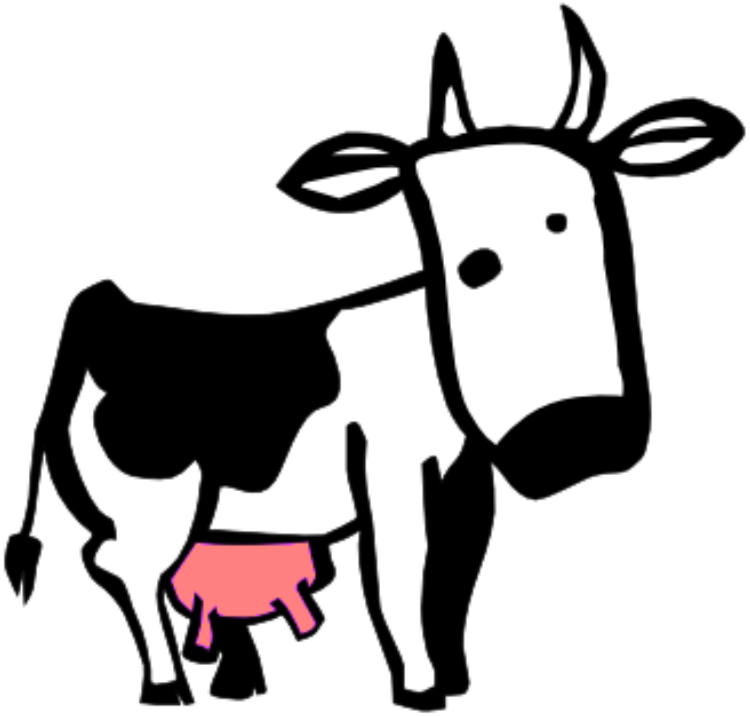
Session 11, EAAP 2008

Production loss caused by increased somatic cell count in different stages of lactation



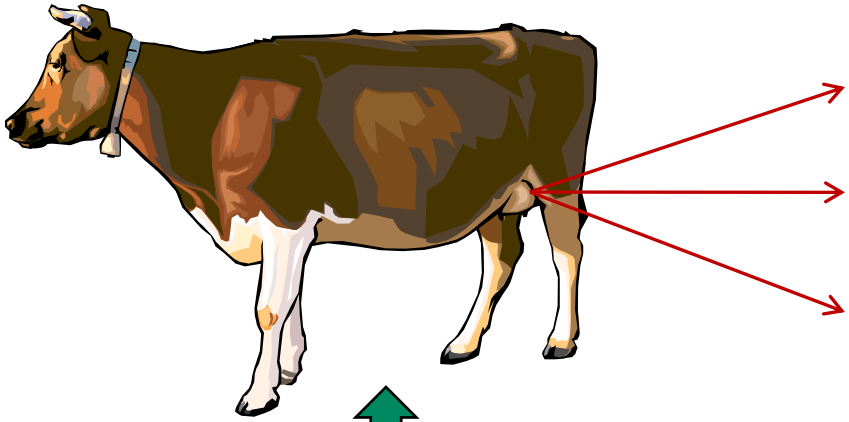
Christel Hagnestam-Nielsen,[1] Ulf Emanuelson,[2] Britt Berglund[1] and Erling Strandberg[1]

[1]Dept. of Animal Breeding and Genetics, [2]Dept. of Clinical Sciences
Swedish University of Agricultural Sciences

