Long-term measurement of rumen pH in dairy cows by an indwelling and wireless data transmitting unit

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Introduction

- ➢ Rumen Acidosis (SARA-20 %) and clincal cases
  pH 6.2 – 7.2 normal
  pH 5.8 – 6.2 critical range
  pH 5.5 – 5.8 subclinical Rumen Acidosis
  pH   < 5.5   clinical Rumen Acidosis

- ➢ Exact definition of RA/SARA
  - ▪ how long under a critical pH-limit?
  - ▪ how often under a critical pH-limit?
  - ▪ how fast under a critical pH-limit?

- ➢ Different rumen fluid sampling techniques (oral stomach tubes, rumenocentesis, rumen fistula)
  - ▪ No continuous measurement

- ➢ Different locations (reticulum, fibre matt, sacc. ventr.,..)
  - ▪ Differing pH-values

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Introducing Indwelling pH Probe with Data Transmitting Unit *(Gasteiner et al. 2009)*

➢ Developed an indwelling sensor

➢ Continuous measuring of pH and temperature

➢ Measurement times are user selectable (10 min.)

➢ Stored data are transmitted (ISM-Band 433 mHz) to an external receiver

➢ Receiver is connected via web with a server

➢ A software analyses and displays the results

➢ pH probes can be given to cows orally

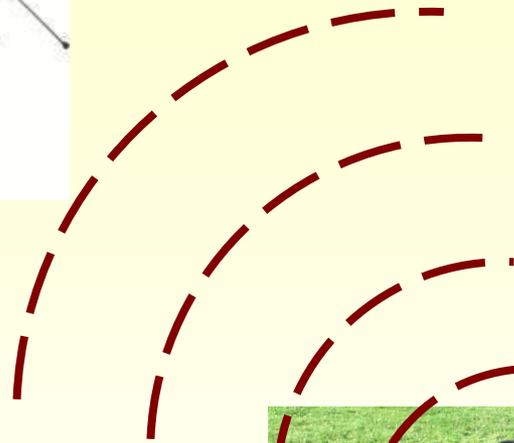➢ Period of continuous measurement is up to 100 days (50 days guaranteed valid data)

pH-Probe: Dimensions

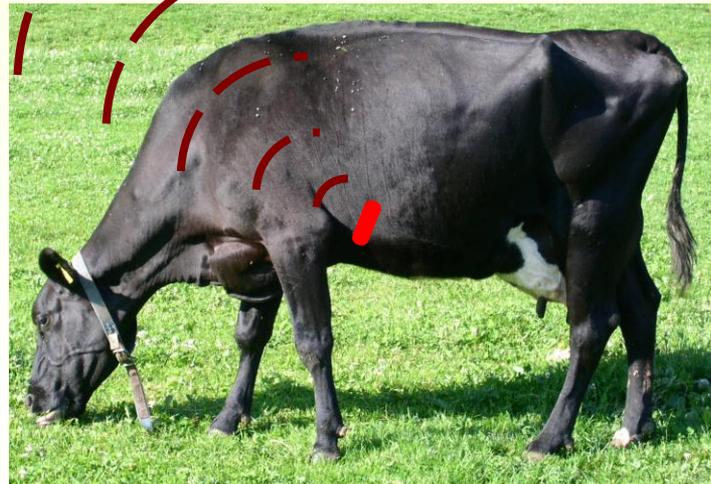**(Length 120 mm, Diameter 36 mm, Weight 208 g)**

Receiver

Web-Server

Radiotransmission of Data

(pH and temperature)

Software for Analysis

Objectives

➢ **Continous measuring of ruminal pH**
- under practical conditions
- in high yielding dairy cows

Control the feasability of the system

➢ **Correlation ruminal pH**
- Feeding conditions (rations composition)
- Feeding management

