

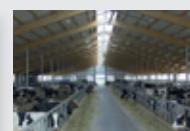


GEA DairyProQ

Guidebook for the automated rotary milking solution for large-scale dairy farms

Content

GEA DairyProQ	4
The next generation of rotary parlors	5
Working at eye level	5
Milking with DairyProQ	6
Farm design	8
Planning for tomorrow with DairyProQ	9
General planning information	10
Planning parameters	11
Work management	12
Supply of resources	13
Animal traffic and selection	14
Holding area – comfortable and relaxing	15
Passageways – safely on the right path	16
Selection areas – comfortable for both people and animals	17
Selection areas – general	17
Selection areas – for animals	17
Selection areas – for people	17
Animal and barn hygiene	18
Walkways – clean with a non-slip surface	19
Freestalls (Cubicles) – fresh and dry bedding	20
Hoof care – healthy hooves mean better milk	21
Herd management software	22
DairyNet in DairyProQ	23
Visualization of the milking process	25
Conditions for optimum milking	26
Udders and udder health	27
Checking the milkability of the herd	27
Limits for successful attachment	28
Determining udder abnormalities	28
Manual attachment and udder cleanness	29
SCC check and microbiological investigations	30



The milk speaks volumes	31
Herd management	32
Proactive herd management	32
Optimized reproduction management	33
Proactive health management	33
Feeding	34
Feeding – appropriate and clean	34
Fresh food and frequent pushing	35
Drinking – unrestricted and clean	35
Lighting conditions and barn climate	36
Light – effective for an enhanced yield	36
Air – fresh and at the right temperature	36
Operator training	37
Dividing cows into milking groups	38
Defining the milking schedule	38
Group management and milking schedule	39
Planning the start-up process	40
The dairy herd	41
Time and personnel requirements	42
The first milking	43
After milking is before milking	44
Checking the milking process	45
Optimizing the system and milk checks	45
Service concept	46-47
Service on your doorstep	48
Scheduled maintenance with no downtime	49
Daily tasks for milking staff	49
Your personal success story	50-51
Attachment	52-57



GEA DairyProQ



DairyProQ - The revolution goes into series production! This guidebook is designed to guide you, the future user of a fully automated rotary parlor from GEA, through all stages of implementing your new milking center. It takes you from determining the farm design and layout, through the build phase to start-up of your new milking system, and well into the future.

The next generation of rotary parlors

The DairyProQ fully automated milking system has been specifically designed to make your working processes as simple as possible. Having fixed milking times keeps the number of staff you need on hand to a minimum. And while you and

your cows enjoy the convenience of automated milking, our tried and tested technologies ensure you always end up with the highest quality products.



Working at eye level

DairyProQ puts you directly at eye level with your cows. The functional components of each milking unit are carefully arranged to ensure that you have free access to the udder at

all times, so you can easily intervene in the milking process whenever you need to.

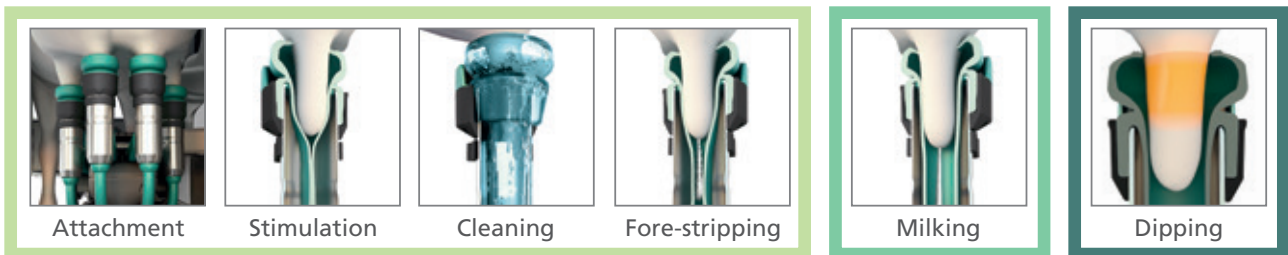


Milking with DairyProQ

A safe, fast, gentle and complete milking process with integrated dipping

DairyProQ makes milking an enjoyable experience for the cows. As soon as they enter the milking system, the single-stage, stress-free milking process begins: attachment and

stimulation with simultaneous cleaning, drying and fore-stripping, milking, dipping each teat and removing the teat cups – all happens in one free-flowing procedure, in-liner.



Once attached, the cluster can move freely without causing any uncomfortable leverage forces under the cow. It can follow every movement the cow makes. No constant pneumatic readjustment is necessary, and the milking process is carried out almost silently.

The stainless steel teat cups place the perfect weight under each udder quarter to ensure each is fully milked out. And as we milk with a stable vacuum, the process is as fast and animal-friendly as possible.



Disinfection for healthy udders

The DairyProQ automatically prevents the transmission of bacteria from teat to teat. After the teats are dipped inside the liner, each teat cup is cleaned internally and externally

after every cow milking to prevent the spread of mastitis. Peracetic acid is used for intermediate disinfection between each milking.



Farm design



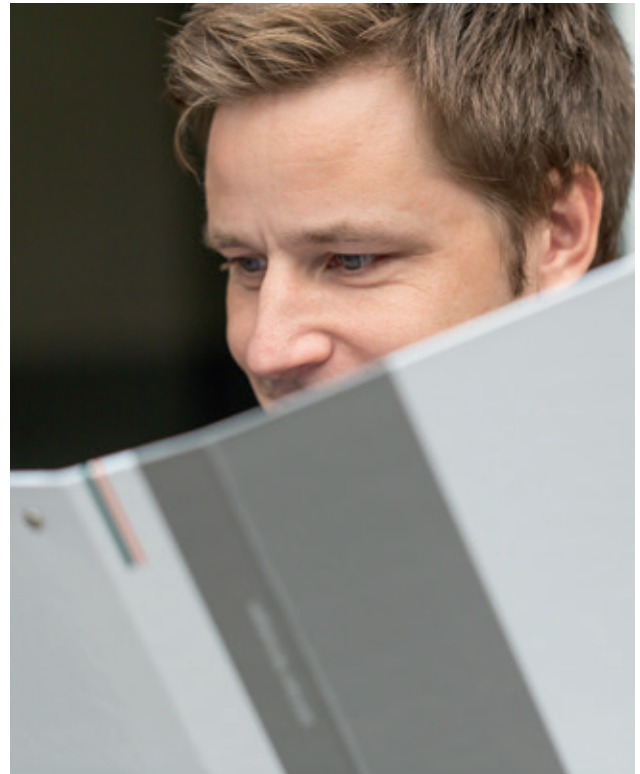
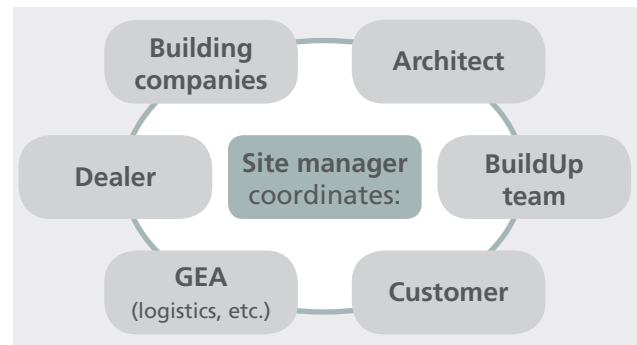
To ensure the success of your DairyProQ, you need optimized operational planning right from the start. We will support you through every stage, so you can relax and look forward to seeing your future development take shape.

Planning for tomorrow with DairyProQ

Changing business conditions, such as the lack of skilled employees to manage the milking process and the rising cost of labor, have led to increased interest in automated milking systems. And our high quality materials and innovative components ensure that your new equipment will provide maximum performance for years to come. DairyProQ is designed to grow with your business.

Before you even lay the foundations for your new milking center, our comprehensive planning process determines the perfect solution for your individual operation. Even at this early, very important, stage, GEA's experts will be at your and your architect's or planning team's sides to provide valuable suggestions and tips from their own experiences with other DairyProQ projects. A site manager will be assigned to guide you through the entire build, coordinating any essential preparatory work with building companies and all of the GEA departments involved in the project. The GEA Build-Up Team of leading installation technicians support the GEA dealers on site during the construction and start-up of

the system. And we are also available to provide additional herd management support, and to help you prepare for and manage the change to your new automated milking.



General planning information

The new operations management concept will have a major influence on the design of new builds, extensions, conversions and expansions. This means that the planning stage will not only focus on the milking equipment itself. Other important steps will include:

- In depth discussion and analysis of factors such as animal and operational logistics, feeding, herd management and labor economics
- Bringing all partners together at the right time during the planning phase
- Developing a final concept that takes into account both the size and design of the individual working and functional areas, as well as the requirements of all of the technical systems and products included

We will work with you to design a comprehensive concept that covers everything from the DairyProQ milking system itself to optimized animal logistics, suitable animal groups, feeding logistics and manure management.

We will use GEA systems and products to demonstrate how the requirements we have for each area and room will impose additional considerations on other firms involved in the building project. Please note however, this does not mean that GEA is responsible for ensuring that these firms plan their parts of the project in detail and implement them accordingly, as this is clearly outside of our area of expertise.

The customer must employ an architect or planning company to work as their agent and take responsibility for the implementation of the build.

All of GEA's detailed plans must be integrated into the overall construction plan by the architect / planning company working on behalf of the customer.

GEA is not responsible for construction work. The architect / planning company must therefore also ensure that technical building utility plans (e.g. gas, water and waste water) and all construction related calculations and documentation (structure, fire protection) are followed and completed.

During the construction phase, GEA specialists and your GEA dealer will be on hand to answer any questions and support you with helpful advice from practical experience to ensure the success of your project.



Planning parameters

The basic functionality, barn plans and technical dimensions of the automated rotary are very similar to those of a con-

ventional system. However, there are a few differences that need to be taken into account when planning the building:

