

# DeLaval VMS™ Grazing Guide

Planning & Getting started





## Preface:

These guidelines have been prepared to assist dairy farmers to make the decision if a Voluntary Milking System (VMS) under grazing conditions is a viable alternative to conventional milking systems. The messages portrayed in this booklet are purely guidelines and is by no means a recipe on how to farm with VMS. Excellent farm management, animal husbandry and pasture management skills remain paramount to achieving success as a dairy farmer using VMS. The use of computers, data sets, sensors and other cutting edge technology,

means that farmers need to be prepared to change their skill sets to get the most out of their new milking system. Farmers should use the technology to spend more time on making sound management decisions with all the information available. In addition more time can be spent managing the herd and pasture.

For any clarification and queries please contact your local DeLaval representative for support.

Pasture based systems: Good farm system performance means focussing on the overall project, while keeping the details in mind.

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## Key

VMS	Voluntary Milking System	OWG	One Way Gate	DelPro™	DeLaval Herd Management system
SSG	Smart Selection Gate	SOP	Standard Operating Procedure	CMS	Conventional Milking System
OPF	Out of Parlour Feeder	MDi	Mastitis Detection Index		



## Planning for automatic milking

How well suited is your farm to automatic milking?  
Take time to make a plan – it is easier to move a laneway or a fence on a drawing now, than later, on the farm.

### Key considerations

#### Topography

- Farm shape – does your farm suit centrally located milking station or is it long and skinny
- Try to keep cow walking distances from the furthest paddock, less than 1000m
- How hilly is the farm, how steep are the hills, do lane ways follow hill contours?
- Are there natural barriers such as rivers or drains?

#### Geography

Is your farm in an ideal location to optimise automatic milking?

#### Consider:

- Climate
- Grass growth rates
- North facing/south facing
- Soil quality
- Farm contour

#### Greenfields site or existing farm

- A Greenfields site can be custom built
- Existing layout can be adapted

#### Adapting Existing Infrastructure

- What is the quality, age and location of buildings?
- Fences, laneways and races
- Is there good cow access to

milking infrastructure and facilities?

- Making good use of existing feed supplement facilities
- Could road infrastructure obstruct voluntary 24 hour cow access?
- Could power lines cause static interference with electronic equipment?
- Is there good internet service for remote diagnostics?
- Is there a reliable power supply or do you need a generator?
- Is there a sufficient supply of quality water?
- Is transport of feed and milk possible?

### Success factors

#### How well do you understand your cows?

- Build a system to suit your cows' behaviour and routines: work around the cows
- Anticipate busy periods and prepare accordingly. (fresh grass becomes available in next pasture)
- Use quiet periods to get other routine jobs done that would normally interfere with the cows and milking e.g. cleaning yards, preventative maintenance

#### Stockmanship skills

- Use your observation skills to anticipate anomalies
- Are cows not moving through the system as they should?
- Optimise cow flow by taking care of feed, hoof health, water and tweaking the system
- Constantly check if the equipment is working as expected

#### Be proactive – have good Standard Operating Procedure's (SOP)

A 3-6 hour downtime in the system could mean 1-3 days before voluntary traffic returns to normal

- Ask your Delaval representative for a 100% filled 'VMS first aid kit' to ensure you have essential spare parts to keep the VMS running with minimal downtime
- Proactive farm maintenance is doubly important e.g. electric fences, races etc.
- Prepare for adverse weather or storms/anticipate cow reaction and respond accordingly

#### Be adaptable

- Farm staffing, roles and shifts will change e.g. more flexi time, different skill sets needed. Less operational milking tasks could mean more flexible work routines
- Working routines and times could vary occasionally, depending on calving patterns, weather conditions, grass growth and allocation



Less 'operational' milking time means more focus on other high value tasks:

- Animal intervention and treatment of cows – ensure you have a separate treatment facility so milking is not disrupted
- Opportunity to optimise pasture management
- Analysing and acting on computer data from DelPro™ Herd Management System to manage by exception

The type of farm system could affect the infrastructure set up:

- Seasonal v split calving – strategies to manage high influx of colostrum cows or train new heifers
- Low vs high input systems and how to manage extra supplements, forages and concentrates
- Animal Type– does the farm layout suit your cows e.g. are walking distances too long for big Holstein cows?

Some breeds are easier to motivate and incentivise than others in voluntary traffic systems.

## 3-way grazing principles

### Why 3-way grazing?

- 3-way grazing is key to motivating cows to move regularly and voluntarily around the farm in a motivated way
- 3-way grazing cows are just as well fed as cows in a conventional system. The only difference is that VMS cows are offered their daily feed allowance in three smaller 'portions' each day

### What is 3-way grazing?

- The farm is divided into 3 similar sized 'farmlets'
- The opportunity exists for all cows to enter the 3 farmlets, each with approximately an 8 hour grazing access opportunity over a 24 hour period
- Each 'farmlet' provides approximately a third of a cow's daily fresh pasture allocation
- The chance to access fresh pasture

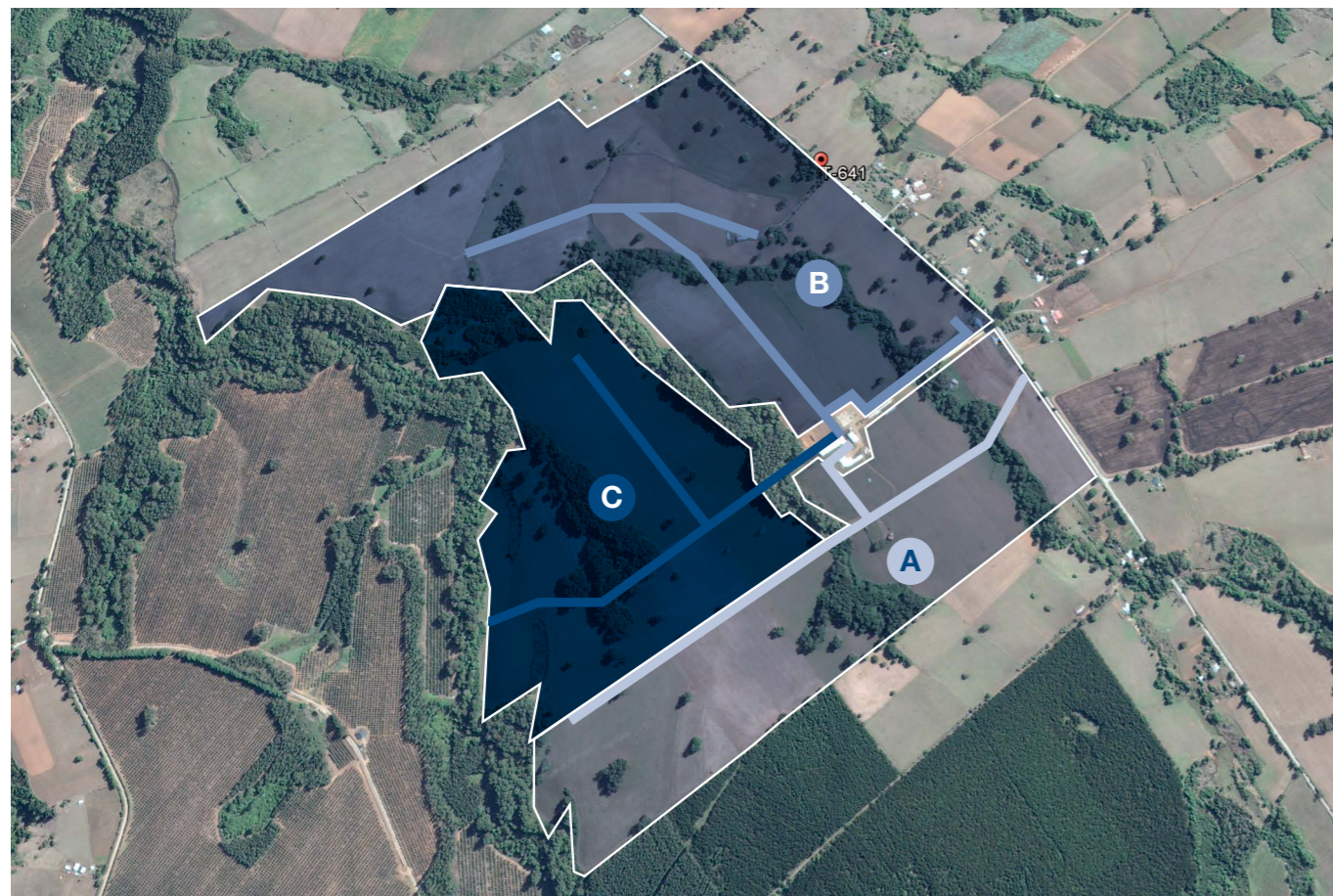
allocations ensures cows will have an opportunity to enter milking centres at least once, and up to 3 times every 24 hours depending on individual cow milking permission settings

- Each cow is allowed entry to the milking centre if granted individual milking permission, this is based on time since last milking and expected yields
- Irregular milking times make it hard to measure yields daily, so they are measured both on daily and on 7 day rolling averages
- Grazing yard layout and design helps to ensure cows can only enter an area allocated to them
- Milking times and average milking intervals gives you a good overview of cows that need some more attention
- In DelPro™ Herd Management it is very important to check the

MDi twice a day, since this is a combination of several quarterly measured items that gives very important information on cow/udder health issues

### To run a 3-way grazing system effectively you must:

- Treat each grazing area as a separate 'farmlet'
- Use strict pasture management principles
- Learn to allocate the right amount of pasture for each grazing round (by measuring the difference between pre and post grazing residuals)
- Over allocation = cows less likely to leave paddock
- Under allocation = cows leave earlier than desired, causing congestion in milking centre
- Weather conditions can influence dry matter intakes – plan accordingly



DeLaval can support and provide guidance on how to prepare and set up your grazing farm for voluntary milking, based on your farm system requirements.

