

# LELY VECTOR

automatic feeding system

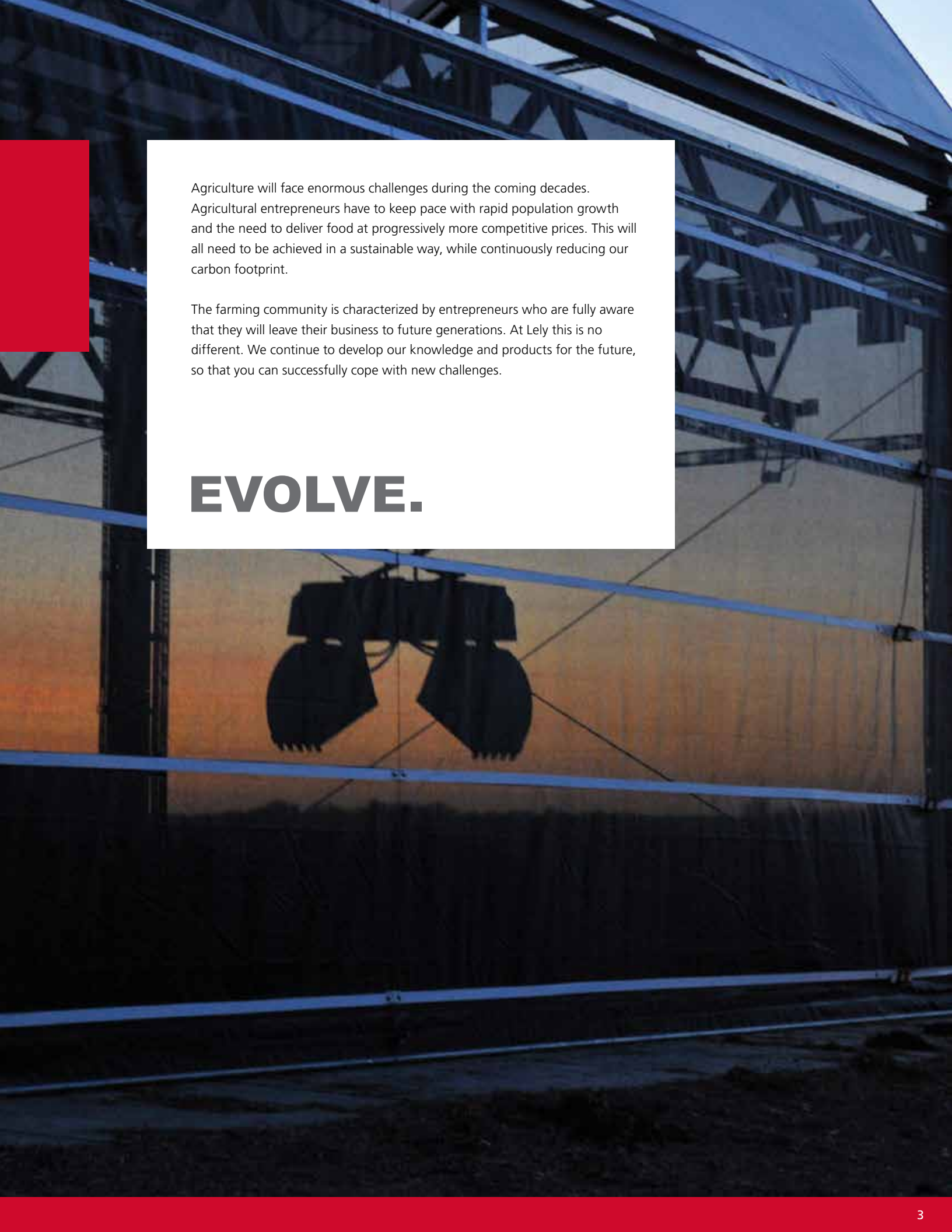


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# Preparing your business for the future

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Agriculture will face enormous challenges during the coming decades. Agricultural entrepreneurs have to keep pace with rapid population growth and the need to deliver food at progressively more competitive prices. This will all need to be achieved in a sustainable way, while continuously reducing our carbon footprint.

The farming community is characterized by entrepreneurs who are fully aware that they will leave their business to future generations. At Lely this is no different. We continue to develop our knowledge and products for the future, so that you can successfully cope with new challenges.