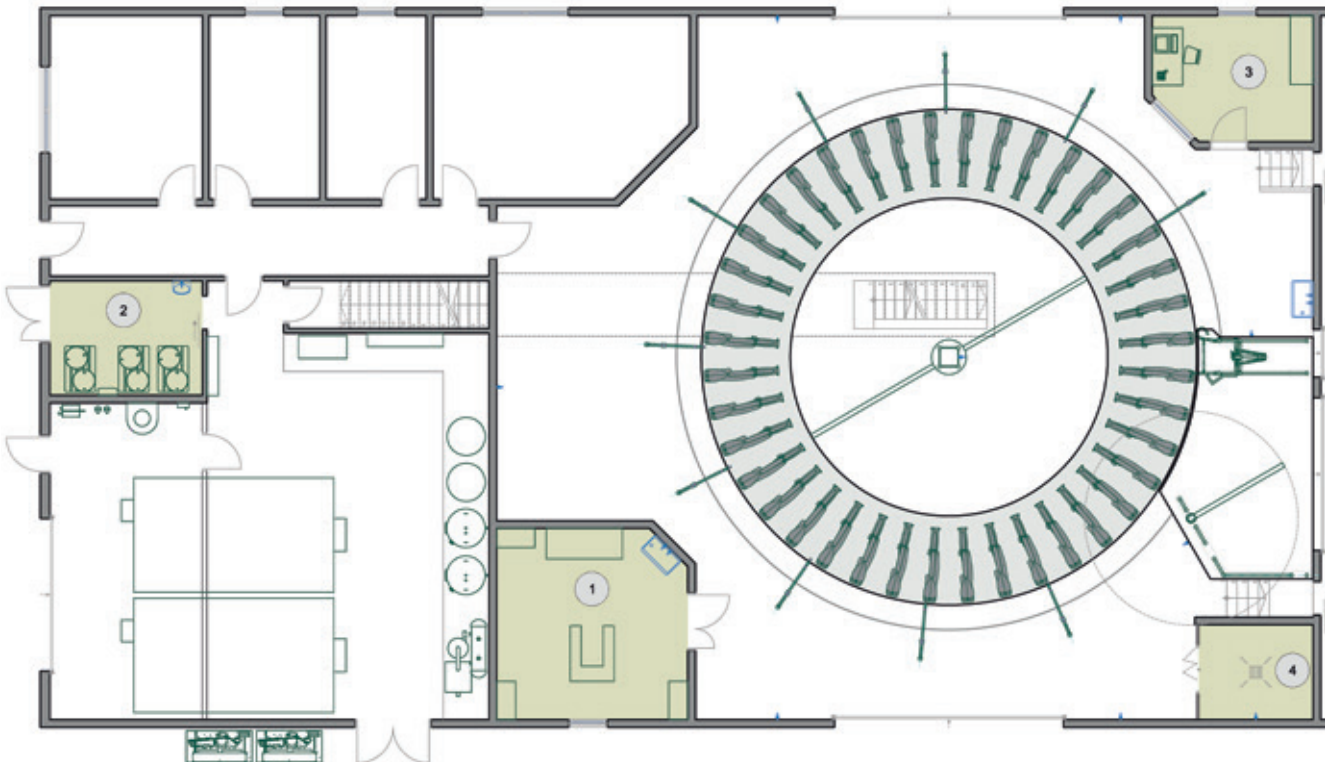


- Two milk pipelines concept (sellable milk / tank milk <-> dump line)
- 1 man operation (operator)
- More technology (system controls / automation)
- Service concept
- Milk collection / cooling / storage
- Technical specifications of the GEA systems and products

Additional rooms and functional areas in the milking building:

- Service room (1)
- Supply/storage room (2)
- Control station for the operator (3)
- Wash box/area for the milking stall modules (4)
- Herd manager office (if not using the control station for this)

- 1 - Milking stall module service room
- 2 - Supply room
- 3 - Control station (control room)
- 4 - Milking stall module washing area (option)

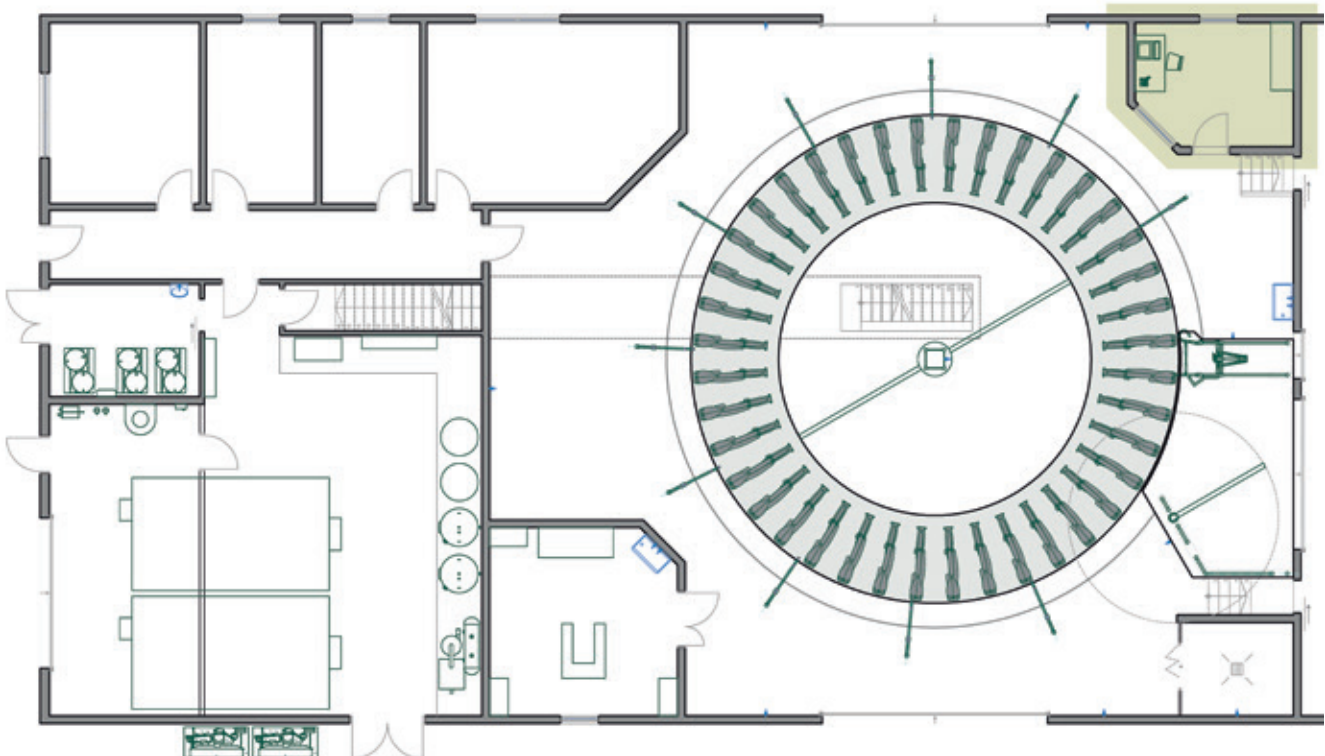
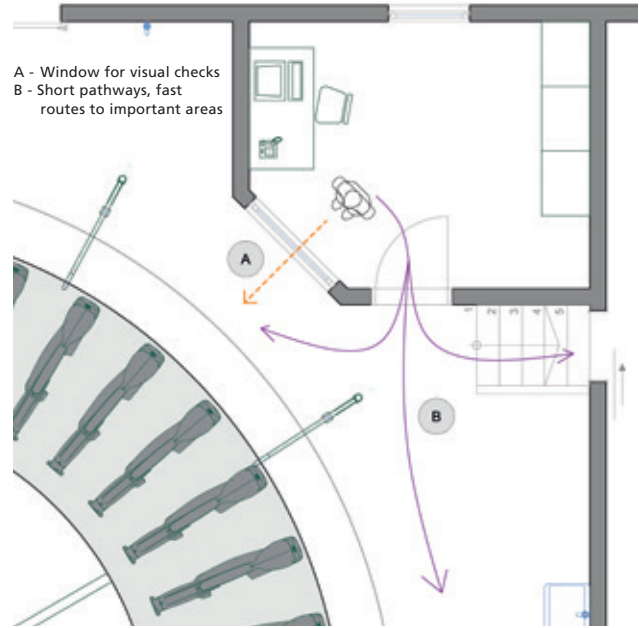


Work management

A single person (operator) manages and monitors the automated milking process.

GEA recommends positioning an office for this person to use as a control station close to the attachment area (entrance) of the rotary. The control station should be on the same level as

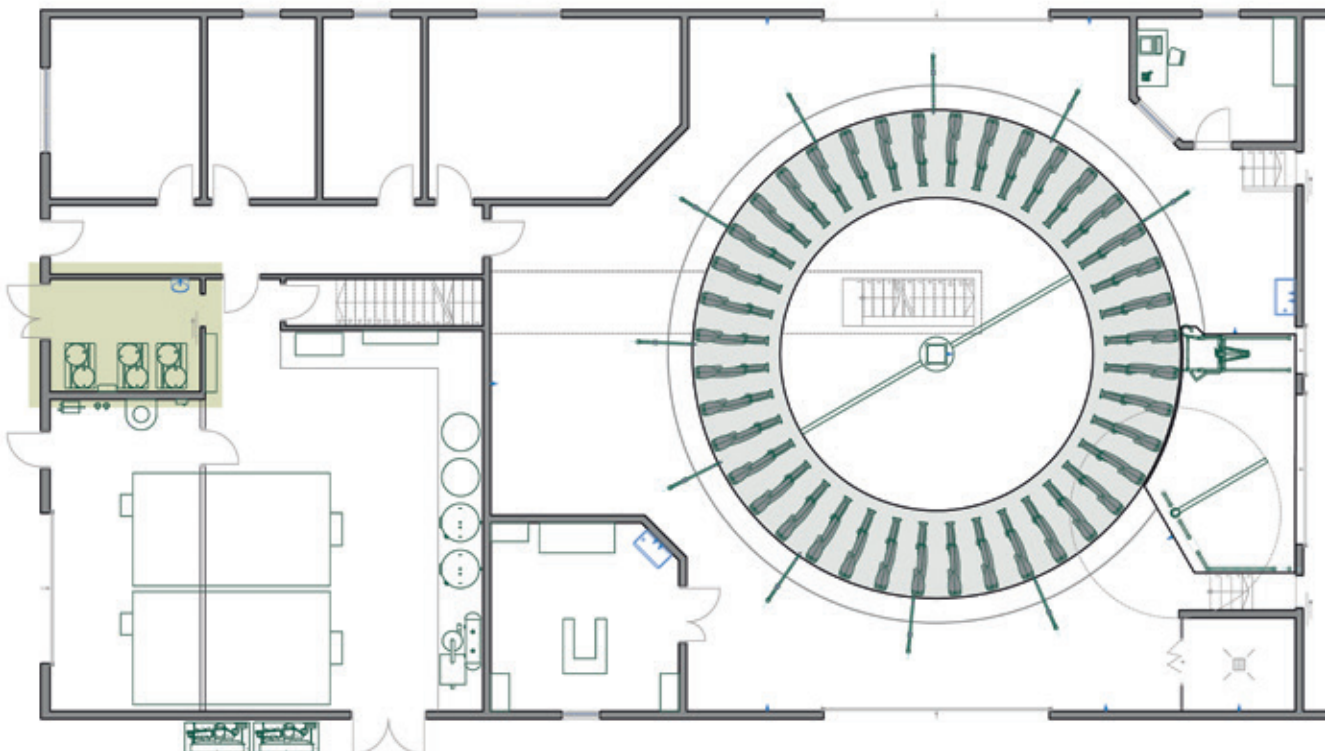
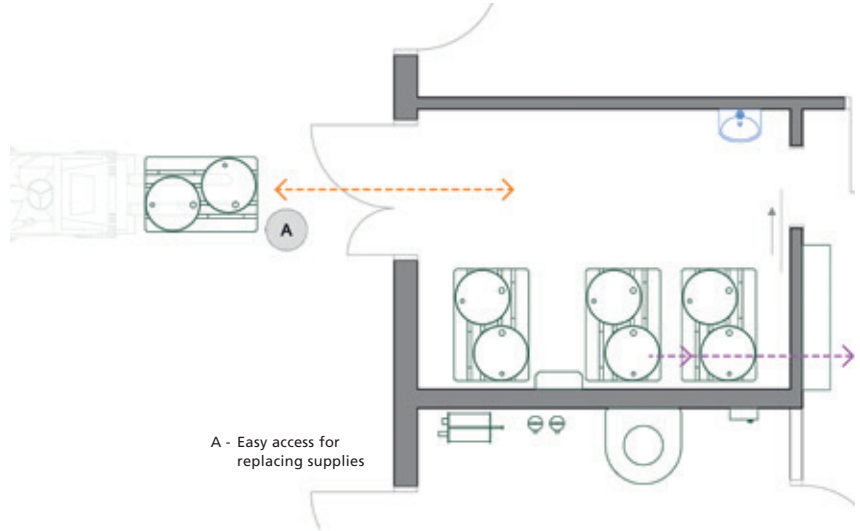
the milking area and windows should be positioned in such a way as to give the operator a clear view of the rotary platform. They should also have simple, direct access to other working areas (holding area, selection areas etc.) to save time during operation.