➢ **Interpretation of data**

- Individual animal data
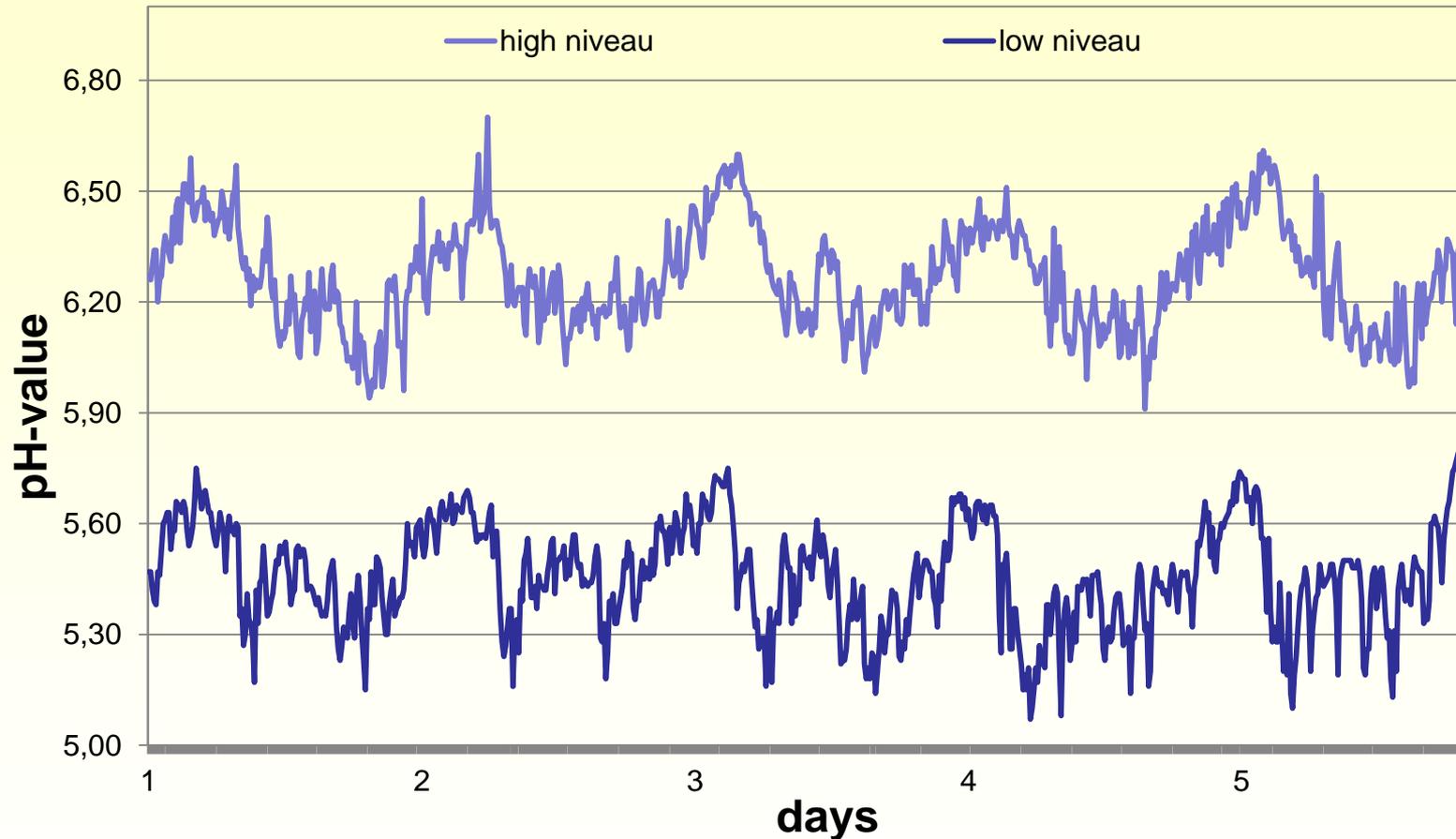- Herd based data

Examinations

- 16 cows from 4 farms (NL)

- Ø 10.200 kg milk yield, 3. lact.

- Continuous pH-measuring 1 week a.p. up to 80 d p.p.