# EVOLVE.



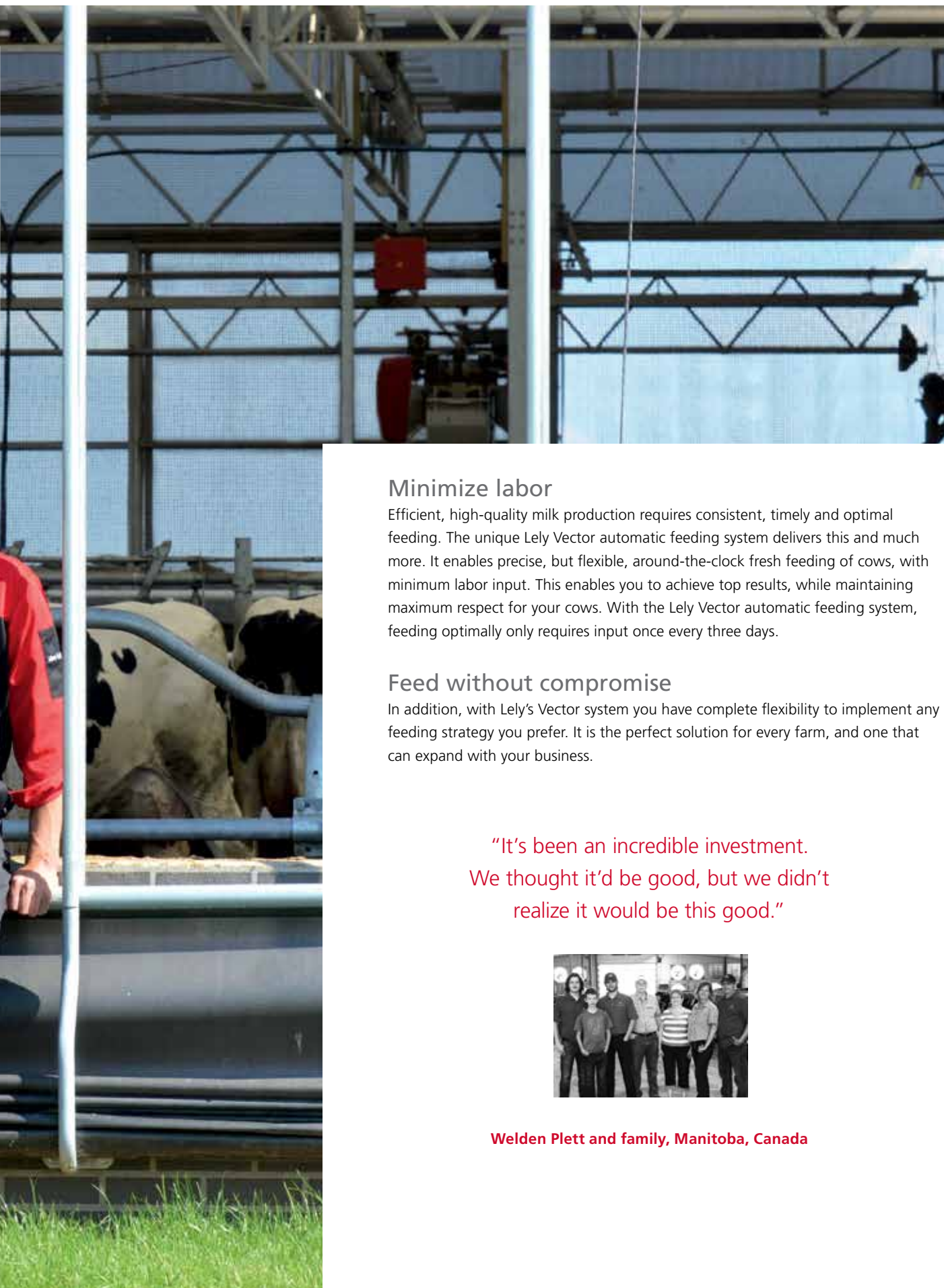
# The Lely way of farming

## one man, two million liters

We support optimally efficient dairy farming. We foresee a future in which it is possible for just one man to produce two million liters of milk per year (528,344 gallons or 62,989 lbs.). Our continual investment in research and development focuses on achieving this in an animal-friendly way. In response to a growing demand from our customers for a solution to optimize feeding, the most time-consuming activity on dairy farms today, we have developed a unique new way to feed cows with the lowest labor input possible — the Lely Vector automatic feeding system.







### Minimize labor

Efficient, high-quality milk production requires consistent, timely and optimal feeding. The unique Lely Vector automatic feeding system delivers this and much more. It enables precise, but flexible, around-the-clock fresh feeding of cows, with minimum labor input. This enables you to achieve top results, while maintaining maximum respect for your cows. With the Lely Vector automatic feeding system, feeding optimally only requires input once every three days.

### Feed without compromise

In addition, with Lely's Vector system you have complete flexibility to implement any feeding strategy you prefer. It is the perfect solution for every farm, and one that can expand with your business.

"It's been an incredible investment.  
We thought it'd be good, but we didn't  
realize it would be this good."



**Welden Plett and family, Manitoba, Canada**



Embrace the challenges  
of **sustainable**  
dairy farming



Sustainability means ensuring that today's activities do not compromise the ability of future generations to meet their needs. It plays an increasingly important role in dairy farming. Animal health and welfare, and the efficient and ecologically conscious use of resources, are fundamental aspects of sustainability. Consumers demand animal-friendly and environmentally sound production methods. Cows should enjoy a healthy and long life alongside increased lifetime milk production. The challenge for the dairy industry is to meet these demands in a profitable way. Careful feeding makes a key contribution to improving sustainability.

### Provide unlimited access to basic needs

Lely believes that cows should have free access to feeding and milking. To enable cows to visit feeding and milking facilities regularly, it is essential that they have sufficient rest and relieve any pressure on their feet and legs. Restricting one or more of these basic needs will affect cow behavior, and subsequently, milk production. Lely considers unlimited access to facilities that satisfy these basic needs to be a vital part of sustainable farming.