Supply of resources

As the system will be working at such high capacity, you must ensure that there is easy access to a constant supply of resources such as dipping or disinfection agents. A separate supply room should therefore be positioned close to the milk tank room. The supply lines run parallel to the pressurized

milk pipe. They must therefore also be taken into account when designing the rooms. The room should ideally be positioned on an external wall as a large door can then be installed to make it easier to move the barrels/totes in and out.



Animal traffic and selection



Relaxed animal traffic systems, and comfortable selection walkways and areas, create a calm, quiet working atmosphere in the barn. Ensure the processes are stress-free – for both you and your cows.

Holding area – comfortable and relaxing

A sloped holding area creates a calm, stable entrance to the DairyProQ. And a screening wall between the holding area and the return alley will make the animals' journeys back to

their part of the barn much smoother. Wire ropes encourage the animals to stay where they are and prevent back-ups-forming on the return path.



Having a crowd gate in the holding area is essential to ensuring the process runs smoothly. In order to prevent an excessive amount of soil being brought into the milking

area on the cows' hooves, the holding area should be kept clean. Accordingly, a cleaning device assures proper hygiene.



Passageways – safely on the right path

- Animals should not be distracted by sensory stimuli.
- Steps should be avoided. If they must be used, ensure they are as flat as possible.
- Consistent lighting between the holding and milking area is more comfortable for the cows (avoid moving from light to dark areas).
- Screens on the barriers help when animals come close to one another.
- Paths should never be flat (not even partially). A slight gradient or slatted floor ensures that liquids can be washed away quickly.
- Intersections should be avoided. If this is not possible, you must incorporate manual herding systems with wide passages into your plans to ensure that the amount of working time required is as low as possible.



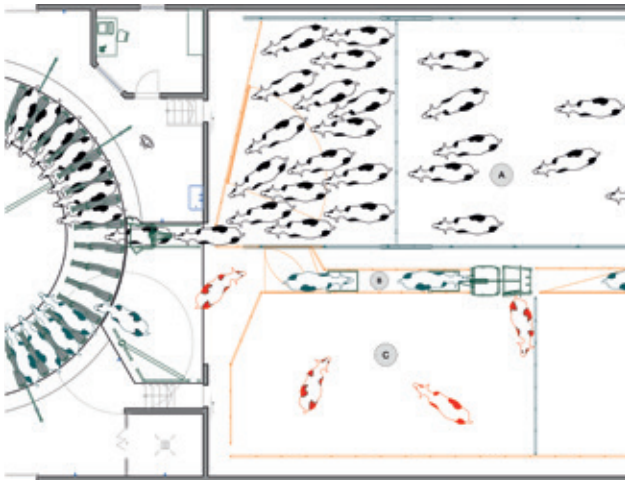
Selection areas – comfortable for both people and animals

The optimum design for your post milking and selection areas depends heavily on your planned working processes. In this area, your staff works directly with the animals. So in addition to efficiency, key aspects such as safety also

need to be taken into account. Below is a list of important recommendations to help ensure that your staff can easily work with your animals.

Selection areas – general

- DairyProQ is designed to include a selection area where problem cows can be checked or milked again if required.
- You should also take into account the need to use the selection area for other activities.
- Selection areas should always be large enough to ensure that animals do not have to wait on the DairyProQ until space becomes available.
- Groups of cows from different milking groups should only be gathered together if they can be divided back into their groups quickly (manually or by using selection equipment).



A - Sloped holding area with crowd gate
B - Return path with automated selection gates
C - DairyProQ selection area



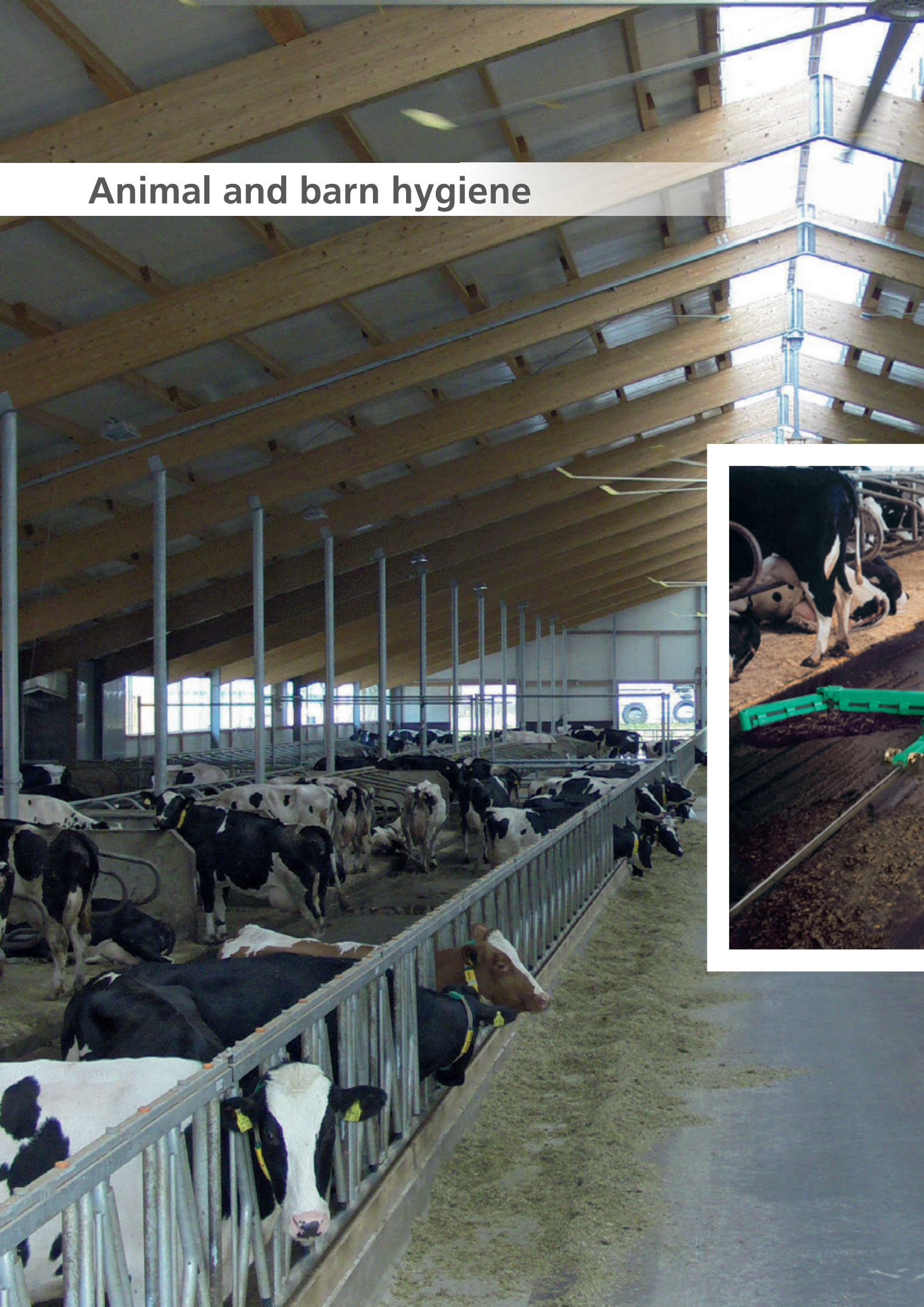
Selection areas – for animals

- The most important things to consider here are that cows should go no longer than one hour without access to food and water and no longer than three hours without being able to lie down.
- If animals have to remain in the holding area for more than an hour, every selection area must be fitted with a water trough.
- And if they then have to remain in the selection area for more than an hour, they should also have access to food. Ensure that this is provided via a mechanical system.
- Freestalls/Cubicles should be installed if animals from more than one milking group are gathered together in a single selection area (number dependant on the maximum number of animals in the selection area).

Selection areas – for people

- Selection areas should be well lit to enable staff to check the animals.
- Entrances and exits should be simple (man-way gates).
- Multiple animal-safe plug sockets (or extension cables from a central overhead point) should be included if electrical devices are to be used in this area.
- It is better to have multiple, smaller, optimized selection areas than one large area that cannot meet every individual requirement.
- Any herding and locking equipment should be able to be operated by a single person.
- Plans must include a treatment station. This can be an individual treatment station and/or a group treatment station.
- We recommend installing a locking feed fence to keep animals in the selection areas. This makes it easier for staff to carry out checks on the animals. It does not, however, negate the need for a separate treatment station.

Animal and barn hygiene

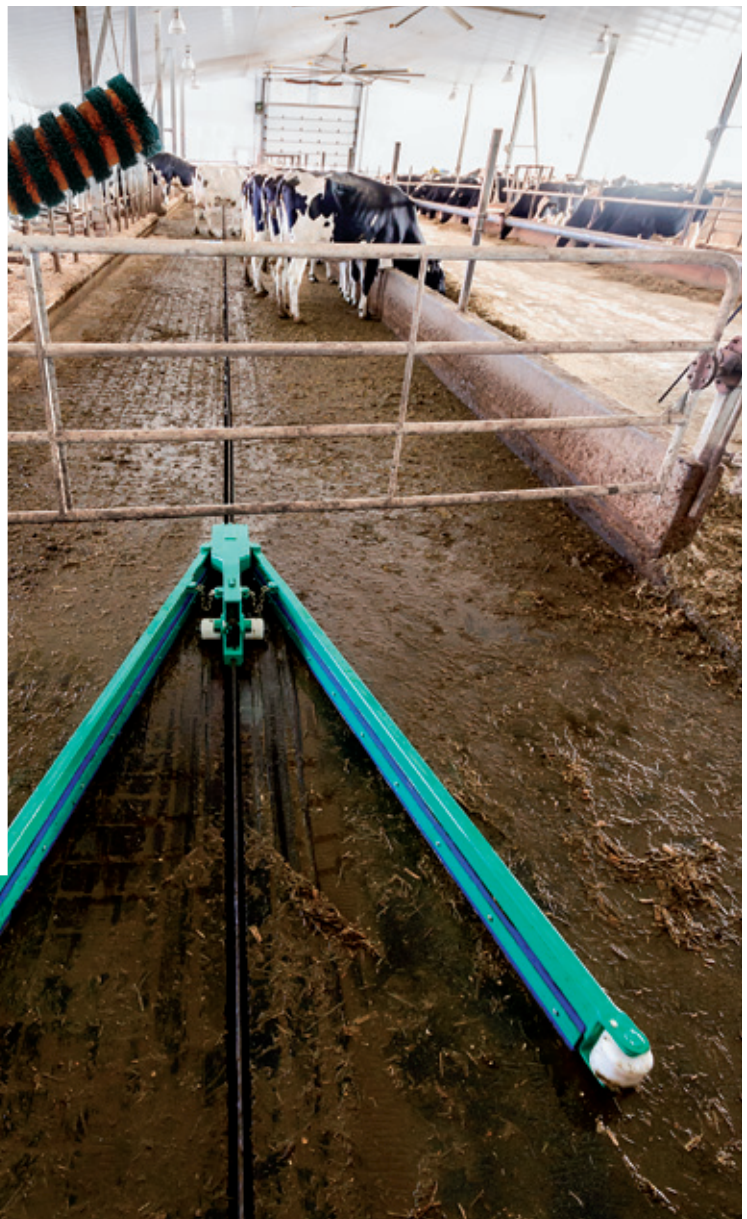


Smooth, hygienic milk production relies on your cows being clean and healthy. So it is vitally important to keep their barn as sanitary as possible.

