

---

# **Data Networking in Precision Livestock Farming for Improved Calf Rearing**

**CIGR World Congress 2006**

**September 3-7, 2006**

**Bonn, Germany**

**Viktoria Spreng**

**Matthias Rothmund**

**Hermann Auernhammer**



**Weihenstephan Center of Life and Food Sciences**

**Department of Life Science Engineering**

**Agricultural Systems Engineering**



# Structure

1. Introduction and objectives
2. Experimental setup
3. Utilized technology
4. Data networking
5. Recorded parameters
6. Conclusion and outlook

# Precision Livestock Farming

## Information Technology in Livestock Farming

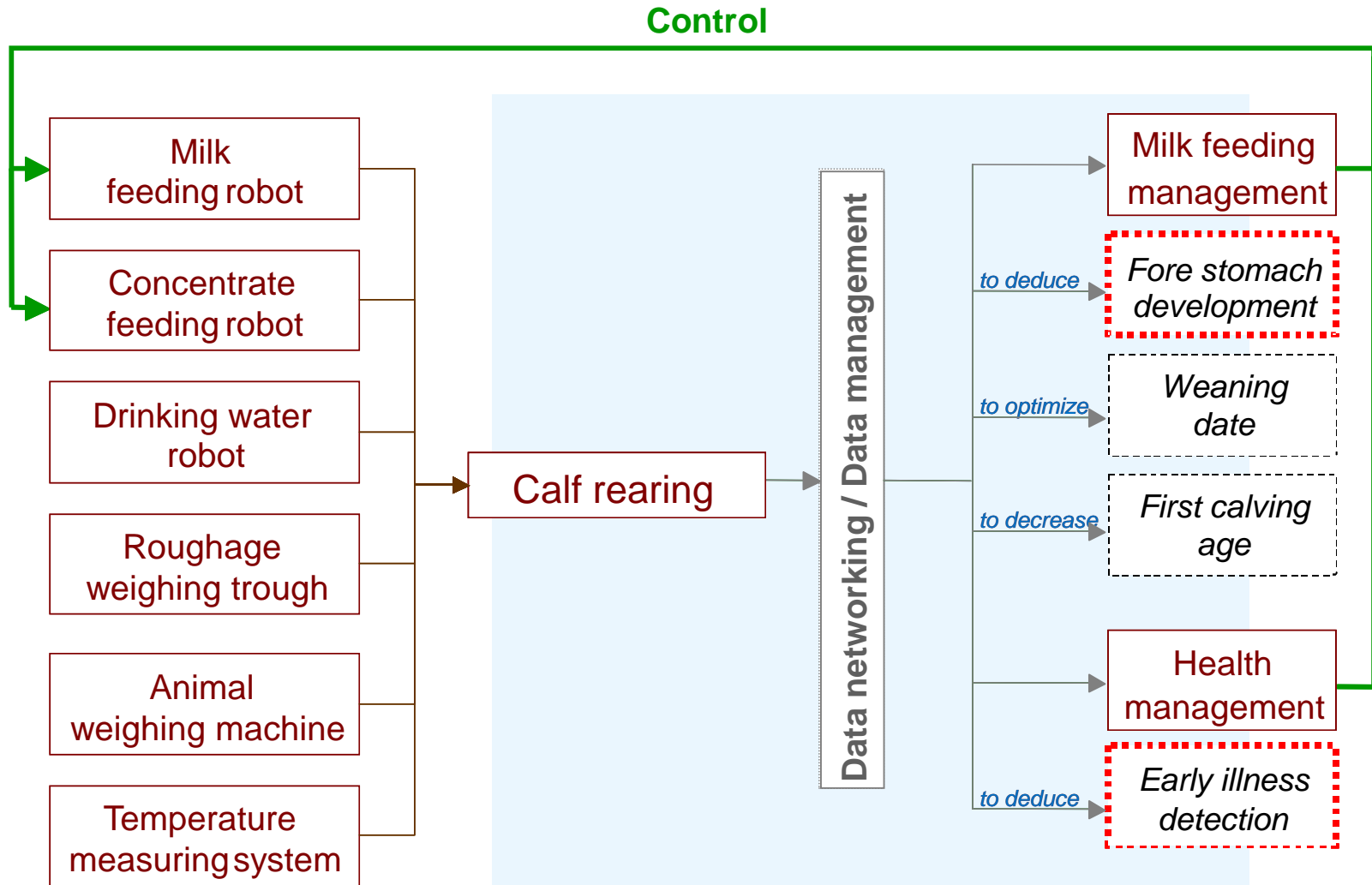
- Creates better management information for animal production by networking electronic process control systems.

