

# Lactational Treatment of Subclinical Mastitis – Economic Analysis using Host and Herd Level Risk Factors

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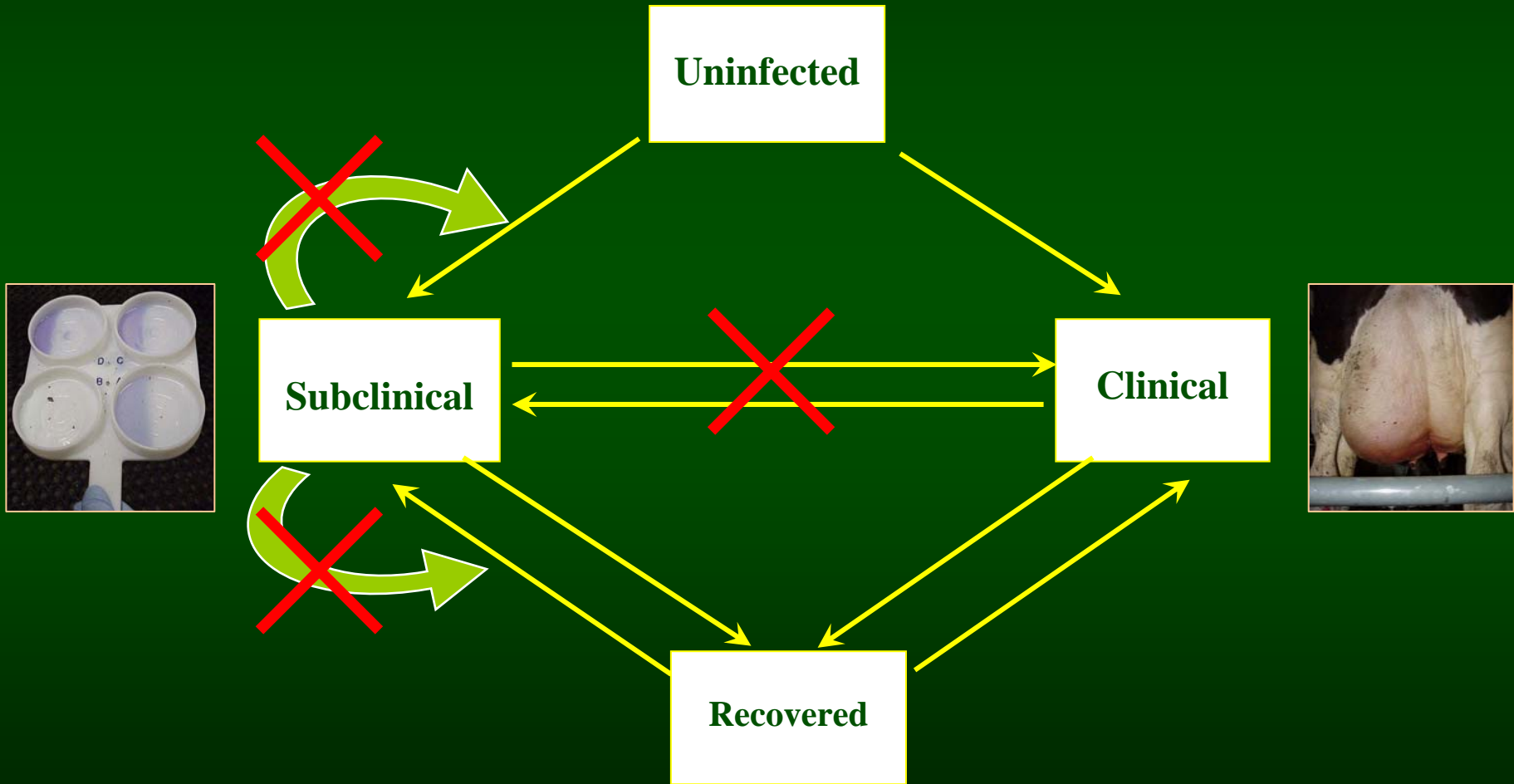
Henk Hogeveen



# Subclinical Treatment Rationale

- EU – BMSCC limit 400,000 cells/ml
- Quality premiums at lower BMSCC
- Increased duration decreases cure (Sol et al., 1994, 1997)
- Prevention of clinical mastitis (St. Rose et al., 2003)
- Prevention of contagious transmission (Zadoks et al., 2002)