Walkways – clean with a non-slip surface

There are two essential factors to consider when designing walkways: Cows require a walkway which both gives them a secure footing and minimizes the risk of injury. For the walking surface, you can choose between solid and slatted floors. Whichever you opt for, regular cleaning is essential. Having

non-slip floors makes moving from place to place a stress-free process for the animals. There are also several automation options to consider: depending on the floor, there are various cable and chain scrapers available, regularly passing along all of the walkways to clean them.



Freestalls (Cubicles) – fresh and dry bedding

Cows should spend the majority of their days in their freestalls (cubicles), so it is absolutely essential to maintain a high level of hygiene in these areas. Freestalls (cubicles) must be

kept clean and dry at all times. Clean them and replace the bedding regularly. Ensure all walkways are kept clear.



Watch out! Singed udders are key to cleanliness and robot function

Freestall (cubicle) bedding material often clings on udder hair. These bedding materials and accompanying soil can make it more difficult to identify the teats during the DairyProQ attachment process, which can result in impairments in the automated milking process. In addition, mastitis-causing bacteria can collect on the contaminated hairs, and possibly make their way to the teat-ends. This is why you should regularly singe udder hair - for optimal udder cleanliness and unit attachment performance.



Hoof care – healthy hooves mean better milk

Your herd's hooves require regular treatment to ensure that they stay healthy and can get through the milking process as quickly and smoothly as possible. Cows that are lame or find

movement painful eat less and so produce less milk, and can also have problems with automated attachment systems.



One simple way to clean and treat your cows' hooves is with a hoof bath. Regular hoof baths help to maintain and improve the health of your herd's hooves and can prevent Digital Dermatitis. Only cows with healthy hooves can produce their full capacity of milk. So when it comes to planning your new barn, it is vital to ensure that hoof baths are positioned in the right place.

They are often integrated into the return alley so that the cows walk through them after every milking. If required, you can also walk your cows through a hoof bath containing various treatment products once or twice per week. We recommend consulting with your vet to determine which hoof care products are most suitable for your herd. The bath should be long enough that the cows can enter it with all four feet at once as this will ensure that the treatment products are applied to each hoof. The bath should also cover the entire width of the passageway so that the cows cannot avoid it when being driven through. We recommend an automated hoof bath with a pre-cleaner as this can be operated around the clock – either with water alone or with additional hoof care products.



Herd management software



DairyProQ uses the latest data processing technology and a new dimension of herd management software to make controlling the milking process, recording data and preparing the equipment as simple as possible.

DairyNet in DairyProQ

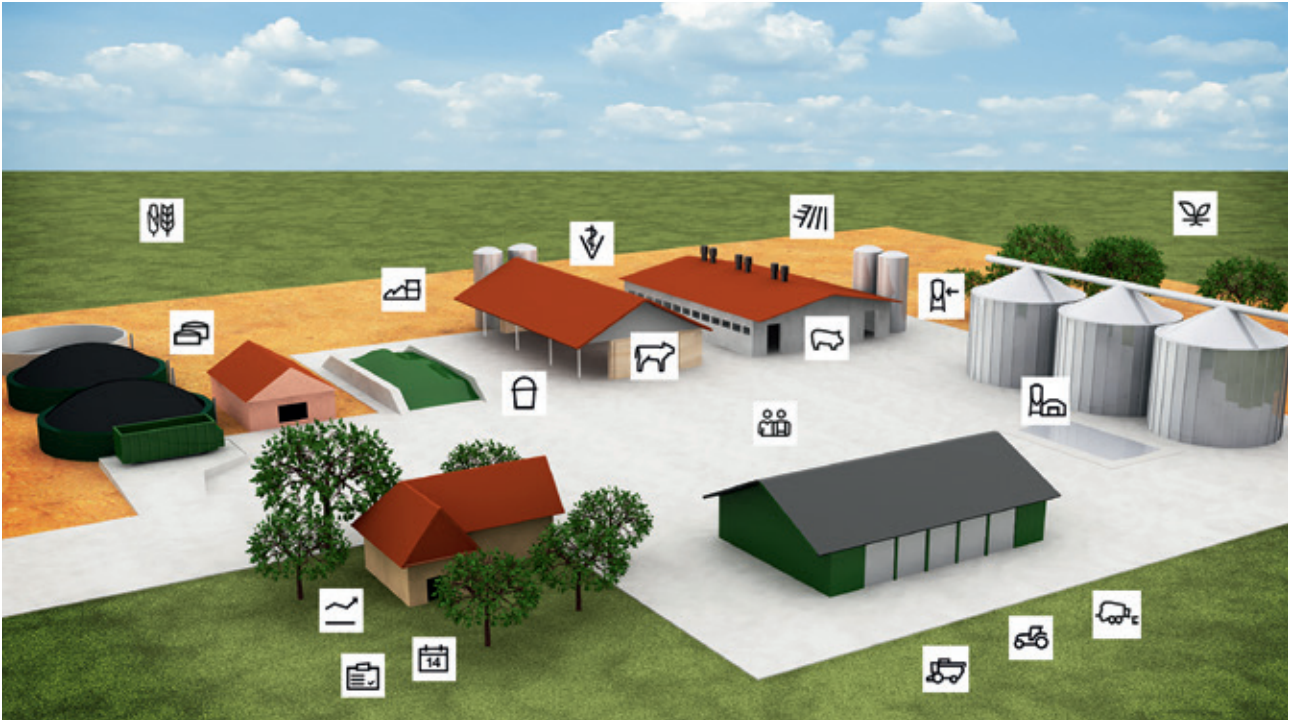
GEA DairyNet is the new computer-assisted herd management system for dairy farms, and is an integral part of the 365FarmNet operations management software. With its consistent user interface and operational philosophy, GEA

DairyNet and its GEA Business Modules (DairyNet) enable you to combine and interlink a wide variety of operational processes, from crop management to cattle rearing.



An internet connection is required to use the full functionality of DairyNet in 365FarmNet on a PC and/or tablet.





The following modules are required to operate the DairyProQ:

Basic cattle module

- Contains master data management and key herd management functions such as:
 - Recording animal stock
 - Entering data into the animal journal for calvings, inseminations, gestation inspections, illnesses etc.
 - Importing milk test data

Sorting module

- Configures selections on your farm and assigns the selection gates to the selection areas.
- Visualizes complex selection processes
- Provides a choice of selection criteria and displays the sorting history of individual animals to ensure a high level of process transparency and efficiency.
- Pasture diary helps you to better document animal husbandry activities.

Milking module

- Analysis of the individual milking performance of each cow, intelligent group management and milking session planning to optimize the performance of both the cow and the milking operator
- Process transparency with quick and systematic analysis of milking process data
- Quality related separation and filling of the milk tanks and reliable milk quota planning based on quality/quantity
- Parlor and milking performance with KPIs (key performance indicators)
- User friendly interface for planning milking sessions
- Graphical analysis of individual milking sessions



Visualization of the milking process

This fully integrated product visualizes the milking process and creates a display of the rotary based on the cow data stored in DairyNet. The touchscreen in the milking center visualizes and combines information to help you control, analyze and monitor the milking process. This enables you

to view the milking process in real time and allows you to view the most important information right where you need it. The industrial touchscreens can be placed at the entrance and/or exit of the rotary. And it can also be accessed from a tablet PC when in the barn.



Conditions for optimum milking



Both you and your cows will experience big changes when you move to your new milking system. These will be particularly felt in the various management areas. But there are certain measures you can take in advance to ensure that the process of switching to DairyProQ goes as smoothly as possible.

Udders and udder health

Udder milkability is vitally important to the performance of your DairyProQ. Cows that have experienced problems in the

past due to the shape of their udders will still be problematic for the DairyProQ.

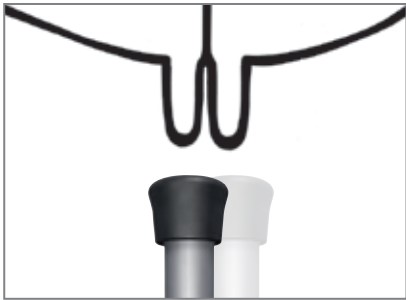
Checking the milkability of the herd

It is normally possible to attach the milking equipment manually in the DairyProQ as you would in a conventional milking parlor. However, the number of animals in your herd requiring this kind of intervention should be kept to a minimum, so it is important to check your cows' udders. You should consider parting with animals for which the

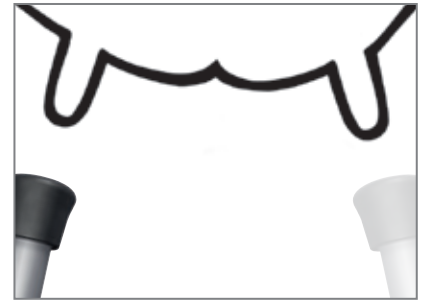
attachment process is often problematic, and animals that take a long time to milk. This is because having to manually attach the equipment means that the milking operator has to remain in the attachment area of the automated milking system. This leads to interruptions to the milking process, additional work and a reduction in throughput.



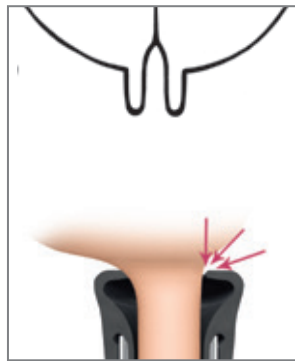
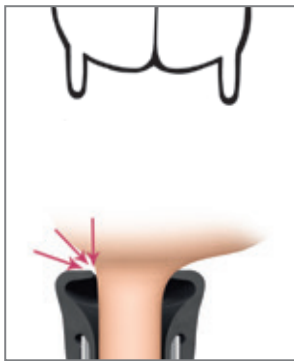
Limits for successful attachment



Insufficient space between the teats to attach the teat cup.



Extremely wide set teats can normally be attached, but are not easy to milk.



If the teats are too far to the outside or too close to the center, the rubber liner cannot rest against the bottom of the udder and air is drawn into the unit. It is vital for you to measure your cows' teats to ensure that you select the right liners. Our specialists are on hand to help you select the right liners, just for your herd.

Determining udder abnormalities

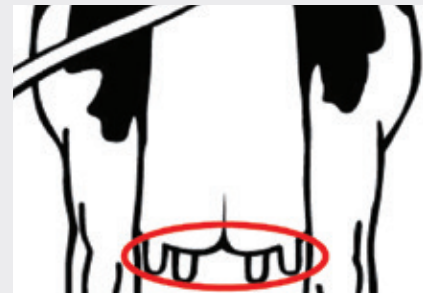
The animals must be checked for udder abnormalities. Cows with only three teats must be noted accordingly in the herd management software to ensure that they are milked correctly.

Data must be recorded about each individual cow before you begin working with the new milking system. Without this

data, the system cannot recognize and milk the cow. The animals will receive their automatic detection tags before the system is started-up; the data (animal number, tag number, abdominal height, abnormalities such as three teats etc.) must be recorded in the herd management program. Training on how to use the software will be provided in advance.



It is particularly important to take udder shape into account when breeding your herd. Udder features such as teat positions and lengths are hereditary and should therefore be a key factor in your selective mating program. As well as having a major influence on the success of the automated milking system, milkability is another important criterion when it comes to selecting the right bull.



