Recurrent cases of mastitis – causes and solutions

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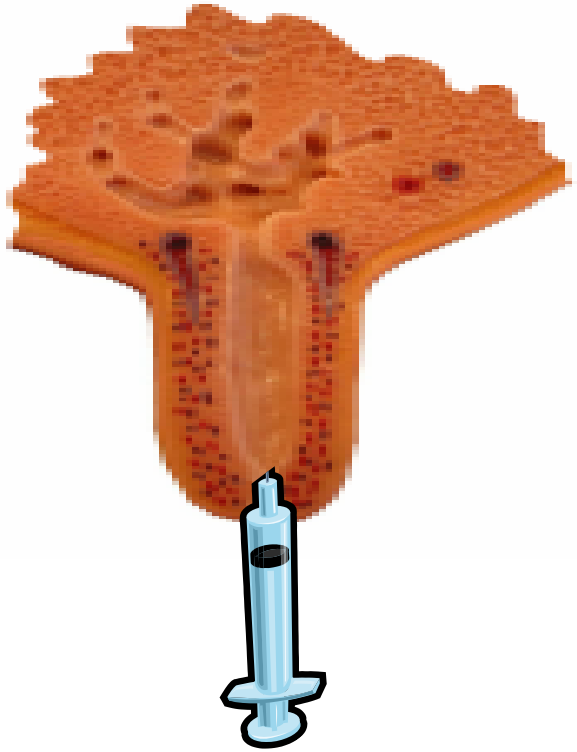
Introduction

- Clinical mastitis (definition, incidence)
- Recurrent mastitis (definition, causes, consequences)
- Trial 1: Persistent or new infection?
- Trial 2: Can treatment change the story?
- Take home



Why clinical mastitis?

Agricultural view:

- if the bulk milk somatic cell count leads to the best possible payment
- milk of all cows go into the tank
- few unexpected deaths occur and
- the life performance is correct

→ clinical mastitis
(unexpected, undesirable, extra, animal welfare, beginning of end)

Veterinary view:

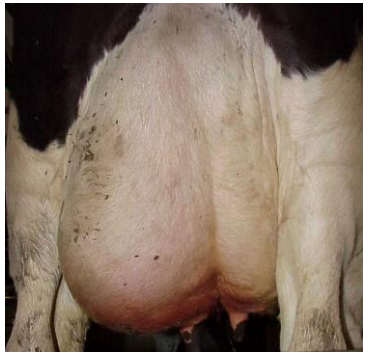
- Subclinical mastitis is going down
- Number of udder healthy cows is increasing

→ clinical mastitis (animal welfare)

What is a clinical mastitis?

Therapeutic Incidence (Documentation)

Classification into mild (milk), moderate (+mammary gland), severe (+syst. disease) (>39.5°C) n. IDF 1999

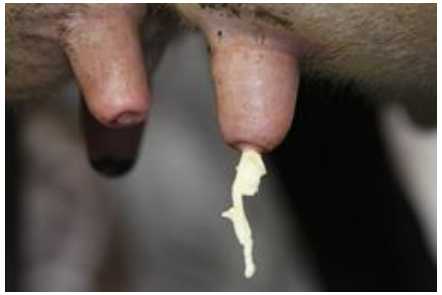


Clinical cure on day 5 > 50 % = 1 score better is associated with bacteriological cure OR = 6.1 (CI 95% 2.4-15.4))

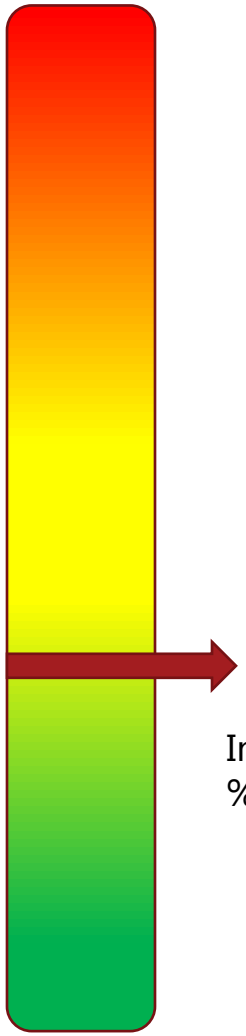
= without improvement - antibiotic treatment pause - (on-farm) test

New case >14 days after first case (in DMS 8 days)