For more information: Christel.Nielsen@hgen.slu.se

Subclinical mastitis
– *common and costly*

Incidence in Sweden (2005/2006): >30%



Animal welfare

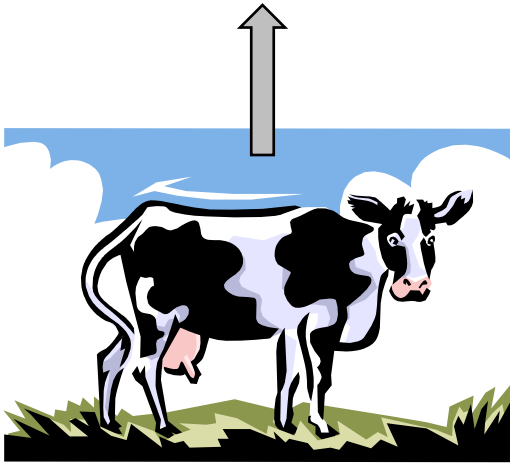
Production loss

Product quality

Preventive measures
gains/costs

Diagnosing subclinical mastitis

No visible symptoms

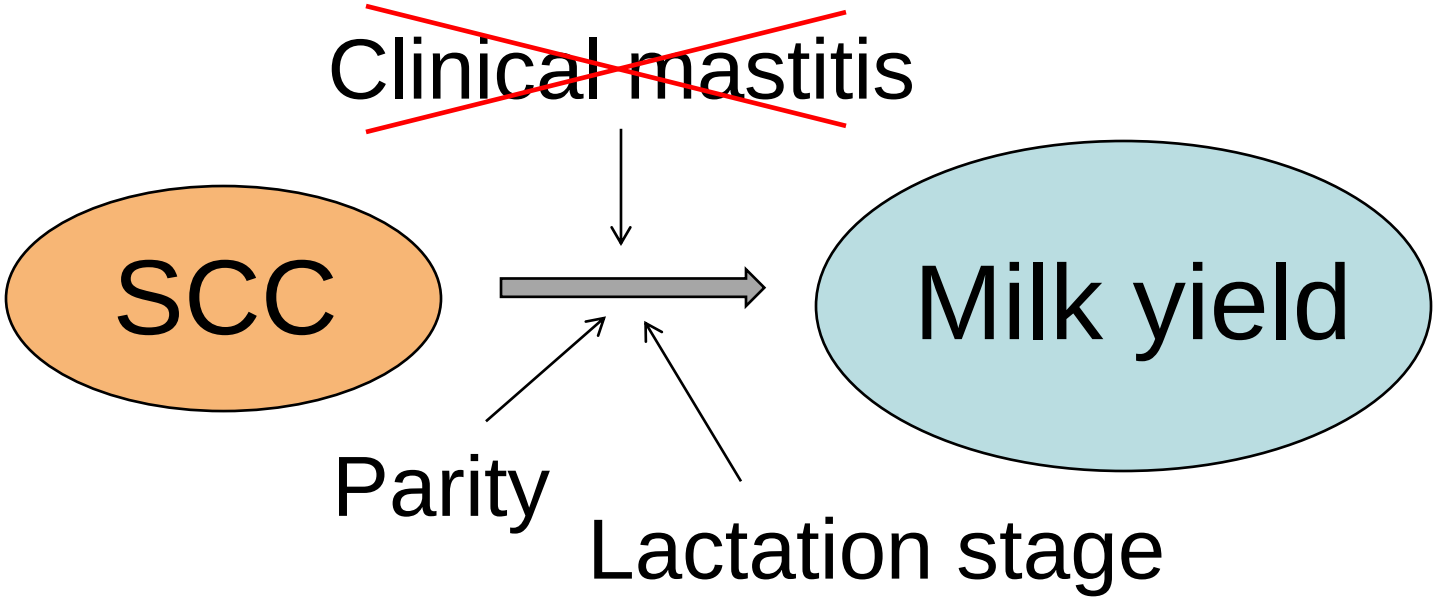


1. Threshold value
2. Yield loss with increase in SCC

Somatic Cell Count (SCC)

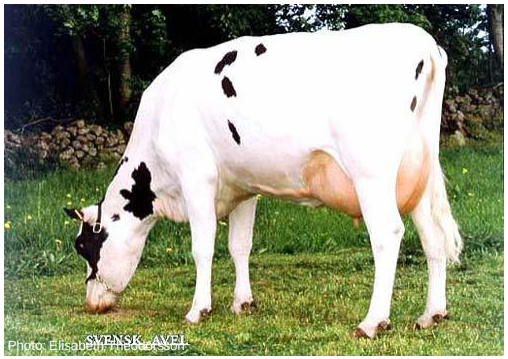
Indirect measure

Relationship between milk yield and SCC



Aim

”To investigate the milk loss associated with increased SCC in different stages of lactation, while controling for the effect of clinical mastitis”



Animals and registrations

- University research herd
- 1989 to 2004
- 497 Swedish Red and Swedish Holstein cows
- Average production: 9 500 kg of milk
- 1,155 lactations (parities 1 to 9)

