Calciumpropionat

guaranteed quality

Contamination of feed components

	Bacteria CFU/g	Fungi CFU/g
Corn	5.000.000	40.000
Wheat	6.000.000	40.000
Rye	6.000.000	40.000
Barley	8.000.000	50.000
Oats	15.000.000	70.000
Soybean, heated	1.000.000	20.000
By-products of oil production	2.000.000	20.000

Schmidt, 1991

Wasted feed/food…

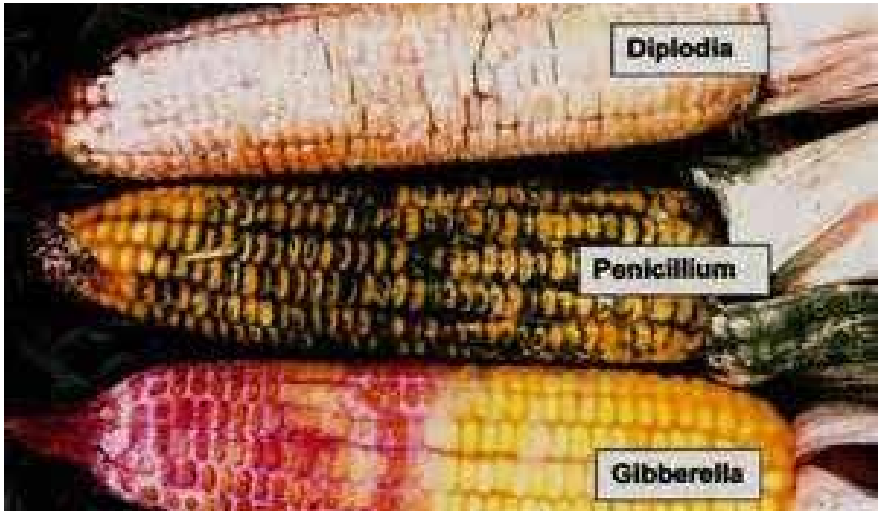
Spoilage – a serious problem!

- Global food wastage: “As much as 50 percent of all food produced around the world never reaches a human mouth!”
- India: “21 million tonnes of wheat annually perishes due to inadequate storage and distribution, equivalent to the entire production of Australia.” (Global Food Waste Not Want Not’ report – 2013).
- Pakistan: losses amount to about 16% of production, or 3.2 million tonnes annually, where inadequate storage infrastructure leads to widespread rodent infestation problems (2013).

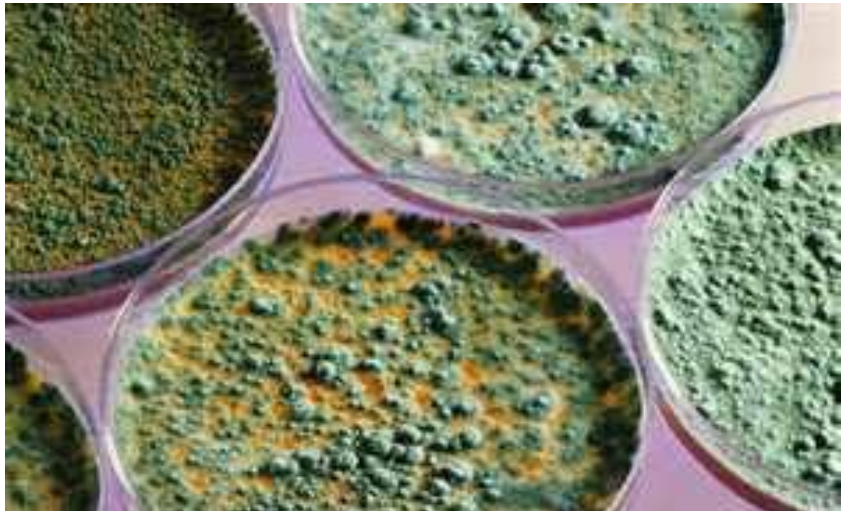
Mould problems in feed and raw materials