## Effluent

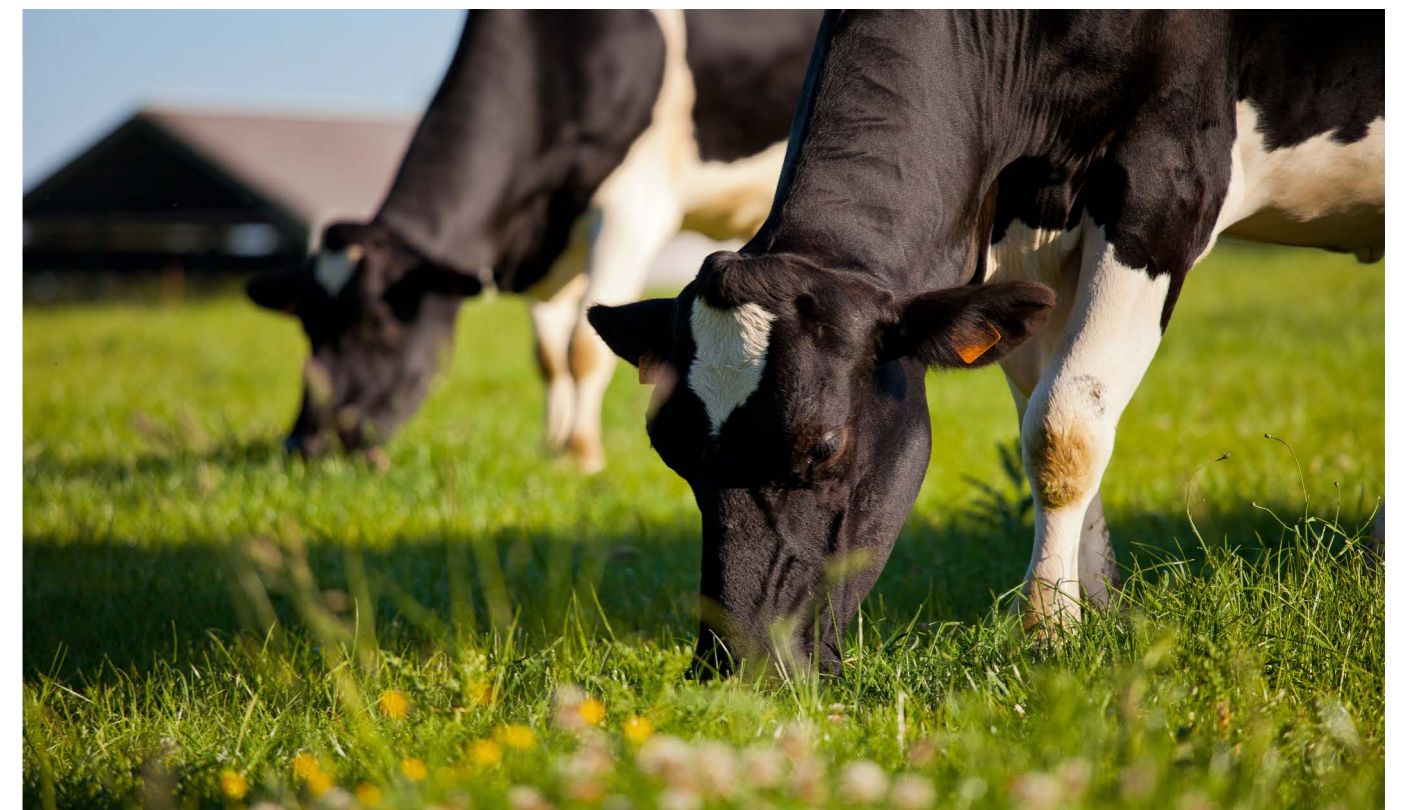
**Effluent drainage and cleaning options for yards.** (When planning your effluent drainage and storage system consult your local authority)

### Yard cleaning options:

- Flood wash
- High pressure water hose
- Manure scrapers
- Sloped floor and good drainage



Consult with your local effluent experts to optimize effluent drainage and facilities.





# Cows

## Training

### Dehorning:

Debudding calves is important, cows with horns can dominate and block cow flow through grazing yards

- For seasonal calving, consider calving heifers two weeks earlier than main herd to allow time for them to get used to the system (milking and traffic)
- For year round calving, set up a daily or weekly SOP to monitor new cows' adjustment to the system

they learn to move around the Smart Selection Gates (SSG), Out of Parlour Feeder's (OPF), One Way Gate's (OWG), interchanges and VMS.

- Teach heifers to eat grain/ concentrate through the VMS and OPFs
- Use a calm voice
- Walk quietly around the heifers
- Keep dogs and any other distractions/stress away from milking facilities
- Visually monitor that newly calved heifers/cows can navigate their way around grazing yard and VMS

infrastructure.

- Can newly calved heifers/cows be successfully milked by the VMS without human intervention at least twice a day?
- If yes to all of the above new cows/heifers have successfully graduated to the VMS and the 3-way grazing system
- They can now join the main herd but may still need supervision
- Always check VMS settings some days after the training period as cows can act differently once settled into new routines

Mix heifers (before calving) with the milking herd at the milking centre so

# Milking

## Robot-cow interaction

Typically, the VMS offers 150-160 milking opportunities a day

To achieve this, ensure you:

- Closely monitor system's performance
- Observe and listen for uncharacteristic sounds or cow behaviour
- Develop a daily routine and SOP's for staff that includes preventative maintenance
- Regular proactive cleaning often allows the operator to prevent minor alarms which waste time
- Be aware that the VMS can do the milking but the cows need to come to the robot
- Use of lights in the milking centre helps attract 'night traffic'.
- Avoid any obstacles and make everything as attractive as possible to let cows do what they should do. Encourage voluntary milking
- Follow DeLaval recommended service routines

## Software settings

Software settings in 3-way grazing include provision for:

- Milk divert
- Milk withholding periods
- Monitoring new cows/observing first milkings
- Introducing new heifers to the system – develop a robust training routine for new cows.
- Check notifications and MDi at least twice a day via the robot screens or remotely

## Incomplete milkings

Incomplete milkings – what happens?

- The cow is sent back to the waiting area for a second attempt
- Research shows more than 50% of second milking attempts succeed

### Why do incomplete milkings occur?

- Udder doesn't fit robotic specifications for some reason e.g. dirt on udder, hair, tail interference, swollen udder, udder conformation (very close rear teats). Check udder specifications
- Robot daily cleaning routines have not been completed
- Animal temperament/behaviour
- Technical fault with robotic milker/ have service protocols been followed

### What happens if a second milking attempt fails?

- Farmer is notified and given the option to draft the cow to the treatment area for attention



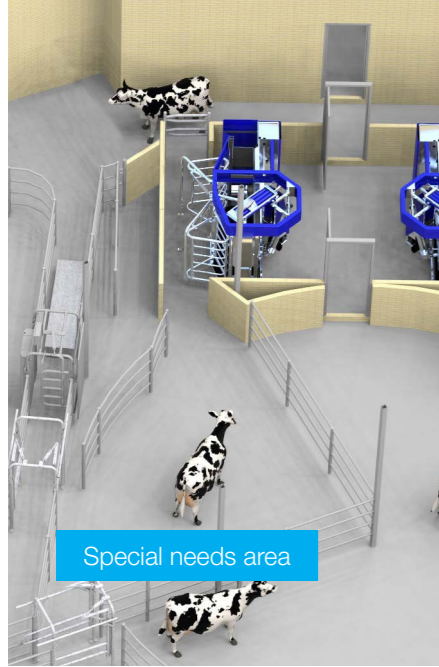
Make time to teach heifers and new cows how to navigate through OWG's, SSG's and VMS's. With seasonal calving systems use the 'dry period' to teach large groups of heifers to navigate through the milking centre and interchanges.



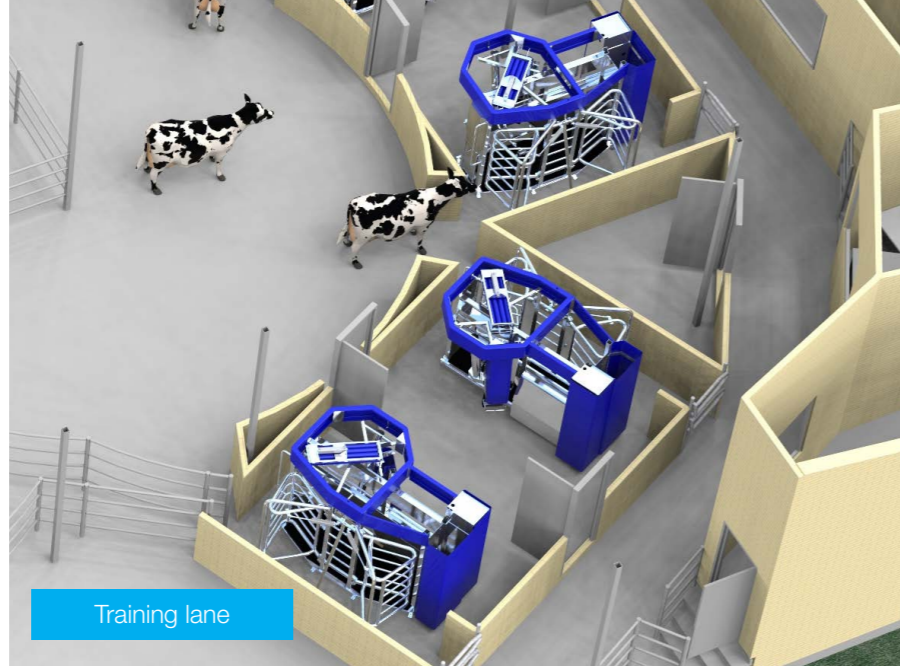
Use a rope to partially open one side of a OWG to entice heifers to push through.



Once confident, remove rope and monitor that heifers move through the OWG confidently.



Special needs area



Training lane

Take time to consult and plan thoroughly how to manage special needs and training facilities in the VMS milking centre, without interfering with voluntary traffic and voluntary milking.

## Cow monitoring and performance for larger herds

**Extra vigilance is needed for larger herds, especially for:**

- Heifers and fresh cows
- Managing 'peaks' in seasonal calving herds

**To cope with peak demands, you will need:**

- Good SOP's and protocols to introduce new cows to VMS quickly and effectively
- Pre calving training
- Supervise first milking sessions ensuring milking is successful.
- Use auto alarms to notify operator if any new cows are 'unsuccessfully' milked

**Note: Treatment or alert cows can be automatically drafted to hospital area for treatment.**

**Seasonal calving – tactics to manage congestion**

- Spread calving (calve heifers 1-2 weeks before main herd –use short gestation bulls?)
- Delay or 'park' cows with milking permission and prioritise urgent or 'overdue' milkers to VMS during congestion times

**Heat detection**

Make use of DelPro™ to highlight anomalies in animal behaviour, routines or production to aid heat detection.

Optimise a mixture of technological aids and traditional human observation methods

- To achieve excellent submission rates, especially for seasonal calving systems, visual observation is still the best strategy. However, technology can 'aid' heat detection to improve submission rates
- With voluntary cow traffic, cows are more inclined to show 'natural heats'

DeLaval VMS V310 and DeLaval Herd Navigator can also give you an instant snap shot of key metrics of every individual animal's reproductive status by analysing progesterone level in the milk. While all of this is happening, the VMS system's real-time management software records all data and events for retrieval and actioning in DelPro™.



The VMS, online cell counter and DelPro Herd Management allows for numerous opportunities to diagnostically monitor, measure and identify many milk quality challenges at an early stage.