## Electronic systems

- Provide information about food intake, animal behavior, animal health and other parameters.
- Data have to be acquired, validated, processed and fed back to control of the overall system.
- Unusual or critical situations can be detected as early as possible.

**But: Many proprietary solutions of different manufacturers available.**

# Data networking in process control – calf rearing



# Aims and method

### **Aims of the research project:**

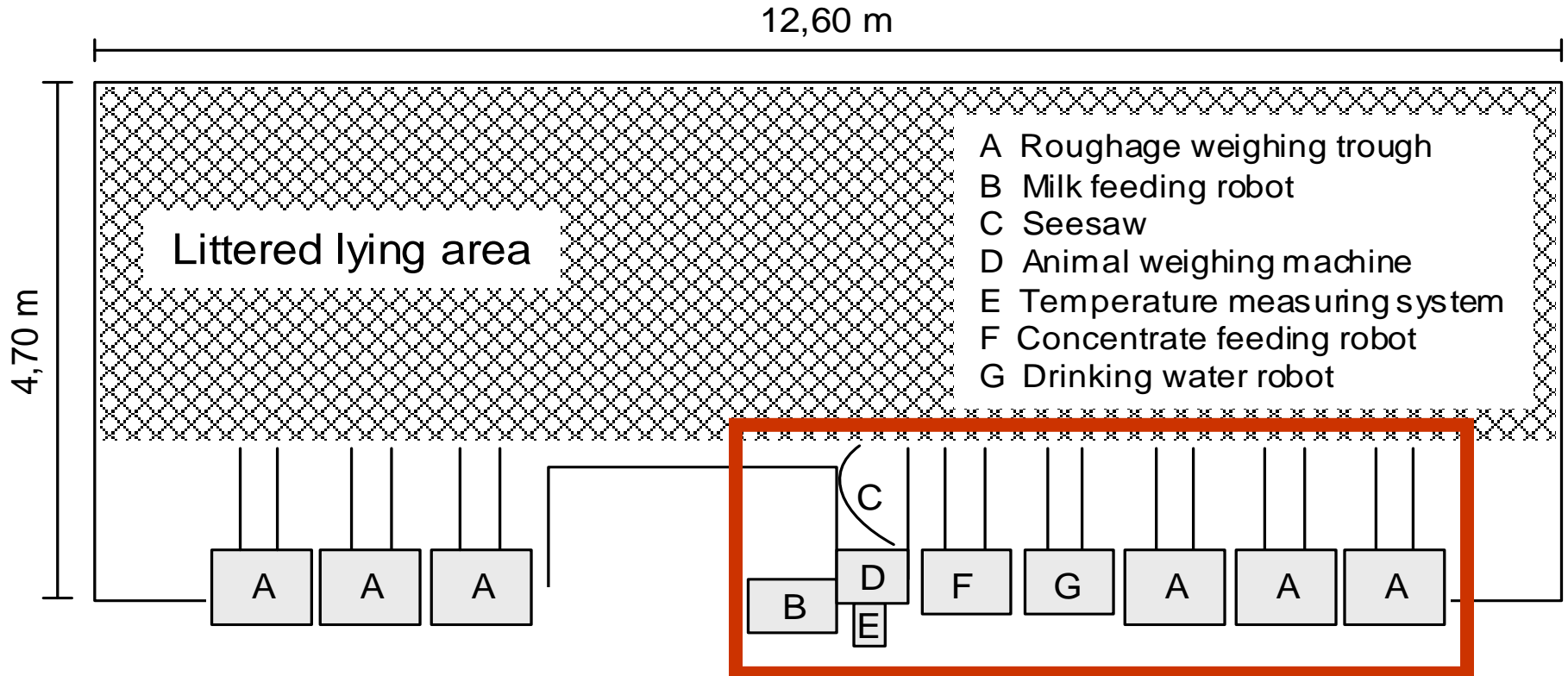
- Estimation of technical and informational requirements
- Deduction of the potential of complex networked systems in calf rearing

