/- 0.05) above the bed.
- Ensures that:
  - the cubicle bed is kept clean
  - your cows will not lie down too far forward
  - your cows will position themselves correctly while standing without dunging on the bedding
- The position of the neck rail should be adjustable (and it should be adjusted if necessary!!).
  - Best is to use a flexible rope as neck rail

##### Brisket Board

- Should help to position your cows in the stall, they should not restrict them:
  - rounded
  - 10 cm high
  - not raised in front

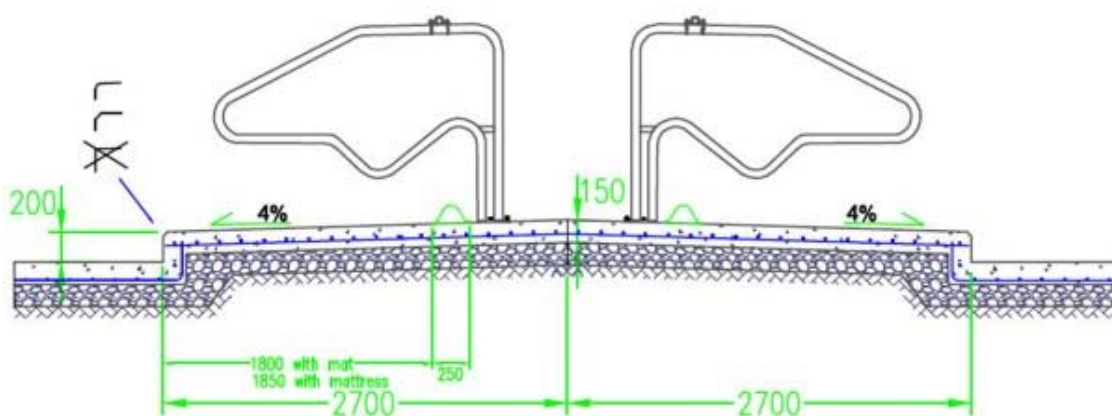




### Welfare / Health - Free Stalls 4

#### Checklist "Free stall dimensions"

Length:	Cows <650 Kg	Cows >650 Kg	
- Towards wall	2.8 m	3 m	
- Head to head	2x2.5=5 m	2x2.7=5.4 m	
- No front wall	2.5 m	2.7 m	
Width (centre to centre)			1.20 - 1.25 m
Brisket board from rear curb			1.80 - 1.85 m
Neck rail from rear curb ( <i>measured horizontally</i> ) Measure the cow			1.65 - 1.75 m
Height of Neck rail			1.25 - 1.33 m
Cubicle slope			4%
Curb height			0.20 - 0.25 m



CC1800 XL Double row for >650 Kg cows



## Barn planning

### Welfare / Health - Free Stalls 5

What can be wrong?

- Cows hit divider



- Cows stand halfway in
- Cows stand long in cubicle



- Cow lying diagonally







## Barn planning



- Cows stand diagonally



- Shiny neck rail disease



- Cows have difficulties to lie down or to raise up



- Front lunge obstruction



## Barn planning



- Cows lying halfway inside



## Barn planning

### Welfare / Health - Free Stalls 6

Checklist "What can be wrong?"

	Cubicle is too			
Your cows...	Short	Long	Tight	Wide
...do not enter	X		X	
...lying in alley	X		X	
...stands long in cubicle	X		X	
...stands halfway in cubicle	X		X	
...have difficulty lying down	X			
...have difficulty raising	X		X	
...raise with front legs first	X		X	
...lying too far inside		X		
...lying too short inside	X		X	
...lying diagonally	X			X
...lying 180 degrees	X			X

	Partition is too			
Your cows...	High	Low	Long	Short
...do not enter	X			
...lying in alley	X			
...lying too far inside		X		
...lying too short inside	X			
...lying diagonally		X		X
...lying 180 degrees	X			

	Brisket board is too	
Your cows...	Backward/ High	Forward/ Low
...do no enter	X	
...lying in alley	X	
...stands halfway in cubicle	X	
...have difficulty lying down	X	



## Barn planning

...have difficulty raising	X	
...lying too far inside		X
...lying too short inside	X	
...lying diagonally	X	

	Neck rail is too	
Your cows...	Backward/ Low	Forward/ High
...do not enter	X	
...lying in alley	X	
...stands long in cubicle	X	
...stands halfway in cubicle	X	
...have difficulty lying down	X	
...have difficulty raising	X	
...lying too far inside		X
...lying too short inside	X	
...lying diagonally	X	



## Barn planning

### 5.12 Welfare / Health - Straw bedding 7



- Straw bedding is comfortable, but not so good in regard to udder health!
- If you have to switch over from straw bedding to free stalls: learn your cows how to use them.







### 5.13 Welfare / Health - Foot bath

Where to place?

**Best place**

- In exit lane
- If possible one cow length behind the exit of the milking station:
  - reduces the increase of exit times
- Change it every 120 cow passages.



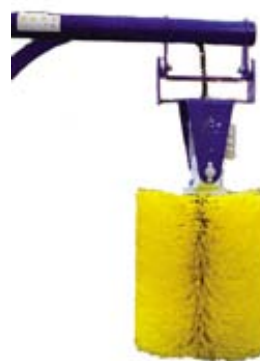


## Barn planning

### 5.14 Welfare / Health - Cow Brush

#### Where to place?

- Remember that a cow brush does remove a lot of dirt from the cow, that falls down in the neighbourhood:
  - not too close to water, feed or office
- Placement in waiting area only if its large enough ( $> 20 \text{ m}^2$ ):
  - not too close to the entrance of the milking station
- Best place is feed alley, but only if it is wide enough:
  - one cow eating,
  - one brushing,
  - one passing!





## Barn planning

### 5.15 Welfare / Health - Ventilation 1



Good barn climate...

- Creates more healthy environment
- Helps to keep the cow cooler
- Decreases heat stress
- Helps to keep flies away
- Will make for a cleaner barn
- Allows the barn structure to last longer





## Barn planning

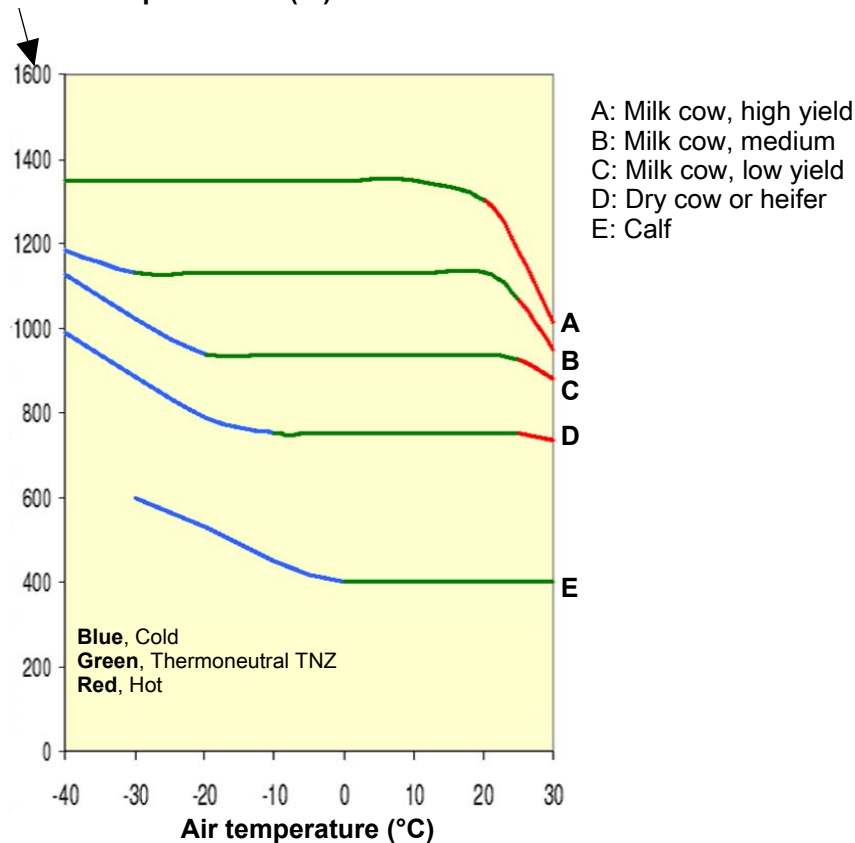
### Welfare / Health - Ventilation 2

#### The temperature needs of your cows

- For lactating cows the thermoneutral zone begins at  $-20^{\circ}\text{C}$  or even lower, but ends at  $+20$  to  $+25^{\circ}\text{C}$  (see graph).
- Remember this when planning the climatisation of your barn.



Total heat production (W)





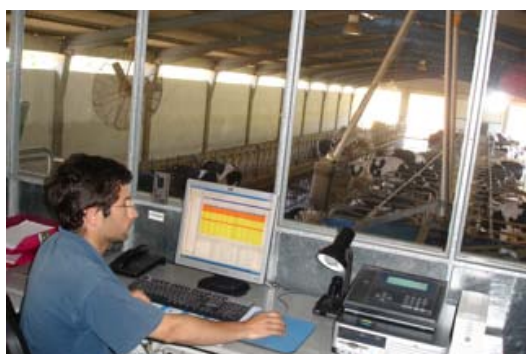
## Barn planning

### Welfare / Health - Ventilation 3

Your possibilities...

... to modify barn climate

- Sun shade:
  - reduces heat load from solar radiation
- Roof:
  - protects from sun, rain, snow,
  - and from thermal radiation (if insulated)
- Wind screens:
  - reduces the cooling effect of the wind
- Misting or spraying:
  - cooling by evaporation
- Natural ventilation:
  - take advantage of natural forces
- Insulated ventilated enclosure:
  - warmer indoor climate during winter
- Tunnel ventilation:
  - increased convective cooling using an artificial wind







## Barn planning

### Welfare / Health - Ventilation 4

Cool and fresh

#### Feeding area

- Cows with heat stress will reduce their feed intake:
  - providing fresh air in the feeding area is very important.

#### Resting area

- Cows which have inadequate fresh air will not lie down readily:
  - good ventilation in front of the cubicles

#### Milking station

- Place your ventilation so that there is no air draft on the cows in the VMS - they might dislike coming there. But try to have a little airflow to displace flies from the VMS





### Welfare / Health - Ventilation 5

#### Signs for a poor ventilation

- Condensation
- Cobwebs
- Smell of ammonia
- Coughing cows
- Cows breathing with their mouths open





### Welfare / Health - Ventilation 6

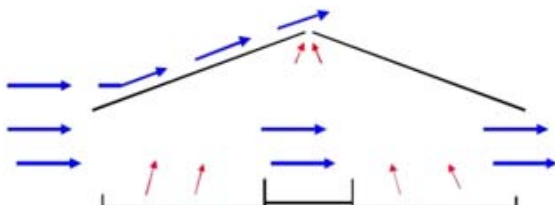
#### Natural ventilation

##### In general

- The wind is the overall power of ventilation
- The chimney effect comes in second hand

##### In the winter

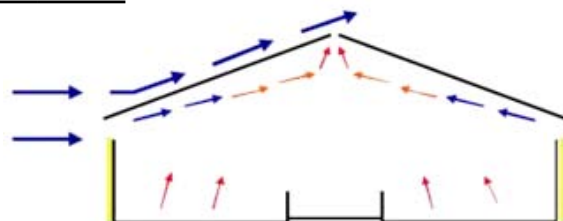
##### Thermal Buoyancy



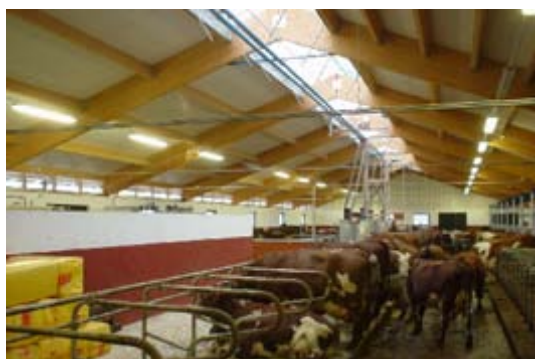
Ventilation in the winter is mostly driven by "**Thermal Buoyancy**" with airflow over the ridge

##### In the summer

##### Wind Forces



Ventilation in the summer is mostly driven by "**wind speed**".



##### Examples:

- Automatic control of air inlet in insulated building.



### Barn planning



- Automatic control of air outlet in insulated building.



- Wind breaker in not insulated barn.