### Keep healthy animals in a healthy environment

The nutrition that cows receive not only affects their feed and milk efficiency, but also has a big impact on general cow health, reproduction and the prevention of metabolic disturbances. Correctly feeding is absolutely essential. Using the Lely Vector can improve feed management and result in a longer life, more lactations and lower veterinary costs.

### Use resources responsibly

Sustainable feeding also means reducing waste, energy use and the use of other resources, and creating a cleaner and quieter barn environment. The Lely Vector contributes to achieving all of these.

#### SIX FACTORS IN PRECISION FEEDING

Ideal feed management combines many key dietary and non-dietary factors. Farm results and productivity can be improved by optimizing these six factors.



"For us, the Lely Vector offers more than just labor saving. A healthy rumen, high-quality milk and a satisfied herd — these things are our true rewards."



Václav Dub, Czech Republic





# The Lely Vector — flexible fresh feeding

The Lely Vector automatic feeding system was introduced in 2012 to provide a revolutionary new tool for the flexible, fresh feeding of cows. It has proved to be an enormous global success and has brought around-the-clock precision feeding, with minimal labor input, into mainstream farming. The system has been welcomed by farmers all over the world.

“Since we started feeding with the Vector, we are feeding seven percent less a day and milk production is up a couple of kilos.”



Dr. Vaandrager and Lely team,  
British Columbia, Canada





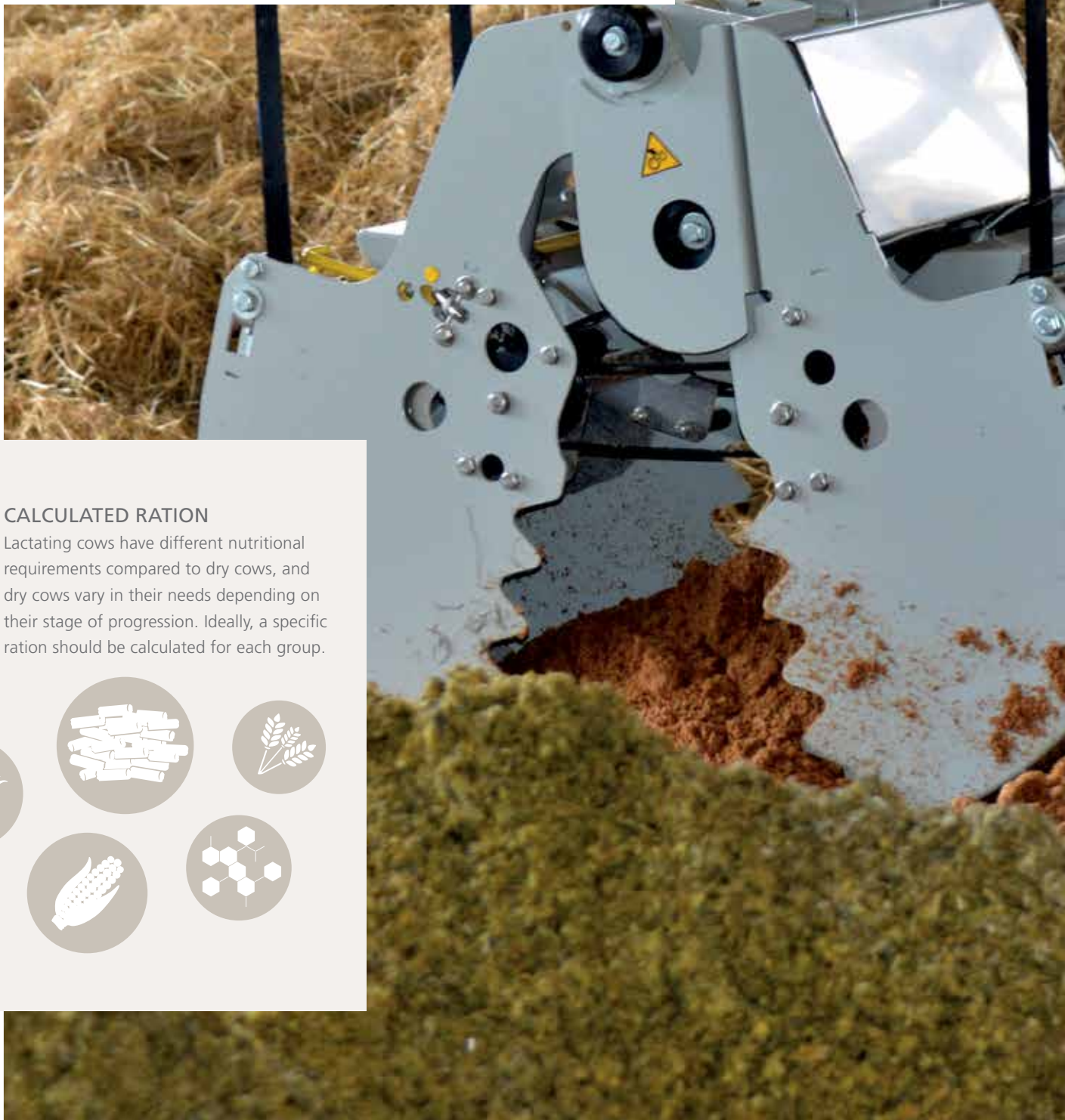
## BEYOND DAIRY FARMING

The benefits of the Lely Vector extend beyond dairy farming. Flexible fresh feeding is also valuable in raising beef cattle. Multiple feeds have a big effect on the growth and development of all cattle. In this sector, where feed constitutes a substantial element in costs, it is very important to use all feed components and barn time efficiently. The Lely Vector makes this possible.