Within 14 days = therapy failure



How many cases? (n= 189 farms)



max. 214 cases

97,5 % 112 cases

Risk factors:

- Parity/Age
- Pathogens
- New infection risk dry period and lactation
- % chronic subclinical mastitis

Per 100 cow years under risk

Median 32 cases

International target: 24 % or 2 % per month

2,5 % 5 cases

min. 2 cases

Outcome	Mild (n=196)	Moderate (n=149)	Severe (n=38)
Gram-negative	13%	25%	40%
Gram-positive	44%	47%	47%
Mixed	5%	9%	
No growth	39%	19%	13%

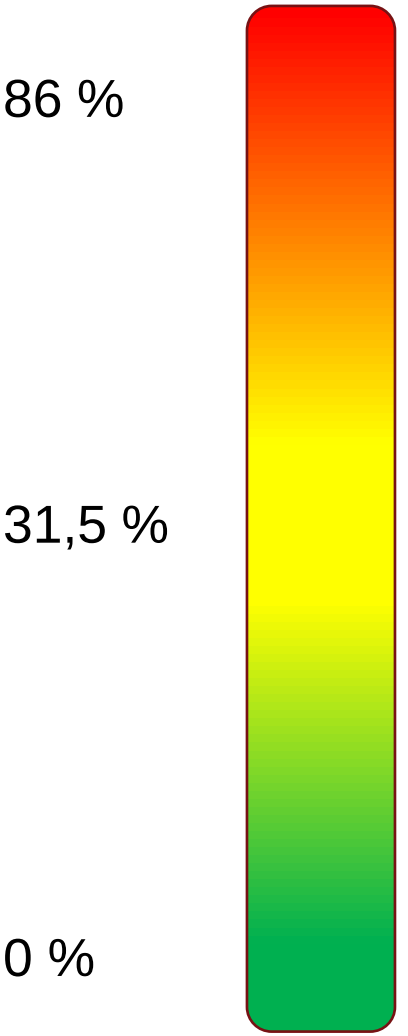
Recurrent Mastitis

Occurrence of mastitis after a previous mastitis within one lactation with a time interval of ≥ 3, 5, 7 or 14 days, based on cow or quarter

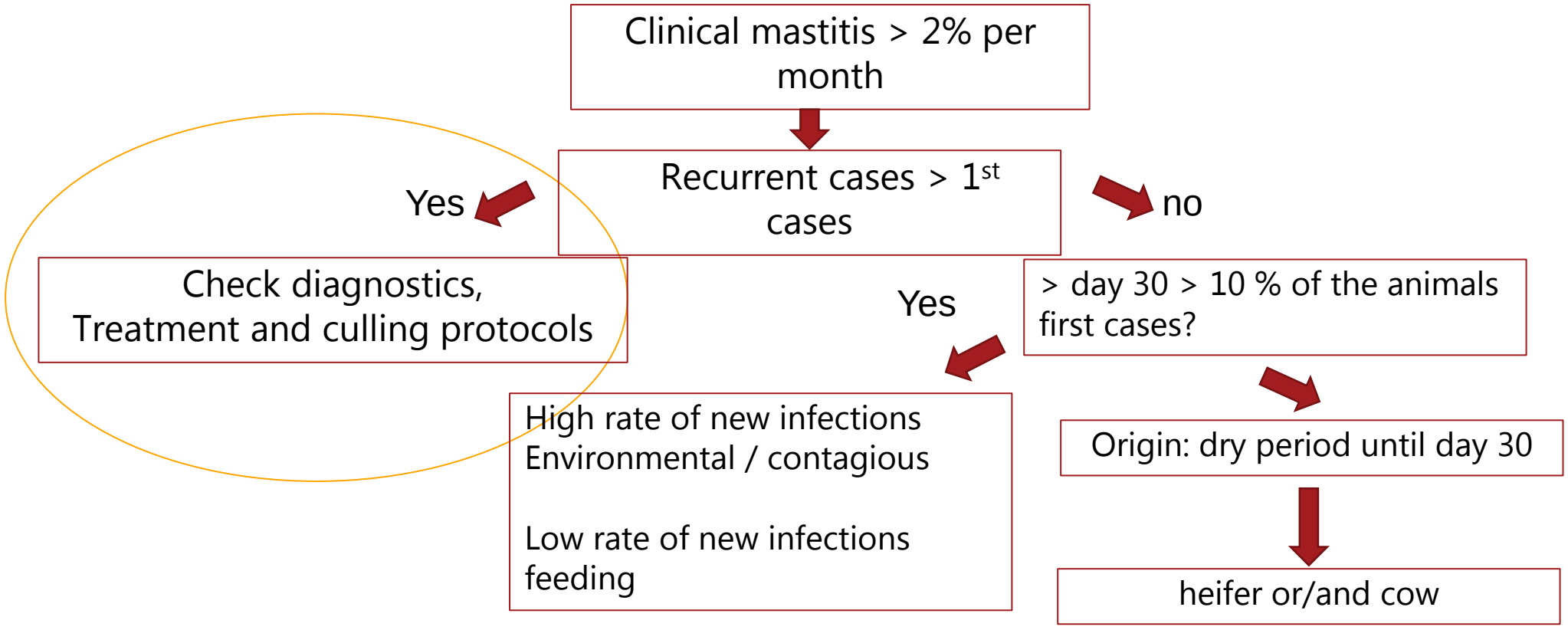
(Barkema et al. 1998; Bradley et al. 2001; Döpfer et al.1999; Gröhn et al. 2004; Houben et al. 1993)