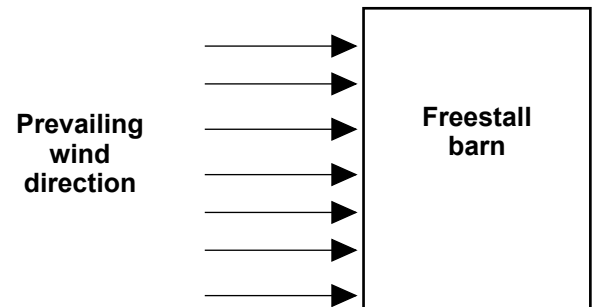
## Barn planning

### Welfare / Health - Ventilation 7

#### Natural ventilation

##### Positioning of the barn

- At right angle to the prevailing wind direction in summer



- Keep enough distance to other buildings (see table)

Minimum distance between buildings when naturally ventilated (m)					
Height (m)	Lenght of windward building (m)				
	15	30	45	60	75
3	15	15	15	15	20
5	15	20	25	25	30
7	20	30	35	40	45
9	25	35	45	50	55





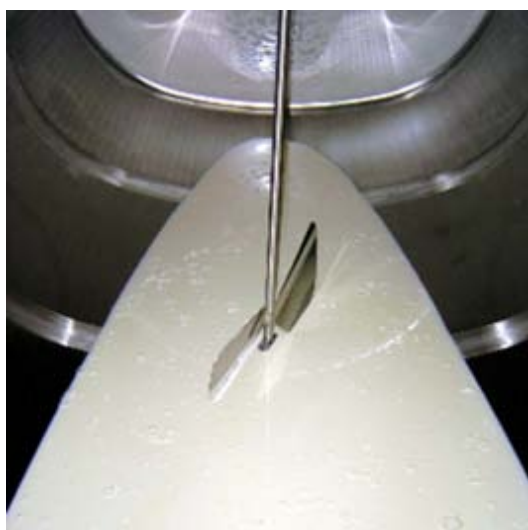
### 5.16 Room Concept Machine Room



#### In general

- Close to VMS
- Access to fresh air for better cooling:
  - Less soiling.
  - Less energy consumption.
  - Longer machine lifetime.
- Maximum 25°C.
- Use a ventilator to cool the room during summer.
- In winter you could use the heat to warm up the VMS room.

### Room Concept Milk Tank Room



#### Hygiene ranks first

##### General

- Milk tank room should not be a walk trough room
- Easy access for milk tank truck

##### If possible

- Situated at the north side of your barn



## Barn planning

### Room Concept - Office

Comfortable and easy to reach

#### General

- The Office is for:
  - Management
  - Record Keeping
  - NOT for Storage!!!
- Office should be heated
- Reachable without needing to wear boots

#### If possible

- Look into barn, not into robot room
- Near to VMS room:
  - for all management tasks
- No direct access to the barn
  - Better air quality for you and your PC

#### To think about...

- Stand up access to key board
- Do yourself a favour by investing in a comfortable office chair.





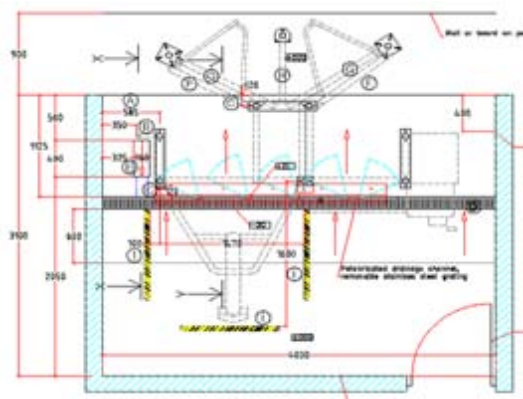
## Barn planning

### Room Concept - VMS

Comfortable and easy to reach

#### In General

- Full plastic strip along:
  - Cows should have full view from VMS to their sisters.
  - Help in very cold periods to continue camera cleaning and prevent freezing problems
- Easy to clean:
  - your cows are milked here!
  - sloped and drained
- In a room with 3 walls and a ceiling:
  - easy-to-clean milking side
  - can be closed easily with plastic strips during winter
- Separated from machine room
- Reachable without needing to wear boots
- For details, see the VMS Planning documentation



*You will provided with all information you need*



### 5.17 Manure Equipment

Clean walking alleys means...

- Better air quality:
  - less evaporation of ammonia
  - less flies
- Claws will stay dryer:
  - less risk of various claw diseases
  - more milk
  - more milkings
  - better heat detection
- Less manure dragged into the free stalls:
  - cleaner udders and teats
  - better udder health conditions
  - lower SCC and more milk

How to reach?

**In general**

Scraping once a day is not good enough:

Clean the barn frequently with a scraper

Adjust your scraper at regular intervals

**To think about**

Scraper for slatted floor:

Clean and dry hooves







## Barn planning

### 5.18 Light

How much and how long?

#### During the day

- You need at least 150 Lux to 200 Lux during the light period (basic rule):
  - use lamps, windows or roof plates to ensure there is sufficient light for the cows.
- Light not only at the feeding table, but also in the cubicles.
- Light inlet - positive but be aware of risk for increased "warming-up"



#### At night

- 8-10 hours of darkness is needed in a loose housing barn at night.
- During darkness, all lights should be switched off.
- The only light needed is in the VMS room.







## Barn planning



Source: Elite 1, 2004

### Installation

#### In General

- The stronger the light the higher it has to be installed.
- Installation heights should always be 1,5 times of the distance of the lamps.
- The barn has to be lightened with the same strength all over
- It is possible to use halogen, natrium or metal high pressure sodium lamps.
- Normal light are not suitable because they loose 20% of their strength within short time

#### To think about

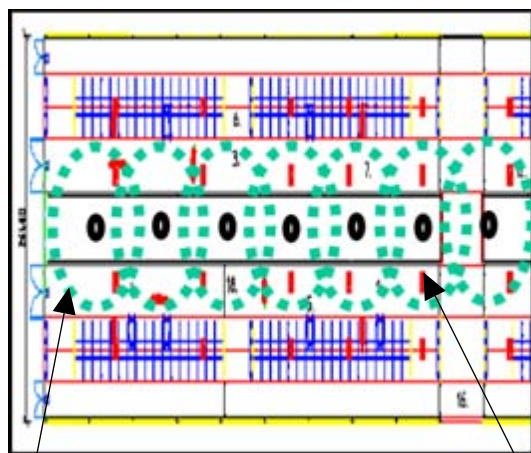
- Light sensor saves energy:
  - as soon as the nature allows, the lights are turned off

## Light

### Installation

#### How to reach 200 Lux

- 2 fluorescent lamps (32 W each)
  - cover 8 m<sup>2</sup> of floor area
  - mounted 2,4 m over feed table
- High pressure FL250 metal halide lamp:
  - covers 64 m<sup>2</sup> of floor area
  - 4 m mounting height



Fluorescent lamp

High pressure sodium

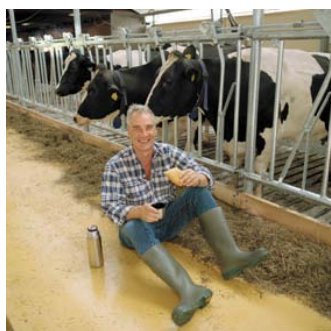


## Barn planning

Light (Lux)	Working	Orientation	Night
Feed alleys	100 (200?)	25	5
Resting area	100 (200?)	25	5
Waiting area	100 (200?)	-	-
Milking station milk storage room ???	200	-	-
Treatment area and calving pens	200-500?	25	5
Service room	100 (200?)	-	-



## Barn planning



### 5.19 Comfort all day long:

- Eat
- Drink
- Scratch your back
- Rest
- And finally go for another VMS milking



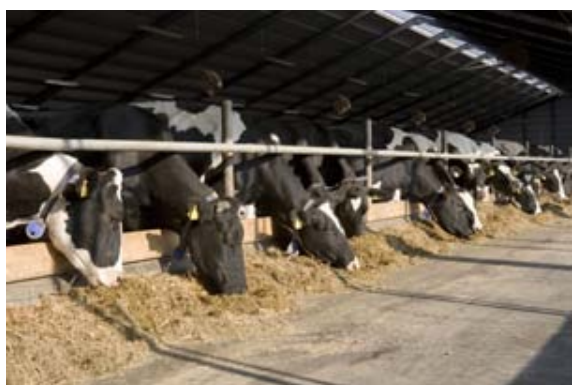




### VMS Best Practices

#### Feeding

##### Chapter 6









### Content

- 6.1 Good grass silage starts at the field
- 6.2 Good maize silage starts at the field
- 6.3 Silage harvesting
- 6.4 Silage storage
- 6.5 Feed table
- 6.6 Rumen score
- 6.7 Barn planning
- 6.8 Water
- 6.9 Manure
- 6.10 Manure score
- 6.11 Feeding strategy
- 6.12 Where to give the concentrates
- 6.13 Body Condition Score (BCS)
- 6.14 Fiber
- 6.15 Close up period
- 6.16 1st & 2nd part of lactation
- 6.17 Dry period
- 6.18 Special for VMS





### 6.1 Good grass silage starts at the field



- Keep your pasture mole free.
- Aim at a high sugar content, a few days of sunshine before cutting improves the sugar level in the grass.
- For silage making, aim at 40% DM.
- Make the period between cutting and ensiling as short as possible or maximum 2 days.
- Start mowing when grass is approximately 18-25 cm long.
- Remaining grass length of 6-7 cm.
- If more than 50% of the plants is other grass than the one seeded, change the grassland.
- If you like to get good silage, when you open the storage again, use DeLaval Feedtech silage additives.



### 6.2 Good maize silage starts at the field



- Harvesting at 32 - 35 % DM.
- Chop length: 6 – 8 mm.
- Use a corn cracker.
- If you like to get good silage, when you open the storage again, use DeLaval Feedtech silage additives.







### 6.3 Silage harvesting

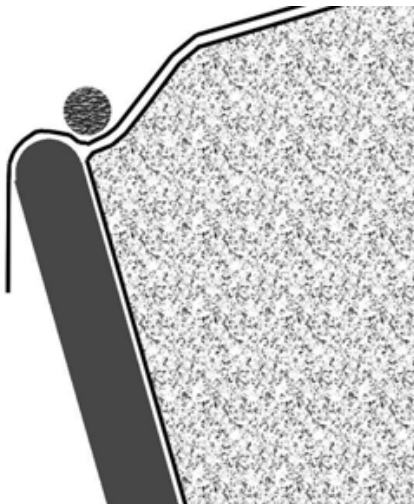
- A clean surrounding with proper drainage keeps the tractor wheels clean and thus also the roughage on the feed table.
- Side walls give a better compression at all types of silage.
- Ensile the silage the same day as the harvest.
- Use or reuse a plastic for a coverage on sidewalls to protect the wall and improve sealing.





### 6.4 Silage storage

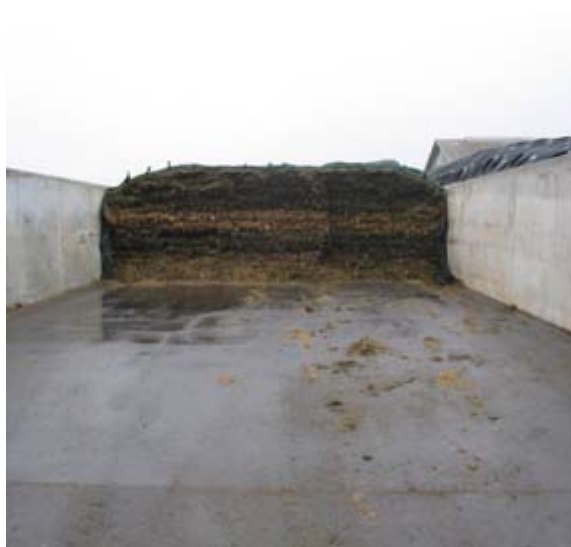
- Normal thickness of plastic film: 0,135 and 0,150 mm.
- The use of braces is labor saving.
- Use protection nets against possible bird damages.
- Check regularly for holes in the plastic cover.





### Silage storage

- Prevent non-compacted silage, because of heating problems.
- Speed of feeding should be 1 to 2 meters per week, depending on silo type, feed type, coverage and weather.
- Be careful when opening a new storage which is totally different from the old one. Cows need 1 to 2 weeks to change ration, so change the ration gradually in 1 to 2 weeks.





### 6.5 Feed table

- **Have a protection for the concrete feed table:**
  - DeLaval surface coating.
  - DeLaval feeding table cover FTC.