### **Method:**

- Implementation of a comprehensive feeding and monitoring system for calves
- Linkage of all - up to now available - technical components
- Acquisition of highly resolved process parameters  
(individual milk, water and feed intake, body weight, body temperature)

# Technical setup for controlled calf feeding

Site: Experiment farm ,Hirschau', Technische Universitaet Muenchen



## Technical setup - Hirschau

### Concentrate feeding robot

Mechanical flap for sensing whether

### Automatic roughage weighing trough

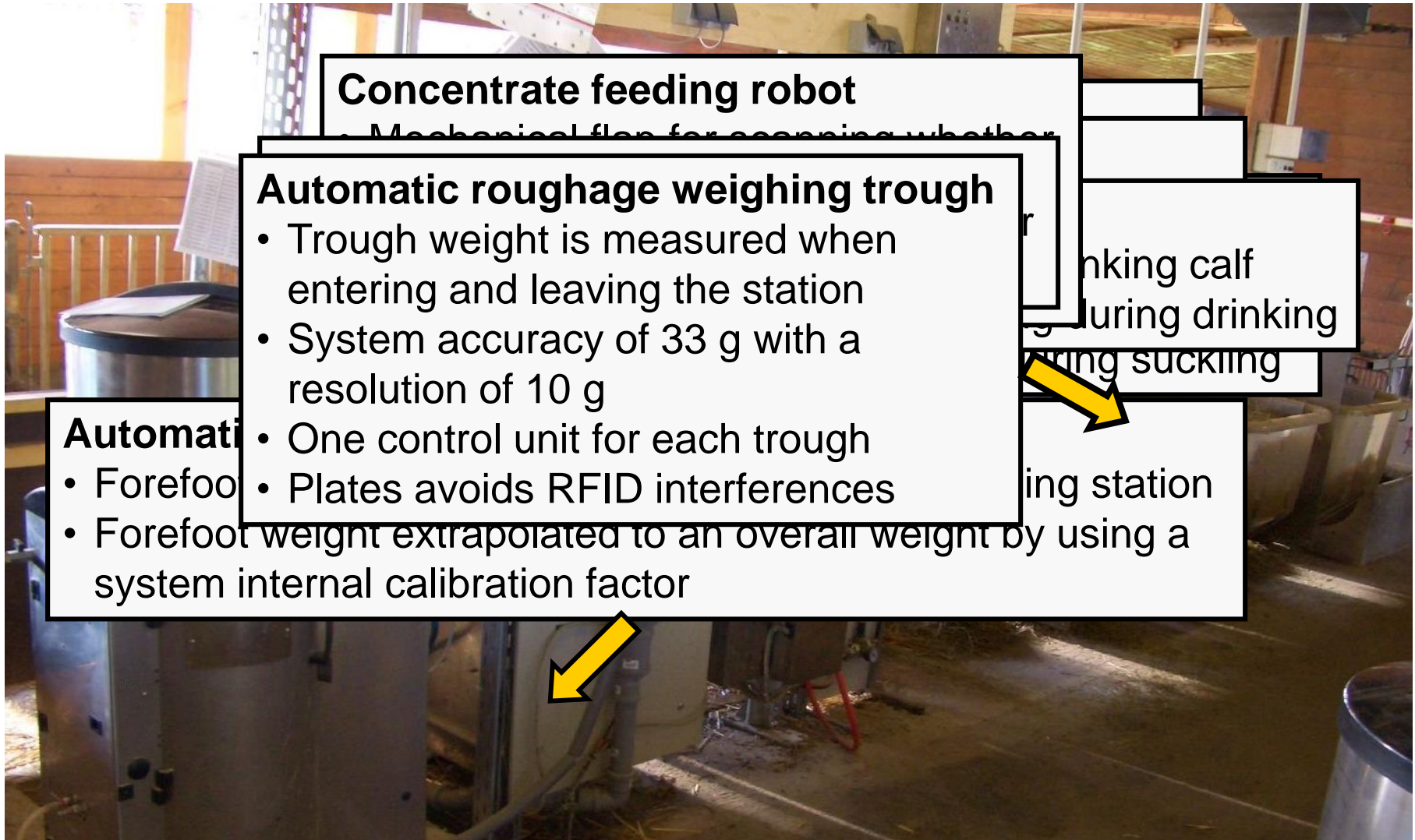
- Trough weight is measured when entering and leaving the station
- System accuracy of 33 g with a resolution of 10 g
- One control unit for each trough
- Plates avoids RFID interferences