## Milk quality

**Mastitis detection and treatment using DelPro™**

- Identifying conductivity spikes can help a farmer identify which quarter has risk of infection and allow for non invasive proactive treatment, reducing risk of a clinical mastitis outbreak
- DeLaval VMS and DelPro™ dairy management automate daily tasks to save time. A smart and simple index called Mdi will give you an updated overview of the udder health of each cow after milking
- For a health check or treatment, draft the cow and use the treatment facility to observe, diagnose and administer any medication
- Make use of automatic drafting thresholds that can easily be set by the VMS user, both on milk and/or cows drafting

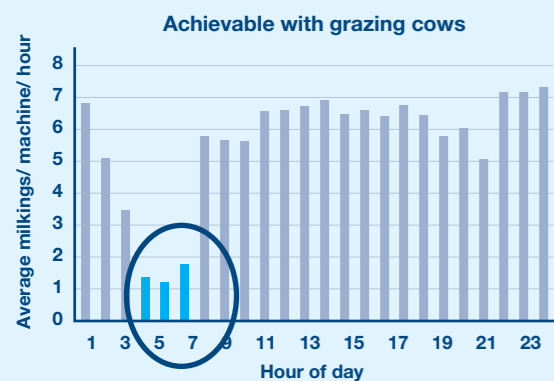
- Check MDi and other notifications a minimum of twice a day
- Do a VMS system cleaning and change milk filters three times a day
- Check the system regularly on cleaning and cooling performance
- Change liners every 2500 milkings and follow the DeLaval maintenance recommendations

**Note: All animal intervention should take place in the treatment facility. If cows have a negative experience in the VMS or SSG's it can lead to stress and risk of reduced milking frequencies and reduced voluntary cow traffic.**

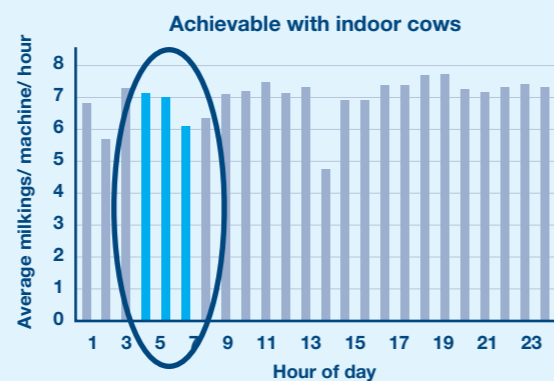
It is important from a milk quality perspective that if a cow is not milked out properly, that she is returned back to the waiting area as soon as possible to be re-milked again. 50% of second attaching attempts are successful ensuring minimal impact on milk quality.

**DelPro™ KPI's provide a wide variety of useful information and notifications to the operator:**

- Reports on averages, peaks and performance for virtual groups e.g. 1st lactation, 2nd lactation, 3rd lactation
- Provides true quarter milking data so all important data is shown per quarter, both at the VMS touchscreen and in DelPro™



Cows have 'sleep time' in grazing systems with the absence of artificial lighting.



Artificial lighting and Total Mixed Rations can allow for more cow activity at night in barns, increasing milking opportunities. Ref: FutureDairy Management Guidelines for pasture-based AMS farms 2010.



Healthy well grown calves will grow into tall strong heifers, that will hold their own in a voluntary milking herd.



With VMS and the ability to monitor cow performance and health through DelPro, basic animal husbandry skills and visual monitoring should not be neglected across the herd.

## Animal health/welfare

- Good observation/ stockmanship skills and understanding cows is vital
- Understand herd and group social structure/smart cows/slow cows to take advantage and optimise the system
- Cows like routine so don't surprise them. Introduce changes gradually
- VMS is not about forcing cows to milk, it's about using incentives and rewards to encourage regular milking frequency. Stay hands off as much as possible
- Curved/funneled infrastructure

replaces symmetrical/angular infrastructure to help cow flow and confidence

- Water allocation – don't restrict water, but place troughs strategically to encourage cow flow through the system. Avoid placing water in bottle neck or congestion areas

### Manage heat stress proactively

Option to modify your outdoor system:

- Sun shade infrastructure to reduce direct sunlight on cows

- Roof/corral area to protect from sun, rain, snow
- Wind screens - create gap which helps avoid draught but allows fresh air
- Natural ventilation - take advantage of natural ventilation to improve air quality of the area and lower the amount of flies in the milking centre
- Vermin can become a problem with lots of available feed sources – use mouse traps or other methods

## Milking frequency

Milking frequency depends on the farm system, animal type and management strategies e.g.

- A low input, seasonal calving – cows can milk 1.6 to 1.8 times a day
- A high input, year round calving - cows can milk 2.2 to 3 times a day
- Future proofing - design system/yards so that you can modify your infrastructure when needed e.g. feedpads, barns
- Take care and regularly monitor milking intervals by adjusting milking permissions, feed availability and feed allocations

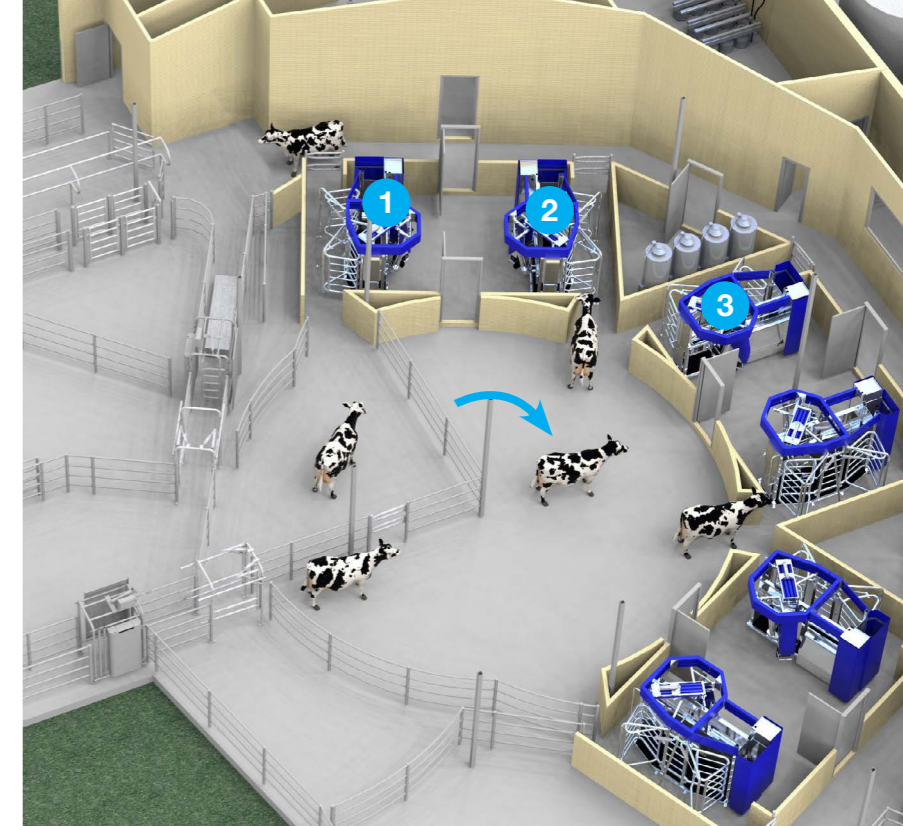
## Colostrum Harvesting

There are two options for milking colostrum cows. In the seasonal calving system the high volume of colostrum cows could disrupt cow traffic. For larger VMS farms there are a number of options:

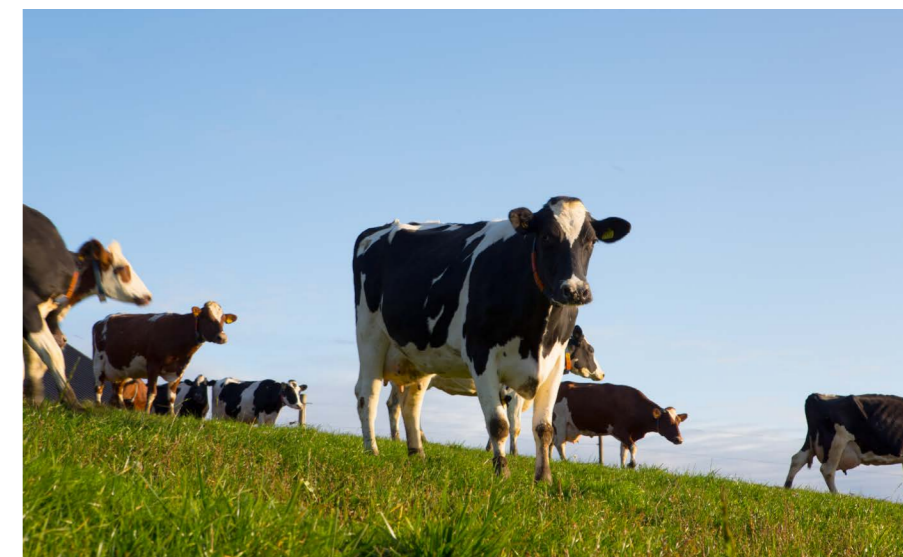
- Dedicate one or two VMS robots to colostrum cows during peak calving periods
- For smaller year round calving herds send colostrum cows to any VMS, but ensure VMS is set to wash post milking before allowing other cows through
- For large seasonal calving herds, send colostrum cows through to a dedicated VMS (in seasonal calving system there are many new cows and heifers – possibly dedicate two milking robots for colostrum)

### Transition steps from calving to colostrum to milking herd

- Trim tail hair
- Singe/shave udder hair
- Update heifer card to calved cow in DelPro™
- Manually strip teat sealed heifers to avoid teat seal residue in milk
- Manually observe cows/heifers milking on VMS for the first time
- Make sure first three milking are



The circular yard in this VMS layout allows for 1...2...3 VMS's to be dedicated to special needs or colostrum harvesting. This is particularly useful for seasonal calving herds when we don't want to disrupt 'mainstream' voluntary milking cows.



Run colostrum cows as a separate group for easy monitoring and handling. Once out of colostrum phase cows can join main herd.

successful with sufficient amount of milk harvested

- If animal is upset manual attach is a viable option to ensure a positive experience in VMS

### Fresh mature cow's adjustment to normal voluntary milking

- If in good health, cow should adjust quickly
- Cows may initially hang around the dairy
  - Only a concern if not milking at all
  - Check for retained membrane or Mastitis

- Observe fresh cows' first milkings on VMS
- Monitor the cow through electronic reports to ensure cow has good milking experience



High quality pasture, drives cow appetite and encourages voluntary cow traffic.

## Feeding

VMS for grazing systems is dependent on cows moving voluntarily to milking because they want to access fresh high quality pasture. Feed is the primary motivator.