- **No empty feed alleys, 3 to 4 % left over is normal**
- **Clean the feed table each day, remove old feed**







### 6.6 Rumen score

#### Hunger groove

##### Indicates:

- Feed intake
- Fermentation speed
- Speed at which the feed is passing through the digestive system

##### To score:

Stand behind the cow and look at the flank

##### Score 1

- Sudden illness
- Insufficient or unpalatable food

##### Score 2

- First week after calving
- Later in lactation:
  - Insufficient food intake
  - Rate of passage that is too high

##### Score 3

- Right score for milking cows

##### Score 4

- Good for end of lactation
- Correct for dry cows

##### Score 5

- Correct for dry cows

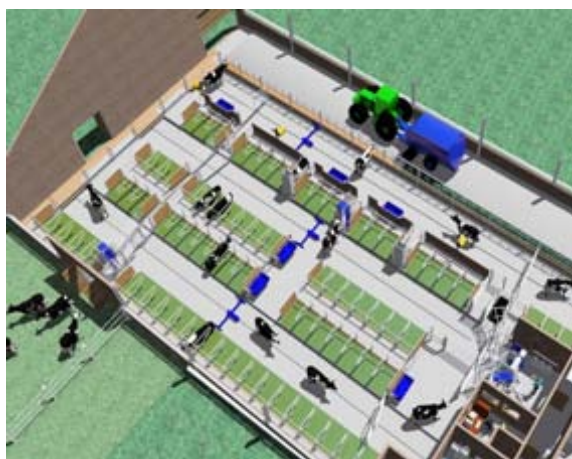
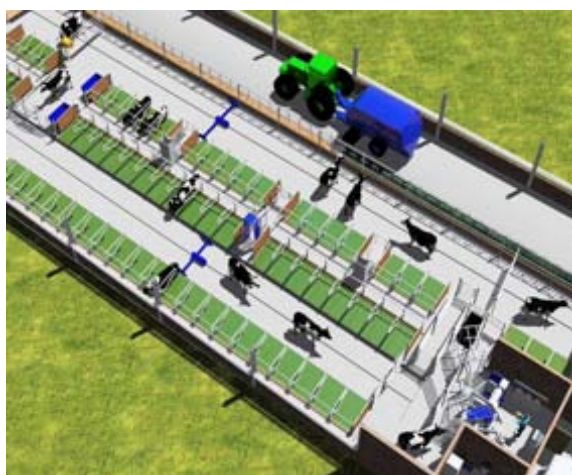
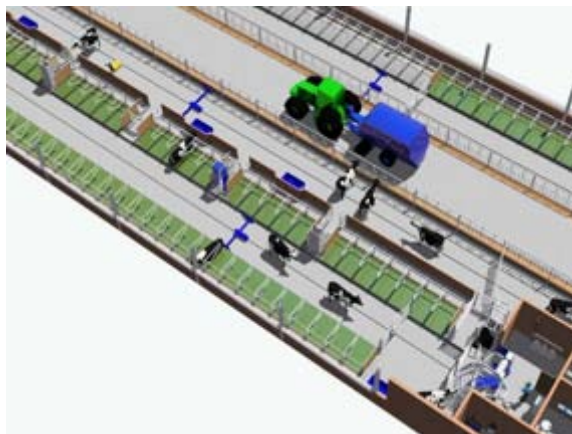




### 6.7 Barn planning

#### Amount of feed fence

- 2 rows of cubicles per feed fence:
  - All cows can eat at the same time.
- 3 rows of cubicles per feed fence:
  - More critical to have always feed on the table, all the time, 24/7.
  - Frequent pushing of the feed necessary, when manual feeding.
- 4 rows of cubicles per feed fence:
  - More critical to have always feed on the table, all the time, 24/7.
  - Frequent pushing of the feed necessary, when non-automatic feeding.
  - Can be applied when feeding multiple times a day.

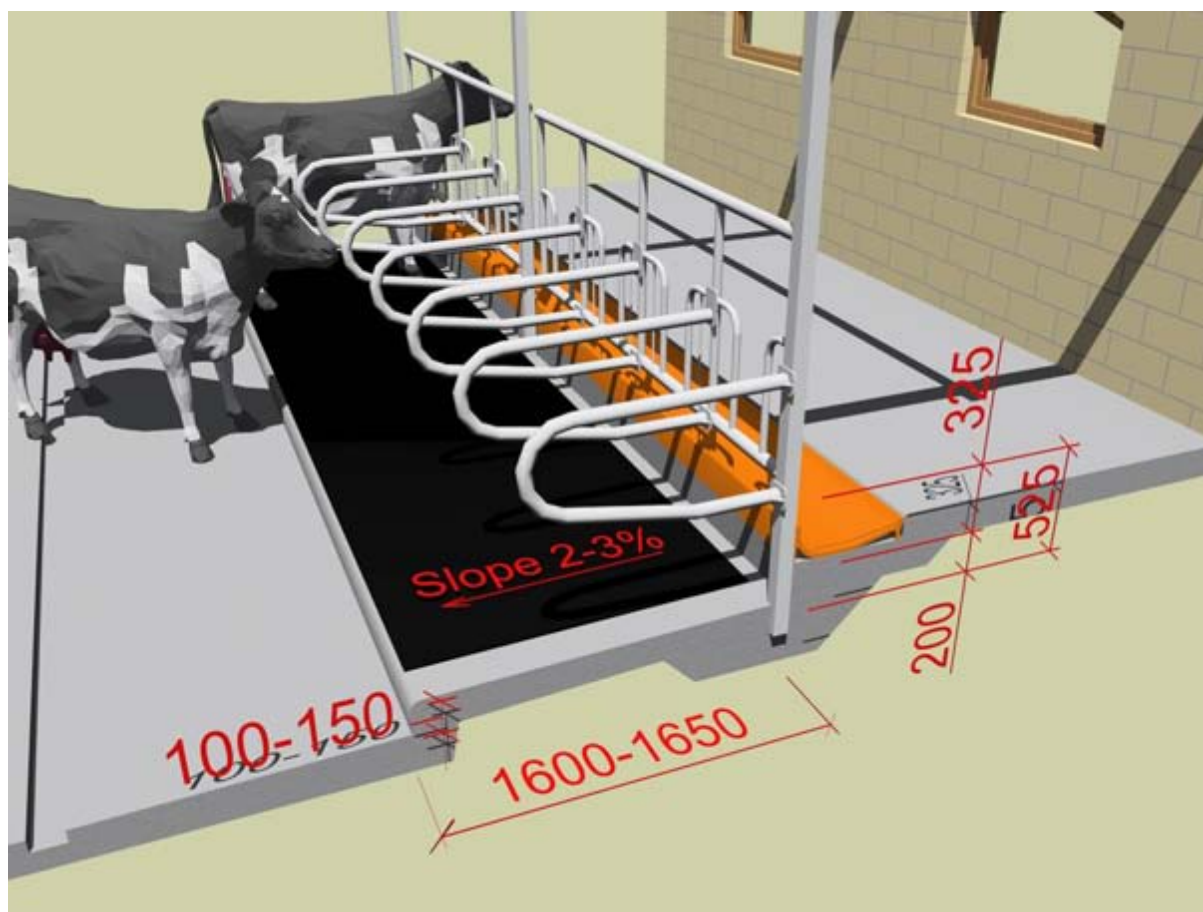




### Barn planning



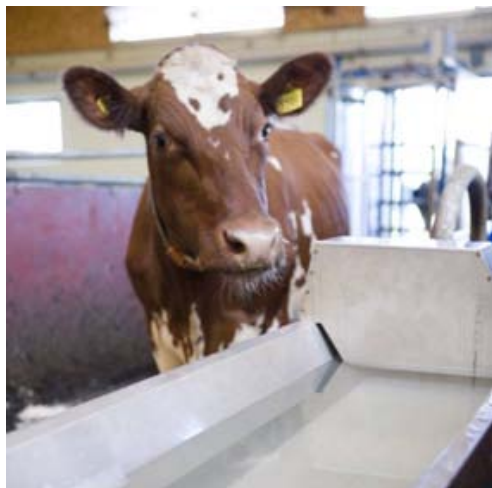
- Feed table should be 10-15 cm higher than the cow feed alley
- Fence leaning forward reduces the pressure on the cow, especially if the feed fence is too low
- Feeding cubicles:
  - High ranked cows cannot disturb low ranked ones
  - A passing manure scraper will not disturb cows while eating





### 6.8 Water

- Maximum 20 cows per water bowl
- Have clean water bowls
  - Easy to clean bowls
  - Clean often
- At least 20 liter / minute available for cow
- Provide water when cows come out of the VMS
- Water level height depends on cow size (55-95 cm)
- Re-use water of the pre-cooler
  - Cows will maximize water intake at 15 – 17°C
  - It requires less energy for the cow to heat up the water to body temperature
  - Cool water is best when temperatures are high







### 6.9 Manure

Corn should not be clearly visible in the manure. Causes:

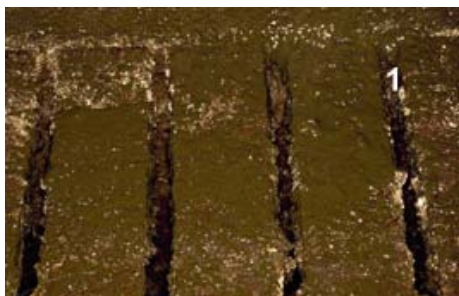
Clear corn in manure = not used nutrients!

- To early opened silo
  - Silo needs to be closed for several weeks after harvesting
- Corn not broken during harvesting
  - Change corn cracker settings
- Wrong digestion speed of the ration
  - Ask advice from a consultant (farm specific solution needed)





### 6.10 Manure score



#### Score 1

- Excess protein or starch or too much of mineral or lack of fiber
- Disease



#### Score 2 – manure layer height is less then 2,5 cm

- Lush pasture
- Lack of functional fiber (scratch factor)



#### Score 3 – will stack up 4 – 5 cm

- Optimal score



#### Score 4 – stacks up over 5 cm

- Dry cows and pregnant young cattle can have this score
- Low forage quality, shortage of protein



#### Score 5 – Feacal balls

- Normally not occuring in milk producing cattle





### 6.11 Feeding strategy

- The best feeding strategy is to give concentrates in VMS + feed station(s)
- Second best is to give concentrates in VMS + On feed table + in feeding stations
- The risk of too fat cows at the end of lactation is the biggest if distributing concentrates in VMS and on the feed table only, but not in additional feeding station(s)
- The most common problem in a robot barn is a too high energy content in the mix of roughages or unbalance between energy / protein and fiber on the feeding table. It makes the cows lazy and they do not walk enough.
- It is an advantage to have the possibility to mix roughages of different harvests.
- Additional feed stations gives more flexibility and individual options.



### 6.12 Where to give the concentrates

DIM*	VMS	Feed station
-65	0	0
-15	0	0
0	1,5	0
25	5,5	2,0
35	5,5	2,0

\* DIM = Days In Milk

- It's the concentrate that makes a cow walk to VMS
- Thus we give more in VMS and the rest in the feed station
- Individual adaptation is needed if body condition asks for it, especially in 2nd part of the lactation

