



Latvia University  
of Life Sciences  
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are shaped here.*

# THE POSSIBILITIES OF SENSOR TECHNOLOGIES IN MODERN DAIRY FARMING

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# Data Driven Dairy Decisions for Farmers (4D4F)



[www.4d4f.eu](http://www.4d4f.eu)

4D4F thematic network is focused on the role which dairy animal and environmental sensors can play in collecting real time information to help make more informed decisions in dairy farming.

- The project is aimed to the use of smart technologies and use of collected data in modern dairy cow and goat farming.
- In project are included partners from 16 organizations from 9 European countries.
- The beginning of the project is traced in 01.03.2016 and it will continue until 28.02.2019.



## The areas covered by project

[www.4d4f.eu](http://www.4d4f.eu)

**In project will be developed Best Practice Guides (BPG's) and Standard Operation Procedures (SOP's) about available sensors and modern technologies for monitoring of:**

- Activity and Behavior
- Calves and Young stock
- Data management
- Fertility
- Grassland management
- Housing
- Lameness
- Metabolic diseases
- Milking data
- Nutrition
- Udder health





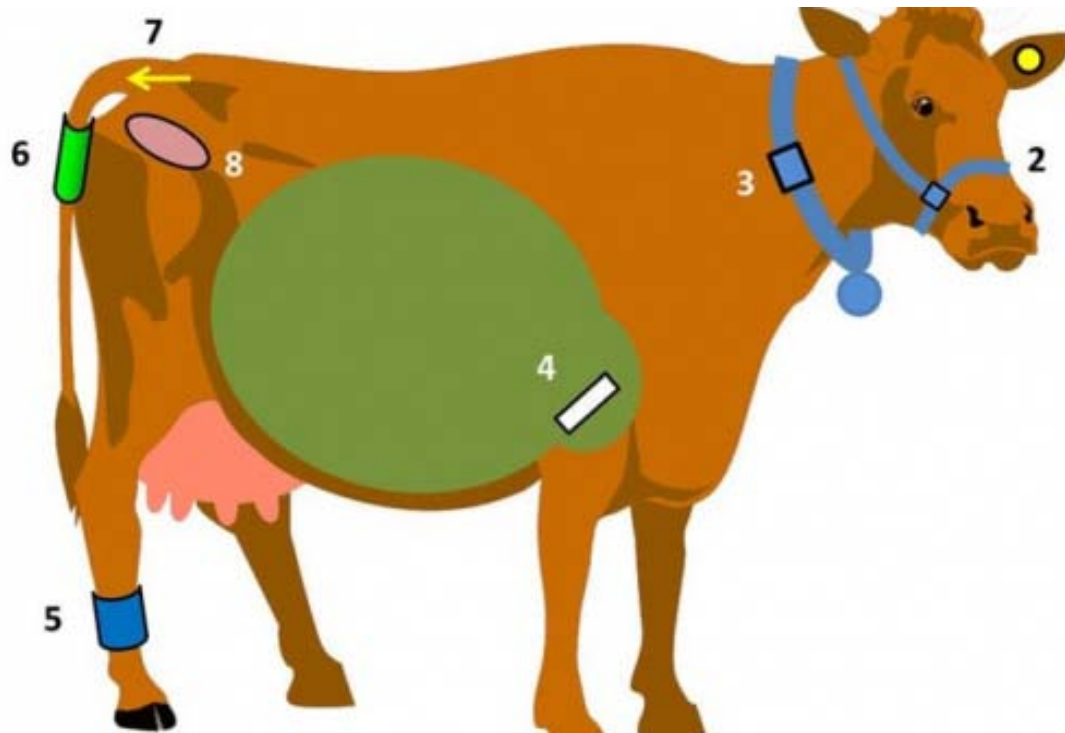
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# The development of milking technologies





## Sensors in dairy farming



- There are many different sensors that can be used in the dairy farms.
- The most common ones are located close to cow (on different body parts as well as in the cows body)
- Different sensors are responsible for different areas in farm. For example, climate control system is responsible for the microclimate in the farm.