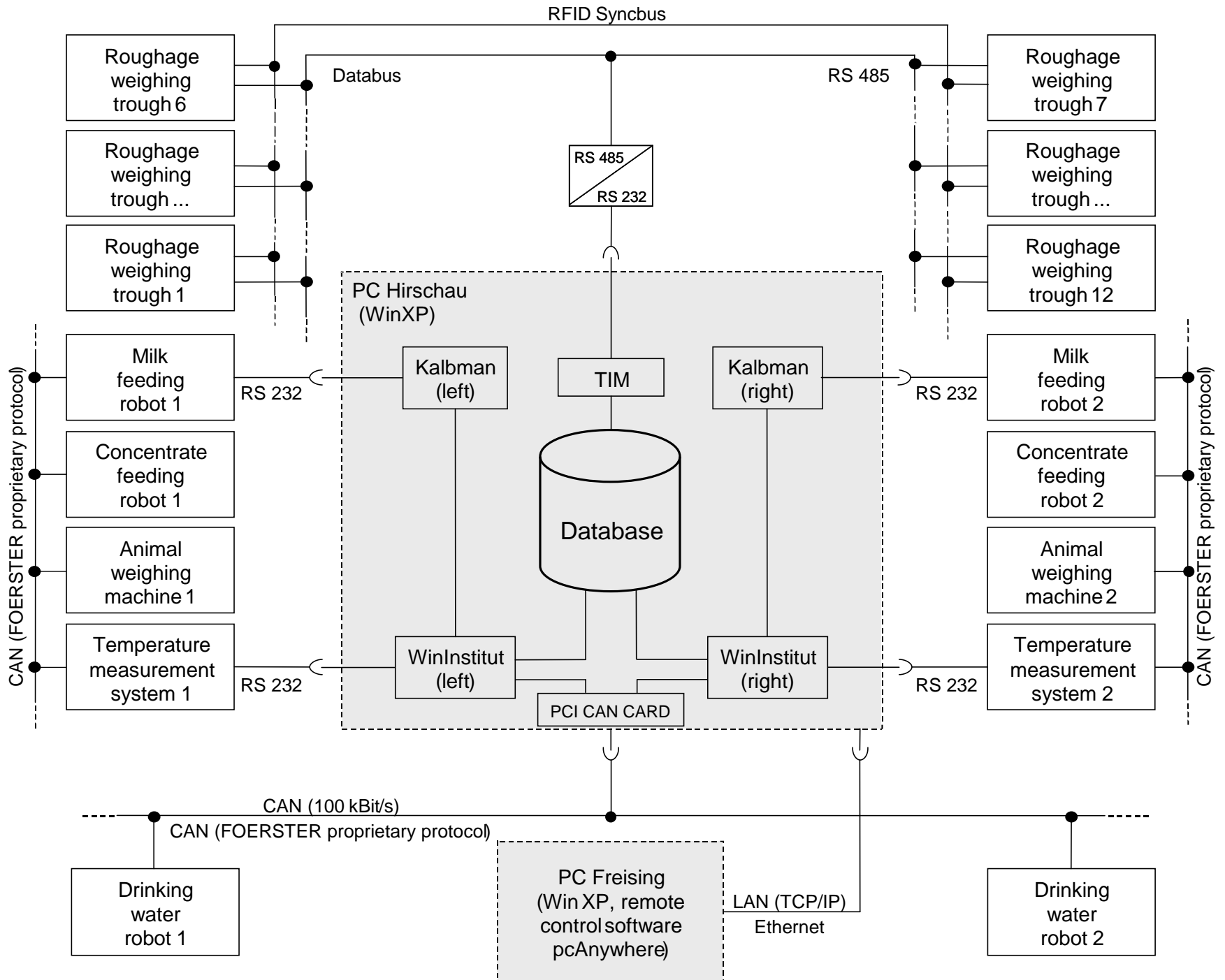
### Automatic

- Forefoot weight extrapolated to an overall weight by using a system internal calibration factor