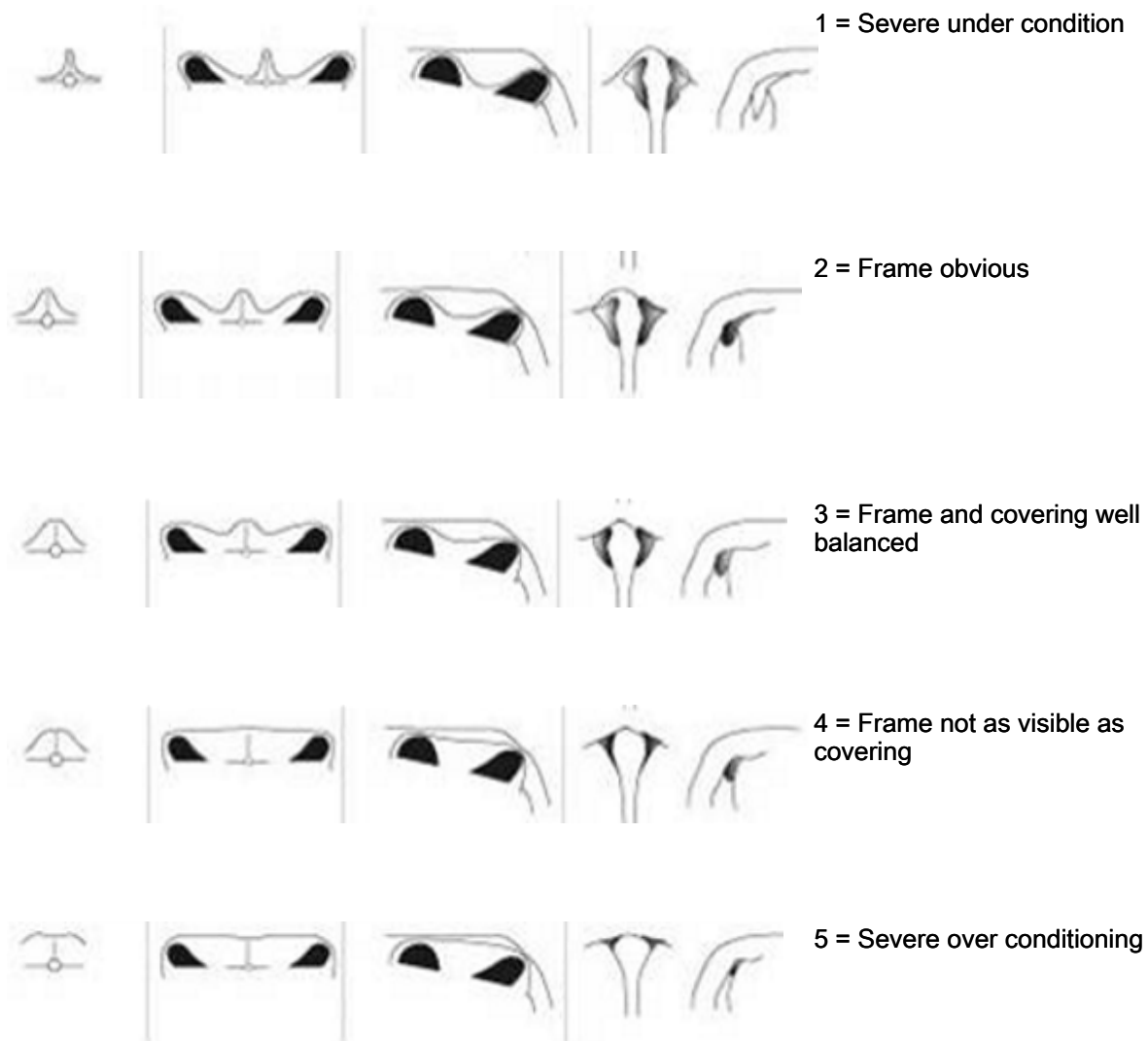


ECM*	VMS	Feed station
0	1	0
20	1	0
35	5,5	0
45	5,5	3,0

\* ECM = Energy Corrected Milk



### 6.13 Body Condition Score (BCS)





### Body Condition Score (BCS)

1 = Severe under condition



2 = Frame obvious





3 = Frame and covering well balanced



4 = Fat cow



5 = Very fat cow







### 6.14 Fiber

Enough fiber in the ration results in active cows, that want to walk to VMS

- Feed enough forage, at maximum 50 to 65% concentrates
- Enough "Scratch factor" (fiber)
  - > 4 cm long
  - Should not be soft
  - High fiber feeds are: Alfalfa, hay or straw
  - Use mixer wagon to mix fiber properly with the rest
  - Do not cut grass to early for harvesting, the older the more fiber it contains
- At any time more than 50% of the cows should be busy ruminating





### 6.15 Close up period: 2-3 weeks before calving

- One of the most important periods to avoid diseases during lactation.
- Decrease in feed intake: growing calf reduces digestive space.
- Strong increase in energy need for final calf growth.
- Ration similar to after calving period.
- Milk fever and other diseases can be mainly prevented by good feeding before calving. In the dry ration large amounts of grass from fertilized land should be avoided.

It is important to control Protein, Calcium (Ca) and Potassium (K) level in the ration; also other minerals, like Phosphorus (P), and Magnesium (Mg) have an important role.

Ask your feed adviser to analyze your ration. For example the Dietary cation-anion balance (DCAB) is often used to analyze the dry cow ration.

- Providing concentrates in a feed station 10 – 14 days before calving is a good solution for big farms.



### 6.16 First part of lactation

- Check cows -> often risky period
  - **Temperature**
    - OK: between 37,8 °C and 39,2 °C
    - Problem: < 37,8 °C or > 39,4 °C
  - **Check manure**
  - **Milk composition** (Cr-Delta, 2008)
    - Rumen acidosis: fat % is lower then protein % and fat % is lower then 4 %
    - Ketosis: the difference between fat and protein % is more then 1,5 % and the protein % is lower then 3,25 %
  - **Body condition score**
    - Maximum drop of 1 point on a 1 – 5 scale, a half point drop should be the goal
  - **Urea**
    - On average 20 – 25 mg/100 ml milk (depending on protein quality)
  - **Other signals, such as rumination behavior**
- 
- Maximum concentrate gift right after calving is 1 kg/day (could be higher, if concentrates are given before calving)
  - Period to reach maximum concentrate level: 3 – 4 weeks after calving
  - Maximum concentrate level in the VMS is 5 – 6 kg/day, the rest has to fed preferably in the concentrate station or on the feed table



### Second part of lactation

- At the end of lactation the BCS should be 3,5 or lower
- Minimum amount of concentrates is 0,5 kg / VMS visit
- If the milk yield of a cow is above 15 – 20 kg at the end of lactation, it is better to lower the milk production in the last week by separate the cow and give a ration with hay or straw only.

### 6.17 Dry period

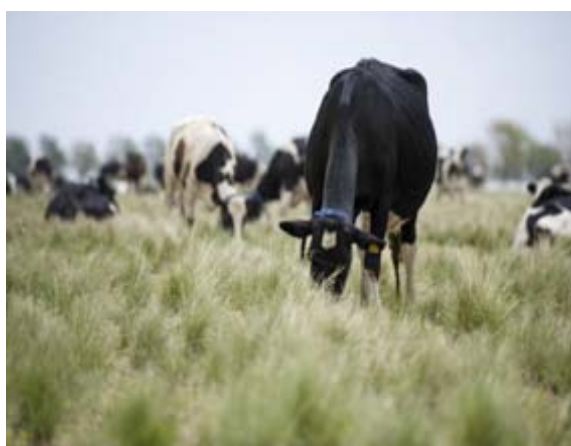


- Use a mixer wagon to feed a low energy diet. An example could be:
  - 50% straw
  - 25% grass silage
  - 25% maize

- No gain, no loss in BCS, keep cows at 3,5 by giving a low energy diet

- Walking has a positive effect on dry cows

- Provide dry cow minerals





### 6.18 Special for VMS

#### Solutions for cows which are not coming to the VMS

- Tasty concentrates in the VMS
  - Pelleted concentrates with no 'dust'
  - Sweet (e.g. sugar beet products, molasses)
  - Cows prefer a wheat and barley-oat mixture
  - Preferable pellets, not milled feed
  - High energy, 6,5 – 7,5 MJ Net Energy of Lactation
  - Toasted
  - Salt also part of the concentrate
  - Don't feed in VMS feedstuff which is known to be not tasteful (e.g. propylenglycol or artificially dried grassFeed first system)
- If grazing, provide also forage in the barn
  - To attract cow to come to the VMS
  - To maintain a high milk production
  - See also Best practice - Chapter "Grazing"







### Special for VMS

#### Feeding multiple times a day

- The quality of the feed becomes worse after it is on the feed table for few hours
- Feeding multiple times a day means providing the same ration during the whole day
- And therefore keeps the cows active



- Enabling feeding cows up to 10 times per day



- Right hand shows the roughage mix
- Left hand shows the left over's after a day
- The difference will be smaller if feeding more times a day.
- Resulting in less selective cow behavior and also less left over's





### VMS Best Practices

#### Capacity

##### Chapter 7

Increase your VMS capacity!

VMS Capacity = milk yield per day and VMS







### Content

- 7.1 Capacity is influenced by many factors
- 7.2 We cannot force the cows
- 7.3 Keep you MS clean and neat
- 7.4 How to reach a good cow traffic flow indoors
- 7.5 How to reach a good cow traffic flow grazing
- 7.6 What to keep in mind when planning your barn
- 7.7 Gate settings
- 7.8 System settings
- 7.9 Breeding for VMS milking
- 7.10 Cow's health
- 7.11 Feed - Roughage
- 7.12 Feed - Concentrates
- 7.13 Light in the VMS barn
- 7.14 Milkability
- 7.15 Other factors of importance
- 7.16 Summary

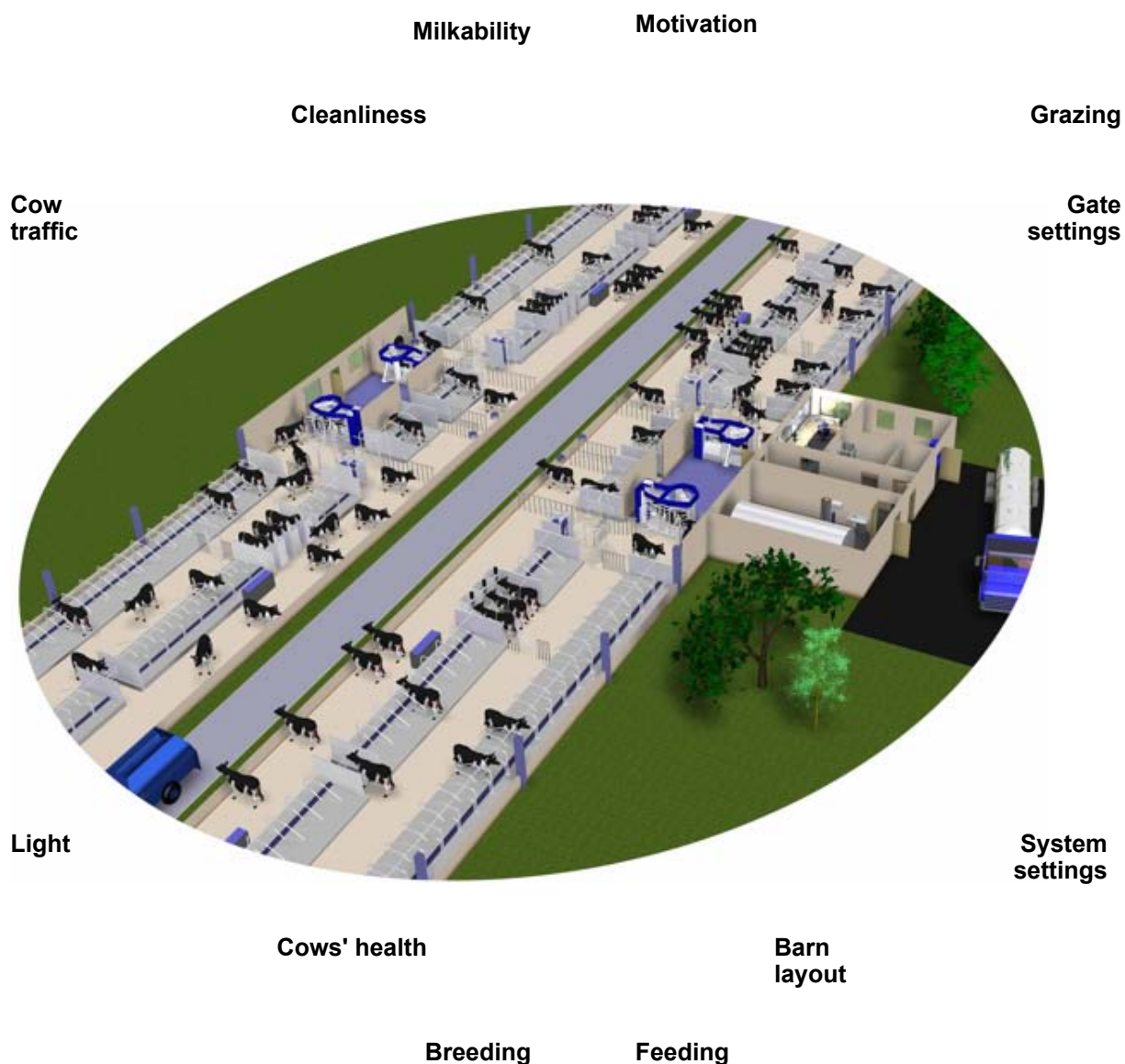






7.1 Capacity is influenced by many factors!

...try to keep an eye upon all!





### 7.2 We cannot force the cows...

...just give them **motivation** and **opportunities!**

#### Motivation

- Always have tasty feed at the feed table.
- Push the feed on the feed table regularly, that action stimulates the cows.
- Make sure, that your cows get attractive (and enough) concentrates in the MS.
- Avoid long ways to walk.
- Don't try to force the cows to visit the MS by using restrictive gate settings especially if they are high yielding.