Mould

Mouldy pellet feed



Mouldy corn



Mould

Introduction

ADDCONIC CalPro

- Is the tradename of the **98 % calcium salt of propionic acid** from ADDCON, produced at the German location in Bitterfeld.
- ADDCONIC CalPro contains **77 % propionic acid** and approx. **21,5 % high solvent Calcium.**
- Available as powder or dust-free granular.
- Free-flowing and **non-corrosive.**

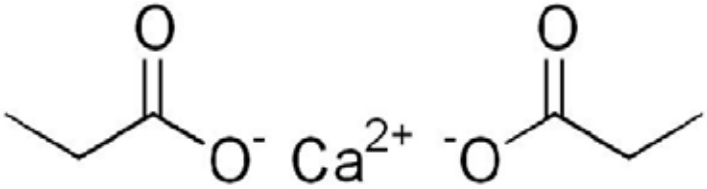
Calcium Propionate - properties

Molecular formula:

$$C_6H_{10}CaO_4$$

- based on the acid equivalent, for CalPro the efficacy of Propionic acid / Propionate can be assumed
- Conditions for the efficency: hydrolysis in acidic environment
  ⇨water is required so that calcium propionate can be break down in calcium and propionic acid

Structural formula:



Calciumpropionat

Guaranteed quality

Registration - preservative

Application - preservation of feed materials
- preservation of compound feed

Additionally - energy supplier in compound feed (poultry, horses)
- especially in milk performance feed (ketosis prophylaxis)

Dosage

ADDCONIC CalPro

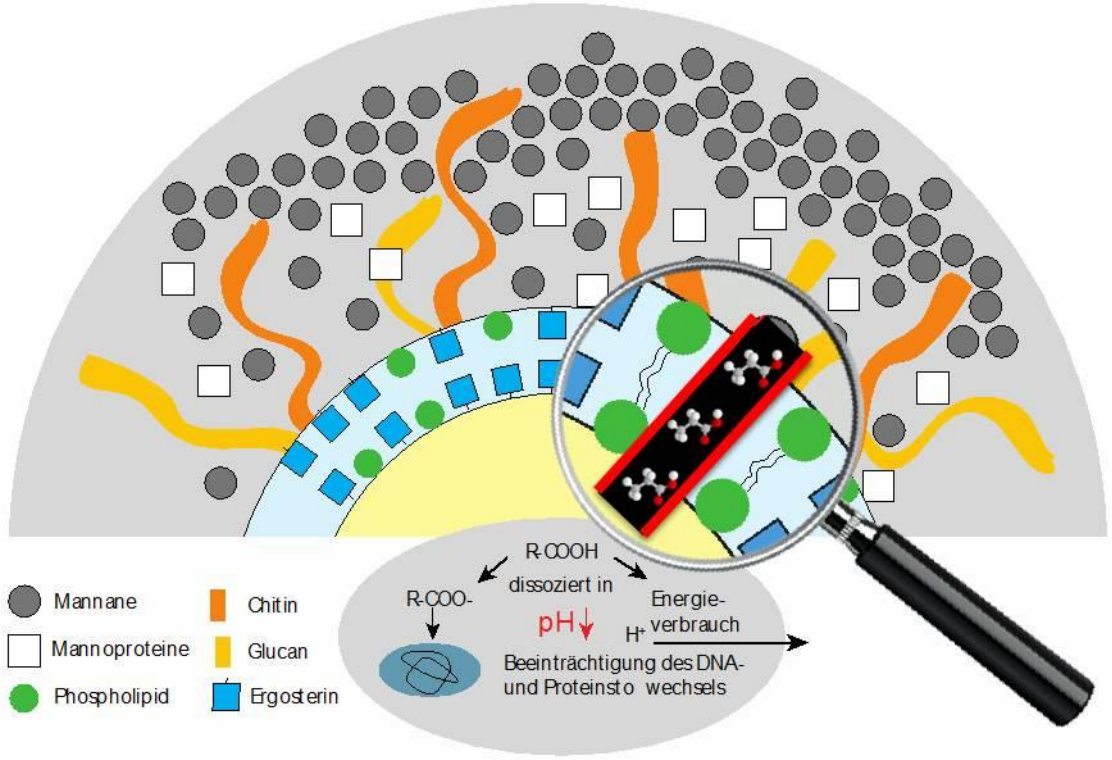
- Preservation of compound feed (max. 8 weeks storage):
  < 14% moisture: 4 kg/t
  14 - 16% moisture: 5 kg/t
  >16 - 18% moisture: 7 kg/t