- > 12.000 pH measurements per cow

- Farms serviced by „Agroscoope®": provided us with high quality of production and feeding data

- Statistics „STATGRAPHICS Centurion XVI"

- Factors for statistics: ruminal pH, rations composition, milk yield, milk quality, day of lactation,
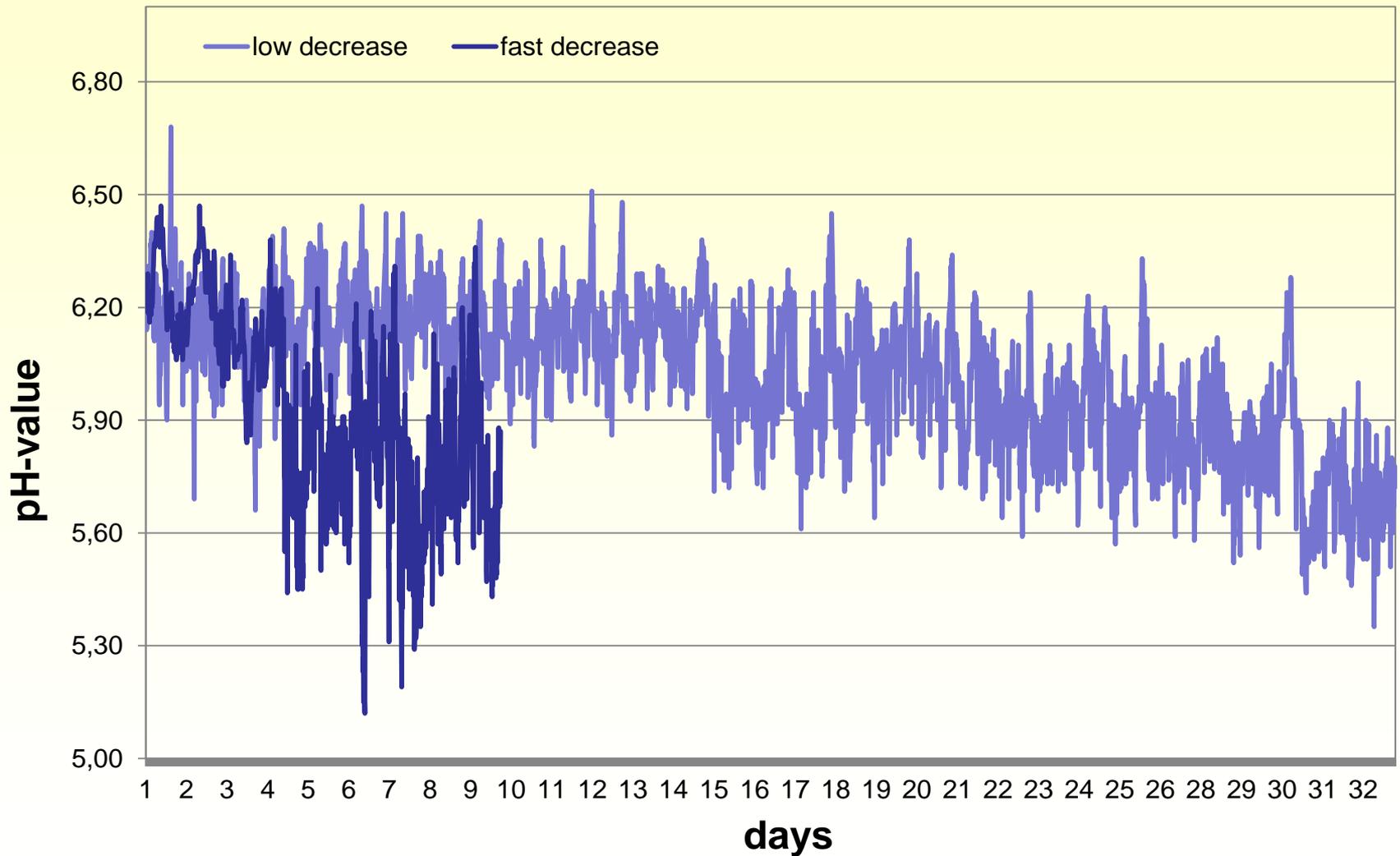
- Interpretation of data
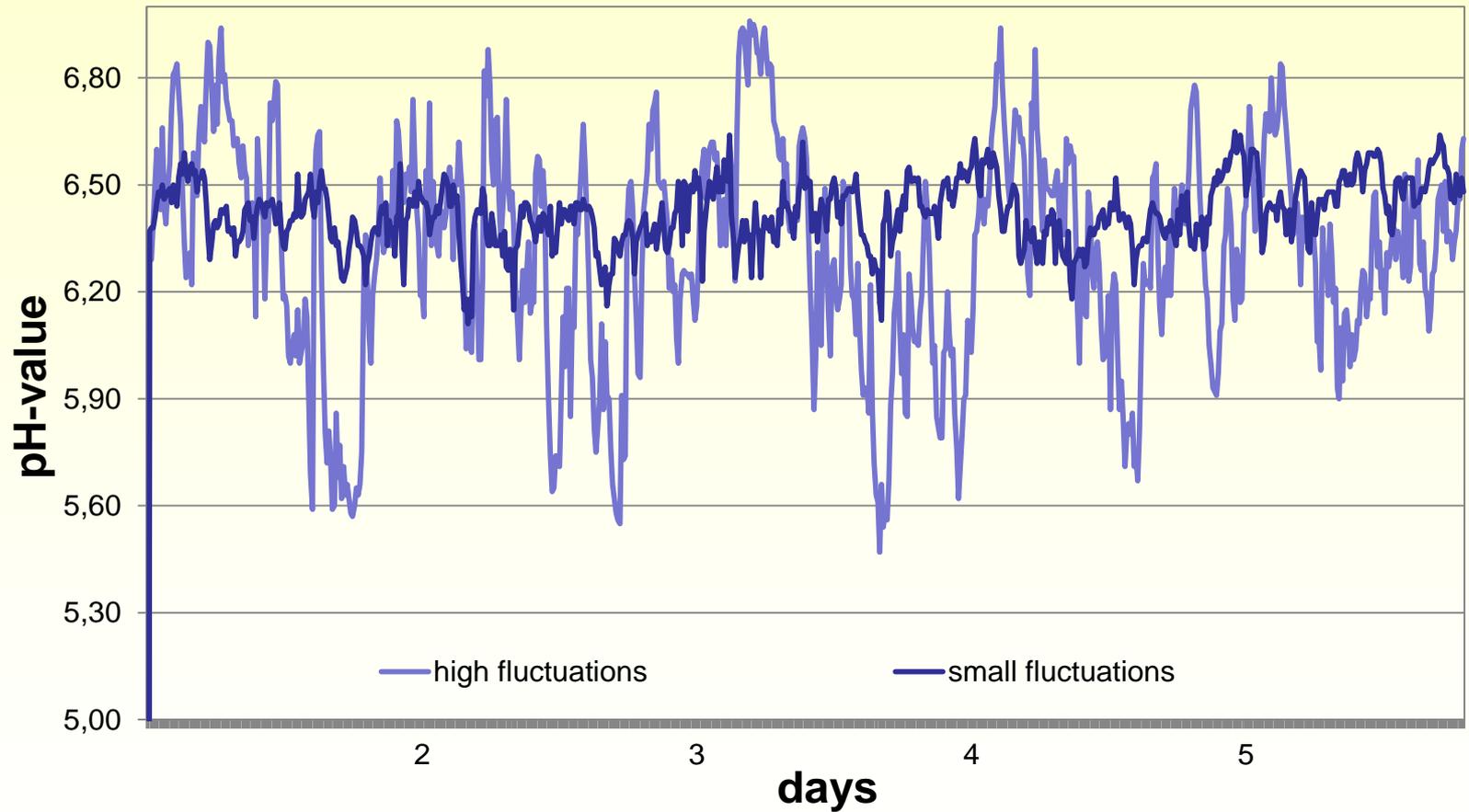
Example: long term measurement with pH-sensor