### The farm layout should encourage the cows to move easily throughout the farm:

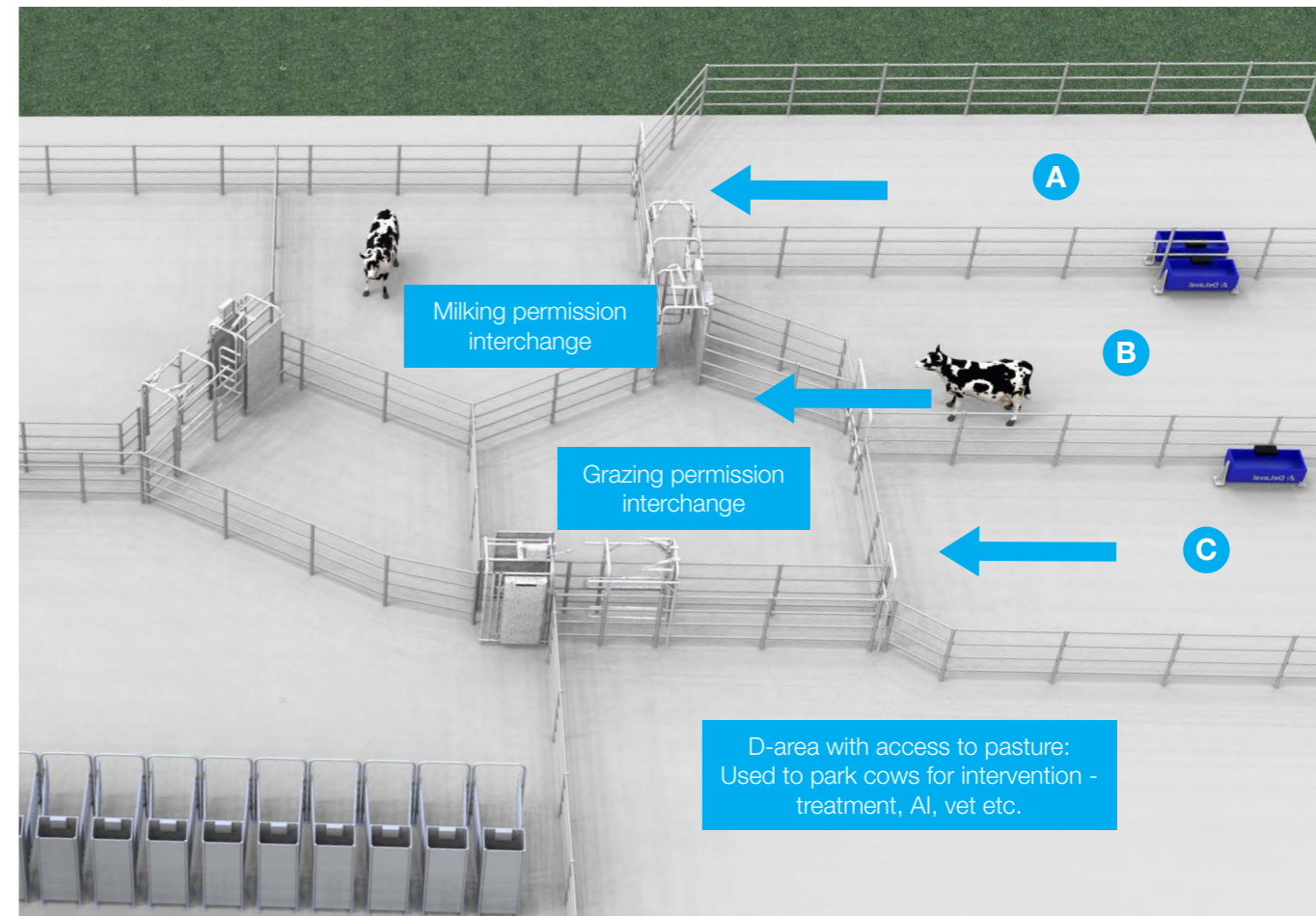
- A full voluntary system is available for cows 24 hours a day [allowing for sessions of down time to clean the system every day]
- The role of the farmer/operator is to ensure feed incentives encourage a cow to present voluntarily to each VMS every 6 minutes
- Does your farm lend itself to this?

### Factors to motivate cows are:

- Distance to the furthest paddock
- When cows are required to walk further than 800 metres from the dairy to a paddock, extra encouragement may be needed, such as higher forage quality in the paddock, to ensure that milking intervals stay at an acceptable level.

### Management options could include;

- Allocate cows 'difficult' paddocks in day time when staff can encourage movement
- Alternate long walks with short walks to balance out walking distances over 24 hours
- Grow high quality forage crops on most distant paddocks for silages
- If distant paddocks also involve hills or slopes, avoid using them for lactating cows



Ensure easy access from grazing areas into traffic interchanges. It is a good idea to allow cows to fully stand on concrete before walking through OWG's.

### Location of feedpad is important

Place feedpads close to laneways, OWG's, SSG's or gates to divert cows to the feedpad

- A post-milking feedpad enhances movement out of the dairy back to pastures quicker
- Research has shown that cows spend less time on concrete by utilising a 'Milk First' strategy
- A pre-milking feedpad makes use of a 'Feed First' strategy which is useful to encourage supplementary feeding during shorter times of the year. Usually this option is used in systems where cows can loaf in paddocks
- The feedpad can act as the third feed allocation if necessary, especially during difficult
  - grazing periods
  - flooding
  - drought
  - feed quality
  - feed availability

## Grazing systems

### What is 3-way grazing?

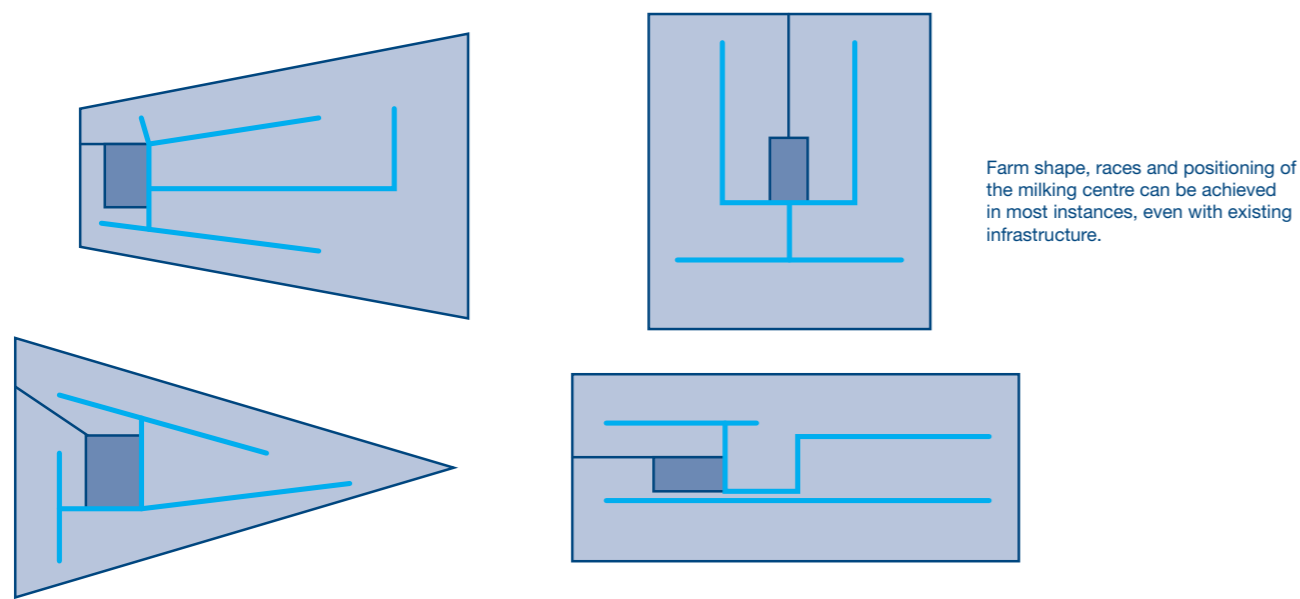
- The farm is divided into 3 distinct areas or 'farmlets'
- A defined area is the daily allocation of fresh pasture
- 3 x 8 hour grazing areas in each farmlet can be accessed by all cows over a 24 hour period
- This ensures the cows enter the milking facilities as they try to access a fresh pasture
- Cows are milked based on individual milking permissions, both expected yields and/or time intervals
- Use data from pasture management tools, DelPro™ milk yield data and stockmanship skills to ensure cows are always fully fed

### To run a 3-way grazing system effectively:

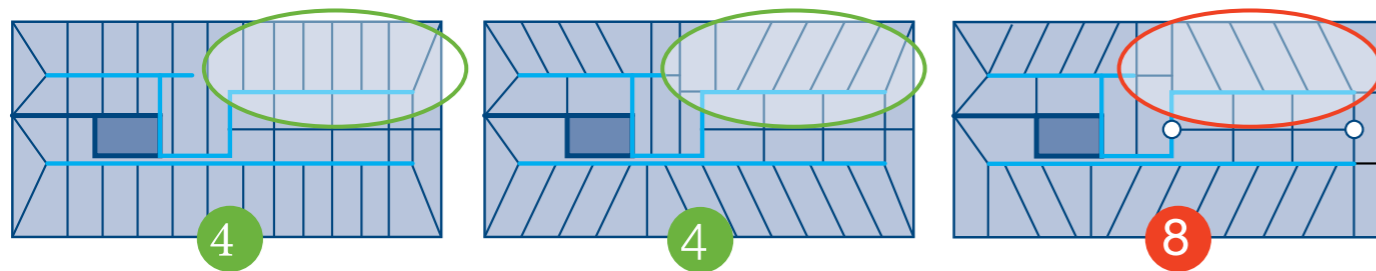
- Treat each grazing separately – use strict pasture management principles and tools to optimise performance
- Learn to allocate the right amount of pasture for each grazing round
- Over allocation = cows less likely to leave paddock
- Under allocation = forces cows out, causes congestion in milking centre
- Weather conditions will influence dry matter intakes – plan accordingly
- Adjust the settings for milking permission and feed allocations through SSG's accordingly