inking calf  
during drinking  
during suckling

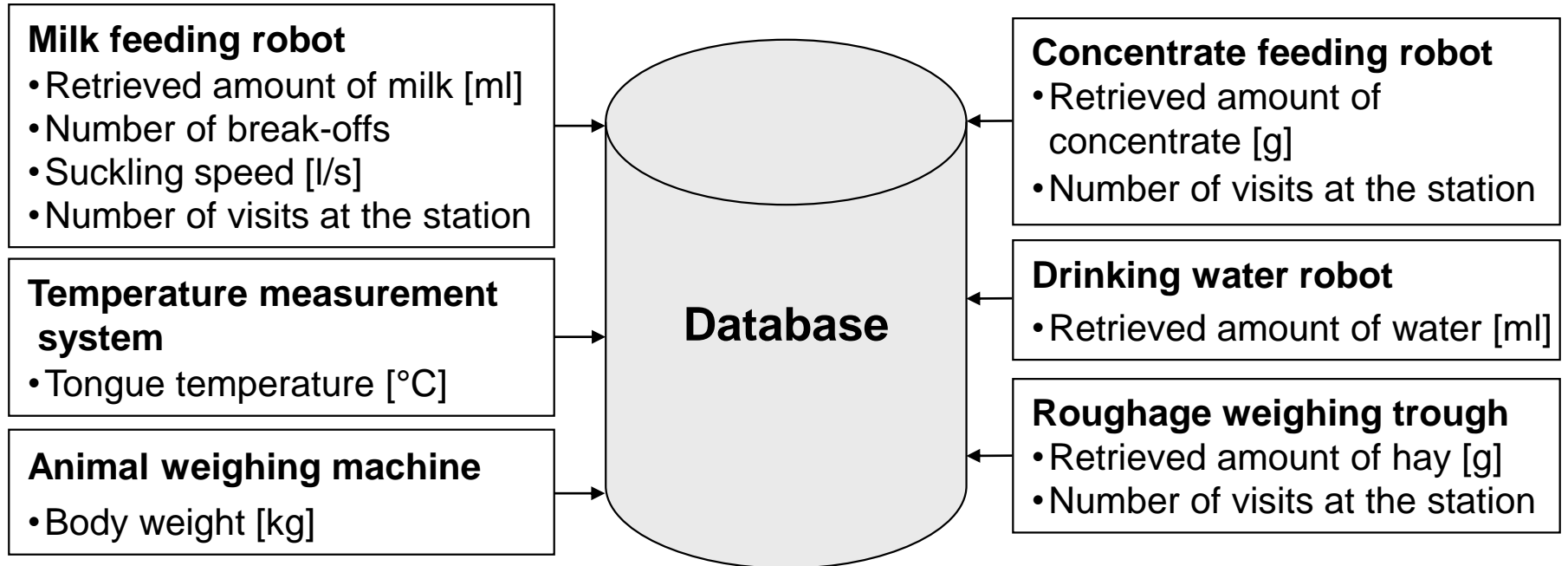
ing station



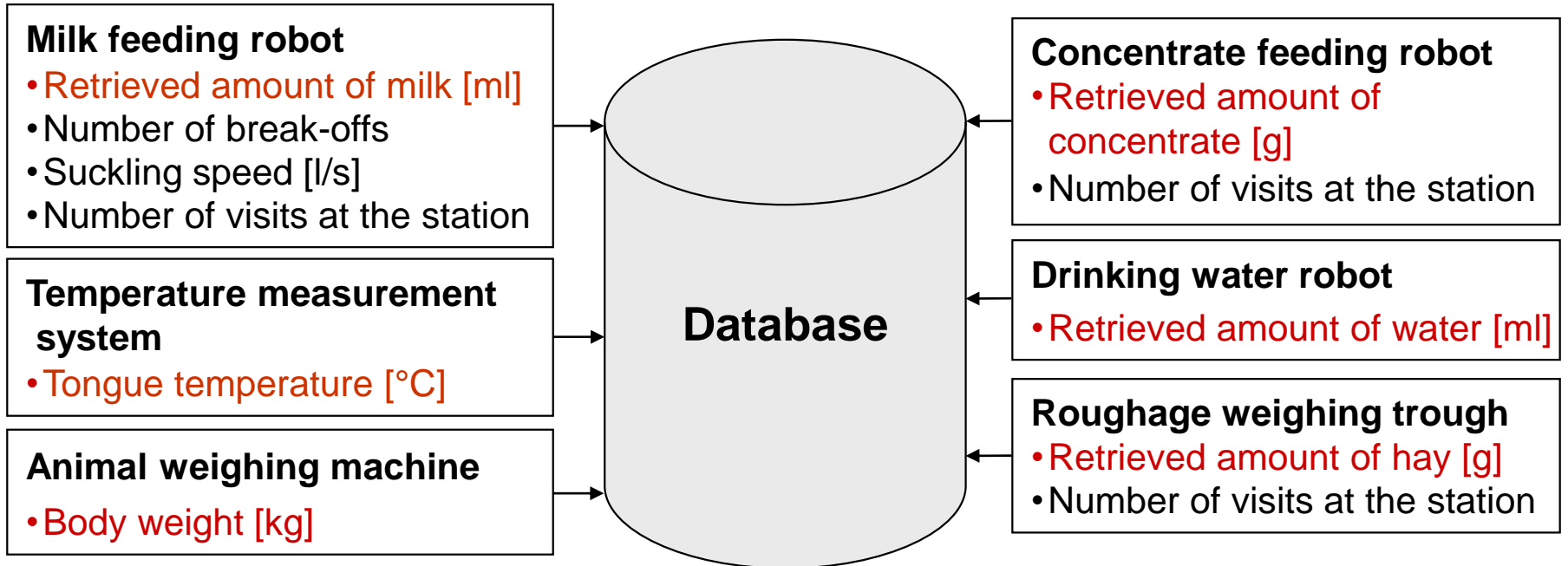




# Calf individual recorded parameters

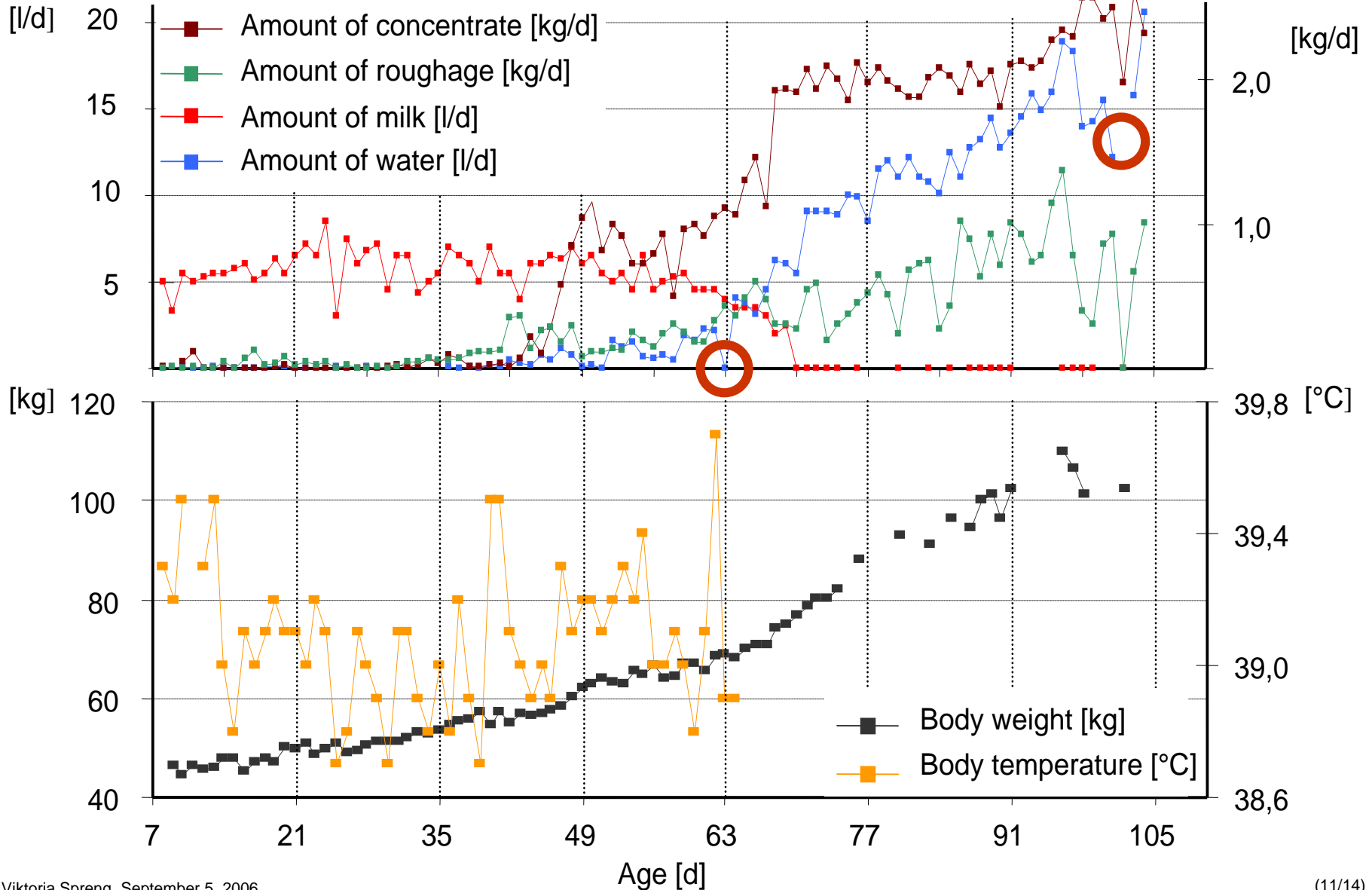


# Calf individual recorded parameters



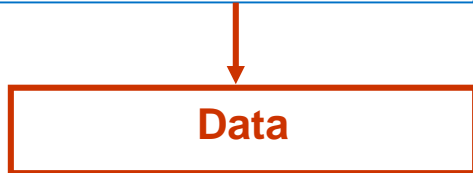
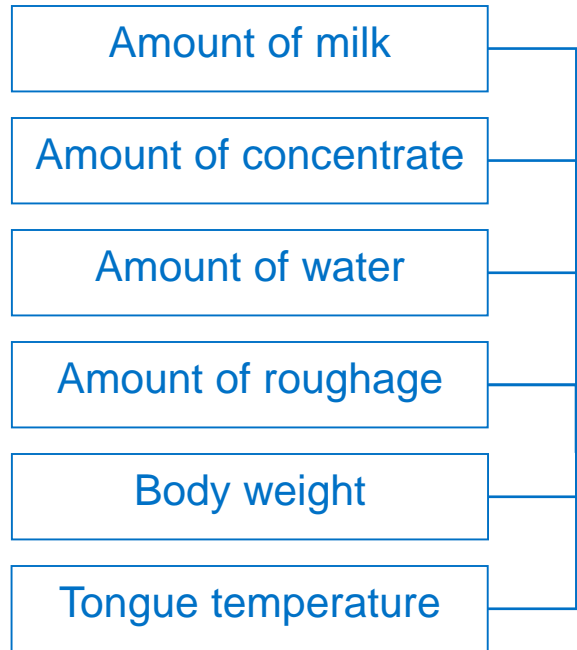