# The main advantages from innovations and modern technologies in farm is:

- 
- Increased milk productivity
  - Increased number of calves per year
  - Prolonged lifespan
  - Reduced risk of premature culling
  - Reduced labor and veterinary costs per animal
  - More precise heat detection and service efficiency
  - **Better quality of farmers life**





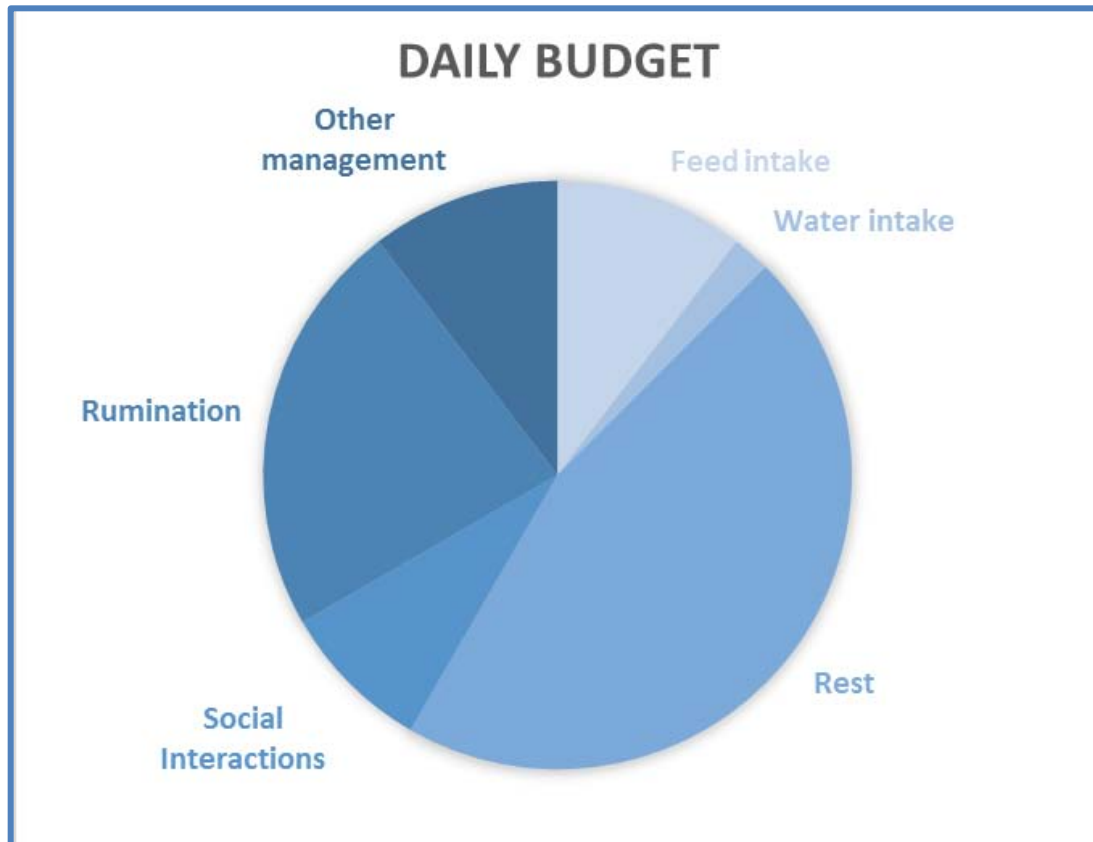
## Activity sensors

- Round the clock work time
- Lowered number of culled animals
- Easier heat detection
- Lowered costs of veterinary medicine and labor
- Continuous access to data





## Behavioral sensors



- Influenced by different in-farm factors that affects laying and sleeping time
- Heat stress
- Milking system
- Phase of lactation
- Direct correlation between leg and hooves health and sleeping time
- Lameness induced feeding time





# Dairy cow longevity in Voluntary milking system

- With the increase of the **knowledge** about the needs of high yielding cows comes more intense farm modernization.
- One of main technologies that improves the cow **daily time budget**, the productive performance of animals and also the life quality of farmer is **voluntary milking system (VMS)**
- One of main benefits of VMS in dairy farms in the long run is **standardized milking procedure** that improves the milk quality and, after adaptation period, milk productivity.



## Dairy cow longevity in Voluntary milking system

The cows with low milk productivity and poor milk quality are often removed from VMS group and **culled early** thus shortening their potential lifespan.