## Farm shape

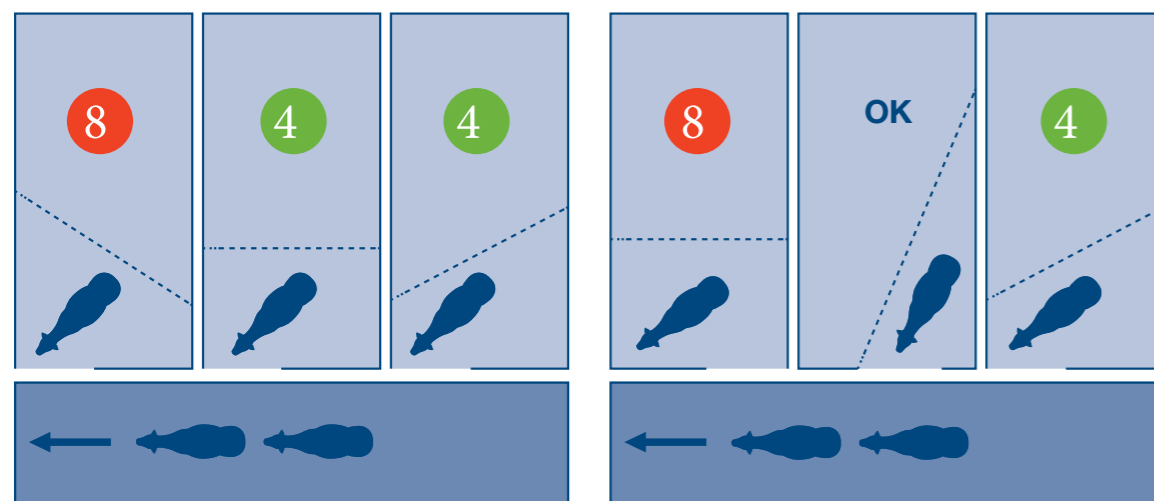


## Grazing layouts and paddock shapes

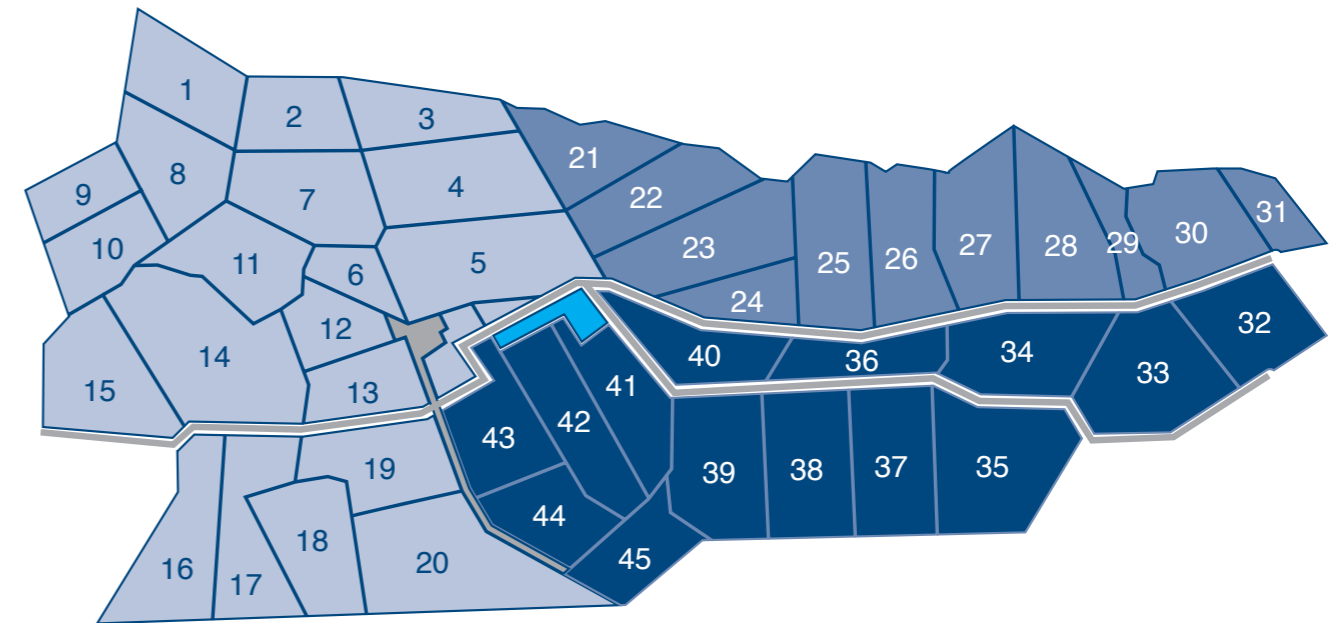


Consider paddock shape before fencing. Paddock shape should allow for easy cow exit.

## Gate and break fence placement



Setting up break fences and opening entrance/exit gates, can confuse voluntary cow traffic. Extra vigilance and care needs to be taken when opening up new grazing allocations to ensure no obstacles will affect cow traffic flow to and from the paddock.



Treat each of the 3 grazing areas as a separate 'farmlet' and feed wedge. Put in place a strict weekly grazing plan, and manage potential surpluses and deficits accordingly.

## Grazing layouts

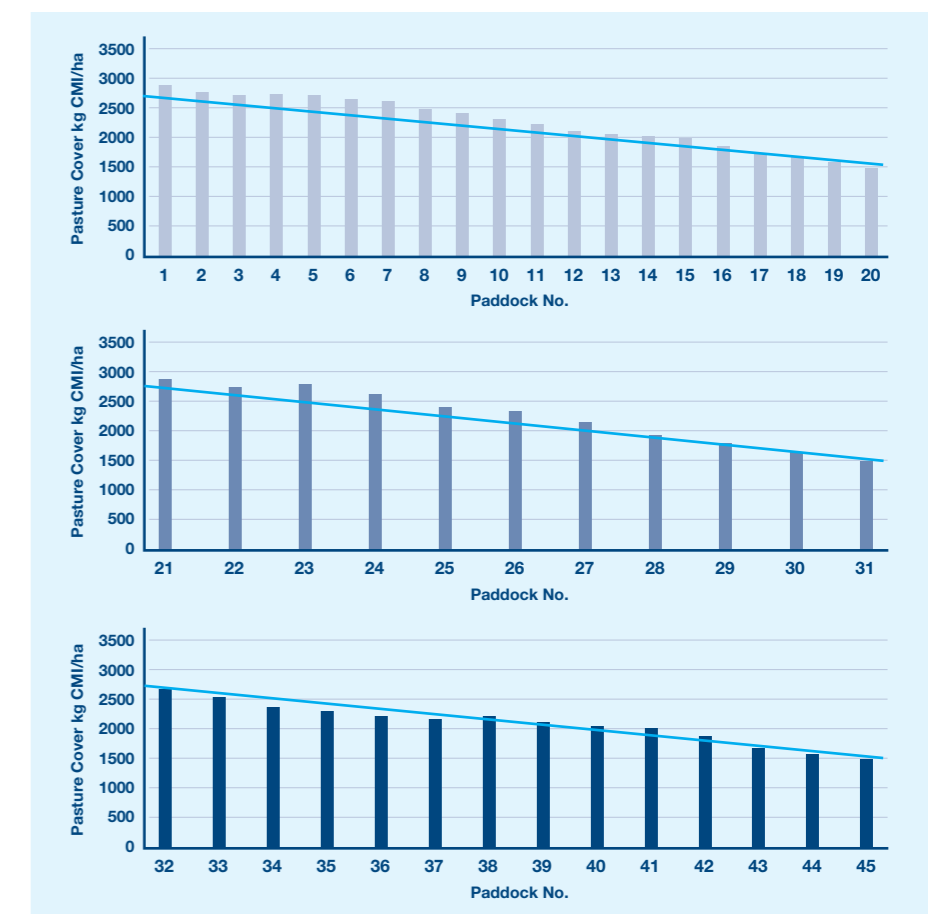
### Factors to consider when planning grazing infrastructure

- Where will you put crops?
- What about wet and poorly drained areas of the farm?
- Some paddocks and areas will be more productive than others
- Ensure that each farmlet can grow similar volumes and quality of feed every year.

Call a DeLaval Farm System Specialist for advice.

### Feeding challenges of seasonal calving systems

- When cow numbers are small (e.g. earliest calvers), paddocks need to be split into smaller sections
- Use electric wire to minimise back grazing as it discourages voluntary movement
- Consider 2 way grazing for a short period, until enough cows to activate 3-way grazing
- Quality and quantity of feed can be variable in early lactation



## Yard layouts

- It is critical to get the right cow flow to ensure cows are milked regularly every day.

### Definitions:

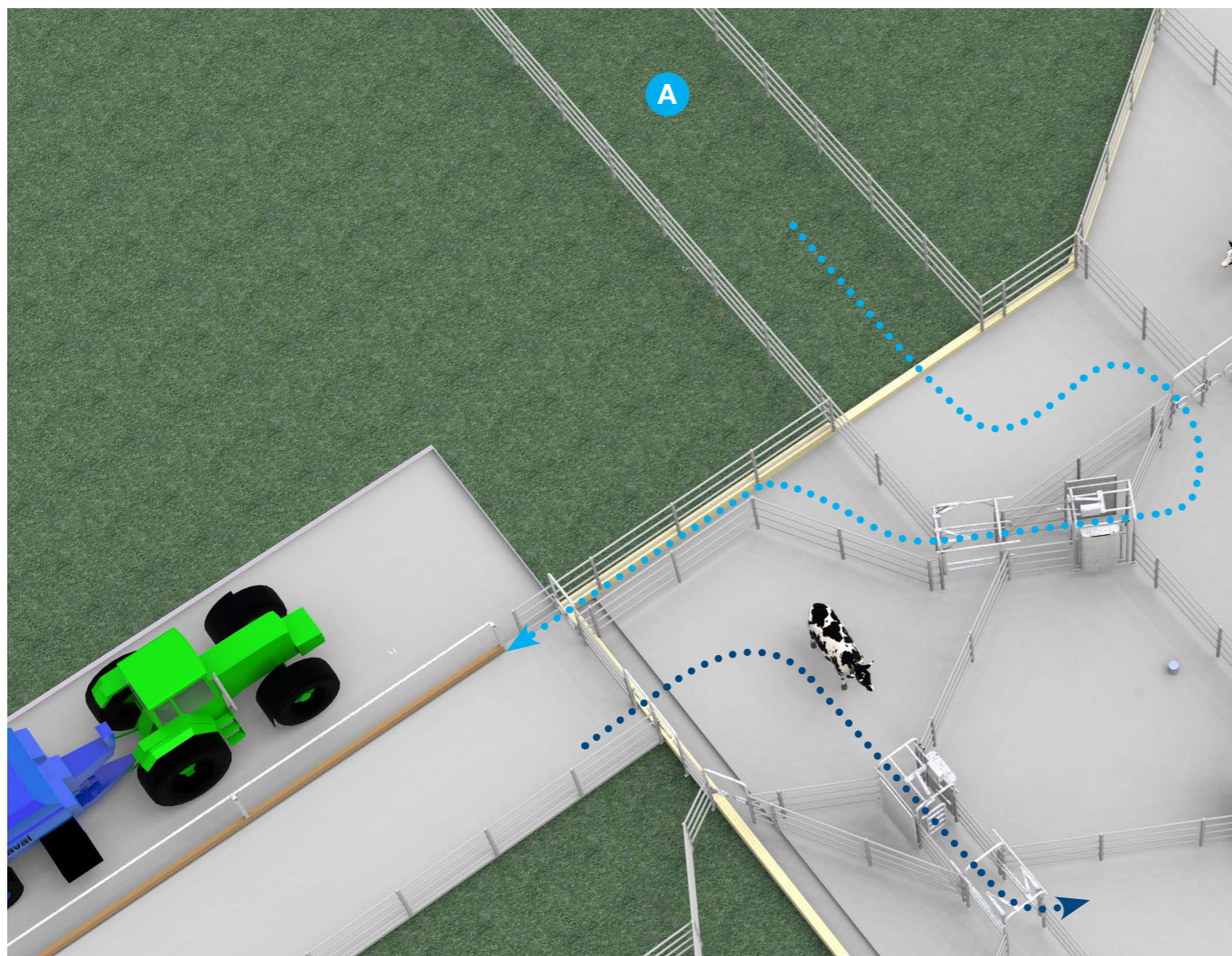
#### Voluntary cow traffic:

The ability for cows to move freely to and from feeding areas to yard facilities in preparation for milking without human intervention.