Important risk factors: parity, higher milk production, no bacteriological cure before

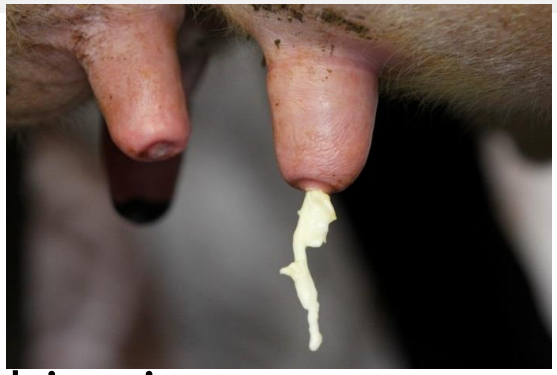
Effects: milk yield reduction, increased risk of culling and mortality (Jamali et al. 2018)



Clinical Mastitis Analysis - Herd Level
(according to Schukken (QMPS) mod.)



Recurrent Mastitis

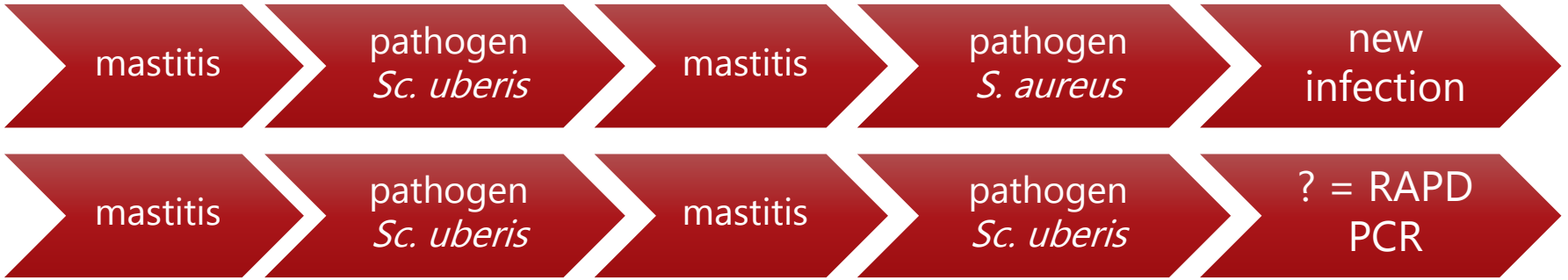


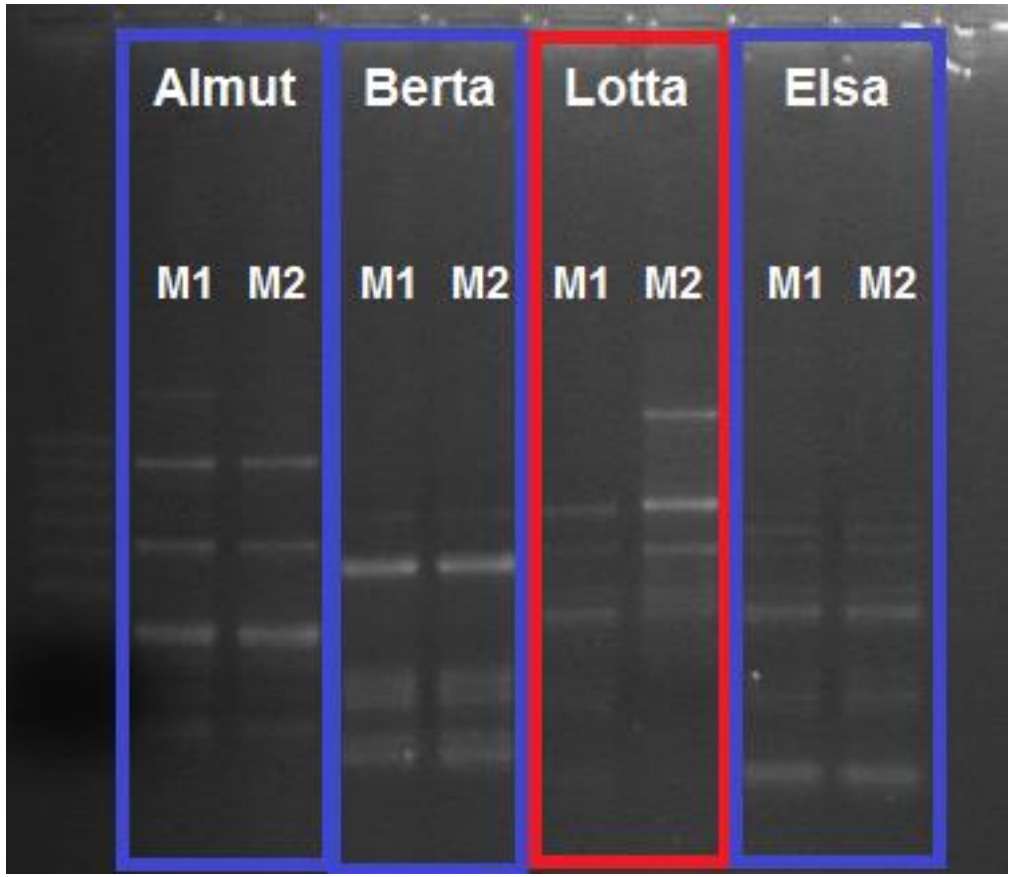
- **Persistent infections**
  Cause: Unsuccessful therapy; MIC not reached in tissue
  Risk factors: Biofilms, intracellular, protected by connective tissue, resistance
  Measures: Culling, resistance testing, follow-up, prolonged therapy or dose increase, concomitant therapy?

- **New infections**
  Cause: Damage after first case facilitates settlement
  Risk factors: 1st case and infection pressure
  Measures: Reduce the rate of new infections, treat the first case extensively (prolonged, local/parenteral, NSAID)

Study design

- 3 farms (2011-2015)