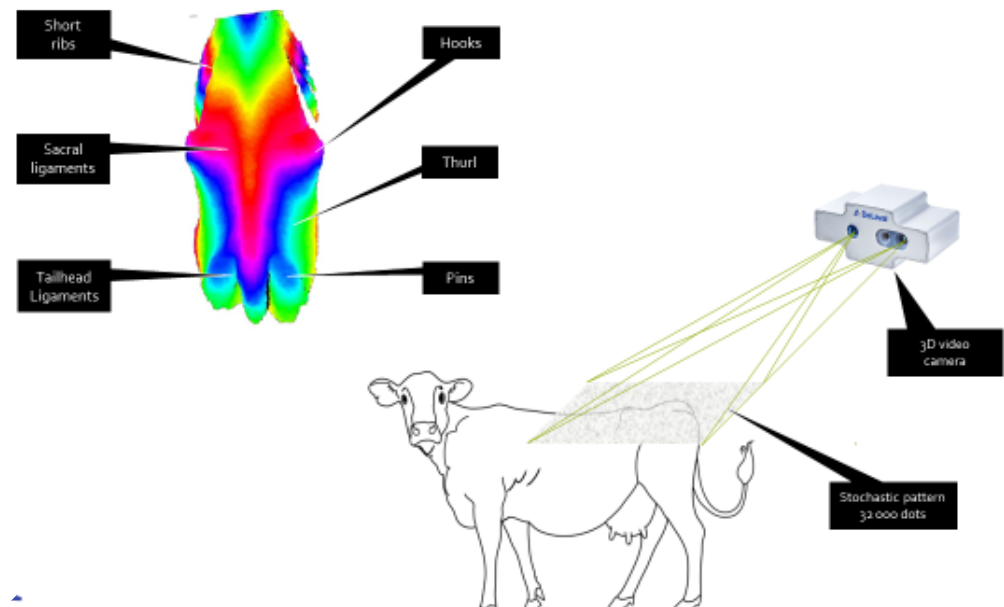
To avoid the **involuntary cow removal** from VMS and the shortening of the productive lifespan, it is necessary to analyze the dairy cow **suitability** for the system.

The analysis of the cow **milk productivity and quality** in the first lactation can serve as the useful **indicator** for the prognosis of the length of each cow lifespan.



# Body condition scoring (BCS) cameras

- Improve overall health conditions
- Gives the opportunity for fast feed ration improvement
- Improves metabolic disorder detection in farm
- Reduces the veterinary and labor costs





## Temperature sensors

- Specially for calves up until the age of 2 months
- Takes measurements every 15 minutes
- Alerts every case of increased temperature
- Helps timely detect viral diseases  
inflammatory  
processes