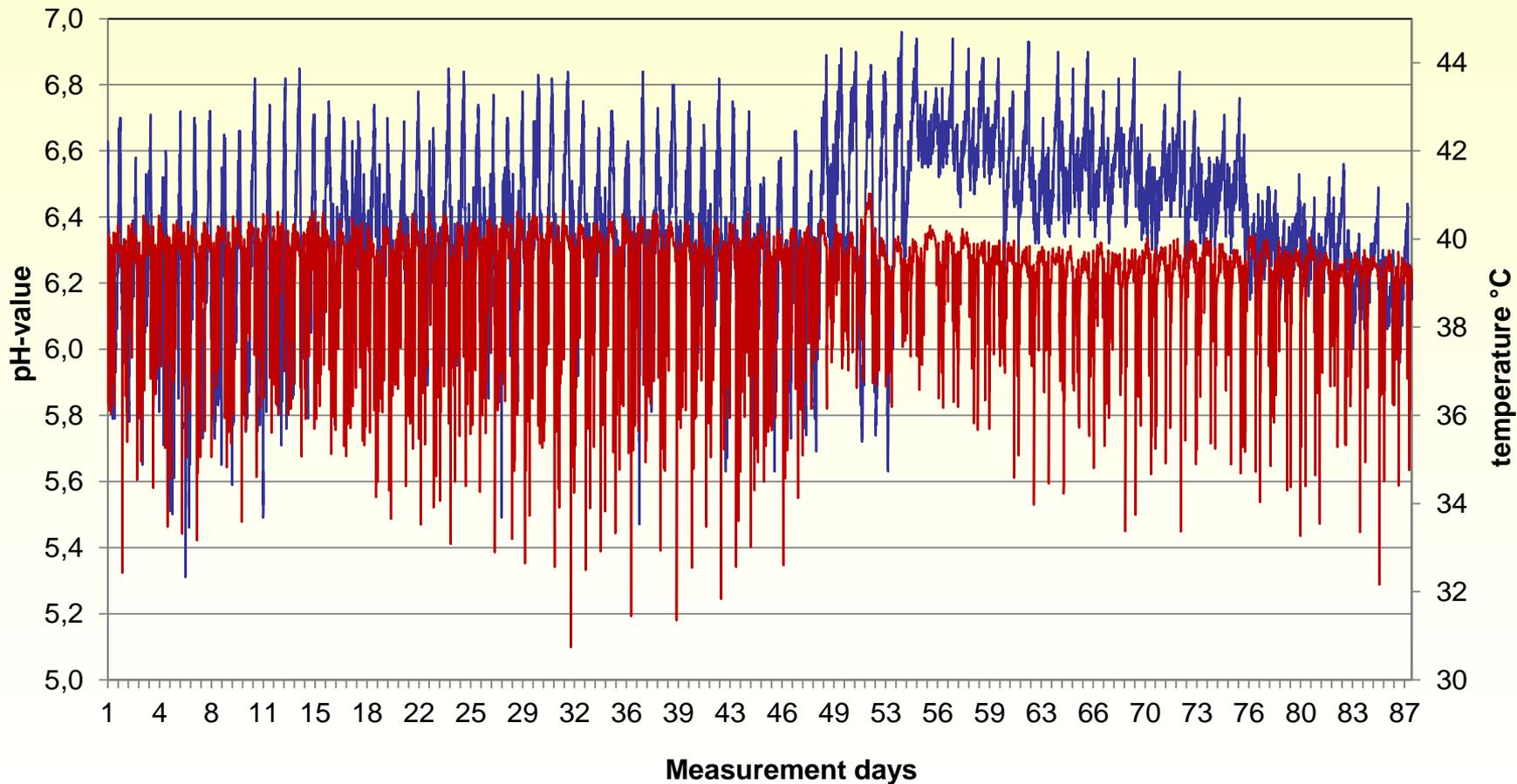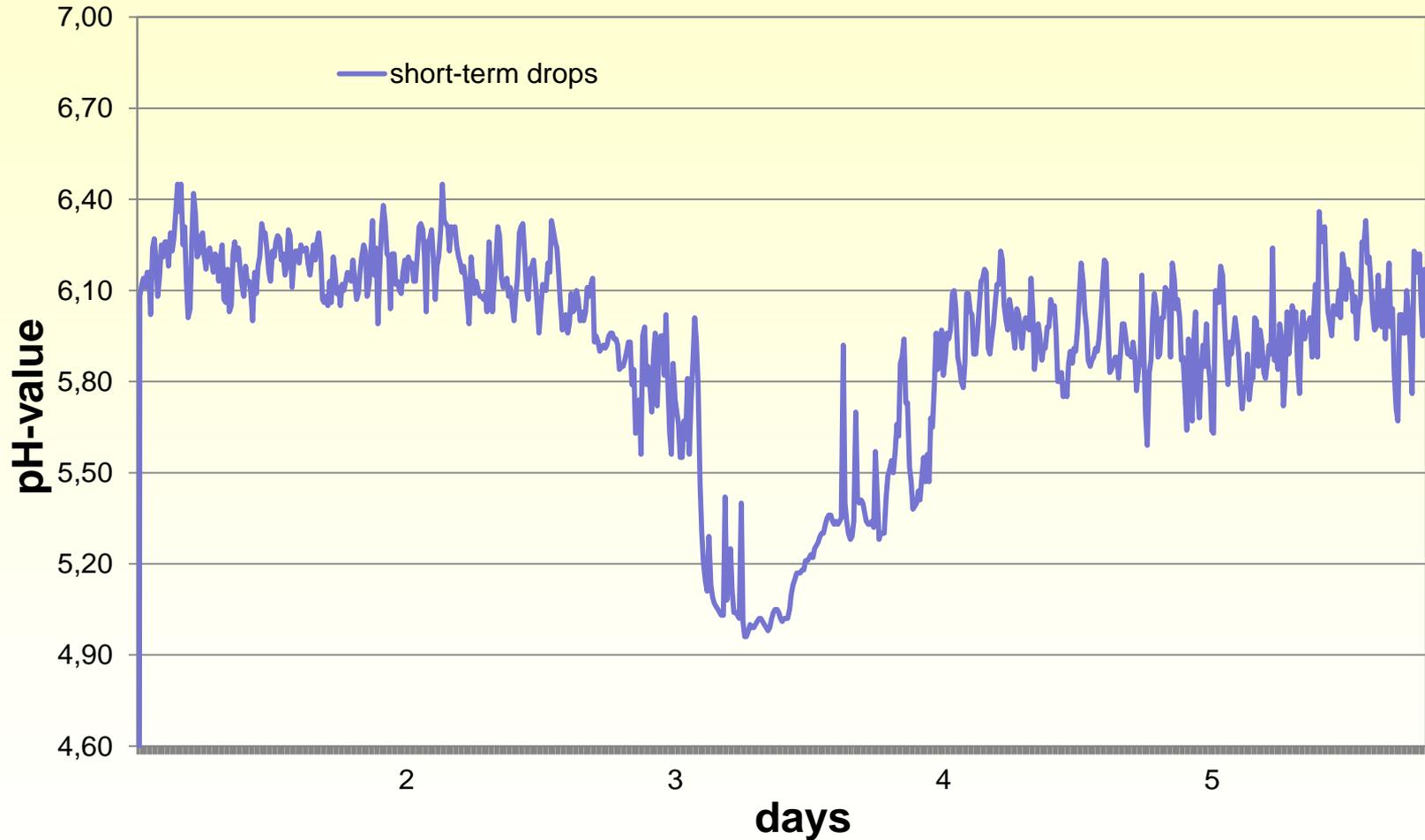
Results: Interpretation pH-Niveau