Manual attachment and udder cleanness

Animals which are temporarily unsuitable for automated attachment are normally switched to “manual attachment” mode. It may also be sensible to switch animals that have recently calved or are ill to this mode until they recover. The herd manager must ensure that the animals are well

prepared for milking as this reduces the risk of problems arising with the equipment. Dirt/soil around the udder and tail can cause delays in attaching the milking cluster. Freestall (Cubicle) maintenance is a particularly important factor here, as a clean freestall (cubicle) means a clean udder.



1 Clean, free from dirt



2 Slightly dirty,
2-10% of the surface



3 Moderately dirty,
10-30 % the surface



4 Very dirty,
> 30% of the surface



At least 80% of cows should be category 1.

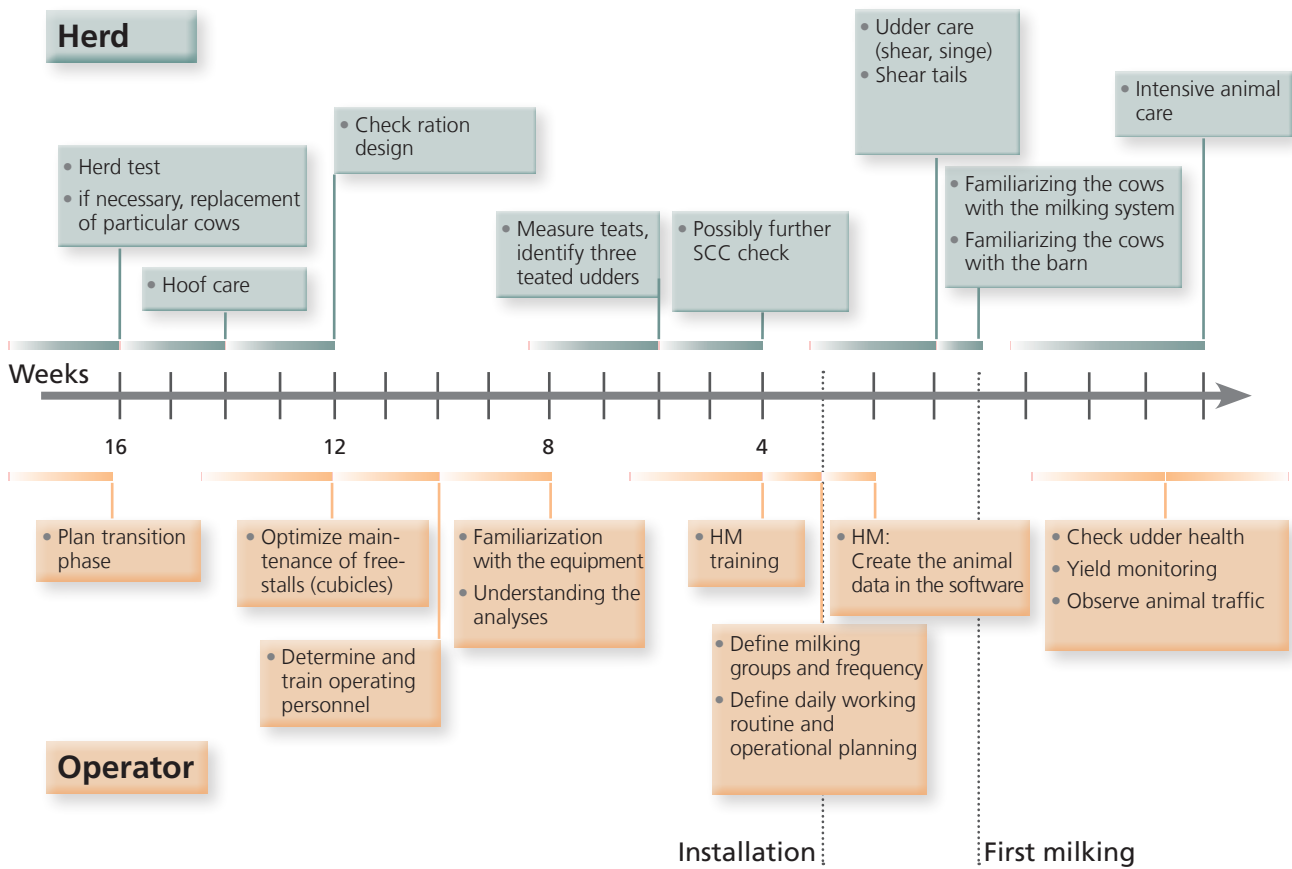
If more than 10% are classed as category 4, hygiene measures are urgently required. Cows in categories 3 and 4 have an increased risk of mastitis infection.



SCC check and microbiological investigations

Microbiological investigations are an absolutely essential tool to help you gain a better insight into the health of your herd's udders. Milk samples taken by individual quarter provide precise information about the cows' udder health. The first tests should be carried out at an early stage, no

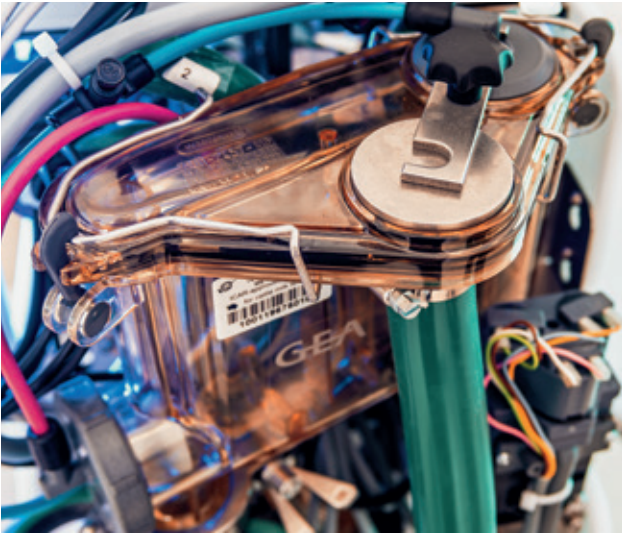
later than 4 months before the first milking, and any animals showing mastitis symptoms should be tested again before beginning to use the system. Chronically sick animals should be removed from the herd.



The milk speaks volumes

The first signs of a change in an animal's health can be detected just by observing their milk flow. DairyProQ thoroughly analyzes each animal's milk, using its reliable sensors to measure its color, conductivity, flow and volume. Alerts inform you immediately of any changes. However, this does not mean that you can stop observing

the animals in the barn completely. You can only determine an exact diagnosis by combining your visual perception of the herd or individual animals in the barn with the results from the sensors.



Herd management

The automated milking process changes the role of the milking operator. As well as managing the DairyProQ milking system, they can also undertake herd management duties. Investing their newly freed up time into herd management

helps to improve the animals' health, disposition, and performance in the medium and long term, thereby ensuring that you get the highest yields possible.

Proactive herd management

GEA supports your herd management measures by providing you with information to help you detect problems with the animals at an early stage.

With a reliable GEA system (e.g. CowScout or CowView) you can monitor your cows around the clock and analyze their behavior. By combining the information recorded by the sensors during the milking process with that provided by the GEA identification software, the system can generate reliable early warnings to help you optimize your management of the following areas:

- Reproduction
- Health
- Feeding



Optimized reproduction management

Not knowing a cow is in heat and therefore not carrying out an insemination can have serious financial consequences. The GEA identification systems record all activity data reliably, around the clock. Even animals who are in heat for very short periods are highlighted for you. And the activity profile makes it easier for you to determine the optimum time for insemination.



Proactive health management

The data recorded on the animals' behavior enables you to generate fast, precise analysis so you can take targeted action. For example, if a cow is moving less than usual or is not eating for as long as it normally would, this can suggest that it is suffering from mastitis, lameness or metabolic problems.



Feeding

You can use the same feeding strategies with DairyProQ as you would with conventional milking systems.

Feeding – appropriate and clean

We recommend aiming for a 1:1 ratio of cows to feeding stations. This means that even less dominant animals can eat whenever they wish. If you are using an automated feeding system, this ratio can be raised to 2:1. Ensure that you observe the regulations that apply to your individual country

and region. If a separate treatment area is installed, you will no longer need to have self-locking safety feed fences in the milking group areas. The surface of the feeding table should be smooth and easy to clean. Ensure that the feeding table is cleaned regularly.



The feeding process and the feed itself have a large influence on the success of the system as a whole. Careful handling of the feed, even during the harvesting and siloing stages, is key to ensuring the animals get the nutrition they need. Feed analysis, including mineral analysis, should form the basis of your feed calculations. We recommend using TMR

(total mixed ration) feeding for different performance groups. The TMR should be calculated according to the average milking performance of the group, and minerals in the form of nutrients and micronutrients should be added according to the milk production level.



Fresh food and frequent pushing

Depending on the size of the feed mixing wagon, feed should be prepared once or more per day.

We recommend providing the cows with a fresh TMR twice per day. An excess of 3-10 % should be factored in when calculating the ration. Feed should be pushed forward several times a day. The activity at the feeding table makes the feed more attractive to the cows and leads to an increased feed intake.

It also makes it easier to check the quality of the feed, particularly on very warm days. You can reduce the risk of the feed warming by distributing it in the evening, or adding preservatives such as feed acidifiers



GEA automated feeding systems represent a reliable alternative to conventional feeding via a feed mixer wagon. Automated feeding involves smaller volumes of freshly mixed feed being distributed multiple times per day. This not only

reduces your workload, but also provides an incentive for feed intake and has a positive influence on animal traffic.



Drinking – unrestricted and clean

Good quality water is essential to producing top quality milk. Cows drink 4-5 liters (1-1,3 gal) of water for every liter (0,3 gal) of milk they produce. The volume depends on yield, feed intake, air temperature and humidity, water temperature and quality. When under heat stress, the amount of water they drink increases by 1.2 to 2 times the normal requirement. In order to counteract a lower milk yield as a result of their water intake being too low, cows should be able to drink as much water as they need. Your cows should be provided with sufficient drinking spaces to do so. As dominant cows could force other cows away from the trough, at least two troughs should be provided for each group and 10cm / 4" of trough length allocated for each animal. A trough should be positioned within a radius of 15m / 50ft of every stall area.



Lighting conditions and barn climate

Light and air are as equally important to a cow's health as balanced and fresh feed. Cows require a clean and dry

environment with plenty of fresh air. Also, the effects of light on the cows and their milk yield is well-known.

Light – effective for an enhanced yield

The effects of light on milk production, growth and well-being are well documented. Practical tests on lactating cows have shown that lighting programs can lead to an increase in yield of 6-12 % when the day is divided into a bright period of 16 hours and a dark period of 8 hours. Additional benefits include better estrus detection and an increased feed intake of up to 8 %. During the day, a light intensity of approx. 150-200 lux is recommended in the barn, although any significant changes from darker to brighter areas should be avoided.



Air – fresh and at the right temperature

Air temperature, humidity and air flow have a significant effect on the cows' yield. In moderate climates, barns are often ventilated using the natural air flow through openings in the barn walls (curtains). In summertime this can be supported with fans, misters, or fog systems.

In extreme conditions, special ventilation systems may be a sensible choice. Fresh air can be brought into the barn by installing fans on the barn wall. The air inside the barn can then circulate, and the stale air mixes with the new fresh air. This also helps to reduce the amount of humidity, heat and

harmful gases in the barn. A temperature range of 40-65°F / 4-18°C is considered optimal. At 75°F / 24°C cows begin to experience heat stress, and from 80°F / 27°C their appetite significantly reduces. The main consequence of this reduced feed intake: less milk. In certain cases it may also affect fertility and hoof health.