- quarter milk samples from clinical mastitis
- sampling and diagnostics according to NMC (1999) / GVA (2009)
- isolates from same farm, cow and quarter
- RAPD PCR





- *Sc. uberis* RAPD PCR

Results

2043 mastitis cases — 100 %

- 1598 first cases — 78 %
- 445 recurrent cases — 22 % // 100 %
  - 145 recurrent cases same species — 33 %
    - 96 different strains, new infections
    - 49 same strains, persistent infections — 11 %

Species	mastitis cases	first cases % of all case)	recurrent cases (% of all cases)	Same species (% out of recurrent cases)	Same strain (% out of recurrent cases)
Strep. uberis	592	76 %	142 (24 %)	88/142 (62 %)	21/142 (14.8 %
E. coli	306	85.3 %	45 (14.7 %)	25/45 (55,6 %)	13/45 (28.9 %)
Staph. aureus	115	73%	31 (27%)	23/31 (74.2 %)	9/31 (29 %)
NAS	69	88.4%	8 (11.6%)	1/8 (12.5 %)	0
Strep. dysgalactiae	57	79%	12 (21%)	4/12 (33.3%)	3/12 (25 %)
other coliforms	54	81.5%	10 (18.5%)	3/10 (30 %)	0
T. pyogenes	36	77.8%	8 (22.2%)	4/8 (50 %)	3/8 (37.5 %)