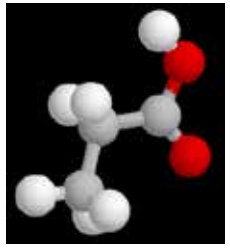
- Energy supplementation of dairy rations:
  150-250 g/cow and day
  energy content: 11.3 MJ NEL / kg

- ⇨250 g CalPro / cow supplies 2.26 MJ NEL

Preservation with CalPro

- Calcium propionate breaks down in calcium and propionic acid because of the presence of water in acidic environment
- the undissociated part have an antimicrobial effect
- Propionic acid reduce mould, yeasts and bacteria





Propion-säure

Skizze adaptiert nach: http://www.uni-marburg.de/fb20/medmikrobio/lehre/NETZ/mykologie.pdf

Advantage

Propionic acid	Calcium propionate
effective	effective
low dosage	low dosage
corrosive	non-corrosive
hazardous	safe
volatile	non-volatile

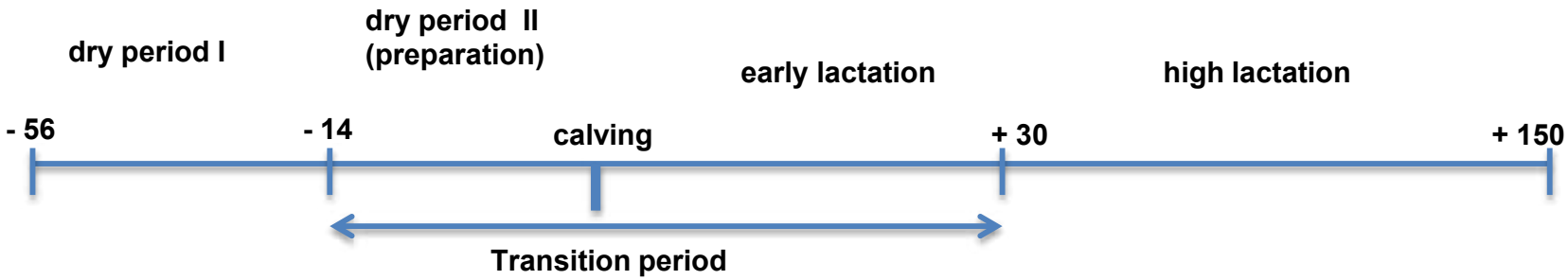
Cattle feed storage up to 60 days – with or without CalPro (0,5%) – test on bacterial spoilage, 14% moisture

storage [days]	control		CalPro	
	bacteria [10^3/g]	mould [10^2/g]	bacteria [10^3/g]	mould [10^2/g]
2	1332	275	697	250
30	1825	177	**26**	125
60	1380	105	**70**	95

⇨feed intake from bulls after eating CalPro-preserved feed was 1.6% higher than control

Lazor et al., 1978

Transition period:



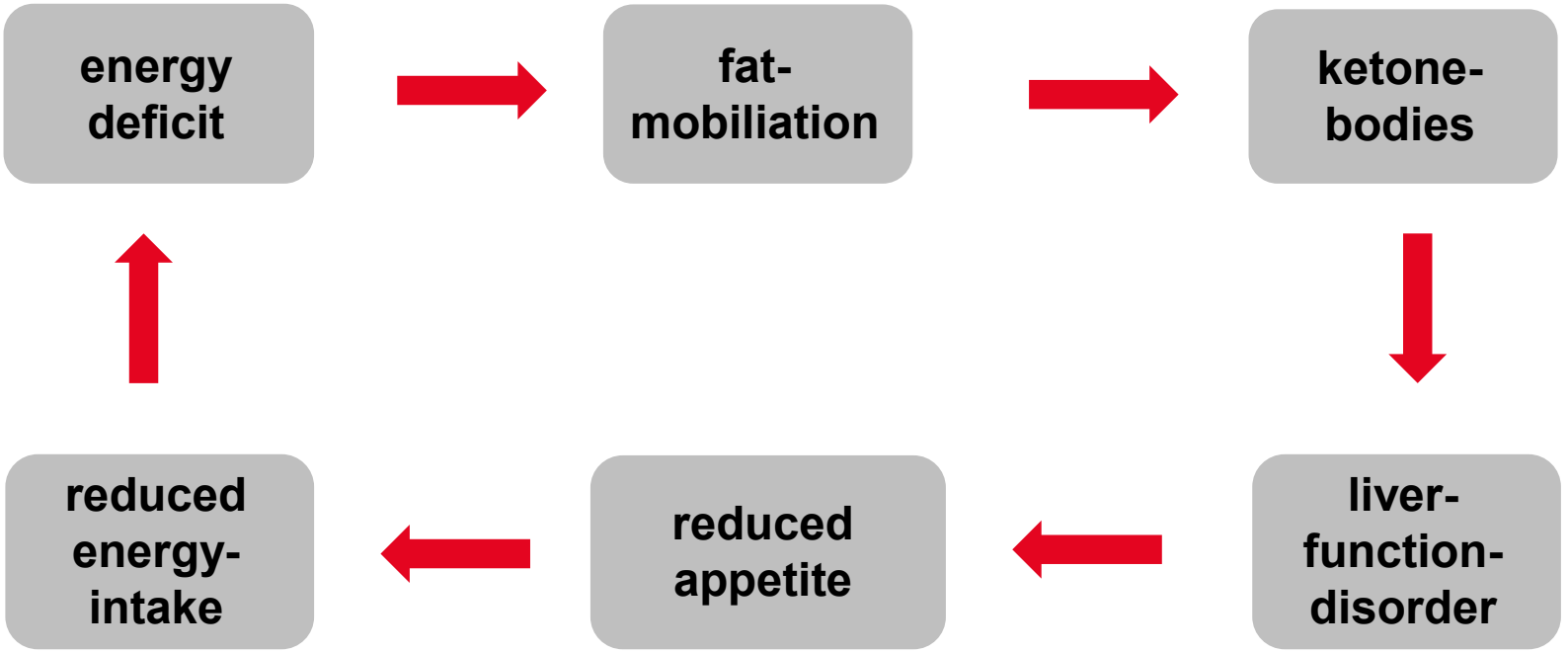
- Period is characterized by tremendous metabolic and endocrine adjustments and physiological changes
- Metabolic health disorder in transition period
  - Milk fever
  - Ketosis

Definition

Ketosis (Acetonämie):

- caused by negative energy balance and excessive body fat mobilization
- high levels of ketone bodies in blood, milk and urine (NEFA and β-Hydroxybutyrat)
- clinical form: 2-6 weeks after calving rapidly loss of weight, drastic reduction in milk yield, reduced appetite, air and milk smell like aceton
- subclinical form: no clear indices for disorder, high level of loss of weight, decline in milk yield, more suspectible for diseases
- Ketosis as pioneer for milk fever

Ketosis


energy deficit
fat-mobiliation
ketone-bodies
liver-function-disorder
reduced appetite
reduced energy-intake