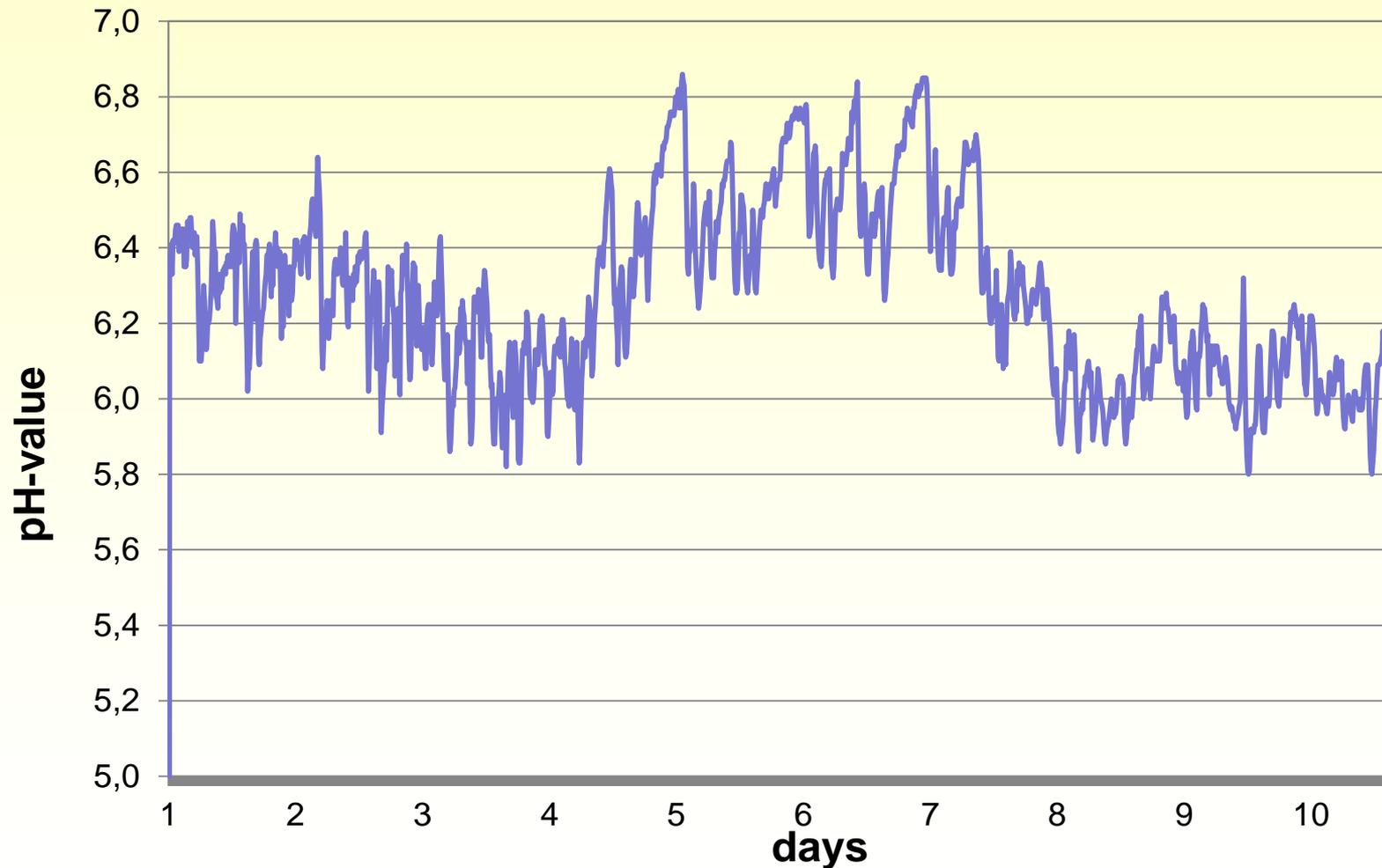
Results: Interpretation pH-decrease
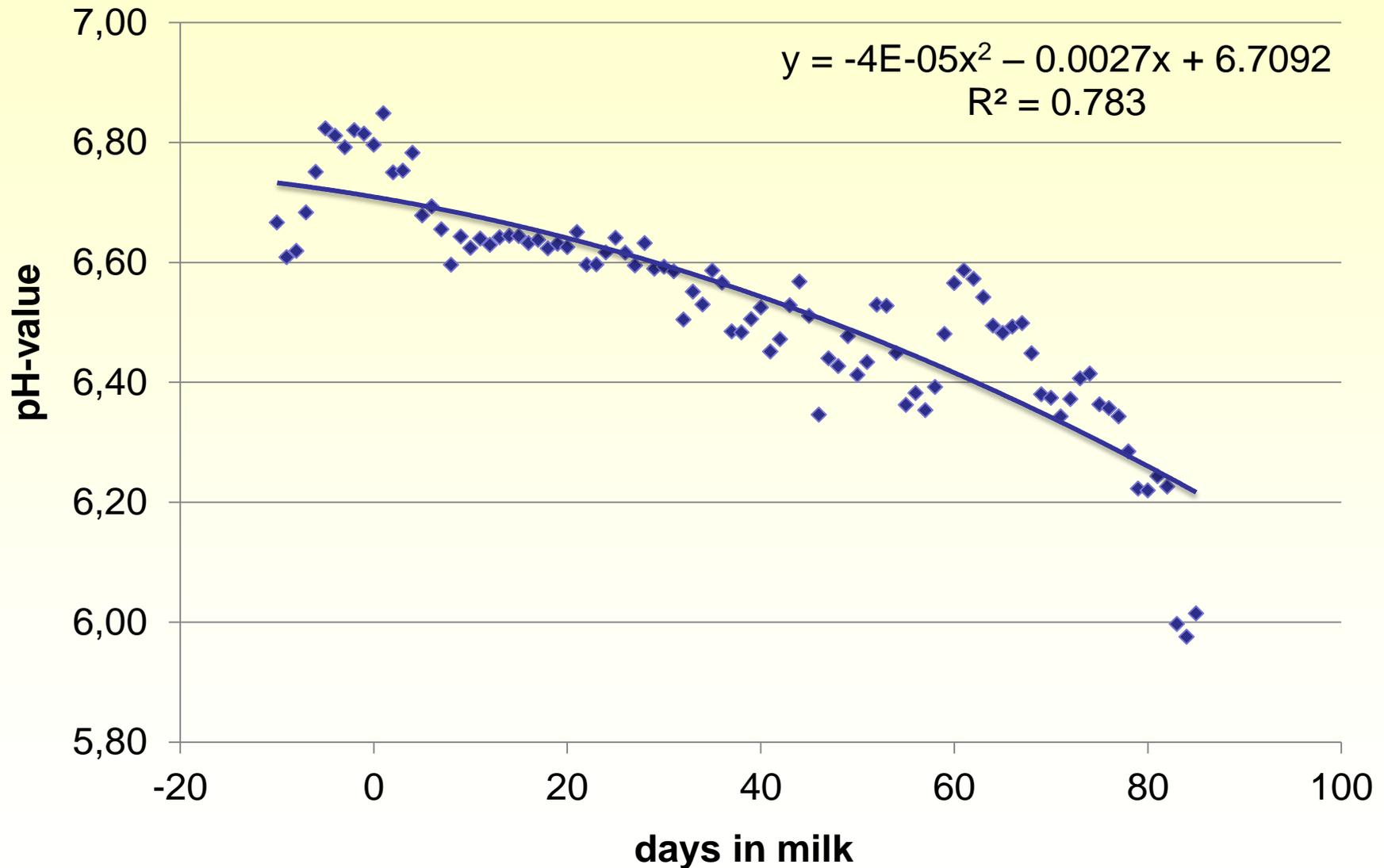
Results: Interpretation pH-fluctuations