Operator training

We provide the best possible training to prepare your staff for their new roles. Giving them the information they need at an early stage and taking them to visit other sites that are already in operation helps to prevent problems developing down the line. The training gives the operators their first insights into the DairyProQ technology, and we can answer any questions they may have. Employees who are interested in the technology are more likely to be successful. Experience

has shown that training sessions also help the operators to manage the animals more effectively. If the cows are relaxed on their way to the milking area and during the milking process, they produce better milk.

Just before your system starts-up, your staff will receive additional training from a GEA specialist to ensure they understand how to operate it.



Dividing cows into milking groups

You should aim for it to take no longer than 60 minutes to get the cows back into their barn after milking.

The size of the milking groups you create should align with the size of your DairyProQ. If your system is completely new, with both the milking area and barn being installed together, the size of the groups should be calculated according to the throughput capacity of the milking system. If only the

milking area is new, it may be necessary to rearrange the existing groups.

We recommend grouping “slow milkers” together if they make up a large proportion of the herd, however these cows should be replaced as they severely affect the milking process.

Defining the milking schedule

Here at GEA, our main focus is helping you get the most out of your herd with the DairyProQ. The system enables you to milk the entire herd, including those producing colostrum and those undergoing udder treatment.

Before start-up of your new equipment, we will determine which order the groups will be milked in. This depends on a variety of factors, such as whether the individual groups need to be milked 2 or 3 times per day. If all of the animals in your herd are to be milked on the DairyProQ, cows that have recently calved or are undergoing under treatments

have to be milked last. If you are using the DairyProQ to milk cows for colostrum to give to your calves, the milk must be collected in a separate container. Milk from cows undergoing udder treatments can also be collected separately or routed directly to the dump line. The entire DairyProQ must then be cleaned.

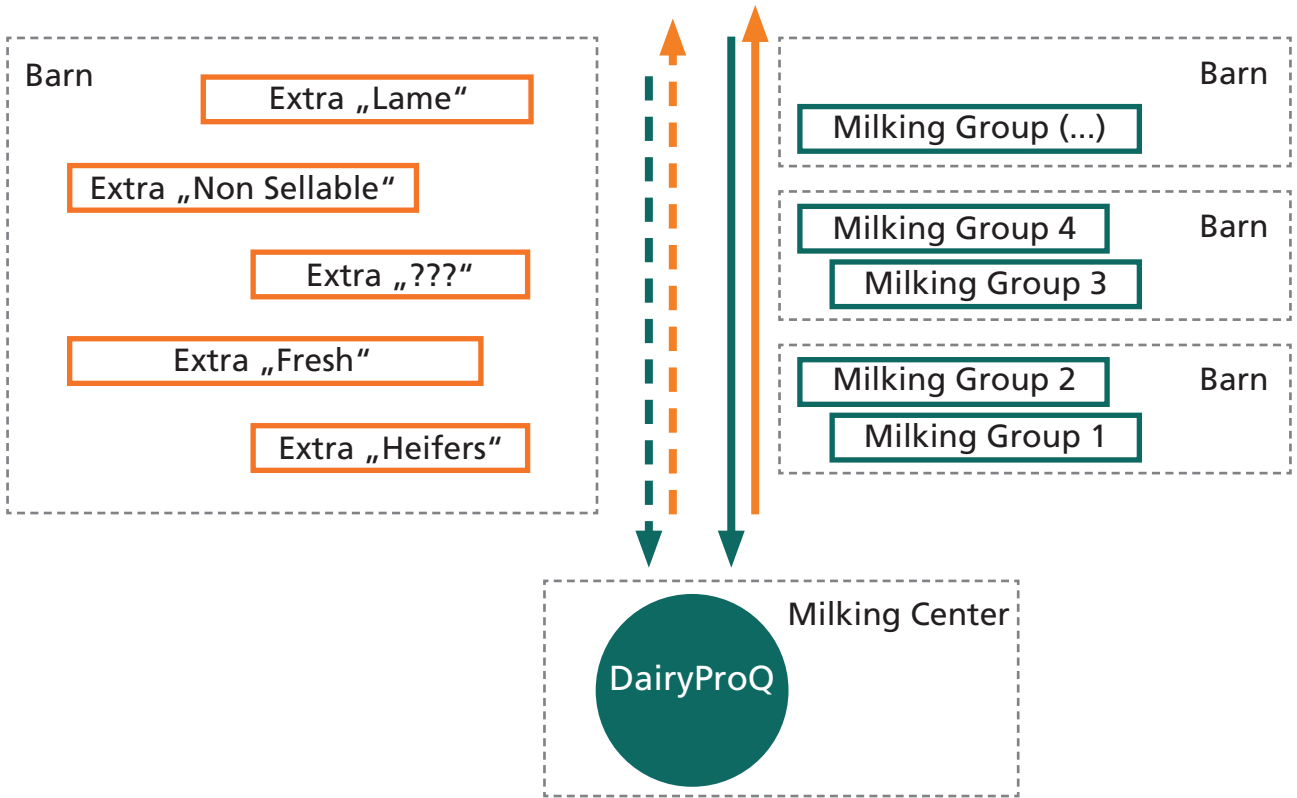
You can also train heifers to use the DairyProQ.



Group management and milking schedule

What milking groups do I have? In what order do I need to milk them?

The milking order will be defined with the herd manager before the system is started up for the first time. Generally, groups with high performing cows will be milked first, followed by those that produce less milk.



Planning the start-up process



The high quality technology used in DairyProQ ensures that your operation benefits from precise, consistent processes that are always gentle on the animals. There are a few things to be aware of to make sure that your first days with the new milking system run as smoothly as possible.

The dairy herd

Depending on the size of the herd, we will discuss the number of animals that will use the new system on start-up with those responsible at your operation. This number is not a fixed value, and can be adapted quickly depending on how the first milking proceeds. The subsequent process will also be defined at this stage. With smaller herds (up to 500 animals), we may attempt to bring the entire herd over to the DairyProQ at once. With larger herds, it is often

more sensible to start with part of the herd and milk them with the new system a few times before bringing in more animals. This step requires close cooperation between all of the parties involved in order to ensure that the individual milking processes and subsequent phases run as smoothly as possible.



Time and personnel requirements

The first days after start-up are the most work-intensive and require increased staffing levels. Precisely how much this amounts to varies from farm to farm.

We recommend having 2-3 people to guide the cows to the DairyProQ during the first milking sessions. Additional helpers will also be needed to cover breaks. You should also

schedule in 2 people who can alternate managing the actual milking and working on the DairyProQ. Managers and all those who will work with the DairyProQ in future should not act as “cow drivers/pushers” but should instead monitor the milking process from the functional area of the DairyProQ as it is explained to them by the attending technician.



Depending on the animals’ behaviour and how well they accept the system, the need for helpers may be reduced in the following days. A start-up with too few or too many helpers makes the process more stressful for both humans and animals. All staff involved should be aware of their task, areas of responsibility and what is expected of them, and should have discussed these in advance.

Tip: Personnel requirements should be calculated according to a precise working schedule. Additional helpers should also be available to assist in the event of an emergency. In order to ensure that as few disruptions as possible are caused, spectators should not be permitted. All personnel involved should switch their phones to silent or turn them off completely.



Consider beginning the start-up process at the start of a week. This will mean that a lot of the work can be completed by the weekend and that the cows will have already become fairly accustomed to the new system. In your own interest, please avoid start-up directly before major public holidays (Easter, Christmas) or field harvesting periods.

The first milking

Once all preparations have been completed, it is time to start the first milking session with your new automated rotary parlor. Just as with start-up of other milking systems,

remember: the calmer and more relaxed you are, the faster the animals will become accustomed to the system.



All personnel who will be present on the day of start-up should gather for a final meeting. Ensuring that the various roles are assigned clearly will greatly improve the chances of the first milking running smoothly. The working processes will be explained and questions answered. Multiple people will be assigned to each role so that staff can be easily interchanged. We recommend adhering to as many existing routines as possible at this stage (for example, a radio can be switched on if the animals are used to hearing music in the milking parlor). Follow all instructions given by the GEA staff.

When the first cows enter the holding area, it is extremely important to avoid causing any unnecessary stress for the animals. The cows will now be led to the DairyProQ. A crowd gate has proven to be particularly effective in encouraging animals to move forward in the holding area. During the first milking, the teat cups will be attached by hand. The milking operator should be particularly calm and careful at this stage. Talking to the animals quietly and petting them gently are particularly effective calming measures. You should also never use cattle prods, canes or similar.

The conversion to automated attachment should be carried out as quickly as possible across the subsequent milking sessions. The operator will then only intervene manually if the machine's attempt to attach the teat cups is interrupted. A corresponding signal on the display at each milking stall module will alert them to this.

During the initial stage of the conversion to the new milking system, we recommend only milking the cows that deliver the best quality milk. For example, if the herd consists of approximately 1000 animals, around 300-400 should be selected when first introducing the DairyProQ. This group should then be worked with for a further 3-4 days. They will quickly become familiar with the new milking system and a clear routine will be established. Then you can continue bringing in further groups. However, you should avoid creating unnecessary pressure by making your objectives too ambitious, for example by defining a certain number of cows you want to be milking on the DairyProQ within a very short timeframe.

As soon as all "unproblematic" animals are happy to be milked in the DairyProQ, you can begin to bring in the remaining cows. The experts at GEA and your dealer will continue to provide comprehensive support at this phase of the integration and beyond.



After milking is before milking



GEA will continue to be at your side to ensure that your DairyProQ provides maximum performance over the long term. One key factor here involves carrying out regular checks on your milk quality and working processes and ensuring the system is maintained correctly. The innovative service concept of DairyProQ is just one way you can benefit.

Checking the milking process

DairyProQ enables you to monitor your milking process at all times: two screens in the milking center (at the entrance and exit) provide an overview of the current status of your animals' milking processes. When each animal enters the platform, they are recognized by the animal detection system and information about them is displayed on the monitor. The attachment process is easy to track as the teats on the display change color when the teat cups are in place. The predicted milk volume and the amount already milked during the

session are also displayed. As each quarter is milked out, it is dipped and removed, and this information is relayed to the touchscreen. Once the milking process is complete, the total milk volume is displayed. So you can monitor the entire milking process for each cow from start to finish.

Optimizing the system and milk checks

In the years following installation, regular checks should be carried out to ensure that the milking parameters have been selected correctly or if changes should be made to improve performance (e.g. changing from rubber to silicone liners or switching from milking 2 times to 3 times per day). Changes to the dairy herd itself may also mean that other settings need to be adapted.