Definition

Parturient paresis (Milk fever):

- Low blood Ca-level, disorder of Ca-resorption (hypocalcemic) and -regulation
- hypocalcemia occurs because Ca leaves the extracellular fluid pool to enter the mammary gland faster than it can be replaced by intestinal Ca absorption or bone Ca resorption.
- clinical form: characterised by hypocalcemia, generally muscle weakness, circulatory collapse and pressed awareness
- subclinical form: low lack of Calcium, lower feed intake, secondary diseases

Feed prophylaxis

Parturient paresis:

- avoidance of to high Ca-intake
  (25 - max. 40 g/day) in transition period
- Ca-dosage after calving (recommendations 100 - 170 g/Tag, GfE 2001)
- Use of acids salts

Ketosis:

- use of glucogenic substances
  (Propylenglycol, Glycerin, Calcium propionate)

CalPro → 1 product against ketosis and milk fever

Ruminant usage of CalPro

- Calcium propionate is part of the glucoplastic substances
  ⇨Gluconeogenesis
- Propionate is resorbed without any change in the structure
- No metabolisation by rumen microorganisms
- Calcium propionate is stored in the liver after resorption

Calciumpropionat

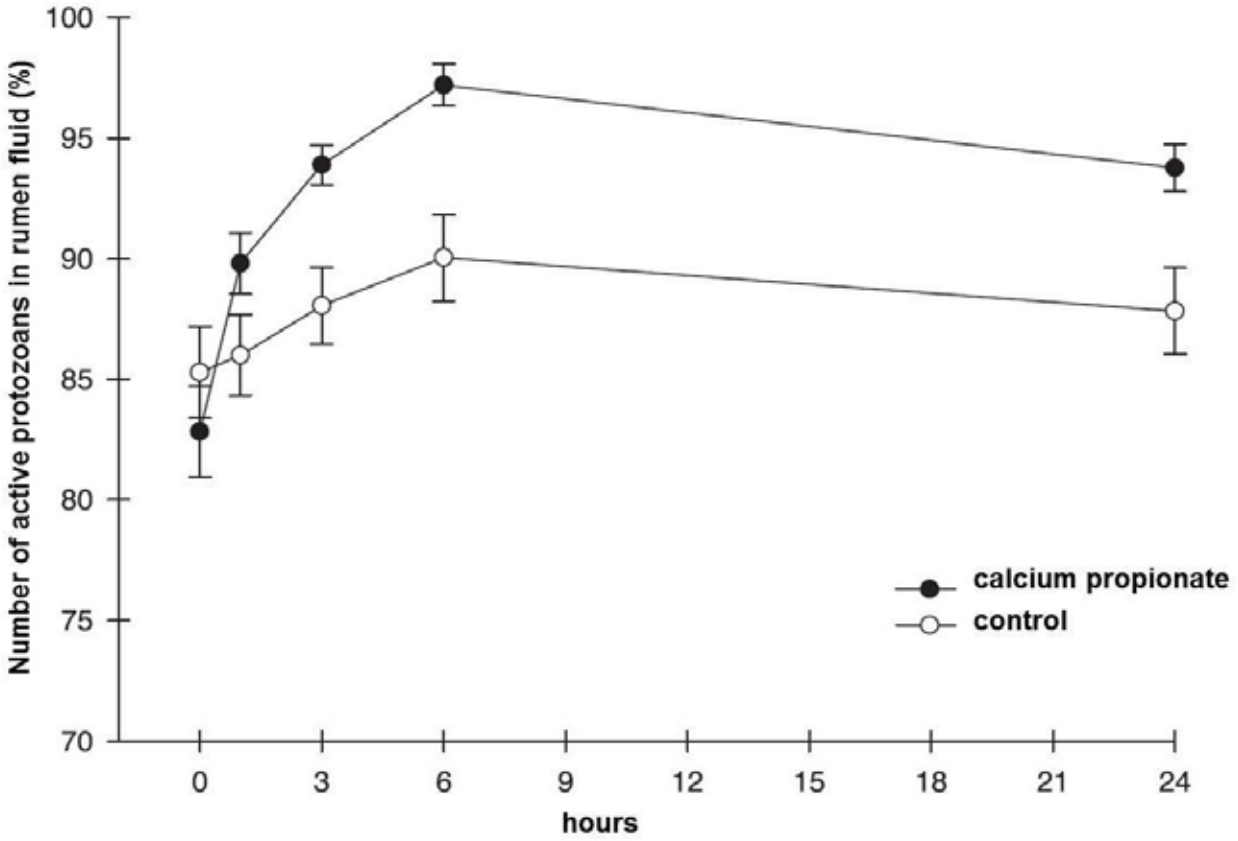
Guaranteed quality

- ***CalPro:***
  - neutral taste
  - increase the activity of rumen flora and fauna
  - no acidic effect on the blood pH
  - serves as glucoplastic substance at the moment of negative energy balance

- ***Calcium:***
  - mobilizes the rumen motor funktion
  - contributes to cover the increased need of calcium while lactation

- ***Propionate:***
  - main energy source
  - important source for glucose production in the liver

Trial I



Number of active protozoans after calcium propionate dosis (300 g)

Geishauser et al. 2010

Trial II

100 dairy cows, 5 weeks, 50 animals in control group, 50 animals in testing group (114 g calcium propionate/cow/day)

Parameters after 5 weeks	control	trial	significance
blood glucose [mg/100ml]	46.4	50.0	**
blood ketone bodies [mg/100ml]	13.8	10.4	*
milk yield [kg/day]	26.5	28.6	**