#### Opportunities

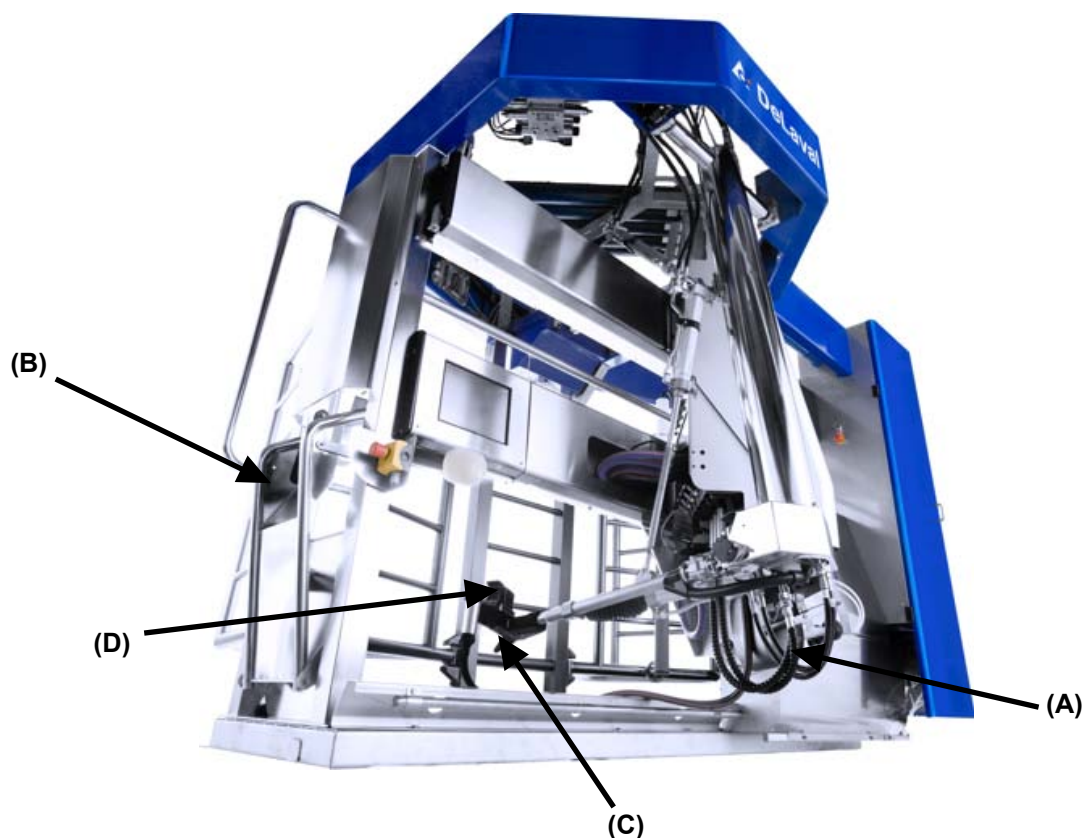
- Try to adjust cleaning times to times when MS is idle or in low use.
- Avoid a narrow entrance to the waiting area, low ranked animals will have less fear to enter this area.



### 7.3 Keep your MS clean and neat

A clean MS helps you...

- to avoid unnecessary problems and stop alarms.
- to enable the service man to do a fast job and avoid long stops (service takes longer time if the VMS has to be cleaned first!).
- to reduce BC level.

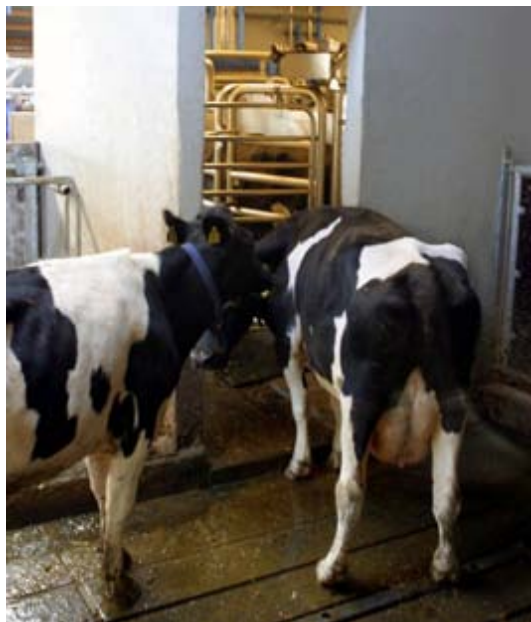


**(A)** Dirty tubes might cause attach problems.

**(B)** Lots of dry manure on the rear plate might cause it to get stuck and make teat finding difficult.

**(C)** Dry manure on the gripper might cause it to get stuck and make teat cleaning and attach impossible.

**(D)** A dirty camera can cause low attach success rate and incomplete milkings



### 7.4 How to reach a good cow traffic flow indoors

A good cow traffic flow will increase your capacity and reduce your labour input.

But don't forget the cows!

- Always have tasty feed available (distribute often or distribute much at the same time and accept left-overs). The feed table should be attractive at every time of the day.
- A wrong basic ration may cause lazy cows (see feeding).
- See to that every milking cow can visit the feed area at least twice per milking session! (by free or feed first cow traffic and appropriate gate settings) Have a special look on high yielding cows in early lactation.
- Use your gate settings opportunities – cows are individuals!
- Don't fetch your cows too early, they may adapt themselves to this routine.

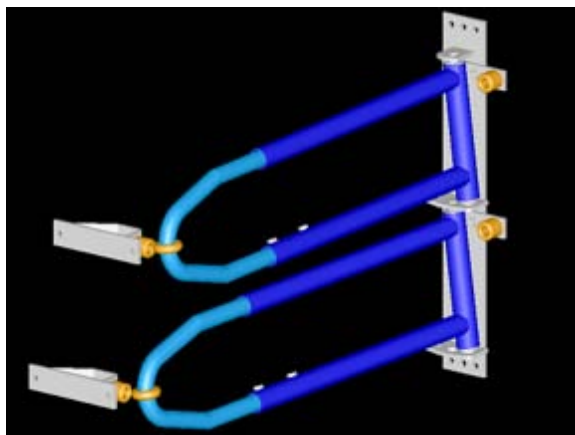




### How to reach a good cow traffic flow indoors

- Avoid slippery walking alleys.
- Regular hoof trimming is of imminent importance. And use a (clean) hoof bath regularly.
- Avoid too complex routing systems (especially those, forcing the cows to take long ways).
- Adjust the neck rails in your cubicles to make it easier for the cows to lay down and raise up.
- Do not fetch cows or clean waiting area when it is full.
- Stop the scraper in front of the waiting area.
- Do not let eating / drinking cows block the way for the cow traffic, especially for cows exiting MS - Avoid putting feed on the feed table close to the MS if necessary.
- Keep your VMS in good order and condition. Your cows will remember unpleasant milking experiences.





### 7.5 How to reach a good cow traffic flow grazing

Grazing is possible with VMS

- Use the gate settings to ensure that your animals can get to the feed table to eat before going out grazing if necessary.
- You can put a separation gate out in the field to lead your animals to different grazing lots on different days or to different grazing lots for different animals.
- Use a one-way gate to stop animals coming in for milking from going out again.
- Your cows should be milked before going out grazing (can be done by gate settings or cow traffic).
- Good results are reached when cows are directed out into the pasture, right after milking. They can then come back into the barn via the feed alley along the feeding table.





### 7.6 What to keep in mind when planning your barn

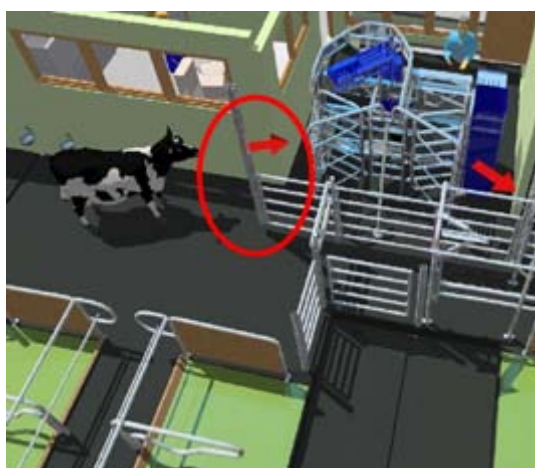
Take your time for planning!

- Avoid dead ends in alleys, especially in narrow alleys.
- There should be place for 10% of the lactating cows in the waiting area, 1.5 m<sup>2</sup> for each cow.
- Avoid a narrow entrance to the waiting area.
- Avoid scraper in waiting area – it might create stress.
- Don't plan your cubicles too short. Your cows will grow due to breeding, your cubicles will not!
- Try to realize short ways for your cows, but don't forget that you also have to reach the MS.
- Avoid steps at the entrance or the exit. If you can't, try to give them the length of a cow and aim at right angles with the walking direction.

### What to keep in mind when planning your barn

Don't forget the details!

- Place your ventilation so that there is no air draft on the cows in the VMS – they might dislike coming there. But try to have a little airflow to displace flies from the VMS.
- If cows chasing away each other at the entrance of the MS, try to protect the waiting cow with a barrier which should have half the length of a cow.
- Avoid “attractions” at the exit of the MS (brush, water bowls, concentrate feeders,...).





### 7.7 Gate settings

What is possible to do with VMS Management software?

Basic setting might be:

- All cows with milking permission should go to MS.
- All other animals should go to feed area.

Add other gate settings suiting your farm, examples:

- An individual limping cow should stay indoors, all others should go grazing from 6 am until 10 pm and stay in at night to increase their feed intake. If a cow has not been in the feed area since 5 hours, she should go there instead of going grazing.
- With semi free cow traffic you can offer free access to the feeding area to individual cows (e.g. high yielding or limping). It's up to you to take advantage of this possibility.





### Gate settings

- When 5 cows are already waiting to be milked in front of the MS, the rest of the cows should go to the feed area - except the ones who have not been milked since 12 hours.
- Feed-only cows and heifers should go to the VMS only when they have not been there since 8 hours, other-wise they should go to the feed area.
- When service is done, the service-man can easily lead all animals to the feed area instead of VMS and avoid decreased consumption. When service is ready the original gate settings are chosen again.
- When hoof trimming your cows, you might want to lead some animals in another direction than usually, e.g. put all cows to be hoof trimmed in a group and lead the cows in that group if they have no milking permission or have milking permission since less than 2 hours.





### 7.8 System settings

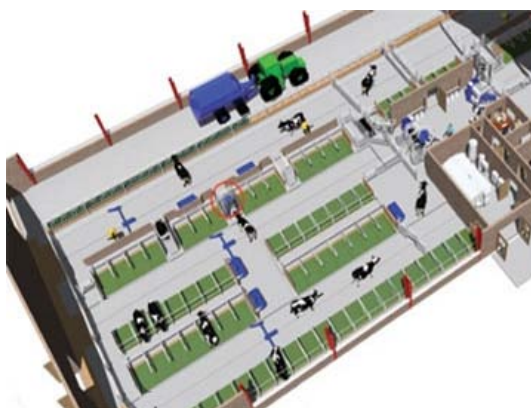
#### Milking permission - general

When should the cows be allowed to milk?

- In the first three months after calving all cows should be allowed to milk after 300 minutes to stimulate their own milking rhythm.
- After three months first lactating should be milked at an expected milk yield of 8-11 kg.  
All other cows should have a milking permission at an expected milk yield of 10-13 kg.  
Additionally all cows should be allowed to milk after 600 minutes.

Time since calving				
	0-3 months		3 months - dry off	
	Minutes	Expected milk yield	Minutes	Expected milk yield
First lactating cows	300	--	600	8-11 kg
Other cows	300	--	600	10-13 kg

(According to new research in Denmark)



### System settings

#### Milking permission

- Look at the milk yield per milking, it should be between 10 and 15 kg. If it is lower you waste capacity, if it is higher you may reduce the performance of your cows.
- Milking permission time should be between 5 and 9 hours, but also use the milk yield settings! (see previous page).
- Shorter permission time in beginning of lactation and longer time in the end.
- Too short time (<5 h) can cause many animals to wait in front of the MS = reduced number of feeding visits and reduced total milk yield and too short milking intervals can result in higher SCC.
- Too long time (>9 h) = reduced number of milkings per cow.
- Strive for regular milking intervals for each cow.
- You can offer free access to the feeding area to individual cows (e.g. high yielding or limping). It's up to you to take advantage of the gate's possibilities.