# Indirect Effects: Cow and Herd Level



# Subclinical Treatment Options

## Advisors and Producers

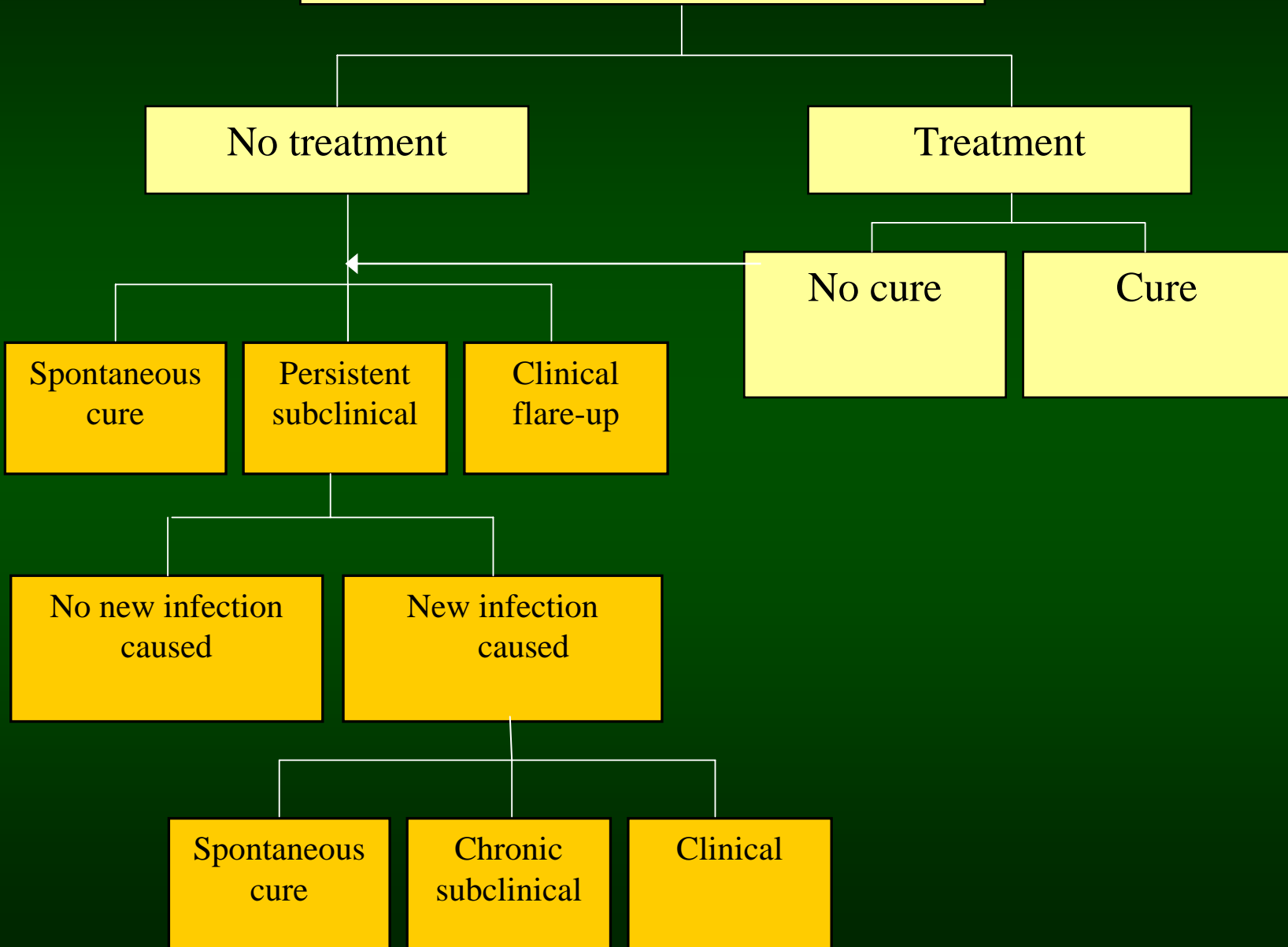
- “Ineffective”
- “Not economic”
- unfamiliar