* signifikant p< 0,05
** high significant p< 0,01

Schultz, 1954

Trial III

Effects of CalPro supplementation in TMR on blood metabolites and urine ketones

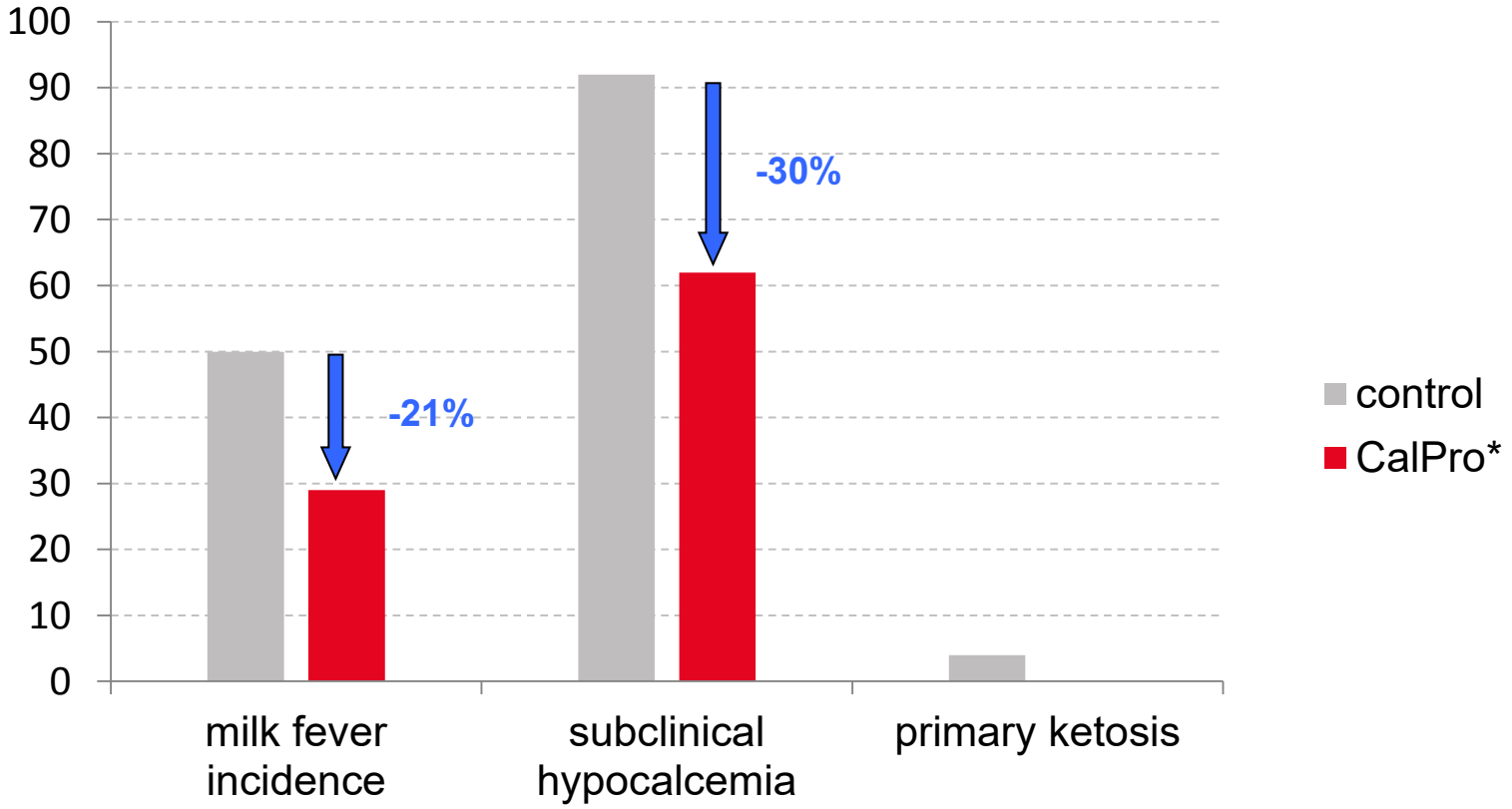
Parameters	Treatment with CalPro			
	control	100 g/cow/day	200 g/cow/day	300 g/cow/day
Glucose [mg/dl]	54.9	57.2	59.3	60.2
NEFA [µEq/l]	371.8	363.6	357.3	352.7
BHBA [µmol/l]	820.7	807.5	792.2	776.9
Urin ketone bodies [mg/dl]	16.4	13.8	11.6	10.0

⇨CalPro decreases the risk of ketosis

Liu et al. (2010)

Trial IV

Changes of the risk of milk fever and ketosis after CalPro supplementation



*Calciumpropionate (74 g) as paste

Goff et al. 1996

Dosage

Ketosis prophylaxis and treatment with calcium propionate:

- **prophylaxis:**
  150 g CalPro / cow and day (2 weeks before calving to 6 weeks after calving)
- **treatment:**
  200 – 220 g CalPro / cow twice a day for 10 days

Milk fever prophylaxis with CalPro:

- **bevor calving:**
  116 – 186 g CalPro / cow and day
- **after calving:**
  460 – 750 g CalPro / cow and day

Comparison between different special foods

	CalPro	Propylenglycol	Glycerin
Energy content MJ NEL/kg	11.3	9.8	7.6
Price €/kg	1.60	1.66	0.43
Price per unit €/MJ NEL	0.14	0.17	0.06
250 g supplies so much Energy MJ NEL	2.26	1.96	1.52
relative to CalPro %	100	87	67