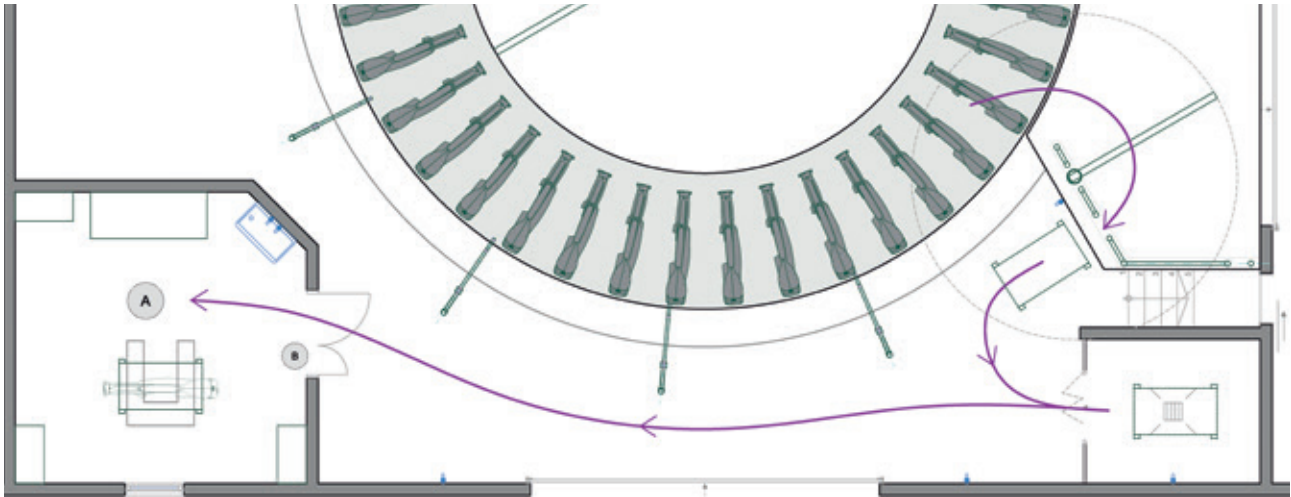
Monthly milk checks are carried out using the conventional GEA samplers which connect to the milking stall modules. The milking performance check is carried out in accordance with the established standards.



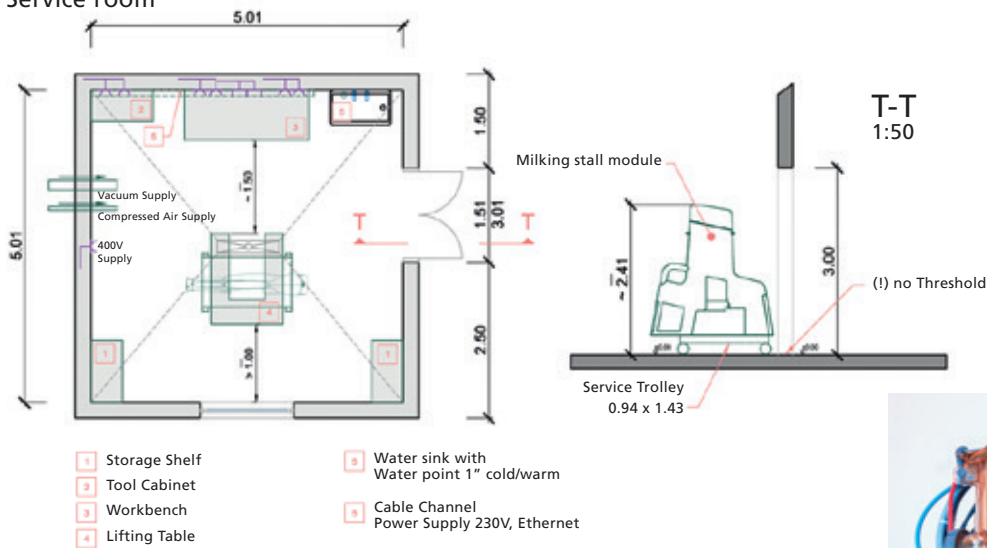
Service concept

The milking center design is heavily influenced by our service concept, which was developed based on the modular structure of the DairyProQ milking system. The service room is a fixed part of this concept and is always positioned on the exit side of the DairyProQ. This room provides a clean, dry environment in which service modules

can be serviced and entire milking stall modules can be checked. If necessary, the stall modules can be lifted from the platform onto a cart/trolley using a swing crane and then pushed past the DairyProQ into the service room.

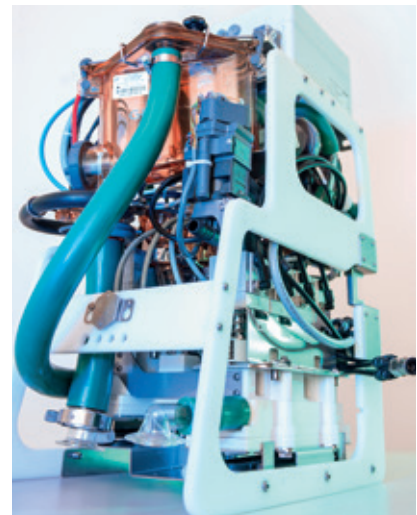


Service room



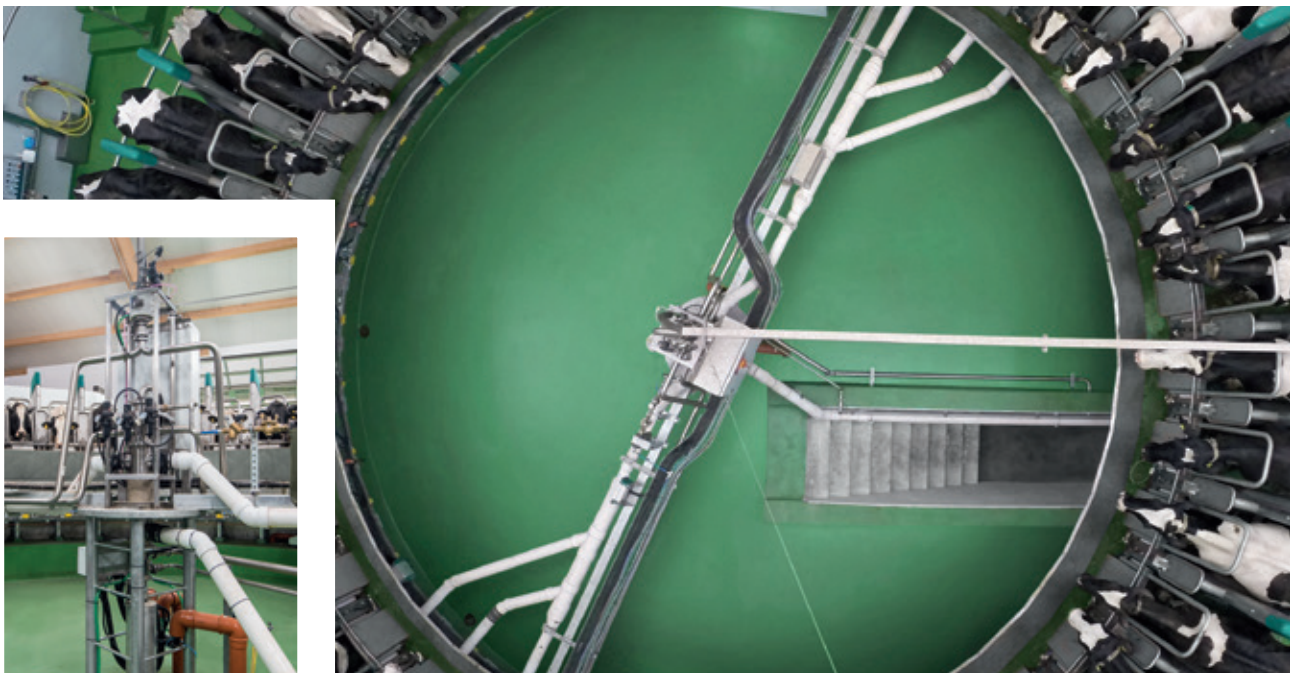
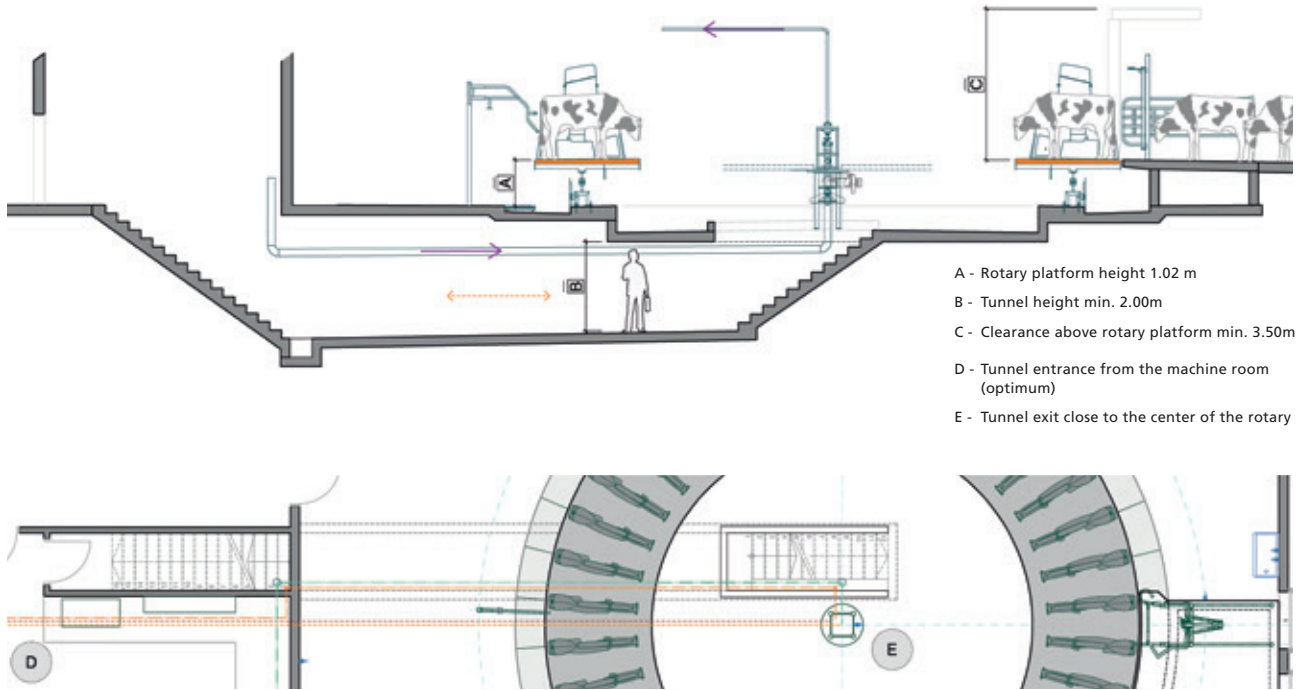
- A - Milking stall module service room (min. room height 3.50m) with workbench, tool cart, lifting table, storage rack
- B - Step-free entrance (opening min. 1.50m x 3.00m)

Work can be carried out undisturbed on the milking stall modules in the separate service room. The unique service modules can be quickly and easily removed from the milking stall modules and serviced.



The inner part of the DairyProQ features a large amount of equipment. A tunnel provides safe access for all checks and service related work at the center of the DairyProQ.

For example, supply lines such as the vacuum run from the machine room, through the tunnel to the parlor center.



Service on your doorstep

GEA's concept is designed to ensure that you receive competent support and service from a certified dealer near you.

Your certified dealer can provide:

- 24/7 support including emergency service



- A full stock of replacement and emergency parts



- Qualified service personnel who receive further training on a regular basis



- Maintenance of your system in accordance with the schedule



- Competent assistance, on-site quickly



Scheduled maintenance with no downtime

Each milking stall module works independently. This means that individual modules can be serviced without affecting others. Maintenance can be carried out in the period be-

tween two milking sessions in the empty parlor or, if necessary, while the system is in operation.



Smaller maintenance tasks can be carried out by the operator themselves once they have received the appropriate training. They will then know which maintenance tasks should be carried out and when to ensure that the system continues to run smoothly. The work must be briefly documented of course once it is complete.