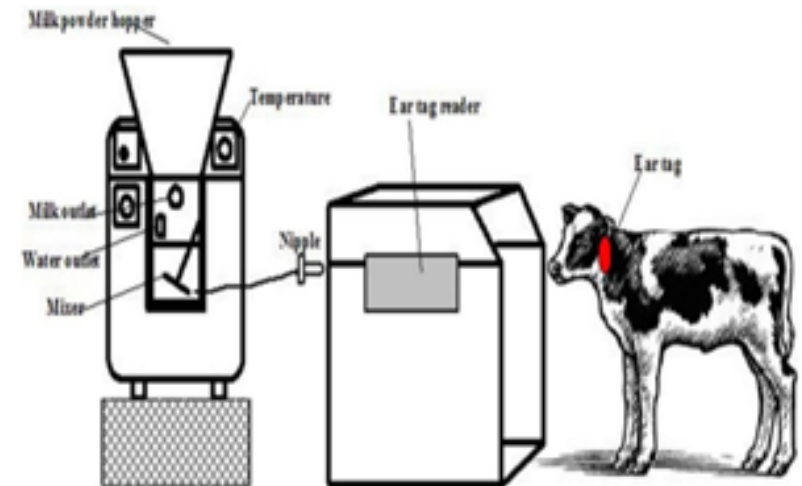






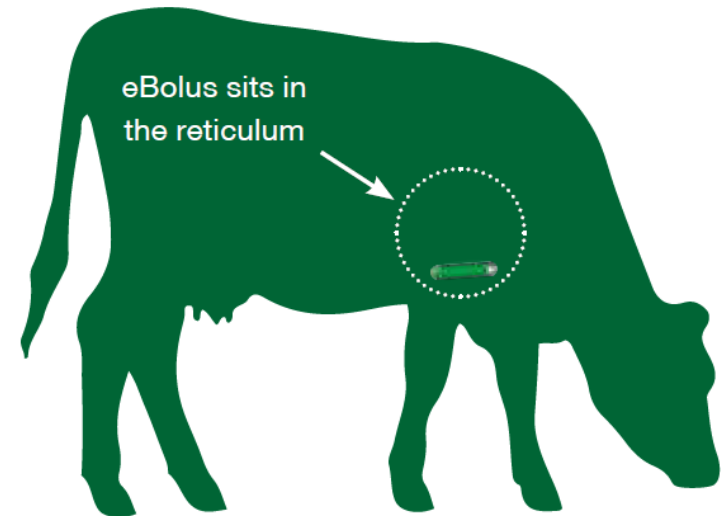
## Automatic calf feeding

- Reduced amount and time of work
- Perfectly balanced feed ration reduces the surplus of feed and building costs
- Significantly lower energy costs
- Increased work efficiency and potential profitability





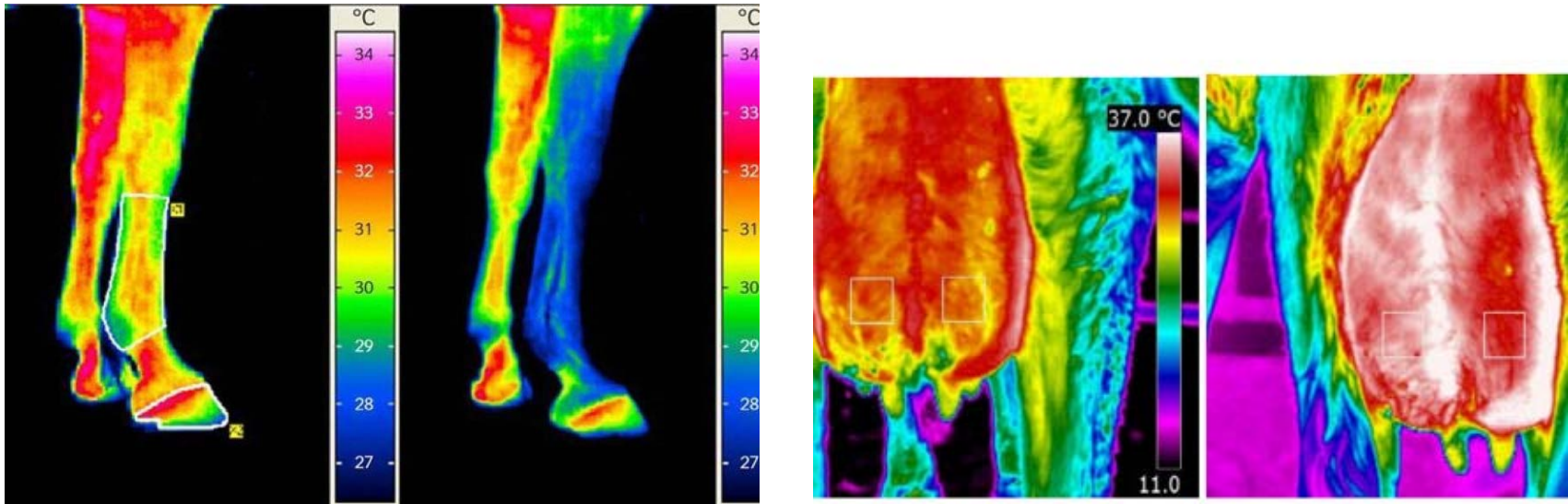
## pH, temperature and activity



- Internal sensors that stays in cows rumen throughout her life
- Records data every 5 minutes
- Reads data whenever cow is close to the data receiver
- Data stored for 120 days
- Durability can vary from 3 months up until 3 years



## Thermal imaging



- Helps timely detect different traumas or local body temperature incensement that cant be visually seen
- Decreases the costs of veterinary medicine as well as different labor costs



# Conclusions

- In modern farming systems there are possibility to improve almost every aspect of cows life, including climate control, feeding, cleaning and milking processes
- Sensor technologies provides real time data about each individual animal, that can help take reasonable and well informed decisions about cow health conditions, welfare and reproductive state
- As the modern technologies are expensive for the every day buyer, the benefits of technology use far outreach the costs. At the end, in farms with sensor technologies, the costs per one animal are significantly lower





Thank You for Your  
attention!