# Flexible feeding routines



## CALCULATED RATION

Lactating cows have different nutritional requirements compared to dry cows, and dry cows vary in their needs depending on their stage of progression. Ideally, a specific ration should be calculated for each group.





The Lely Vector offers unprecedented flexibility. Any feeding strategy can be implemented, whether feeding is preferred several times a day, required in varying rations or differs for groups of cows. An effective feeding strategy will improve cow health and production.

### Quickly and easily adapted

The feed kitchen of the Lely Vector system comprises an open space that can store any type of feed. Each feed type can be contained inside its own location within the kitchen. Separation of feed types is very easy to achieve and it is also easy to change the feed type and redefine its location. This offers extensive flexibility and allows easy adjustment of the mixed ration or changes to concentrates. Filling the mixer using the feed grabber or by tower silo provides the opportunity to mix many different feed types, even in small rations for smaller groups of cows.

### More precise feeding

A wide range of feed types can be loaded into the system using feed grabber filling. For the right quantity or bite size, height and closing of the grabber can be adjusted for greater precision in feeding. With the last grab per feed type, the system estimates weight and automatically corrects the feed grabber. Thus, the cows in the group are fed exactly what they need, and you know exactly what has been fed.

*“With the Vector, you can  
feed a lot of different groups  
with great accuracy.”*



**Nicolaas Zeldenrijk, Canada**

### Group flexibility

Lely Vector software requires only basic information about the ration. This makes adjusting to new group situations simple. You can easily move cows to another group, add heifers to the group or set up a completely new group.

### Ideal when combined with grazing

The composition and quantity of rations can be changed easily. Automatic feeding is also ideal in combination with grazing. During rainy or hot periods, grazing cows that are taking shelter in the barn can obtain an extra portion of food inside.





# Flexibility

## in your daily routine

The Lely Vector not only saves labor, it reduces stress. Filling the kitchen and periodic cleaning are the only requirements. The system frees your time to manage your farm the way you want to.

### Freedom to plan work and spare time

The Lely Vector's feed kitchen can stock feed three days ahead. This means work can be planned well in advance. Furthermore, since there is enough feed available in the kitchen to last longer than a weekend, it can create new opportunities for your spare time.

### Independence from external labor

Feeding cows is an important job. It can be done by you or by hired external labor. However, can you always trust others to feed correctly? With the Lely Vector, you program in your own feeding regime and enter the rations, routes and set-up of the kitchen in advance. Filling the kitchen is an easy job that can be entrusted to someone else, if required.



**8** HOURS OF LABOR  
SAVED PER WEEK

The Vector's kitchen requires filling once every three days. Our existing customers report a savings of more than eight hours per week compared to once-a-day feeding regimes and multiple feed pushing. Over the course of one year, this equates to a saving of 416 hours.

### Intelligent feeding

The Lely Vector knows where and when fresh feed is needed, and delivers it, no matter the time of day. The feed height sensor is an advanced feature that measures the exact amount of feed at the feed fence. It determines where and when fresh feed is needed without input from the farmer or manager. The system can also push up the feed between feeding times and simultaneously measure the amount of feed left over.

**"The Vector does its job 24 hours a day. You just don't have to worry about it."**



**Gaylen Nolt, Pennsylvania, USA**

# Flexibility for every farm — now and in the future

There are many different types of barns, each with their own physical advantages and limitations. This used to make investing in an automatic feeding system a matter of compromise. The Lely Vector offers superior physical flexibility, it is easy to install and comes with negligible preconditions for operation. It works in virtually any farm layout and can be adapted if that layout changes — even if those changes are substantial.

## Negotiates any barn

As an autonomous vehicle, the Lely Vector does not need extra support or profiles, power lines or rails. You can start right away with automatic feeding. The system does require a minimum feed alley width, but currently regular feed alleys are generally much wider. Narrower alleys significantly reduce construction costs and free up space for extra cows.

## Multiple barns — one feeding system

Using its inductive sensors, the Lely Vector can navigate to feed in separate barns. When youngstock or dry cows are in different locations, the Vector can easily be programmed to deliver feed to these groups, too. Weatherproofing means that it can drive outside without any problems.

## Expandable

Being comprised of modules, your Lely Vector system can be expanded, if necessary. One mixing and feeding robot can feed up to three hundred animals. To increase feeding capacity, a second robot can be added. While one is feeding, the other one can be loaded. This can extend the capacity of your system.

## Operational in all circumstances

The Lely Vector has been tested and validated in many countries worldwide. Currently used in more than twenty countries, it is suited to a wide range of climate conditions and environments. The system processes all kinds of feed types and rations. The feed grabber can handle blocks, round and square bales, and even grabs with great accuracy from out of a box. Filling the Vector with a tower silo is also possible. The Vector suits every farmer and fits almost all circumstances.