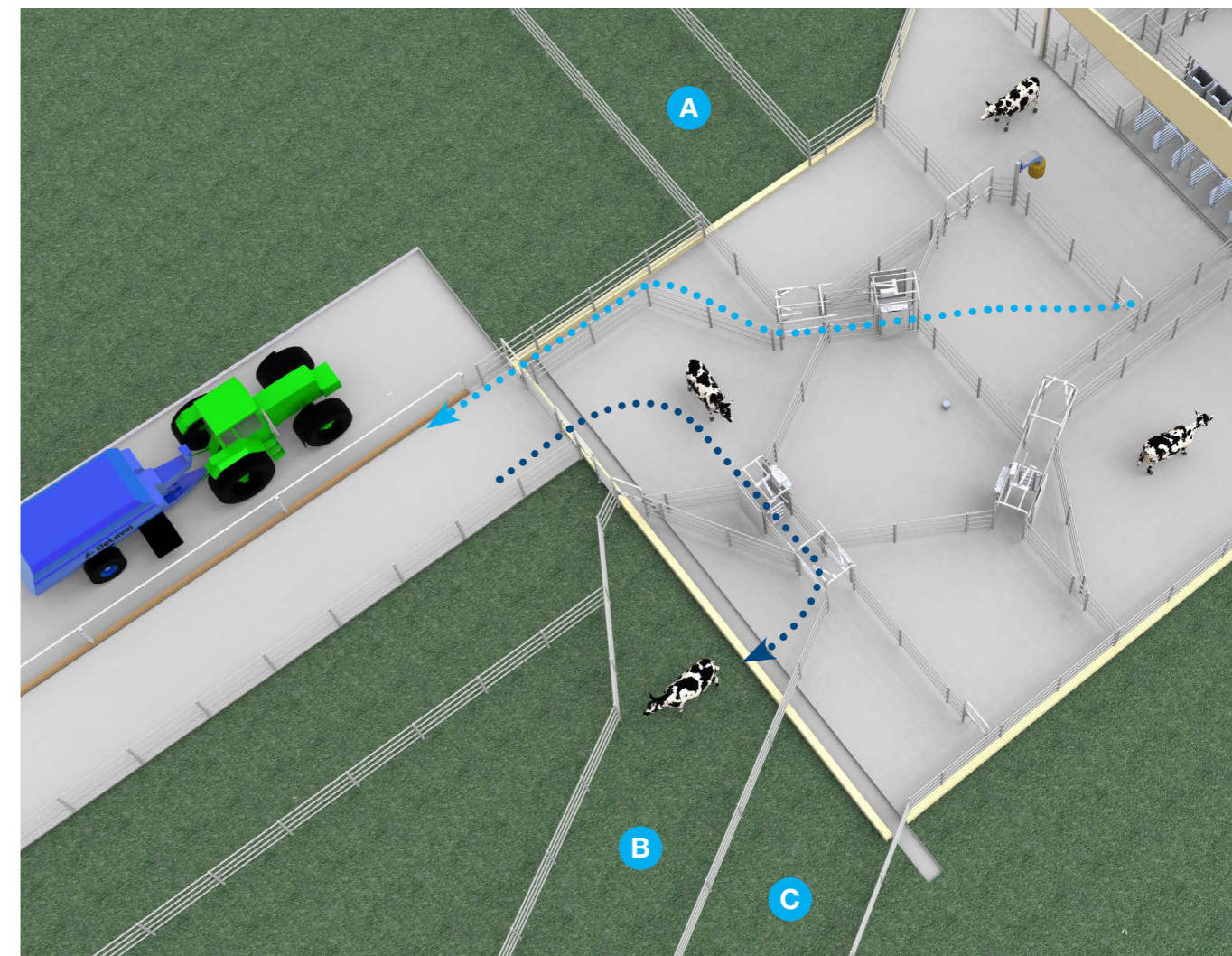
#### Voluntary milking:

The ability for cows to present themselves from feeding areas into the VMS, milk successfully and then move back to feeding/ loafing area without human intervention.

By far the biggest motivator is to provide good quality food (pasture and supplement) and a treat (grain/ concentrate) to help motivate the



"Pre Milking" Feed pad: Cows walking back from area-A can access the feed pad en route to milking. Pre milking supplementation can be practiced to 'top up' cows during short feed deficit periods. Cows can also be 'parked' on the feed pad during periods of congestion in the milking centre.



"Post Milking" Feed pad: Cows can access supplement on the feed pad post milking, before walking to a pasture allocation in area-B or area-C. Post milking supplementation can be practiced during prolonged dry periods, and where cows have access to loafing in area-B or area-C in close proximity to the milking facilities.

- It is critical to get the right cow flow to ensure cows are milked regularly every day.

**Definitions:**

**Voluntary cow traffic:**

The ability for cows to move freely to and from feeding areas to yard facilities in preparation for milking without human intervention.

**Voluntary milking:**

The ability for cows to present themselves from feeding areas into the VMS, milk successfully and then move back to feeding/ loafing area without human intervention.

By far the biggest motivator is to provide good quality food (pasture and supplement) and a treat (grain/ concentrate) to help motivate the cows through the voluntary traffic management system.

- To feed cows well in a voluntary milking system we need to understand the cow's metabolic state from an eating perspective E.g. a ruminating cow will not be motivated to move and if she is disrupted (i.e. pushed out of a paddock); a dominant cow can disrupt and cause traffic jams, especially within the milking facilities.

**Feed pad**

- A feed pad is usually a concrete surface allowing for supplementary feeding of cows, with water and sometimes shade in close proximity to the milking centre
- Feed pads can also serve as a loafing pad or a retirement area for stock to ruminate
- A decision to put in a feed pad is related to the farm system you want to use, not a prerequisite for using a VMS
- Feed pads make sense for heavy supplement users –minimising wastage of feed and damage to pastures at certain times of the year
- There are benefits to placing the feed pad next to the milking centre:
  - Good for cow traffic by providing a feed incentive close to the milking centre

- Effluent from feed pad and milking station can be managed together
- Other things to consider when putting in a feed pad
  - Seasonal split/year round calving – could help with supplementing cows during busy seasonal periods
  - Size of the herd – the bigger it is and/or the higher the stocking rate, the more likely you'll need a feed pad
  - Climate – can relieve pugging in wet periods, provide shade in hot periods
  - Comply with effluent environmental and regional regulations
  - Future proofing feedpad infrastructure –think about the layout and build so that a roof and

- cubicles can be added if desired
- Topography – if possible, avoid hills between paddocks and dairy or feed pad
- Location of feedpad is important**
  - Place feedpads close to laneways, OWG's, SSG's or gates to divert cows to the feedpad
  - A post-milking feedpad enhances movement out of the dairy back to pastures quicker
  - Research has shown that cows spend less time on concrete by 'milking first'
  - A pre-milking feedpad or 'Feed First' is useful to encourage supplementary feeding during shorter times over the year – normally this option is used in systems where cows can loaf in

- paddock close to the feedpad
- The feedpad can act as the third feed allocation if necessary, especially during:
  - difficult grazing periods
  - flooding
  - drought
  - feed quality
  - feed availability

Consult a DeLaval specialist for feedpad sizes and recommendations based on your farm system.

### Advantages of pre-milking feeding

#### 'Feed First'

- Attracts cows back to the dairy quicker – less fetching
- Good facility to 'park' cows if there are other cows that need more urgent milking
- Good if emphasis is on feeding a lot of supplement over longer periods

### Advantages of post-milking

#### 'Milk First'

- Enhances cow movement through the dairy and back to the paddocks
- Less time between milkings
- Supplementary feeding after milking is the option in most pasture systems
- At certain times of the year pasture quality may be less than feed on feed pad, meaning less motivation to commute to paddocks.
- At this time of the year farmers can put supplement along paddock fence lines to keep cows moving voluntarily
- Cleaning options for feed pads
  - Flood wash
  - Manual flushing
  - Scrapers (tractor mounted or mechanical)
  - Sloped floors and good drainage



With voluntary traffic and farm system type, feed pads only need to be big enough to accommodate 30-50% of the herd at any one time.

## Feeding concentrates

- The VMS can provide concentrate to cows in the robotic milking unit. Concentrate is supplied through trickle feed, individually adjustable to the cow's eating rate. This prevents wastage and stops other cows eating a previous cow's ration
- A farmer can install an OPF at the exit area of the milking centre, providing an extra reward for cows moving through the milking facility
- OPFs allow high producing cows to be offered extra concentrate
- Generally cows eat at 400 grams/minute. This means that the VMS has opportunity to offer a cow 1.5-2kg of feed per milking
- OPFs can deliver up to 4 different feed stuffs per feed station
- OPFs at the exit area are also good for udder health – they encourage cows to stand in a clean environment for 10-20 minutes after milking before commuting back to pastures
- To avoid congestion, ensure you allocate enough OPFs to avoid competition. If the area is too congested, some cows will bypass the opportunity to take concentrate
- The OPF can be set up back to back or parallel
- Elevating the OPFs slightly avoids bullying – submissive cows are less likely to be pushed out by dominant cows.

The VMS becomes an expensive OPF if cows are expected to consume more concentrate than the cows' milk out time. This can reduce milking opportunities in the VMS.

- Cows' concentrate intakes are measured by the DelPro™ herd management system. If a cow's consumption drops dramatically it can indicate the cow is suffering from a displaced abomasum or another health issue. Good proactive management can highlight issues early through 'managing by exception'



Farm system, cow numbers, VMS's and feeding rates determine how many OPF's are required per VMS installation.

#### See DeLaval operating instructions for:

- Set-up on DelPro™
- Calibrating and monitoring
- Preventative maintenance



Managing and providing the correct amount of concentrate at each milking over a 'rolling 24hrs'; based on cow performance and maintenance requirements helps reduce rumen acid loading in VMS cows.



Use of 'tipping' water troughs is advised for yard areas. Tipping troughs are easy to keep clean. Cows will readily drink clean water and this can have a positive effect on milk yield.

## Water

- Avoid use of water as an incentive in voluntary cow movement. Water is a basic necessity and can be deemed an animal welfare issue if cows are restricted access to water
  - Water is an integral part of milk production and should never be restricted
  - Some of the incentive is lost if there is any surface water on paddocks from rain or irrigation
  - The incentive is not as great in cool weather
- Ideally make water available in all locations
  - For greenfield sites, opt for water troughs in laneways rather than paddocks because of the need to direct voluntary cow movement from paddock to VMS back to paddock



Large water troughs with strong water flow should be placed strategically in grazing areas.