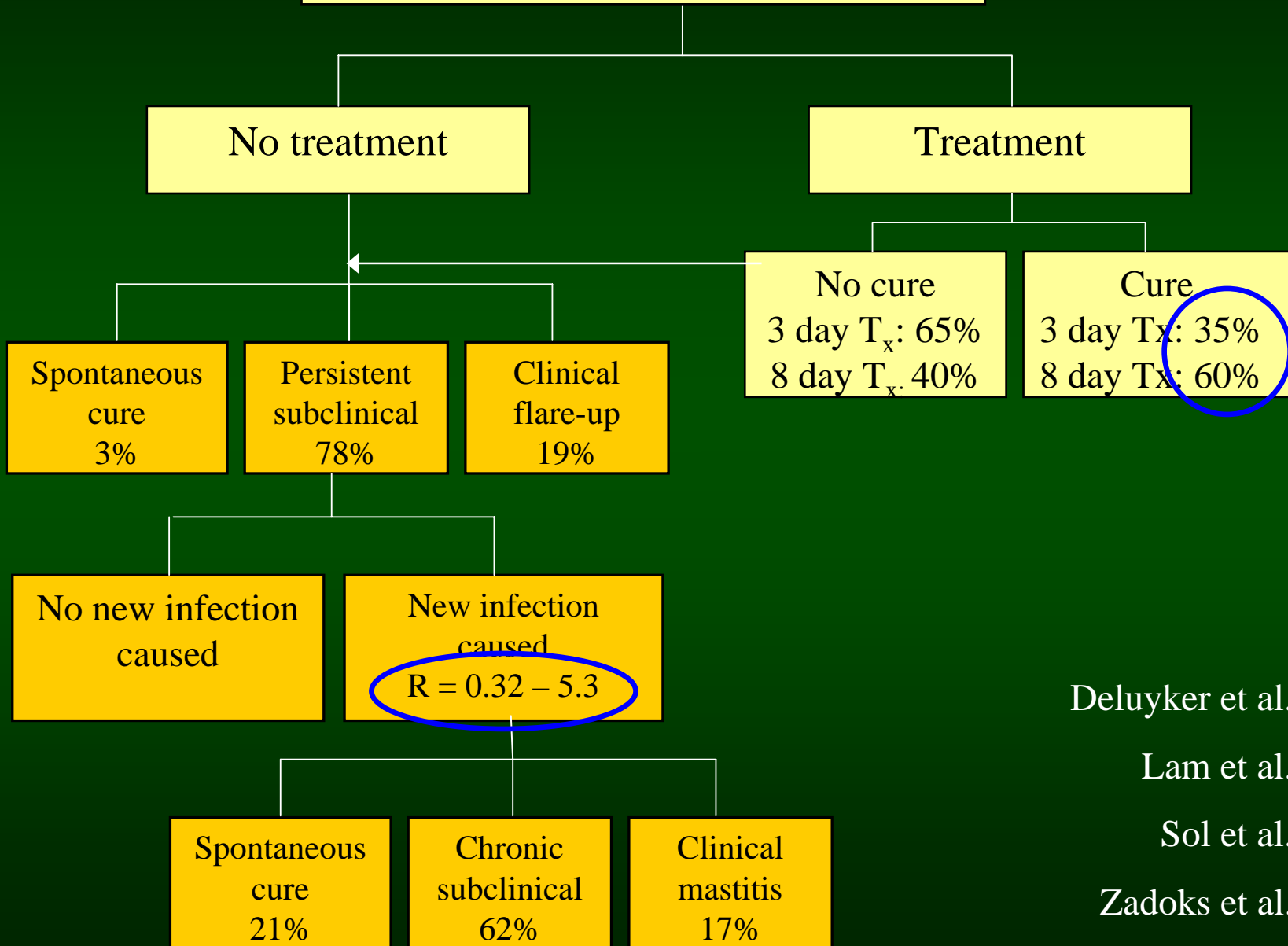
## Pharmaceutical companies

- 3-day parenteral treatment
- 8-day intramammary treatment

Chronic subclinical mastitis  
*S. dysgalactiae, S. uberis, S. aureus*



Chronic subclinical mastitis  
*S. aureus*



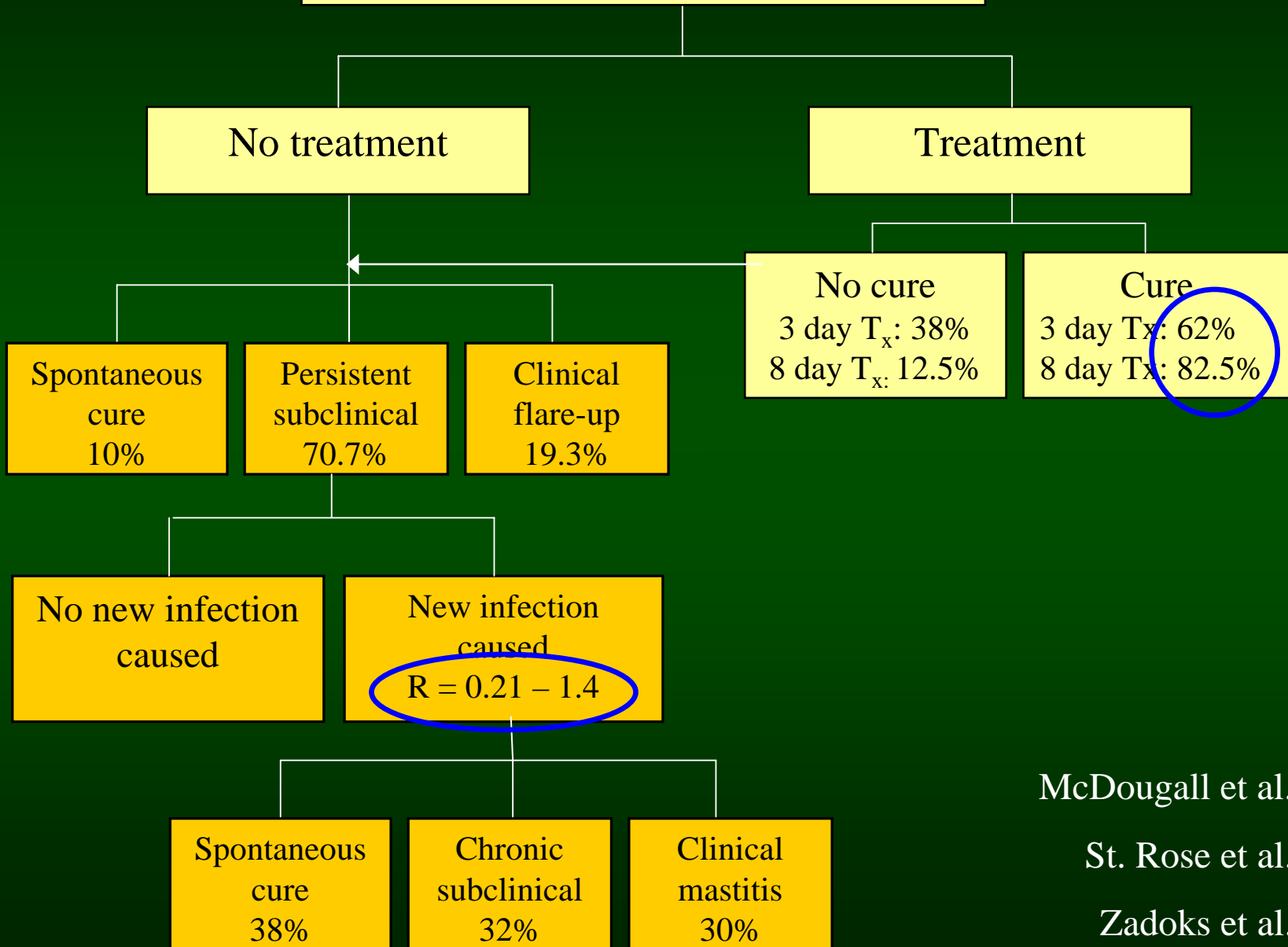
Deluyker et al., 2005

Lam et al., 1996

Sol et al., 1997

Zadoks et al., 2002

Chronic subclinical mastitis  
*S. dysgalactiae, S. uberis*



McDougall et al., 1998

St. Rose et al., 2003

Zadoks et al., 2001

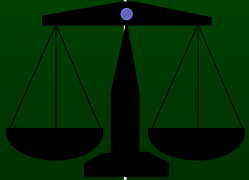
# Economic and Epidemiological Inputs

- Dutch conditions
  - Quota in place
  - Prices 2002/2003 (SDY/SUB)
  - Prices 2004 (SAU)
- Four scenarios
  - 3-day Tx vs. 8-day Tx
  - high R vs. low R



# Partial budget

<p>Extra revenue</p> <p>Milk production increase</p>	<p>Reduced revenue</p> <p>Withheld milk</p>
<p>Reduced costs</p> <p>Reduced clinical mastitis Prevented new infections Reduced culling</p>	<p>Extra costs</p> <p>Antibiotics Bacteriological culture Labor, penalties</p>
<p>+</p>	<p>-</p>



# Input *S. aureus*

- Increased milk production 0 kg
- Cost clinical flare-up €187,-/case
- Probability of culling 12 %
- Costs culling €506,-/case
- Prevention high BMSCC €0
- Improved fertility €0
- Discarded milk 25.3 kg/day
- Treatment and WHT duration 6-11 days
- Costs discarded milk €0,14/kg
- Antibiotic costs €9/day
- Labor costs 0
- Penalties for antibiotic residues 0

# Average Net Result (€) *S. aureus*

Reproductive ratio	0.32		5.3	
	Treatment	3-day	8-day	3-day
<i>Extra revenue</i>	0	0	0	0
<i>Reduced costs</i>	35.51	61.64	152.25	261.76
<i>Reduced revenue</i>	21.25	38.96	21.25	38.96
<i>Extra costs</i>	35.38	80.38	35.38	80.38
<b>Net result</b>	<b>-21.12</b>	<b>-57.70</b>	<b>95.62</b>	<b>142.42</b>