“A mixer wagon and a tractor would almost cost the same as the Vector, but wouldn’t give us the same independence.”

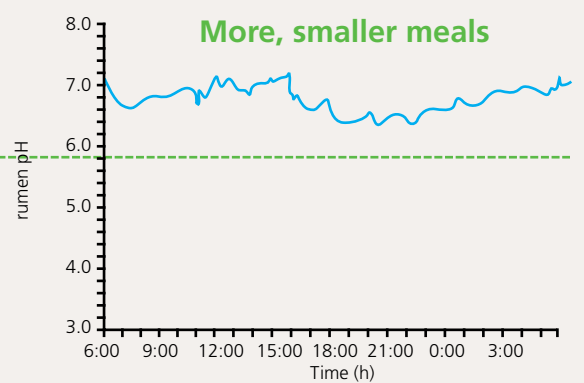
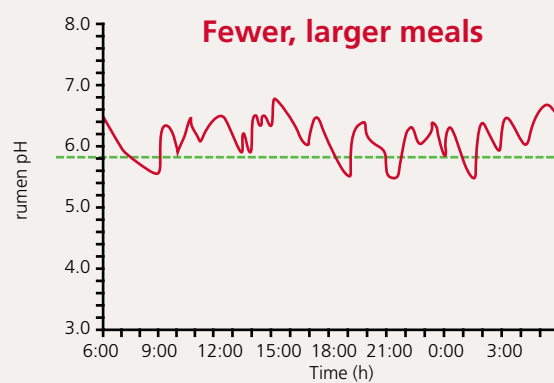


Lars and Simon Andersson, Sweden









Dohme et al. 2008. J. Dairy Sci 91: 3554-3567

# Fresh feed in well-mixed, **balanced** portions

Cows deliver their highest milk production when they are in top health. Good feeding is vital for achieving this. The Lely Vector serves fresh feed in well-mixed, balanced portions, helping to keep your cows in the best shape.

## Excellent and fast mixing

The Lely Vector loads the various feed materials in the best possible order. As a result, the ration only requires light and short mixing and particle size is left at the optimal length for supporting healthy rumen activity. In combination with greater dry-matter intake, this results in increased milk production.

## Everything tastes good

All cows prefer to eat the tastiest feed first. However, sorting the ration at the feed bunk causes larger fluctuations in the acidity (pH) of the rumen and decreases feed intake, which can lead to health problems.

By providing fresh feed several times a day, sorting is minimized. This results in higher dry-matter intake and minimum waste. Taste can also be preserved by feeding small portions several times a day in order to avoid the oxidation and heating that occurs with larger, less-frequent feeds.

## Higher feed intake

A healthy cow will naturally consume eight to twelve meals a day. Constant delivery of well-mixed, fresh feed by the Lely Vector system encourages cows to consume more and provides more opportunities for low-ranking animals to eat. This positively influences milk production.

## Safe storage for several days

The Lely Vector system can provide around-the-clock, year-round fresh feed. When ensiled properly, feed enters the kitchen in optimal condition. The feed remains fresh for days, because it is stored in blocks. This prevents oxidation, inhibits the growth of mold and bacteria, and safeguards food quality.

## HEALTHIER AND HAPPIER COWS. DO YOU KNOW WHY?

1. Increased salivary secretion and lower feeding rate (kg/min)
2. Smaller decline in rumen pH
3. Better rumen efficiency
4. Less waiting and fighting for a place at the feed bunk
5. More freedom for cows and more cow traffic

“Feed waste was significantly reduced after I started feeding with the Vector.

I clean the feed fence twice a week, but there is almost no feed to remove.”



Ola Kvarberg, Norway



# Make your feeding strategy profitable

Ensuring improved milk and feed efficiency while reducing operational costs is critical for profitability. Providing the best ration consistently is essential for healthy, high-producing dairy cows and reduced veterinary costs. A higher feed intake for all cows, including young heifers, results in better performance of the herd, especially of low-ranking cows.

## More frequent feeding

By presenting cows with a fresh ration at the feed bunk several times a day, their activity will increase. The cows visit the feeding robot more often and will require more milkings. By using a robotic milking solution, labor can be reduced further.

## Low running costs

Running costs for the Lely Vector system are extremely low and huge savings are achieved compared to the costs of operating conventional systems. The Vector's unique direct electric motors avoid the need for energy-inefficient power transmissions.

## Improved feed efficiency

A dairy manager must know how much feed is distributed to every group and how these groups are performing. Analyzing feed efficiency starts with precise reporting. With the Lely Vector, this is possible for different feed types and for the ratio of each feed type in mixed rations.

"Since we started feeding with the Vector, the feed intake has improved and production has gone up by 1.5 liters (.3963 gal) per cow. The cows are now milked 3.2 times a day."