## Traffic

### Grazing layouts

**Setting up races and paddocks**  
Often only minor modifications are needed. Limitations could be:

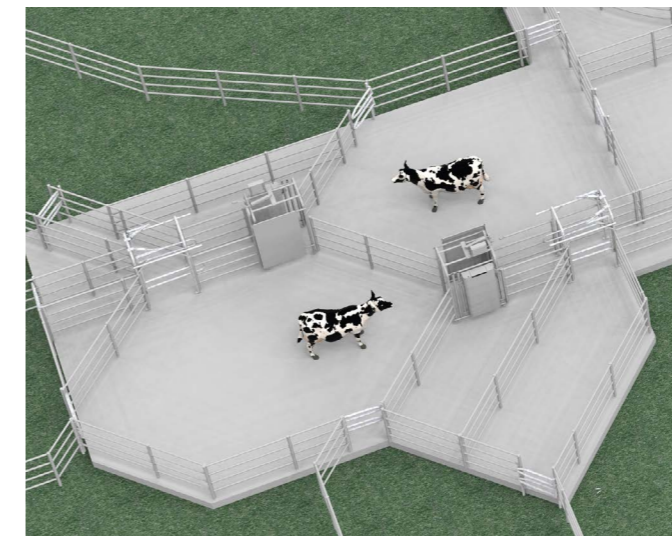
- Farm shape
- Tanker access
- Power/ communication access
- Drains
- Topography
- Hospital area
- Existing infrastructure
  - Old milking shed
  - Feed pads
  - Feed storage e.g. silage pits
  - Homestead

### Yard layouts and design

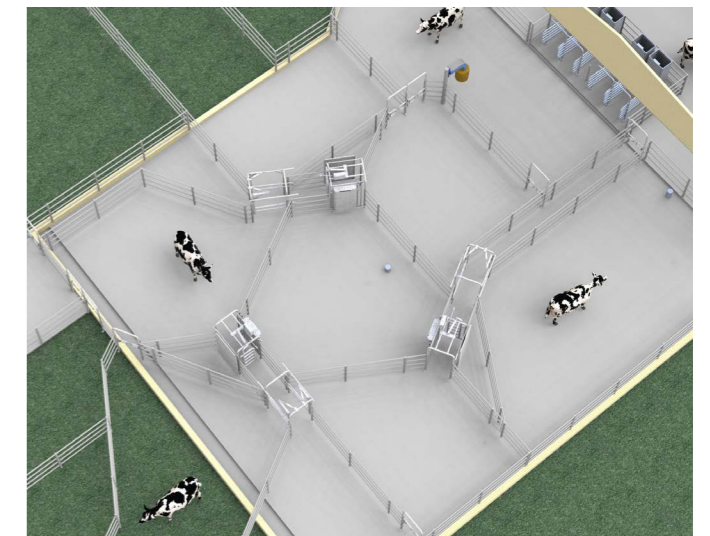
The key is to manage the farm system and DelPro to ensure cows are presented in the VMS consistently and optimally, ensuring there is enough incentive for milking without human intervention

- When designing a cow traffic management system, always aim for a circular flow of cows.
- Designing a cow traffic management system is not easy Time needs to be taken to understand things such as:
  - Farm system
  - Shape
  - Current infrastructure

- Farmer's goals and aspirations
- At its most basic level, the VMS farm shape consists of 3-way grazing, milking and a treatment facility



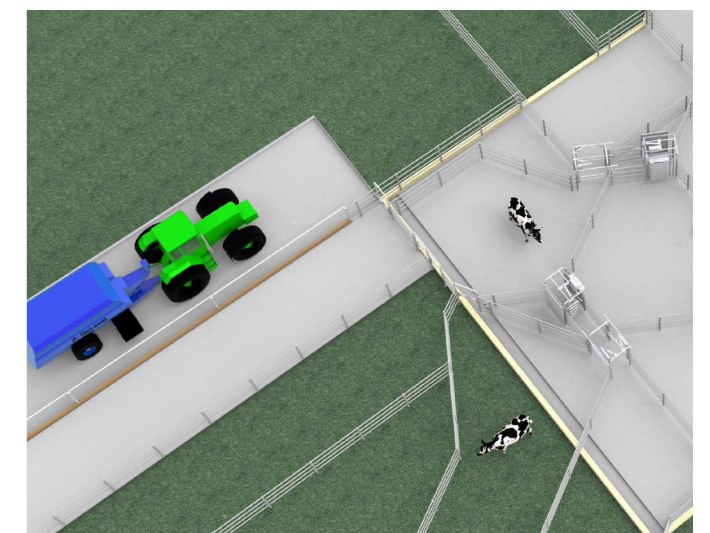
x2 SSG interchange system to accommodate simple 3-way grazing.



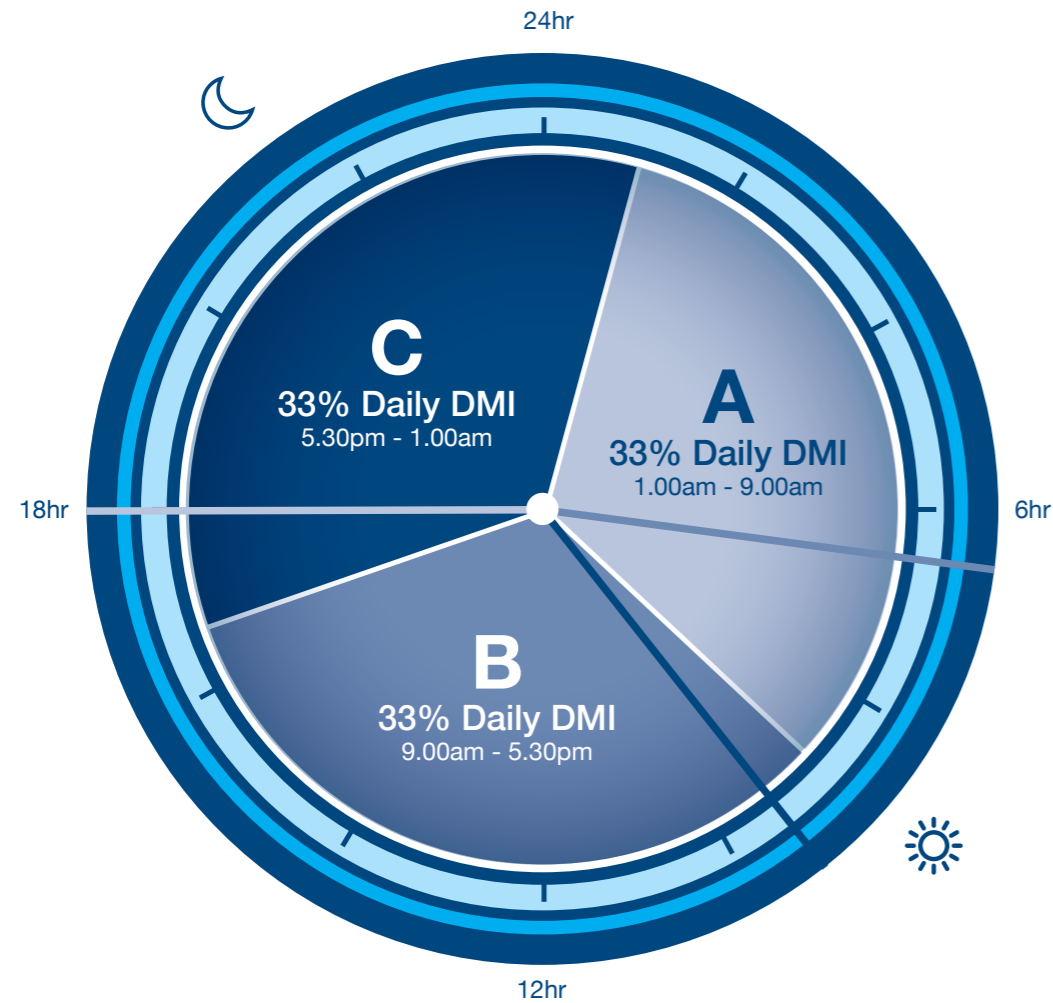
x3 SSG interchange system to accommodate a feed pad and 3-way grazing.



x1 additional SSG to accommodate 'special needs' opportunities in VMS's - A dedicated VMS can be used for treatment animals, colostrum. VMS's equipped with OCCs can do true cell count if required.

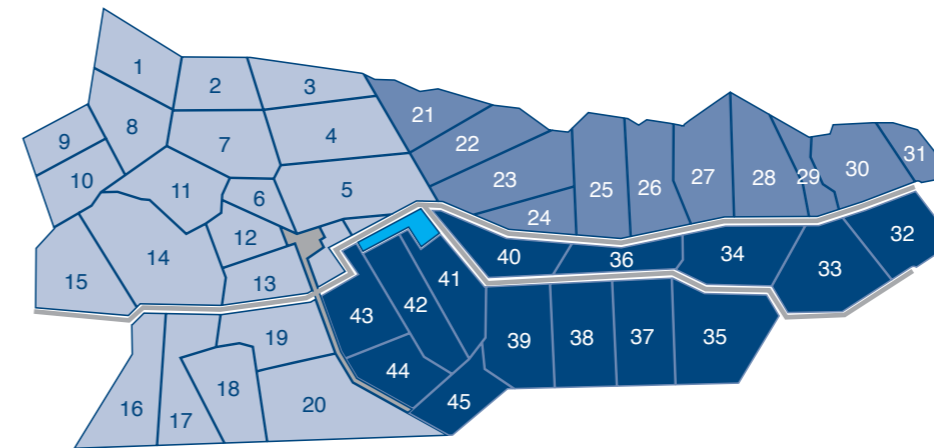


SSG layouts can be designed to accommodate 'Pre' and 'Post' milking feedpads.



Area	Open	Close	Fetch	DMI* (% DMI) Allocation	Feed Type
A	01:00	09:00	18:00	30%	Pasture
B	09:00	17:30	06:30	30%	Pasture
C	17:30	01:00	09:30	30%	Pasture
Feed Pad					
VMS/ OPF Concentrate	24hr	24hr		10%	18% Protein 12.5 MJ ME/Kg Energy

Use of different visual tools on the dairy office wall are useful for the team to get a 'snapshot' of the daily traffic settings, gate changes and grazing plan. \*DMI - Dry Matter Intake.