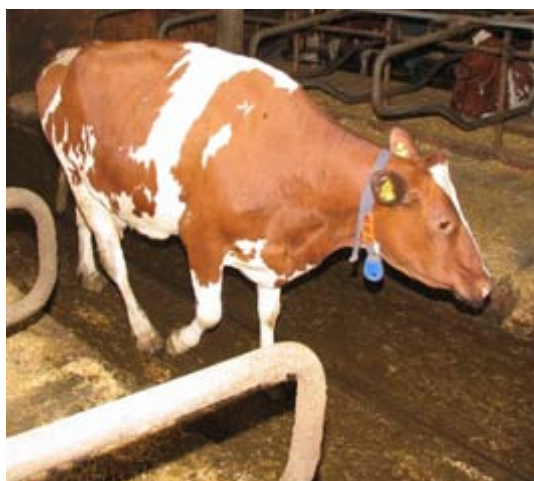


### System settings

#### Optimize your settings!

- Use low flow setting for individual slow milking cows if necessary.
- Try to increase the number of direct attach – but it might cause more false kick-offs and reattaches.
- Adjust cleaning times to times when MS is idle or in low use...
- Set your take off flow to suit your vacuum level, default with vacuum level 44 kPa is 210 g/min.
- Set the maximum milking time to at least 800 sec. (same as from factory of delete).
- Thin or short teats – use direct attach.
- Do not milk your cows too often! High yielding cows (>35 kg per day) should milk 3-4 times per day, low yielding cows 2 times per day and cows to be dried off soon at least once per day.





### 7.9 Breeding for VMS milking

Keep cows with:

- high milk flow (but not leaking).
- less strong ligament.
- behaviour / character that results in frequent milking and less fetching (curious cows).
- high harvesting flow.
- Remember though that cows with extremely high flows do have also an increased risk of mastitis and higher SCC.

If possible - select bulls:

- that give active cows that want to walk.
- with udder index above 100.



### 7.10 Cow's health

Sick cows will reduce the capacity of your system in any case, try to keep them healthy!

- Good hoof health creates opportunity for the cows to walk easy and gives a smooth cow traffic:
  - keep the floor comfortable, as dry as possible (?), clean and non-slippery. Check the hooves regularly.
  - regular hoof trimming is of imminent importance. And use a (clean) hoof bath regularly.
- Cows with good health give more high quality milk.
- With healthy cows you need less cleanings. This will enhance the capacity and reduce the costs for water and energy.
- It is recommended to keep sick cows for special treatments in a separated area.





### 7.11 Feed - Roughage

High roughage availability = good cow traffic flow

- Have enough space for at least 1/3 of the cows at the feed table.
- Always have tasty feed available (distribute often or distribute much at the same time and accept left-overs). The feed table should be attractive at every time of the day.
- The feed should be easily available – push it towards the cows with regular intervals.
- Automatic roughage feeding can guarantee that there is always roughage on the feed table.
- If you discover that your feeding times have an impact on the daily rhythm of your cows, you might distribute not enough feed...
- Keep the basic ration to cover up to approx. 2/3 of the average milk yield, rest via feed stations to avoid lazy cows.



### 7.12 Feed - Concentrates

Give your attention to concentrate feeding. It motivates your cows!

- Always feed the cows in the VMS! 2 ways to do this:
  1. Give a special feed in the VMS, e.g. Feed X1 in feed stations and Feed X2 in VMS. It might be the same feed in reality! Give a ration of each feed.
  2. Least available ration in feed stations higher than in VMS, e.g. 300 g vs 200 g. Some feed will be “saved” to give in the VMS.
- Adjust the dispensing speed to your feed, observe your cows in the MS and check for left over
- Control and clean the dispenser regularly
- Don't distribute too much concentrate in the VMS – it takes time to eat!! Less than 2 kg per milking is enough
- Stop dispensing feed when first teat cup is detached



### 7.13 Light in the VMS barn

- Introduction of guiding light during night hours has an immediate effect on the milking interval – but after approx. 2 weeks the effect has disappeared.
- Use full illumination all day round or full illumination day time and guiding light night time in your barn – but be consistent.
- The individual variation in milking interval is greater with guiding light during night hours.



### 7.14 Milkability

Your cow's milk flow speed has a big impact on capacity!

- 10-15% higher flow rate brings 9% more capacity \*
- Compare your cows and put the slow ones on the 'culling'-list.
- Select your bulls also on milk flow rates.

*\* Source: Ipema & Hogewerf, University of Wageningen, NL, AMS symposium 2004, proceedings page 450.*



### Milkability - Leaking cows

Milk leakage (open teat canals) might cause a high SCC

- High milk flow might cause cows to leak:
  - Adapt your breeding.
- Long milking intervals may have a negative impact:
  - Give follow up to those cows.
- Incompletely milked cows leak earlier than others:
  - Try to avoid incomplete milkings by adapting your settings (see e.g. attachment strategy in the VMS-Mgmt-Software).
- Hearing teat cleaning and milking might cause cows to leak milk (Oxytocine release comes from touching udder as well as from sounds, visual stimuli, etc.):
  - Put sound proof walls around your MS to decrease the risk of leaking cows!
  - The longer the distance from the MS - the smaller the risk of cows leaking.



### 7.15 Other factors of importance

#### Management

- Do not fetch cows against their individual rhythm. Look at the milking times when the cow was coming voluntarily and try to realize similar fetching times. The cow then probably will recover her old rhythm.
- Give yourself a fixed timetable to control the most important settings of your system (concentrates, milking permission, gate settings, etc.).
- Reduce your idling time – app. 20 min per day are needed for maintenance and manual cleaning of VMS – the rest of the time it should be milking your cows or cleaning.







### Other factors of importance

#### Cows

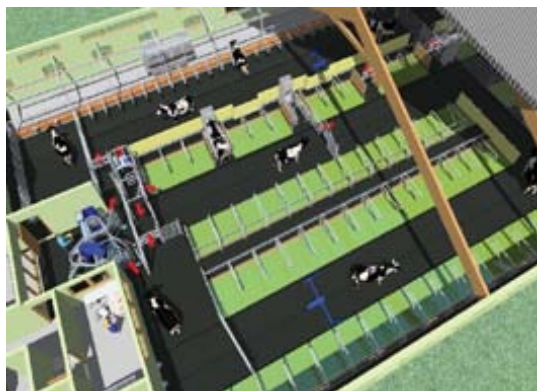
- Shave / flame the cows' udders to avoid unnecessary long attach times

**Note!** In some countries singeing udder hair may not be according local legislation and/or local community opinion.

#### System

- Use liners that suit the main part of your cows.
- Reduce the number of incomplete milkings by good teach of teat positions, clean camera, using VMS Cow settings, etc.
- Check your vacuum level.





### 7.16 Summary

#### How to increase your VMS capacity

- Don't force your cows! Give them motivation and opportunities!
- A good cow traffic flow will increase your capacity and reduce your labour input. But don't forget the cows!
- High roughage availability = Good cow traffic flow!
- Take your time for planning! And don't forget the details!
- Optimize your settings! There are a lot of possibilities in the VMS Management software.
- Keep your MS clean.
- Sick cows will reduce the capacity of your system in any case, try to keep them healthy!
- Your cow's milk flow speed has a big impact on capacity! But keep an eye on milk leakage.
- Aim for cows that want to walk!





### VMS Best Practices

#### Grazing

##### Chapter 8



Image is important.  
Consumers highly appreciate to see cows grazing in Summer time.







### Content

- 8.1 Why grazing
- 8.2 Pasturing methods
- 8.3 Flat grazing most popular
- 8.4 Positioning of pasture gates
- 8.5 Calculate parcel surface for flat grazing
- 8.6 Grazing layouts
- 8.7 PC setting
- 8.8 How to start after winter
- 8.9 Water and salt
- 8.10 Research
- 8.11 Various

*This chapter is mainly focused on common practical use in continental Europe only.*





### 8.1 - Why grazing?

- Feeding cows by letting them eat from pasture is the cheapest way to feed cows.
- When roughage and concentrates get expensive, own grass production becomes a profitable activity.
- It needs less work than summer feeding, thus vital if there is a shortage in available labor on the farm.
- Being out in pasture is definitely good for claws and legs of the cows and her health and welfare in general.
- Image is important. Grazing maintains the 'green' image of milk. Consumers highly appreciate to see cows grazing in summer time.
- In some countries one may get a bonus for milk produced by cows on pasture.
- One talks about real pasturing if cows rely for 1/3 of their dry matter intake on grass from pasturing. If less it's more like a leg stretching exercise outside of the barn.





### 8.2 - Pasturing methods

- **Unlimited grazing:** day and night.
- **Limited grazing:** with additional feeding in the barn. In daytime the cows are pasturing and in nighttime they are in the barn or the other way around. Choice depends of the outside temperatures.
- **Flat grazing:** cows are grazing on a surface where grass growth is equal to consumption and for 3-6 weeks.
- **Rotate grazing:** change every  $\frac{1}{2}$ , 1,2, 3 or 4 days to a new pasture.
- **Switch grazing:** use two parcels, first one in the morning and second one as per 12:00 o'clock.
- **Strip grazing:** 1-2 times per day cows get a small additional fresh part of the parcel. Thus less grass is trampled upon or polluted with manure and urine.
- **Siesta grazing:** cows are on pasture in morning and evening (night), but in the barn from 12:00-18:00

#### Non-pasturing feeding methods:

- **Feeding grass in the barn:** cutting fresh grass and feeding it in the barn. Cows stay year-round in the barn.
- **Summer feeding:** feeding ensilaged grass in the barn. Cows stay also year-round in the barn.

**Note!** Above may not be allowed in countries with special legislation in regard to a minimum of grazing in summer time



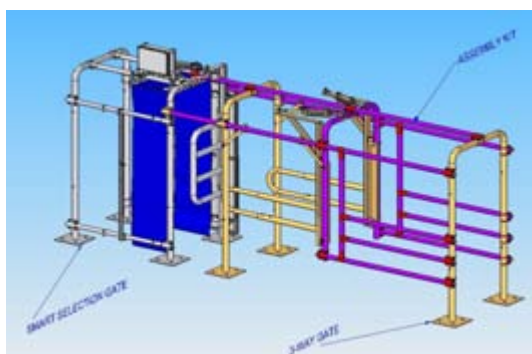


### 8.3 - Flat grazing most popular

#### Flat grazing + Smart gate

Cows are grazing on one parcel where grass growth is equal to consumption for a 3-6 weeks period

- Flat grazing is today the most popular grazing method in combination with the use of a milk robot.
- It results in a steady taste and grass quality.
- Resulting in tranquility and regularity for the cows, who get into a rhythm of milking – resting – eating, etc.
- Good grass and/or corn silage on the feed table in the barn should balance the possible fluctuation in available grass quality and quantity on the pasture.
- Use a Smart selection gate + possibly a 2/3 way gate to allow cows to go out for pasture or not as from e.g. 8:00 in the morning.
- As from 8:00 cows should be allowed to go out if no milking permission.
- Around 11:00 most will be outside.
- Around 13:00 the first will come back.
- As from 15:00 you could stop allowing cows to go out.
- At 17:00 you could bring the last cows into the barn.







### Flat grazing + Smart gate

Cows are grazing on one parcel where grass growth is equal to consumption for a 3-6 weeks period

- Flat grazing is only successful if you estimate the grass growth in the right way.
- When grass quality or quantity goes up or down temporarily, you need to adapt:
  - Feeding less or more in the barn
  - Increasing or decreasing the number of pasturing hours
  - Increasing or decreasing the size of the pasture
- Flat grazing needs relatively a low input of labor.