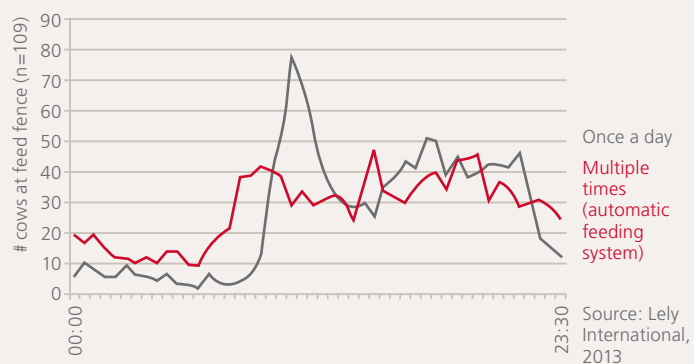


Corne van den Berg, The Netherlands



## FEED AVAILABILITY

Feed needs to be available and accessible around the clock.  
This can be achieved by pushing the feed several times a day.



# A clean, quiet, energy-saving, and safe system

## Consumes less energy

The Lely Vector uses less energy, because feed is dropped into the mixing unit in small quantities and a varied order, and mixing requires minimal energy.

## Eco-mode

The Lely Vector's mixing and feeding robot can be switched to an energy-efficient eco-mode when small amounts of feed need to be mixed. This reduces the required mixing time.

## No noise or pollution

The Lely Vector system is electrically powered. It is soundless and does not disturb the herd, or people, in any way. It is also emission and pollution free. The herd very quickly becomes accustomed to the system.



## SIGNIFICANT FUEL SAVINGS

Electricity and fuel use were monitored on two farms in the Netherlands over a two-year period — for one year up to and one year after installation of the Lely Vector. The figures show the savings achieved by using the Lely Vector.

	Decreased fuel usage	Increased electricity usage
Farm A	1,535 gal (5,811 liters) per year	8,030 kWh/year
Farm B	984 gal (3,728 liters) per year	7,760 kWh/year

Based on prices during the period of monitoring, Farm A saved almost \$6,954 and Farm B more than \$3,744.





## Maximum use of every kW

Our extensive experience in developing autonomous vehicles, such as the Lely Juno feed pusher, helped us develop the Lely Vector system. Tried and tested expertise in gears, batteries, etc., was able to be transferred in developing the Vector to ensure that it provides maximum use from every kilowatt of power.

## Safety features

Extensive attention was paid to safety for animals and humans in developing the new system. It meets stringent international standards. Safety features are integral to its design, for example, the feed kitchen itself can only be opened when it needs to be filled. Depending on the individual farm layout, additional safety doors and/or safety fences can be installed.

“My aim is to create an energy-closed farm. With investment in the Lely Vector, we made a big step towards, that goal. Our solar panels supply the energy needed. The Vector consumes 21 kWh/day.”



Jan Borgman, The Netherlands



A comprehensive and  
**intelligently**  
engineered system





## FOUR RULES OF GOOD MIXING

- 1 Load long crops before short ones, and dry crops before wet ones.
- 2 Avoid underloading or overloading.
- 3 Adapt the mixing time to the crop conditions.
- 4 Consider the right time to add supplements or water.



## Mixing and feeding robot

The mixing and feeding robot of the Lely Vector system is a self-contained, battery-operated vehicle that is capable of automatically feeding a self-mixed ration.

## Feed kitchen

The feed kitchen is the area in which the feed is stored, selected, picked up and loaded into the robot for mixing. In the kitchen, a crane construction with a feed grabber is installed. It moves above the kitchen to the right block of feed to load the Lely Vector. Depending on the width and depth of the kitchen, it can easily stock feed for three days.

## Specifications

Dimensions of mixing and feeding robot	
Length	96 <sup>27</sup> / <sub>32</sub> in (246 cm)
Width	63 <sup>25</sup> / <sub>32</sub> in (162 cm)
Weight	3,273 lbs. 13.8 oz. (1,485 kg)
Height with sliding door open/closed	109 <sup>29</sup> / <sub>64</sub> in/75 <sup>63</sup> / <sub>64</sub> in (278 cm/193 cm)
Mixer volume	6 ft 6.7 in <sup>3</sup> (2 m <sup>3</sup> )
Capacity and requirements	
Max. capacity one robot (animals)*	250 – 300
Max. capacity two robots (animals)*	500
Max. number of groups	16
Surface floor	Flat
Max. slope	5 %
Required min. width of feed alley	
Feeding on both sides	127 <sup>61</sup> / <sub>64</sub> in (325 cm)
Feeding on one side (with return)	122 <sup>3</sup> / <sub>64</sub> in (310 cm)
Feeding on one side (without return)	102 <sup>23</sup> / <sub>64</sub> in (260 cm)
Corridor without feeding	108 <sup>17</sup> / <sub>64</sub> in (275 cm)

\* Can vary depending on individual farm and ration.

# From the office to the herd

Applying more than twenty years of experience, Lely has developed the world's first dedicated and complete farm management system for robotic milking and feeding: Lely T4C (Time for Cows), which connects all Lely equipment and provides a complete information system for producers. In addition, Lely Control and Lely T4C InHerd for mobile phone or tablet provide information on equipment settings, herd monitoring and analyses. They present clear, easy-to-use and useful information to help you make decisions more quickly and easily.

## Strategy

For strategic settings and long-term analysis, the Lely T4C desktop can create extensive but clear reports to help you assess feed accuracy, efficiency and management. This is particularly useful in discussing and planning the feeding strategy with key personnel or advisors.