Results: Interpretation pH – short-term drops

Interpretation pH – "Off-Feed-Syndrome"

Herd based Results: Correlation pH-value with DIM

$$y = -4E\text{-}05x^2 - 0.0027x + 6.7092$$
$$R^2 = 0.783$$

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Results: Correlation pH-value with milk yield (kg)

$$y = -0.0005x^2 + 0.0171x + 6.846$$

pH-value

Milk yield (kg)

Results

➢ **Ruminal pH was influenced significantly by**

- Fed ration (starch and fibre content, DMI)

- Feeding management

- Day of lactation (DIM)

➢ **Interpretation of individual pH data:**

- pH – Niveau

- pH – Fluctuations

- pH – Decrease (time)

- pH – Short-term drops

- Off feed syndrome

Summary

➢ **Ruminal pH is a reflection of the fed ration and of the feeding management–visible by continuous measurement**

➢ **Determination of changes of ruminal pH in time allows an accurate definition of ruminal acidotic load and to evaluate fed rations**

➢ **Introduced pH probe is a helpful tool for scientific questions dealing with rumen acidosis, as..**
  - Feeding different levels concentrates
  - Pasture and rations with low fibre
  - Use of drugs to neutralize rumen acidosis

➢ **Practical use on farms**
  - Is in process (Europe)
  - Future Management Tool in dairy herds

Thank you

Unterschiede pH Haube-Pansen