### Flat grazing

- In a flat grazing pasture the grass is preferably 8-10 cm long.
- Longer grass leads to trample losses.
- Long grass has a lower nutritive value.
- But too short grass isn't OK either. Cows will not eat enough and re-growth is slower.
- Check regularly the status of grass growth.
- You can do that when you fetch daily the last cows!
- Faster re-growth of grass can be achieved by reducing the number of grazing hours or also by increasing the size of the parcel.
- With pasturing periods of 5 weeks on the same parcel, a split of fertilizing is beneficial to a more regular protein content of the grass.
- 50% before start of pasturing and 50% after 2-3 weeks

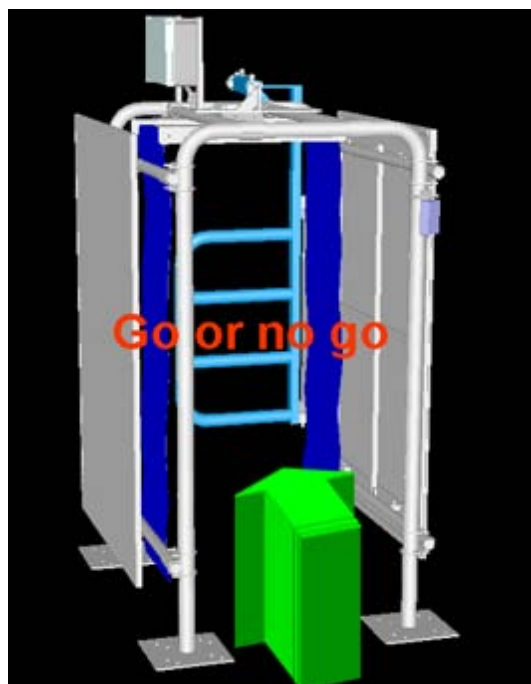


### 8.4 - Positioning of pasture gates

Using a smart gate to give access to the pastures

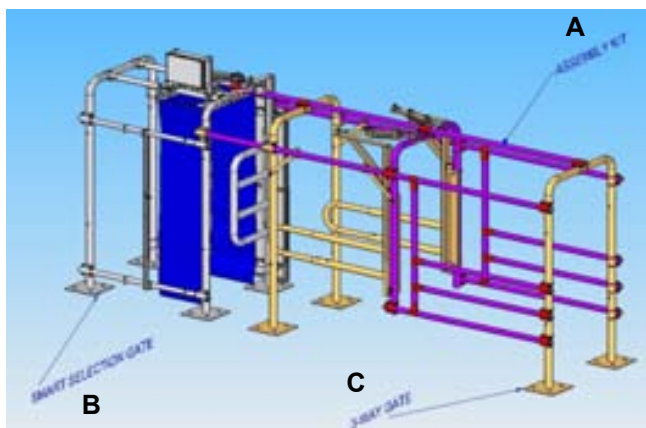
#### Method 1

- Only using a smart gate.
- Go or no go principle.
- Smart gate fits on the space of 1 cubicle only.
- Thus easy to implement in most of the barns.
- Some cows have difficulties to learn the 'Go-No go' principle.
- In most cases next to the smart gate there is a one way gate to allow cows coming from pasture back into the barn.



Go or no go





A: Assembly Kit

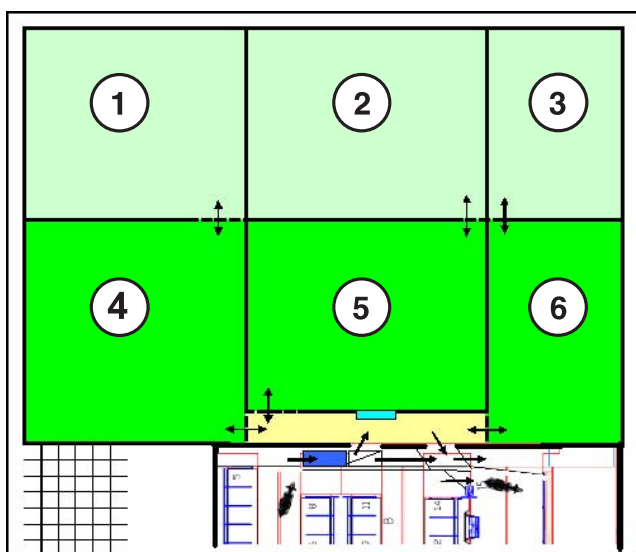
B: Smart selection gate

C: 3-Way gate

Using a smart gate + 2/3 way gate to give access to the pastures

### Method 2

- Only using a smart gate and a 2 or 3 way separation gate.
- Cows will always walk through.
- But the position of the 2/3 way gate decides where they go:
  - To pasture 1
  - Or pasture 2
  - Or back into the barn, because she need to be milked first.
- You need more space for this setup.
- All cows easily learn to use the gate.
- If there isn't enough space in the barn, you could plan smart gate and 2/3 way gate also outside of the barn. Protect smart gate with roof and keep it frost free.
- In most cases next to the smart gate there is a one way gate to allow cows coming from pasture back into the barn.



### Explanations of picture 2:

1: Extension Pasture 1

For Summer and Autumn (4 ha)

2: Extension Pasture 2

For Summer and Autumn (4 ha)

3: Extension Pasture 2

For Summer and Autumn (3 ha)

4: Pasture 1 (6,5 ha)

5: Pasture 2 (6,5 ha)

6: Pasture 3 (6,5 ha)



- Example of the use of smart gate + 3 way separation gate to 2 paddocks or back to barn.







### 8.5 - Calculate parcel surface for flat grazing

#### Size of the pasture at flat grazing for 70 cows

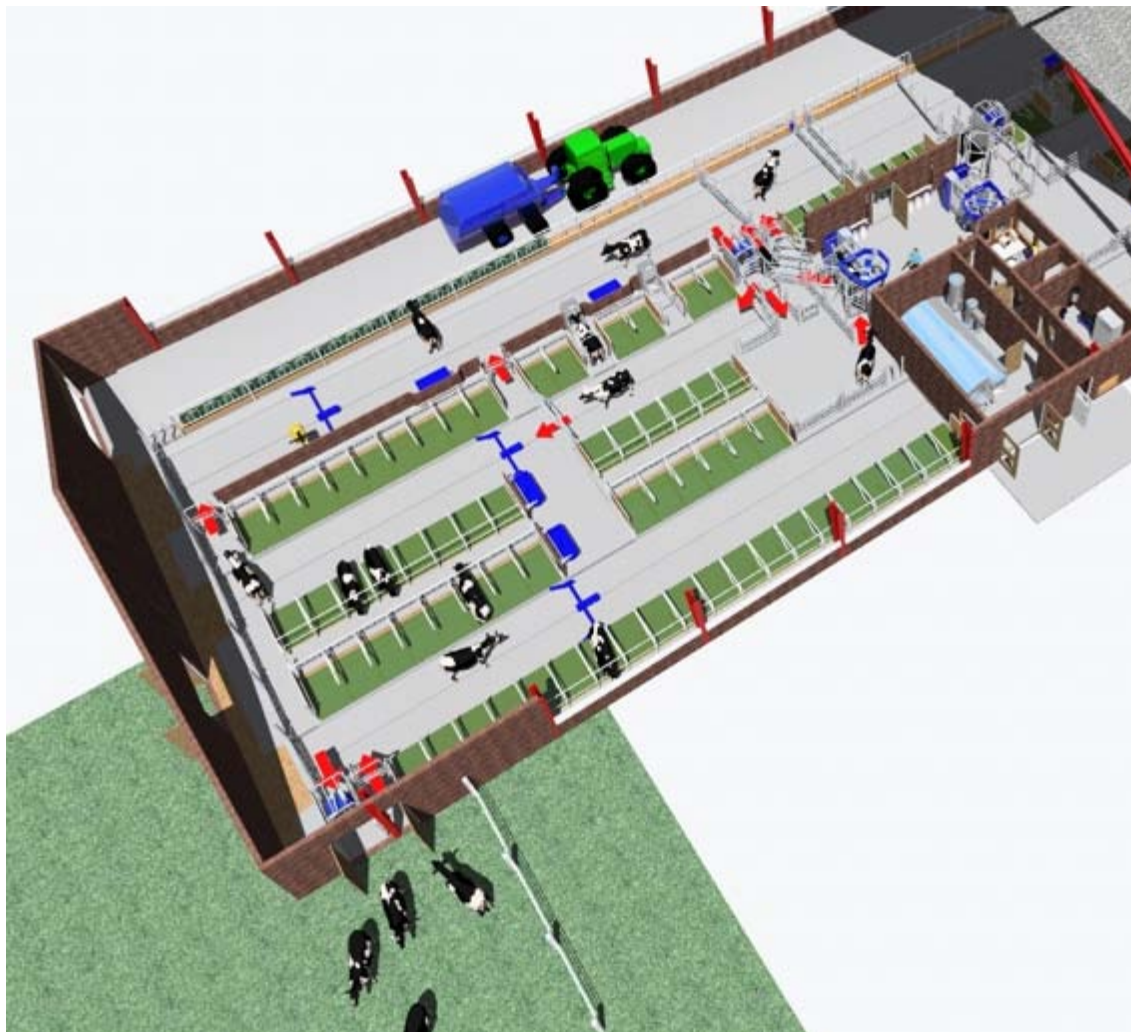
- In Spring grass growth can be 90-100 Kg DM per day and hectare.
- In Summer and Autumn it can decrease to 50-70 Kg per ha.
- A cow producing 8.500 Kg of milk, eats around 16 Kg of DM per day from roughage.
- During 9 hours of pasturing, cows will eat around 9 Kg of DM.
- In the barn they will eat another 6 Kg of DM from silage.
- 70 cows take thus  $70 \times 9 = 630$  kg DM from pasture.
- In Spring time the pasture parcel should be  $630:95 = 6,5$  ha.
- In Summer / Autumn time the pasture parcel should be enlarged to  $630:60 = 10,3$  ha.
- Or you need to give more silage in the barn.
- After 5-6 weeks all cows should go to the 2nd big parcel that you need as a minimum for flat grazing.
- A 3rd parcel would be handy for periods of fluctuating grass growth.
- After cows leave the 1st parcel, one can apply organic or artificial fertilizer, cutting grass for silage after 3 weeks, applying a light fertilizing and after another 2 weeks that parcel is again available for pasturing





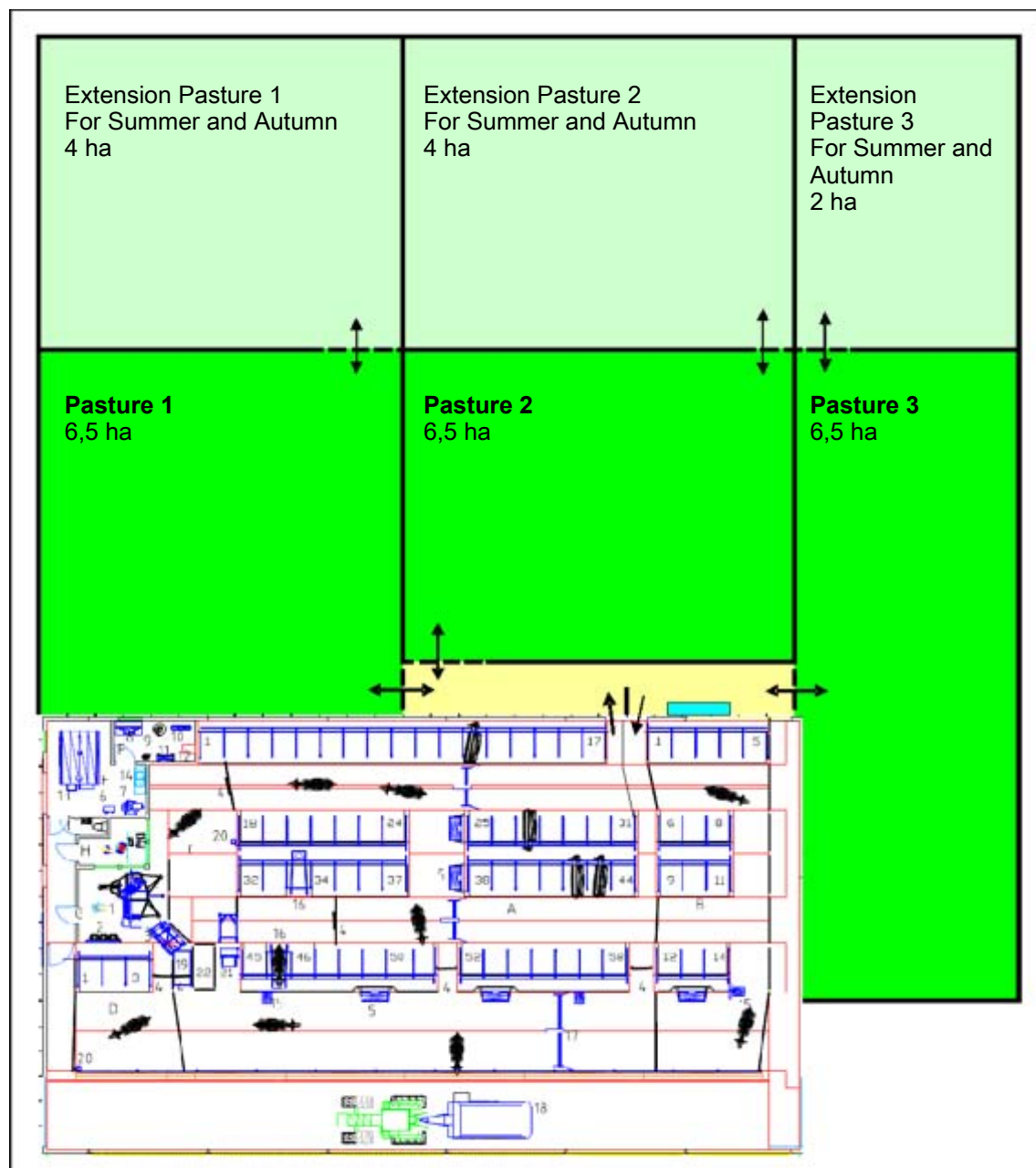
### 8.6 - Grazing layouts

Feed first + Smart gate and one way gate for grazing





### Flat grazing layout example





- Example layout for 2 VMS station, feed first with a 3 way gate for summer pasturing exit. It is possible with some extra fences to avoid cows using the cubicles in summer time and for certain periods. In this way they will be milked in time in stead of laying down in the cubicles.