## Daily use

Lely T4C, combined with Lely Control, enables direct control of the feed management on a daily basis. You can create and set rations, fill the feed kitchen or adjust the route of the mixing and feeding robot directly with this application. Key Performance Indicators (KPIs) provide direct information on the dry-matter intake, feed efficiency and different feed quantities of the various groups in your herd. With this information, your feeding strategy can be streamlined from day to day.

## Feed kitchen

Various groups in your herd require different rations and feed types. These feed types are stored in the library of the system to facilitate filling the feed kitchen. With a single touch, select the correct feed type at the correct location. Additional information, such as dry-matter percentage and feed price, can be set.

## The perfect mix

To serve the best ration to your herd, mixing is crucial, but it is different per ration. Therefore, the loading sequence, grab depth, mixing time and counter knife adjustments can be set per ration. This allows you to feed the optimum ration based on the needs of your herd. With a simple touch you can stop and start the mixing and feeding robot at any moment.

## Feed efficiency

Lely T4C provides full control and new insights for improving your farm's operation. By combining the amount of feed distributed by the Lely Vector with the milk yield, T4C constantly tells you what feed efficiency you achieve.

**"We really like the information that we get from the Vector and from T4C."**



**Corjan and Sandra Doornenbal, Canada**





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## LELY T4C — MODERN FARM MANAGEMENT THE EASY WAY

Connected

Lely Astronaut  
automatic milking system

Lely Vector  
automatic feeding system



### T4C communication devices

- T4C office PC
- T4C robot control panel (manager model)
- T4C InHerd Phone/Tablet

### Analyzed information

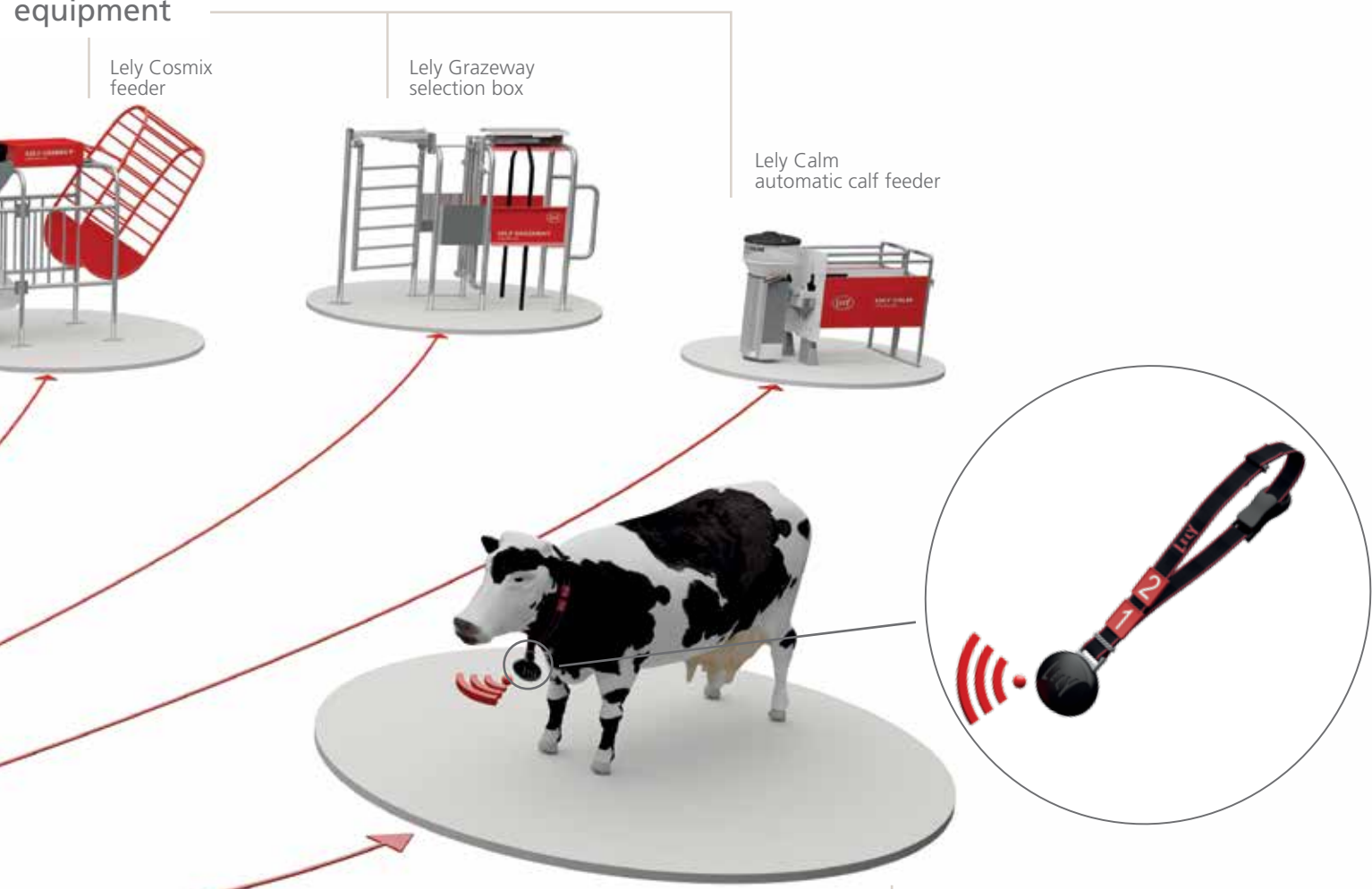
- Cow health
- Milk production
- Milk quality
- Cow activity

### Benchmark

Lely T4C benchmark makes it possible to compare farm management information with colleague farms all over the world.



equipment



Lely Qwes health and reproduction monitoring

A unique, collar-mounted cow identification and activity sensor to determine health problems and heat at the earliest stage.