### Races

Factors that encourage good cow movement:

- Well maintained
- Good surfaces
- Good camber for drainage
- Gentle turns

### Paddocks

Factors that encourage good cow movement:

- Place gates strategically
- Ensure easy entry and exit
- Avoid high traffic points that are prone to mud –cows don't like mud/ takes robot longer to clean the teats

### Training

Cows need training to learn how to travel in a VMS

- Consider calving heifers two weeks earlier than the main herd to allow more time to give them attention while they get used to the system
- Teach heifers to walk through OWG's
- Repeat with SSG's; turn off for a few days then turn on again
- Mix heifers with milking herd so they learn to move between paddocks and VMS to paddocks

### Post calving

- Follow a graduation programme for new milking animals. Before 'graduation' ensure:
- Heifers have had sufficient precalving training with OWG's, SSG's
- Newly calved heifers/cows can navigate around VMS, SSG's

## Voluntary movement

- The 3-way grazing system is built on voluntary cow movement. Voluntary cow movement will only occur if all factors support good cow traffic flow
- The farm is divided into three similar-sized farmlets. The cows have the ability to access each farmlet for grazing for approximately 8 hours over a 24 hour period
- Cows can spend up to 15-24 hours in one of the farmlets
- Applying these parameters will give cows the ability to enter milking centres at least once every 8-24 hours as they try to access fresh pasture
- The DelPro™ herd management system and VMS SSG traffic system determines if cow is ready to be milked. We call this individual milking permission
- If a cow leaves her paddock and walks to the milking centre and has milking permission, the SSG will let her through to the milking robot. If she doesn't have milking

permission, the grazing will either send her back to the paddock she left or a new paddock if she is allowed to enter it

- Good SSG yard layout and design ensures cows can only enter areas allocated to them
- Layout of the farm and yards must encourage and give cows confidence to move voluntarily

### Factors to consider:

- The greater the distance between paddocks and milking centre, the longer the interval between milkings
- If cows are expected to walk more than 800m, extra encouragement will be needed. Options to manage such a situation include:
  - Offer cows difficult paddocks during the day when staff are there to encourage movement
  - Alternate long walks with short walks to balance out commuting time over a 24 hour period
  - Grow high quality forage crops on most distant paddocks

- Avoid distant paddocks altogether if hills or slopes are involved
- VMS is not about forcing cows to milk, it is about using incentives and reward to encourage regular milking. After many years of batch milking, many farmers find it hard to break the habit
- Stay 'hands-off' with the cows as much as possible
- Walking distances
  - Cows will travel well from paddocks located up to 800m from the milking station
  - Beyond 800-1000m the milking frequency could start to be affected
  - Careful management and extra care to maintain feed quality is needed for paddocks furthest from the milking centre to maintain cows' enthusiasm to walk the 'extra distance'
  - Consider illuminating the milking centre to encourage milking traffic

- Other disincentives: For distances of more than 1000m, cow traffic could be affected by the following factors:
  - Hills
  - Heat
  - Poor races/laneways; mud, stones, contour
  - Line of sight – cows move faster if they can see other cows at the destination paddock (especially the poorly motivated cows – late lactation)

### Barriers

If cows need to be encouraged to move through an area, voluntary cow movement could suffer. Remember: on most occasions there could be a small number of cows that may need to be encouraged out of a paddock at the end of a grazing session.

- Public roads or rail lines won't work for voluntary cow traffic unless under or over passes are built; special attention is needed with underpasses to avoid spooking the cows
- River crossings require bridges

### Laneways

2 or 3 laneways on a farm provide ideal flexibility to offer cows 3 pasture allocations a day.

Strategic placement of laneways and access paddocks can create extra flexibility – discuss with your DeLaval Farms System Specialist.

# People

Operating a VMS requires a huge mind shift change from conventional farming practices.



24hour milking requires 'on call' support. Schedule and plan your roster to suit your team, system washes and cleaning routines.

Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1st Shift: 9hrs							
2nd Shift: 7hrs							
3rd Shift							
4th Shift							
Standby/On Call: 8hrs (24hrs active)							
Manager/Supervisor							
Time Off							

The VMS offers flexible work routines. As an example, use the above template to your advantage to display and communicate responsibilities effectively within your team.

## There are many differences between Conventional Milking System (CMS) and VMS. A fundamental change of approach to run the dairy farm needs to be applied

- With CMS, cows tend to conform to the routines and infrastructure laid out by the farmer
- With VMS, human intervention is reduced and often discouraged.

The focus is on ensuring sufficient incentives to encourage cows to enter milking facilities. Engineering and design of the system is done with the cow in mind

- Milking is 24/7 instead of batch. Try to achieve similar cow flow day and night to try to achieve highest performance and the optimal milking intervals.

## Differences for the farmer and his staff include;

- Different farm layout
  - 3-way grazing
  - Cows continually moving in different directions
  - Curved infrastructure to aid cow flow.

## New style of farming

- Less time on milking, more time on high value tasks e.g. pasture management, cows, breeding
- More hands off with cow movement, not pushing them into batch milking routines
- More proactive with preventative maintenance; reactive management can throw out cows' routines (always think, 'what if?')
- New skills/more training
  - More complex equipment to clean and monitor
  - New SOP's to learn
  - Interpreting computer data from the VMS
  - High stockmanship skills/ understanding cows/watching for abnormalities with cow behaviour or milking equipment
- Changed work environment
  - Different operating routines for management and staff
  - Different farm operation – new shifts/new roles
  - Flexibility to adapt for weather, season, lactation stage
  - Some on call work but expect call outs to be few with well run and maintained system
  - 'Managing by exception' Cows that are 'outside the norm' can be highlighted in custom reports and managed accordingly.

## A new look working day

Routine with VMS is much more flexible than on a conventional farm. Seasonal requirements will alter what needs to be done but routine 'day to day' tasks will include:



When collecting 'lazy' cows, take time to assess post grazing residuals, observe cows and set up new grazing breaks.

- Visual monitoring
  - Assess overnight and current cow milking data
  - Assess milking station performance – observe animal behaviour and equipment – several times a day
  - Manage and action exception lists/reports by drafting and attending to exception animals.

## Fetching cows

- Fetch cows who have not moved voluntarily to milking centre – this could be a 'paddock sweep' from each of the 3 grazing areas daily.

## Cleaning

- Clean robot laser/camera proactively – make it a habit when passing the VMS to look and assess if cameras need manual cleaning
- System wash 3 times per day according to DeLaval recommendations
- Clean external surfaces – twice a day, one comprehensive, one light
- Initiate bulk tank wash/check refrigeration/agitation is working
- Yard wash – at least once a day, preferably during low traffic periods
  - Change the milk filter 3 times per day.

## Computer data

- Monitor, filter and act on computer and service reports/timers
- Review and act on overnight events
- Use initiative and farming skills to continually improve cow and system performance from the DelPro™ data.

## Animals needing attention

- Draft cows, physically/visual check and act on all animals requiring health checks, AI, etc.
- Deal with colostrum/treatment cows accordingly
- Preparation of calved cows to re-enter milking herd i.e. udder hair singeing, tail trimming
- Supervise, 'fine tune' first milkings of cows, re-entering of herd data
- Act promptly on drafted cows so they can return to paddocks to feed and rest.

## Feeding

- Set up fences daily for fresh pasture allocations
- Place supplementary feed on feed pad if applicable
- Check performance of concentrate feeders in robots and OPFs.

## Calves and heifers

- More free time to do a better job of rearing calves and check and inseminate heifers.

## Seasonal activities

- More 'quality' time available to do agronomy and animal health tasks
- Pasture improvement, forage harvesting, mating (AI), health vaccinations, fertiliser spreading, drying cows off, springer movement

A key difference between conventional farms and VMS farms is the trade off between flexibility and being on call. If anything goes wrong with the system it will generate a

notification to the person on call via mobile phone. Most are minor and can be deferred till later, but sometimes it means dealing with the issue during the night.

## Monitoring

- Observation, monitoring and acting swiftly/proactively to issues/anomalies is key to VMS success. Excellent stockmanship skills and understanding the animal behaviour is more important than ever
- Upon arriving at the dairy in the morning observe the situation
  - Firstly, check incomplete milkings and high MDi cases to determine if any manual intervention is required
  - Would you expect this number of cows in the milking yard?
  - Does everything sound and look right?
  - Do some cows need fetching?
- When monitoring later in day
  - Are there any anomalies affecting cow traffic or milking frequency?
  - Again, check number of incomplete milkings and MDi
  - Is there any congestion at OPFs?
  - Are cows trafficking from pastures earlier or later than usual?
  - Is there overcrowding at SSG's or interchanges?
  - Are cows loafing in strange places?



Scheduling daily cleaning and preventative maintenance routines during low traffic periods, is one way to ensure alarms and call outs are minimized.

## Proactive cleaning/ maintenance

- Have robust SOP's in place for all maintenance and cleaning in the dairy. It is vital staff follow a checklist and mark off tasks as they are performed
- Cleaning external surfaces in the dairy is more important than in a conventional farm. Pay attention to:
  - Milk tubes
  - Robotic arms
  - Milking platform
  - Camera lenses and photocells on SSG's
- Dirt, dust, cow urine and manure is very corrosive and abrasive. Be sure to always keep machinery and working surfaces clean. Keeping surfaces wet and moist during operation helps reduce workload
- Thorough cleaning and the observation that occurs, can help reduce the number of minor alarms at inappropriate times
- A high pressure cleaner can make cleaning routines more effective and faster. Be mindful not to apply pressure washer directly onto sensitive equipment like the VMS
- Follow up unusual sounds: usually means something could be loose or needs attention

### In Service preventative maintenance

This is paramount for good robotic milking operation and performance.

- VMS requires excellent preventative maintenance routines to optimize performance
- Make it part of daily routine to observe, monitor, clean equipment pro-actively
- Check, adjust and repair equipment to avoid downtime

Talk with your DeLaval representative to ensure you have a preventative maintenance and Inservice plan that suits your operation.

### Be proactive to avoid downtime

- Clean lasers/camera lenses a minimum of twice a day – this is a particularly good way to avoid overnight alarms and reach higher performance
- Regular cleaning of photo sensors on SSG's will improve performance and prevent irrational

SSG performance, reducing the frustration for cows:

- Always follow up if SSG's are acting erratically e.g. taking longer to respond, congestion or noticing behaviour change in the cows
- Check feeding system daily. Listen that grain is continually 'trickling' when cows are feeding – a good way is to set an alarm to DelPro™ feeding if cows are not getting full daily feed allocations
- Feed stations should be cleaned and calibrated regularly as to DeLaval's instructions
- When changing concentrate type, always recalibrate to ensure cows are getting correct feed allocations
- An idea is to put the person on duty in the afternoon on overnight call out duty – they will be proactive by doing a thorough cleaning and maintenance job before 'clocking out' for the day

### Cow maintenance

Cows also need to be maintained so milking equipment works smoothly

- Remove any 'dry cow' residuals (teat seal)
- Trim tail
- Singe udder hair



## Downtime

- Any equipment downtime on robotic milking is disruptive and costs production
- Having procedures and protocols in place will minimise impact and ensure downtime is used productively

### Unscheduled downtime

- Try to estimate how long the downtime will be so you can make decisions about management of milking herd and tasks that can be achieved
- Brief downtime (less than an hour)
  - Easiest to deal with, can avoid changing gate settings and re-drafting cows
- Moderate downtime (1-3 hours)
- Consider allowing all cows to

come to dairy to access feed stations or feed pad

- Extended downtime
  - For cows due to milk, increase the size of pasture allocation of paddock
  - Direct cows that walk to dairy to feed pad or paddock close to dairy
  - Try to avoid locking cows in paddock as it makes it harder to move them when equipment is operating again.

### Scheduled downtime

- Before downtimes, offer cows smaller pasture allocation to encourage them to milk earlier than usual
- Conduct manual batch milking session
- Provide larger than normal pasture allocation to encourage cows to stay in paddock
- Try to schedule downtime for low traffic time in dairy i.e. early morning
- Scheduled downtime is a good opportunity for cleaning or disruptive maintenance e.g. changing rubberware on the milking robot

*We live milk*

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