## 5. Recorded parameters

### Example – data of calf no. 817

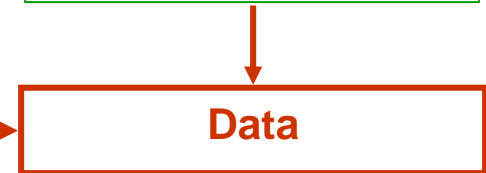
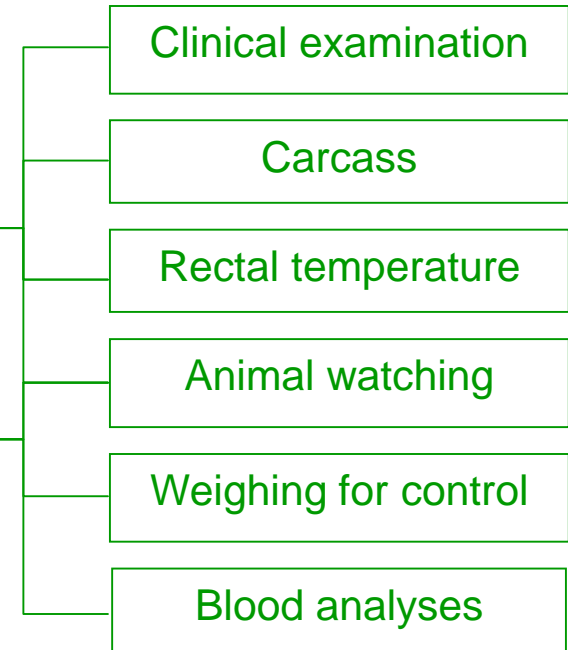


# System validation using control parameters

## Technical parameters



## Control parameters



**Validation**

# Conclusion

- The established calf feeding and monitoring system allows to get individual, highly resolved data.
  - By networking, the data of the single technologies can be fed into one common database.
  - Control measurements are necessary to validate the technical acquired data.
- Early illness is detectable and fore stomach growth can be estimated.

**After further processing and data networking, algorithms have to be developed for the implementation within a knowledge-based decision support system.**

---

# Thanks for your attention !

Thanks for supporting this research project to:

- **Foerster-Technik GmbH**  
(Engen, Germany)
- **DeLaval GmbH**  
(Glinde, Germany)
- **Bavarian State Research Centre for Agriculture (LfL)**  
(Freising, Germany)

Contact:

[viktoria.spreng@wzw.tum.de](mailto:viktoria.spreng@wzw.tum.de)