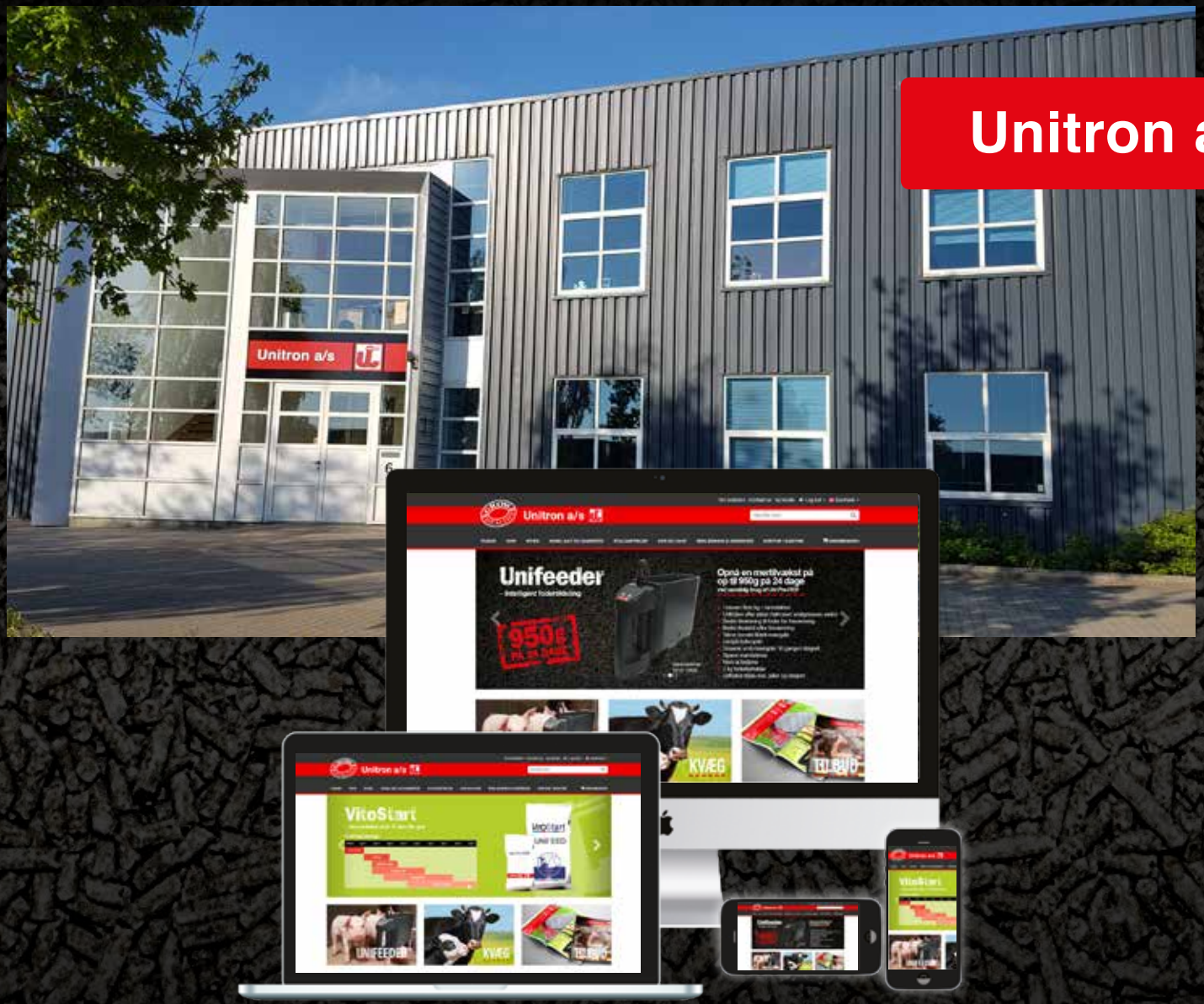
Structure

- *Introduction*
- *Basics*
- *Preservation with CalPro*
- *Ruminant usage of CalPro*
- *Conclusion / Product properties*

CalPro – Product properties

- High efficacy ⇨ various independent proves
- No residues
- Easy to handle
  - Non corrosive
  - High active

Safe for humans and animals
Efficient for animals Profitable
for the farmer



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