### 8.7 - PC settings

- Keep the milk permission setting at e.g. 6 h, because of Free Fatty Acids.
- One should adapt settings for late lactating cows and according to behavior.
- When its muddy outside after long periods of rainfall, you could double the teat cleaning time for all cows.







### 8.8 - How to start after winter

#### From Winter to Summer

- Ask your concentrate supplier to make a new ration plan for the grazing/Summer period.
- If you let them out with a filled stomach, they won't eat too much of grass the first days!
- Give cows 3 weeks to adapt when they go out after Winter for the first time.
- 1st week: only for some hours, cows eat 2/3 of Winter ration.
- 2nd week: cows stay more hours on pasture and still eat 50% of Winter ration in the barn.
- 3rd week: cows stay out 'all' day and eat 1/3 of Winter ration in the barn.
- For robot cows it's important to have silage with enough structure, that keeps them walking.
- Keep an eye on changes in yield, fat and protein content.





### 8.9 - Water and salt

- Water ad lib to be available, but not at any place.
- Put water at such places, that it helps to get them back to the barn (halfway).



Water only in barn or also at pasture?

Result of research:

- Cows drink same quantity,
- Same milking frequency and milk yield.



- Salt is needed!
- And salt on the right spot can stimulate them to walk to the barn!



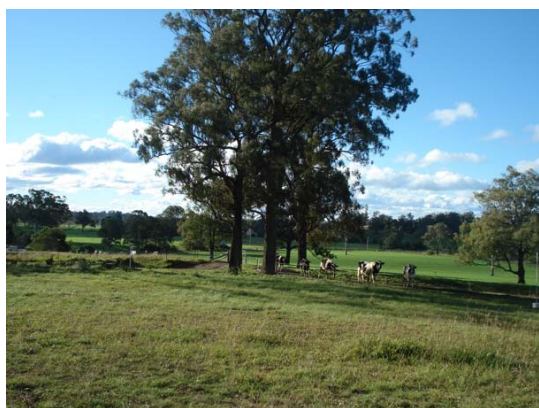
### 8.10 - Research results:

- When only 50-100 m path to pasture.
- Higher milking frequencies.
- Higher milk yield.
- If 250 m path to pasture.
- Cows tend to rest on the path towards the pasture.
- During the initial 10 days you have a loss in # of milkings and milk.
- After the cows have found a new rhythm, ergo be patient and don't start fetching cows too early.
- Don't fetch the overdue cows only, it's more effective to fetch the whole herd.
- During summer time one kept the same routing: Milking-feed table-SSG-pasture-resting area.
- The longer the distance the more it's small groups that walk back to the barn. Same goes for cows going out, but in somewhat smaller groups.
- Walking track should be good for walking (no stones, sharp sand, not too much manure, one-way: 2 m, two-way track: 3-4 m, curves possible)





### 8.11 - Various



- Hot and sunny Summer: keep the cows in day time inside and allow for grazing in evening and night.
- If no shade in pasture, but optimal circumstances in the barn, e.g. an isolated roof and no transparent sheets in the roof and maybe even big fans, than cows prefer to stay in the barn.
- But remember there should always be enough feed on the table.
- Some use a border collie to fetch the cows and quad tracks.
- Put that smart gate outside of the barn if there isn't enough space in the barn. To avoid bad cow flow inside the barn.
- Try to avoid crossing between cow traffic to and from the pastures and the regular tractor / lorry traffic around the farm buildings.
- Have some system reserve capacity. Cows tend to come back in small groups.
- Cows will stay indoor during rain or hot sunny weather.



### Various

- Bottlenecks can occur when cows come in groups.
- Periods of inactivity/idle time.
- Average number of milkings/day may drop.
- When you fetch the last cows, check also if they leak milk.
- Limit the total walking distances to 1000 m.

**There are always various methods that lead to success, also your method will work, since you will make it work!**





### VMS Best Practices

#### Management

##### Chapter 9



Reading manuals is not man's favourite activity, but it makes your life so much easier afterwards

Power is what you do with your knowledge



Should I be satisfied with 1500 kg of milk per station and day?

It is a good start, but no, one can reach 2000 - 2500 kg per station and day on all farms with the proper management.

Should 2500 kg milk / station and day be harvested from 60 or 70 cows and why?

Profitability wise you can reach a better result with 60 cows, be a top herd-manager and have top cows.



Should one use production groups and how?

- You can also feed single feed kinds, like soybean residues via feed stations, thus avoiding the need for production groups.
- Switching cows from one to the other group may create stress and it always creates additional work.
- Some like though to mix certain single feeds with the basic ration for only the high group.
- You could use a special layout called: "Auto milk separated cows too". See the barn planning chapter.
- With 2 VMS stations serving 2 different groups the forming of production groups is much easier. But it is best to keep groups together with as little group changes as possible.

What is the best group size on bigger farms? 65, 130 or 195 cow group?

- Small groups is best for the animal.
- In smaller groups you can find more easily a problem cow.
- We strongly recommend a max group size of 130 cows, milked by 2 stations.



How to grow in the most cost efficient way from 70 to 140 cows?

### Make a plan

- In one - three steps.
- If you need a complete new barn, the smaller VMS barn + 2 stations = cost wise the same or even lower than the cost for a traditional barn + traditional parlor.
- Sell part of your land and/or machines and buy milk production quota. There are many that can do the field work for less cost.
- Buy quota in bits, milk some more cows in VMS, lease quota if possible until you buy the 2nd VMS.
- Ensure that your building is extendable.
- To reduce the investment costs, consider the 2nd hand market for your 2nd VMS.

### Can I treat cows in VMS?

- Never allow a vet to treat a cow in the VMS station.
- A dry-off treatment in the station is OK, because she forgets about this event during the dry-off period.



Report - Overview

Overview

Item Name	Item Value
Animals	107
Cows	74
Milking Cows	65
Dry Cows	9
Active VMS Animals	67
VMS Animals To Be Milked Normally	65
VMS Animals To Be Fed Only	2
VMS Animals To Be Passed Thought Only	0
Avg. Daily Yield / Animal Last 24h	21,0
Avg. Milkings / Animal Last 24h	2,21
Avg. Yield / Milking Last 24h	9,5
Concentrates Consumed Last 24h	400
Animals Milked Last 24h	68
Animals Fed Last 24h	70
Concentrates Consumed Per Fed Animal Last 24h	5,7



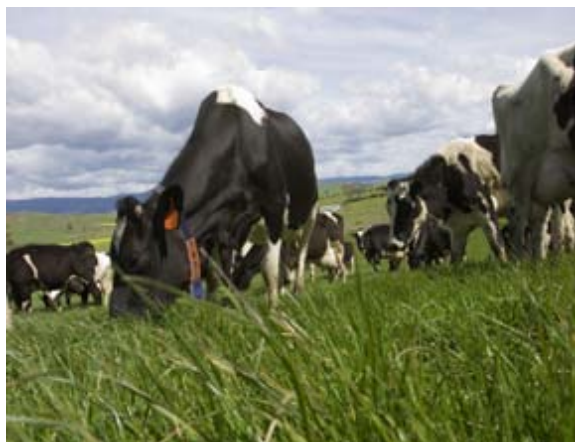
## Management

Who manages my farm during my holiday leave?

- Top users manage with an extra laptop or smart-phone to do a lot on remote control. Works fine for when you visit a meeting or family.
- For longer absences you always need somebody on the farm or close by to act when needed.
- Inspire one of your neighbours to go also for VMS milking, thus you can help each other during holiday periods or other longer absences.
- Make sure 2 persons on the farm learn how to push the buttons (your wife, eldest child, father or mother).







### Can I learn from other users?

- Pay them a visit, the majority of people likes to share their experiences
- Ask your supplier if they can organize VMS farmer club meetings, 2x per year, inviting a speaker on milk quality, feeding and other subjects.

### What is the cost per kg of milk on your farm?

- The differences between farms are > 10 € cents per kg
- Saving time with VMS gives you the opportunity to spend some more time on the accounting of your operation
- Your accountant can help you to find the most important data and local consultants can help you to compare your data with others.
- Imagine you milk 550.000 kg per year. Reducing the biggest cost drivers with e.g. only 2 € cents per kg of milk will increase your annual profit with € 11.000,-
- The biggest cost drivers are feeding and labour. With VMS the remaining one to optimize is the feeding cost.



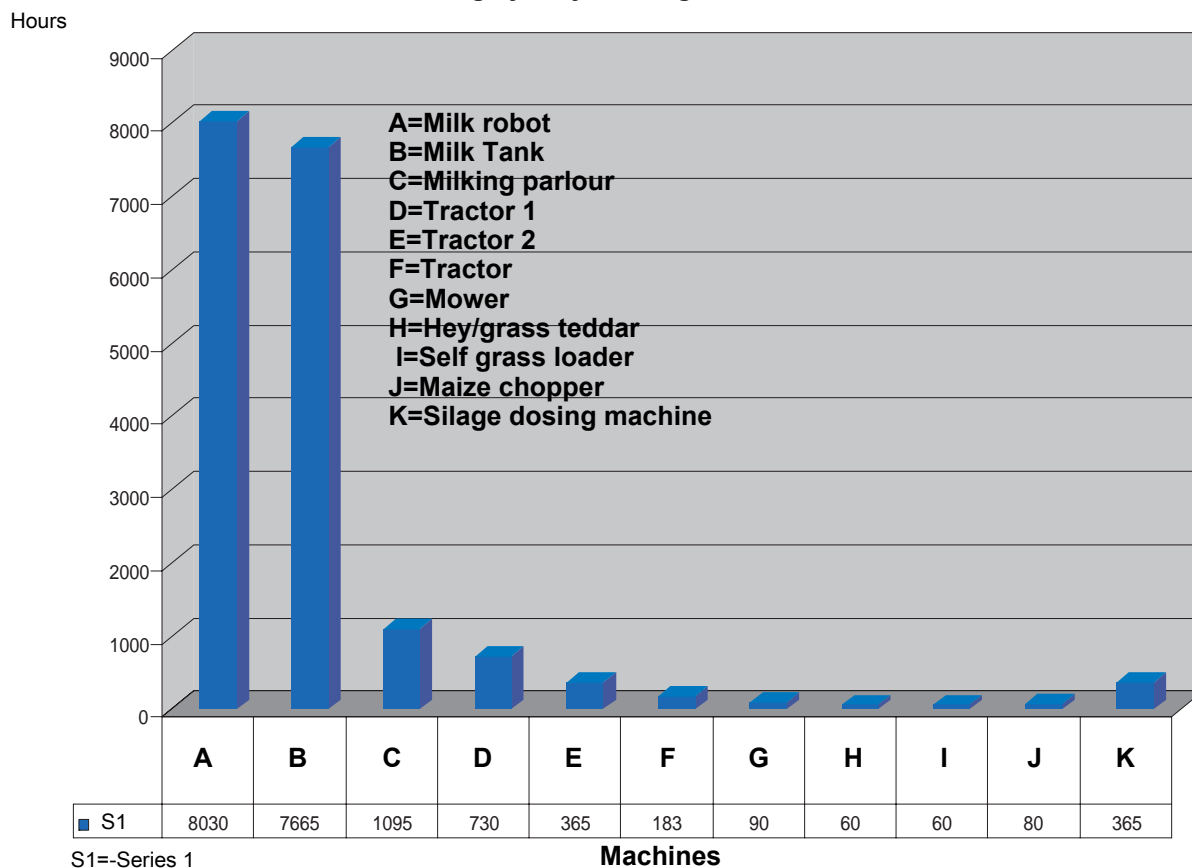


Some machines on your farm are really doing the job.

Too many are standing still most of the time!

- There are different ways of getting things done.
- Consider a contractor to do some or all the field jobs.
- The contractor doesn't deliver only the machine, the machine comes with a driver. You can earn more in another way during that same time.
- Automatic feeding may be a much better investment!
- To save more labour, a more regular cow traffic and have better control over your feed costs.

**Average yearly running hours farm machines**





In which areas can I lower the cost with help of VMS?

- Lower SCC by optimizing the management decisions, possible when using an OCC (Online Cell Counter).
- Less cases of mastitis.
- Less replacement due to mastitis.
- Production fine-tuning (adapting the settings).
- Less veterinary costs.
- Longer lifetime of my cows.
- Saving precious labour hours every day.