Information from the Lely Astronaut

- Milk color (per quarter)
- Fat/protein indication of the milk
- Lactose indication of the milk
- Conductivity of the milk (per quarter)
- Milk temperature
- Somatic cell count category per cow
- Cow weight
- Milk production
- Feed intake
- Rest feed
- Milking time/dead milking time
- Maximum milking speed
- Number of milkings
- Number of refusals

Information from the Lely Qwes

- Rumination minutes of the cow
- Cow activity

Information from the Lely Cosmix

- Feed intake
- Rest feed

Information from the Lely Vector

- Forage fed per group
- Feed efficiency

Information from the Lely Grazeway

- Based on time since last milking, cows will be directed to specific areas.
- Based on customer needs and farm setup, cows will be directed to specific areas.

Information from the Lely Calm

- Milk intake
- Weight
- Number of failed milkings
- Boxtime



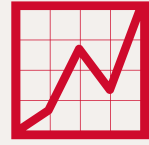
1.

Agreement  
on purchase details



2.

Advice on kitchen set-up  
and routing on the farm



3.

Advice on feeding and  
cow management

# Steps to successful automatic feeding

Once you have decided to invest in the Lely Vector, our expert team can assist with every aspect of getting the system installed and operational on your farm.

The timeline on this page shows the ideal flow of events for a successful start-up.



7.

Installation of system



8.

Basic training  
and start-up



9.

Vector farm  
management training





4.

Discussion on how to align construction and safety preparations



5.

Preparation of the farm and equipment



6.

Double check safety, construction and logistical plans

“We could not have imagined that the Lely Vector would work so reliably from the start.”



Carsten Geßler, Germany



10.

Customer satisfaction check



11.

Ongoing support and advice



12.

Ongoing analysis and advice

# Dairy farming is what we **live** for



Coming from a farm, we know what it is like to wake up early in the morning. We know how it is to spend hours in the barn, day in, day out, ensuring optimal treatment of your herd. We understand how you work, and why.

## Unique range of equipment

The quality and quantity of feed largely determines how healthily and efficiently milk can be produced. Lely is the only manufacturer to offer a complete range of milking, feeding and barn equipment. This experience helped us when developing the Lely Vector.

## Service beyond bolts and software

Lely's expert consultants are dedicated to ensuring that you get the best possible benefit from our products and services. While the high-quality Lely Vector comes with a guarantee for one year, our service engineers are available around the clock. Our passion for innovation goes beyond the technical features of our products to cover all practical and management aspects on the farm. Lely ensures that all of its service engineers stay up-to-date on the newest techniques through training and testing organized by the Lely Academy.





## Lely Center concept — dedicated and educated

The Lely Group has developed the Lely Center concept to secure the availability of professional sales and service for Lely products in local areas worldwide. We ensure that all of our service engineers stay up-to-date on the newest techniques. They are trained and tested every year on the current state of their knowledge, as set out by our Lely Academy. Of course, they are at your service 24 hours a day, 7 days a week.

“There were surprisingly few errors during the start-up of feeding with the Lely Vector, and the few errors that occurred were handled immediately by the people from Lely.”



**Steen Kildahl Hansen, Denmark**



Lely has a long and deep history of recognizing the needs of modern dairy producers. Our products are developed with the cow as the starting point. We strive to let her excel and supply products to dairy producers and contractors ranging from feeding, housing, caring, milking and energy sourcing. In addition, we boast specific knowledge and experience in helping dairy producers to get the best out of their equipment. Our in-depth knowledge of the complete farm cycle — from grass to glass — is unrivaled in the agricultural business.

*We are committed to a sustainable, profitable and enjoyable future in farming.*

Lely, Astronaut, Astri, C4C, Calm, Caltive, Cosmix, Discovery, Grazeway, Lely, L4C, Lely Center, Lelywash, Luna, Orbiter, Qwes, Shuttle, T4C, Vector, and Walkway are registered trademarks of the Lely Group. The right of exclusive use belongs to the companies of the Lely Group. All rights reserved. The information given in this publication is provided for information purposes only and does not constitute an offer for sale. Certain products may not be available in individual countries and products supplied may differ from those illustrated. No part of this publication may be copied or published by means of printing, photocopying, microfilm or any other process whatsoever without prior permission in writing by Lely Holding S.à r.l. Although the contents of this publication have been compiled with the greatest possible care, Lely cannot accept liability for any damage that might arise from errors or omissions in this publication.