# Average Net Result (€) *Streptococci*

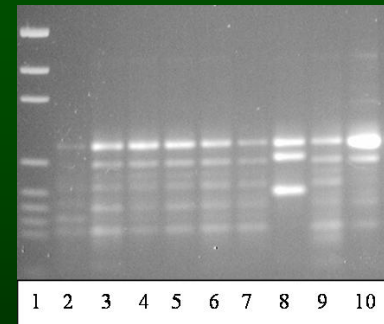
Reproductive ratio	0.21		1.4	
	Treatment	3-day	8-day	3-day
<i>Extra revenue</i>	0	0	0	0
<i>Reduced costs</i>	48.78	68.80	105.76	149.25
<i>Reduced revenue</i>	10.16	18.63	10.16	18.63
<i>Extra costs</i>	27	72	27	72
<b>Net result</b>	11.62	-21.83	68.60	58.62

# Preliminary conclusion

- Treatment of *Streptococcus* infections usually profitable
- Higher profit with higher cure ( $SDY > SUB$ ) and higher risk of transmission ( $SDY > SUB$ )
- Treatment of *S. aureus* infections profitable on farms with high risk of transmission
  - poor udder health management
  - highly contagious strain

# Risk factors for cure

- Cow factors
  - Parity
  - SCC
  - DIM
  - Quarter location
- *S. aureus* strain
- Treatment duration



Sol et al, 1997, 200 and Deluyker et al., 2005

# *S. aureus* – 3 day Tx – Cow factors

Pathogen	PC (%)	Cow Factors				Transmission	
		Parity	SCC	LS	QRT	low	high
PS	18.2	young	low	early	front	-39	22
	36.6	young	low	mid	front	-19	103
	59.9	young	low	late	front	5	205
	6.0	young	high	early	front	-51	-31
	14.2	young	high	mid	front	-43	5
	29.9	young	high	late	front	-26	73
	11.1	young	low	mid	hind	-46	-10
	24.4	young	low	late	hind	-32	49
	8.5	young	high	late	hind	-49	-20
	7.2	old	low	early	front	-50	-26
	16.8	old	low	mid	front	-40	16
	34.3	old	low	late	front	-22	93
	5.5	old	high	mid	front	-52	-34
	13.0	old	high	late	front	-44	-1
10.2	old	low	late	hind	-47	-13	

# *S. aureus* – 8 day Tx – Cow factors

Pathogen	PC (%)	Cow risk factors				Transmission	
		Parity	SCC	LS	QRT	Low	High
PR	59.4	young	low	mid	front	-58	<b>139</b>
	79.1	young	low	late	front	-37	<b>226</b>
	13.9	young	high	early	front	-106	-59
	29.5	young	high	mid	front	-89	<b>9</b>
	52.0	young	high	late	front	-66	<b>107</b>
	24.0	young	low	mid	hind	-95	-15
	45.0	young	low	late	hind	-73	<b>77</b>
	19.0	young	high	late	hind	-100	-35
	16.5	old	low	early	front	-103	-48
	33.8	old	low	mid	front	-85	<b>27</b>
	57.0	old	low	late	front	-61	<b>129</b>
	27.5	old	high	late	front	-92	<b>0</b>
	22.3	old	low	late	hind	-97	-23

# Conclusions *S. aureus*

- With low risk of transmission ( $R=0.32$ )
  - average net result negative for 3-day and 8-day Tx
  - net profit predicted for cows with chance of cure  $>55\%$
- With high risk of transmission ( $R=5.3$ )
  - average net result positive for 3-day and 8-day Tx
  - net profit predicted for cows with chance of cure  $>27\%$
- Profitability depends on herd, cow, strain

# Conclusions *S. dysgalactiae/S. uberis*

- With low risk of transmission ( $R=0.21$ )
  - average net result positive for 3-day Tx
  - average net result negative for 8-day Tx
- With high risk of transmission ( $R=1.4$ )
  - average net result positive for 3-day and 8-day Tx
- Profitability depends on herd, strain
- No cow level factors identified

# General Conclusions

- Higher % cure = more profit (SDY>SUB>SAU)
- Higher risk of transmission = more profit
- Need to refine model (e.g. animal value)
- Economic outcome is affected by pathogen, host and environment.
- Farmers, veterinarians and advisors should shift focus from high probability of bacteriological cure to “economic cure”.



Questions?



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