Discussion

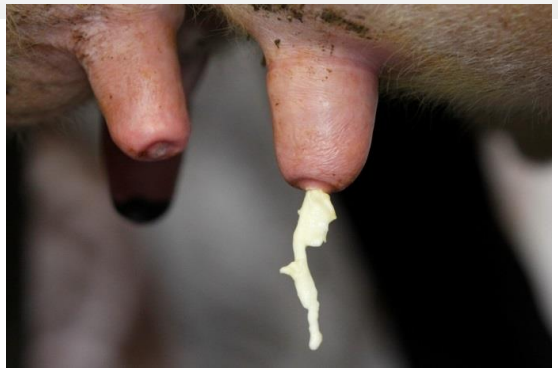
Diagnostics

- New infections with the same strain are possible
- Multiple strains in one sample are possible

In some farms with many recurrent clinical mastitis cases …

- 90 % of recurrent mastitis cases are new infections and
- RAPD-PCR can help to identify causes
- New infection prevention is more important than treatment

Recurrent Mastitis



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Aim of study

is an

Intensive mastitis therapy

- local, parenteral, extended and NSAID –

able to influence **1st Gram positive clinical cases in lactation**

due to

- Bacteriological cure rate and
- Recurrent mastitis rate?

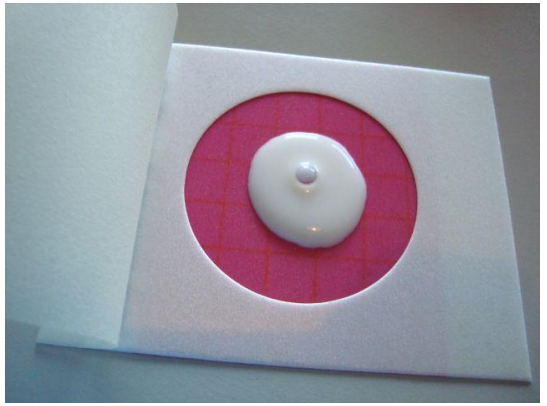
Material and Methods

5 farms

- Northern Germany
- 2013-2015
- 165-1795 lactating cows per farm
- 9,900 - 12,250 kg lactational yield
- Bulk milk somatic cell count 96,000-215,000 cells/ml
- freestalls, HF, 2-3 milkings per day

625 mastitis cases recorded/ 525 complete

- 1st case per lactation
- No visible udder lesions
- one quarter
- Only Gram-positive infected quarters
- No other treatment



Methods

- Mastitis identification (farmer, herdsman, milker)
- Randomised by eartag number (even/odd)
- Quarter milk samples
- Treatment and clinical scoring done by herdsman or vets
- 1. control sample 14 (+/-2 days) after treatment
- 2. control 21 (+/-2 days) after treatment
- Documentation of recurrent cases (100 days)
- Cytomicrobiological examination, resistency testing (DVG/NMC)

Methods

Test:

- Ubrolexin®: 1 tube per quarter and day for 5 days
- Ingel Mamyzin®: 10 Mio. IE per animal for 3 days intramuscular
- Metacam® 20 mg/ml: 1 x 2,5 ml/100 kg for 1 day subcutaneus

Control:

- Cobactan LC®: 2 tubers per quarter and day for 2 days

Bacteriological outcomes

Pathogens (n)	Total	(%)
Streptococci	175	33,3
S. uberis	124	23,6
S. dysgalactiae	27	5,1
Staphylococci	75	14,3
S. aureus	20	3,8
Other or mixes	33	6,3
No growth	242	46,1
Total	**525**	100,0

No significant differences between treatment groups due to pathogens, clinical score, lactation no. and days in milk

Results

	Bact. cure rate (%)	New infection rate (%)	Clinical cure rate (%)	Recurrent mastitis rate (%)
Control Strep Staph Other	74,8 % 85,1 51,2[a] 85,7	5,9	95,5	23,9
Test Strep Staph Other	80,5 % 84,8 66,7[b] 85,7	5,9	98,8	12,6
P	n.s.	n.s.	0.039	<0,01

Take home

- Clinical mastitis recurrence becomes more important
- Persistent infections exist, but often they are new infections
- New diagnostic techniques are required for identification
- New infection prevention succeeds by reducing risks at herd level and at individual animal/quarter level
- An intensive therapy of 1st Gram positive clinical mastitis cases in lactation may lower the recurrence probability
- Further work must show whether this effect is caused by the NSAID alone.

Mistakes are the portals of discovery

James Joyce

Tak for din opmærksomhed

Thanks to farmers, herdsman and milkers,
Steinbeis Research Center Milk Science,
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