Daily tasks for milking staff

So that you and your cows can enjoy milking with the DairyProQ for a long time, the following tasks must be carried out during each milking session:

- Change the milk filter before every milking
- Check on cows with milking alerts (conductivity, color, milk volume)
- Check on cows with “incomplete milking” status
- Check dipping and cleaning agents
- Care for special needs cows (e.g. nervous heifers)
- Train new animals when necessary
- Clean milking stalls and camera
- Carry out a visual check on the installation
- Check activity list and check on any animals that may be in heat

Your personal success story



GEA DairyProQ is a fully automated rotary milking parlor that closely combines humans, animals and technology. As you can see on the basis of this guidebook, you actively shape the path to your success in your role as a managing director, operations manager, herd manager and systems operator. Together with your dealer, we at GEA support you as a partner in quality milk production.

This is an exciting time on your dairy operation, and we encourage you to take the opportunity to develop your business goals and write your personal success story!



A large, light gray rectangular area designed for writing, consisting of 20 horizontal lines. The lines are evenly spaced and extend across the width of the page, providing a template for a personal success story.

Attachment

Timeline installation for DairyProQ (example: 40 stalls)

	Installation										
Weeks	...	1	2	3	4	5	6	7	8	9	...

GEA headquarters

Site manager											
BuildUp team (mechanical)											
BuildUp team (electrical)											
Start-up engineer											

Local GEA company

Herd manager											
Technician 1 + 2											

Dealer

Technician 1 + 2 + 3 + 4											
--------------------------	--	--	--	--	--	--	--	--	--	--	--

Preparations for start-up

Stage 1: up to 16 weeks before start-up

Microbiological investigations are an absolutely essential tool to help you gain a better insight into the health of your herd's udders. Milking samples taken by individual quarter provide precise information about the cows' udder health. The first tests should be carried out at an early stage, no

later than 4 months before the first milking, and any animals showing mastitis symptoms should be tested again before beginning to use the system. Chronically sick animals should be removed from the herd.

Checklist for stage 1

SCC check and microbiological investigation carried out	<input type="radio"/>
Cows with chronic mastitis removed	<input type="radio"/>
Cows not suitable for automated milking noted and removed as necessary	<input type="radio"/>
Schedule for the transition stage drawn up	<input type="radio"/>

Stage 2: 8-15 weeks before start-up

Around two months before start-up, you should familiarize yourself with the new equipment and the herd management program. This will ensure that you can understand and use the data produced. We will be happy to support you in this. In order to make the most of your new milking system, it is important to ensure that your cows' hooves are healthy. This takes a lot of time. If you are converting to a DairyProQ in an existing building, you should carry out a hoof care procedure for the entire herd at this point. However, if you are planning to move to a completely new barn, the hoof care procedure should not be carried out immediately before or after the move, as new walkways and slats are generally rougher than normal. This causes the hooves to wear more, and may lead to lameness if they are freshly trimmed.

The camera used during the attachment process will be able to detect the cows' udders and teats much more easily if

they are clean. It is therefore vital to ensure that the cows' freestalls (cubicles) are cleaned regularly.

Work with a feed consultant to control the rations for each individual group. Should the components of the rations you intend to feed the herd in the future vary from their current feed, we recommend a gradual conversion over the course of six to eight weeks prior to start-up. The villi and bacteria in the rumen have to get slowly accustomed to the new feed so that there is not a sudden drop in yield in the somewhat stressful next stages.

Checklist for stage 2

Herd management software installed and animal data added	<input type="radio"/>
Old building: Hoof care procedures carried out on all cows	<input type="radio"/>
New barn: Hooves should not be trimmed immediately before moving to the new barn	<input type="radio"/>

Stage 3: 4-7 weeks before start-up

The herd should undergo an additional udder health check and animals should be treated where necessary. You should attend a training course to ensure that you are able to use the new herd management program.

It is also time to fit your animals with their identification tags.

Checklist for stage 3	
Training course attended	<input type="checkbox"/>
Identification tags fitted	<input type="checkbox"/>

Stage 4: 3 weeks before start-up

The various milking groups should be assigned and daily working routines and future operational plans defined. Additional animal data (abdominal height, abnormalities such as three teats etc.) should be entered into the herd management PC. You should now be able to maintain the cow calendar and enter all animal activities via the herd management program. You should be familiar with the equipment and the system's most important operations.

During the installation stage, there must be a constant exchange of information between all parties involved. Make sure that all construction work is largely completed and electricity, water and compressed air supplies are available by the time of installation.

Checklist for stage 4	
Bacteriological investigations carried out for treated animals where necessary	<input type="checkbox"/>
Daily working routines established	<input type="checkbox"/>
Operators trained to use the herd management program	<input type="checkbox"/>
All animal actions carried out using the herd management program	<input type="checkbox"/>
Milking groups defined	<input type="checkbox"/>
Milking frequency determined	<input type="checkbox"/>
Service contract concluded	<input type="checkbox"/>
Functionality of selection systems checked	<input type="checkbox"/>
Suitable date for start-up determined	<input type="checkbox"/>
DairyProQ functionality checked by authorized personnel	<input type="checkbox"/>
Internet connection established	<input type="checkbox"/>
System test log signed and handed over	<input type="checkbox"/>

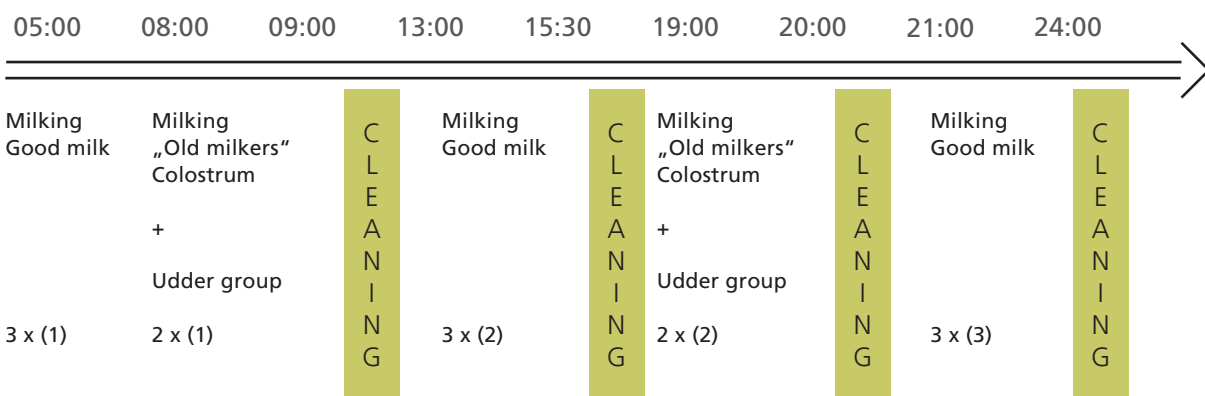
Stage 5: 1 week before start-up

Shortly before beginning milking, you should remove “no-go” cows from the herd. The udders on all the remaining cows should be prepared to ensure that the DairyProQ can attach the teat cups easily.

You should also now ensure that sufficient helpers will be available for the week of the start-up.

Checklist for stage 5	
All construction work completed	<input type="radio"/>
Operating instructions read and understood	<input type="radio"/>
All udders prepared	<input type="radio"/>
Animal detection tags attached to all animals and data stored in the herd management program	<input type="radio"/>
Animals allocated to various milking groups based on their yield	<input type="radio"/>
You are familiar with the most important lists in the herd management program	<input type="radio"/>
You are aware of the emergency telephone numbers	<input type="radio"/>
You are familiar with the most important steps involved in working with the DairyProQ	<input type="radio"/>
Exact start-up schedule drawn up	<input type="radio"/>
Sufficient helpers available for the start-up	<input type="radio"/>

Example for shift schedule and milking times



Milking schedule

3 x Milking Good milk

2 x Milking Good milk („Old milkers“)

2 x Milking Colostrum + Udder group

Initial milking plan for DairyProQ

The initial milking with the new technology must be carefully discussed and organized with the operator. Depending on the farm situation and herd size, operations should begin with the entire herd (up to 500 animals) or with only a part of the herd. That is why with larger herds with more than 500 animals it makes sense to begin milking in stages. For example, milking can initially commence with approximately

300-400 animals which can be worked with for 3-4 days until the animals have become used to the new system. After that, 200-300 more animals can be milked in the same fashion until the entire herd is milked with the new system. The following points should be considered and implemented in order to ensure a smooth transition to milking with a DairyProQ system:

Preparation	
<p>Information for the employees who will work with DairyProQ in the future</p> <p>Good, early information preparation for your employees enormously simplifies the work/stress of the new system. This can serve to eliminate possible prejudices against the new technology in advance.</p>	<input type="radio"/>
<p>Planning the milking groups and positioning in the barn</p> <p>Optimizations can be made, if necessary.</p>	<input type="radio"/>
<p>Herd management programs have been set up and training provided</p> <p>GEA herd management software must be used.</p>	<input type="radio"/>
<p>Preparing the udders</p> <p>Prepare the udders and tail length of the cows (singing, shearing, etc.) so that the camera can properly identify teat location. Training to „sing“ udder hair can be offered as part of the milking training.</p>	<input type="radio"/>
<p>Cows with special udders</p> <p>Cows with special udders (three teats) have been registered in the system.</p>	<input type="radio"/>
<p>Special needs cows</p> <p>If special needs cows (freshly calved cows, cows with udder sicknesses, etc.) are to be milked on the DairyProQ then these must always be the last string in order to enable and ensure correct cleaning so that no unsuitable milk enters into the tank with the saleable milk. The tank must be reconnected before milking these cows.</p>	<input type="radio"/>
<p>Technical training for the milkers during operation</p> <p>Technical training must be carried out once, 3-4 weeks before putting the system into operation, on another farm. Another appointment must be arranged a short time before putting one's own system into operation in order to resolve any open questions.</p>	<input type="radio"/>
<p>Advance training for handling the animals</p> <p>Advance training for the employees on how to gently handle the animals when pushing/driving them into the holding area or the rotary is mandatory.</p>	<input type="radio"/>
<p>Crowd gate</p> <p>Crowd gate is installed in the holding area.</p>	<input type="radio"/>



Initial milking

Maximum number of personnel during initial milking 2-3 milkers to operate the rotary 3-4 people to „push/drive“ in the holding area Approx. 3-4 additional people from the GEA or dealer team on site for technical support. Spectators are not helpful during this phase and must be consistently removed from the facility.	<input type="radio"/>
Spare personnel Spare personnel must be held ready for milking and „pushing/driving“.	<input type="radio"/>
No disturbances during milking Do not permit any disturbances during milking (switch off mobile phones, etc., consistently prevent visitor traffic).	<input type="radio"/>
Familiar situations in the milking parlor Where possible, milking in the DairyProQ should take place in the same way as in the old milking parlor (same people, routines, noises such as the radio).	<input type="radio"/>
Understanding and following the instructions of the GEA personnel Milkers and „pushers/drivers“ must follow the instructions of the GEA personnel during the initial milking face. This must be discussed in advance with the system operators and passed onto their employees.	<input type="radio"/>
Quiet and patience Stay quiet and patient when milking and pushing/driving the cows. Haste and agitation disrupt the milking process. The animals must not be hit, kicked or driven into the milking parlor using sharp objects.	<input type="radio"/>
Operating procedures The operating procedures have been printed (see IO manual) and are available for reading.	<input type="radio"/>

We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.

GEA Deutschland

GEA Farm Technologies GmbH

Siemensstraße 25 - 27

D-59199 Bönen

Tel +49 23 83 93 7-0

Fax +49 23 83 93 8-0

info@gea.com

gea.com