Clinical mastitis
Primiparous cows: 20%
Multiparous cows: 29%

SCC, geometric mean
Primiparous cows: 55 000
Multiparous cows: 95 000

Animals and registrations

- Test-days affected with CM

  Affected = diagnosis + 8 days *(International Dairy Federation, 1997)*

- Test-days 305 days after calving

→ 36 000 weekly test-day records

43% primiparous cows

57% multiparous cows

Statistical method

-a repeated measures mixed model

Test-day milk yield =

Lactation stage

Linear, quadratic and cubic effects of SCC, nested within lactation stage

Week in milk

Calving disorders

Reproductive disorders

Metabolic disorders

Claw disorders

Parity

Breed

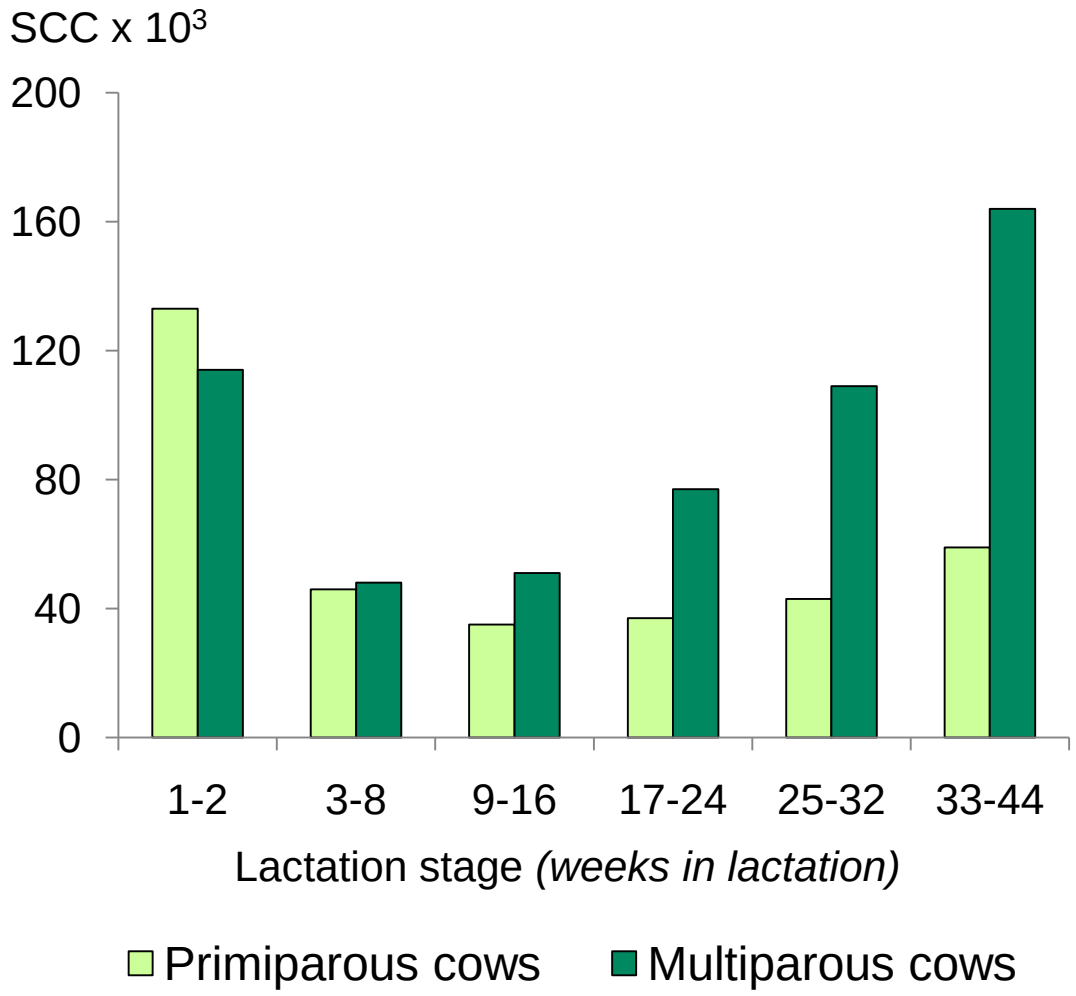
Pregnancy status

Calving year/season

+ random regression describing the individual lactation curve

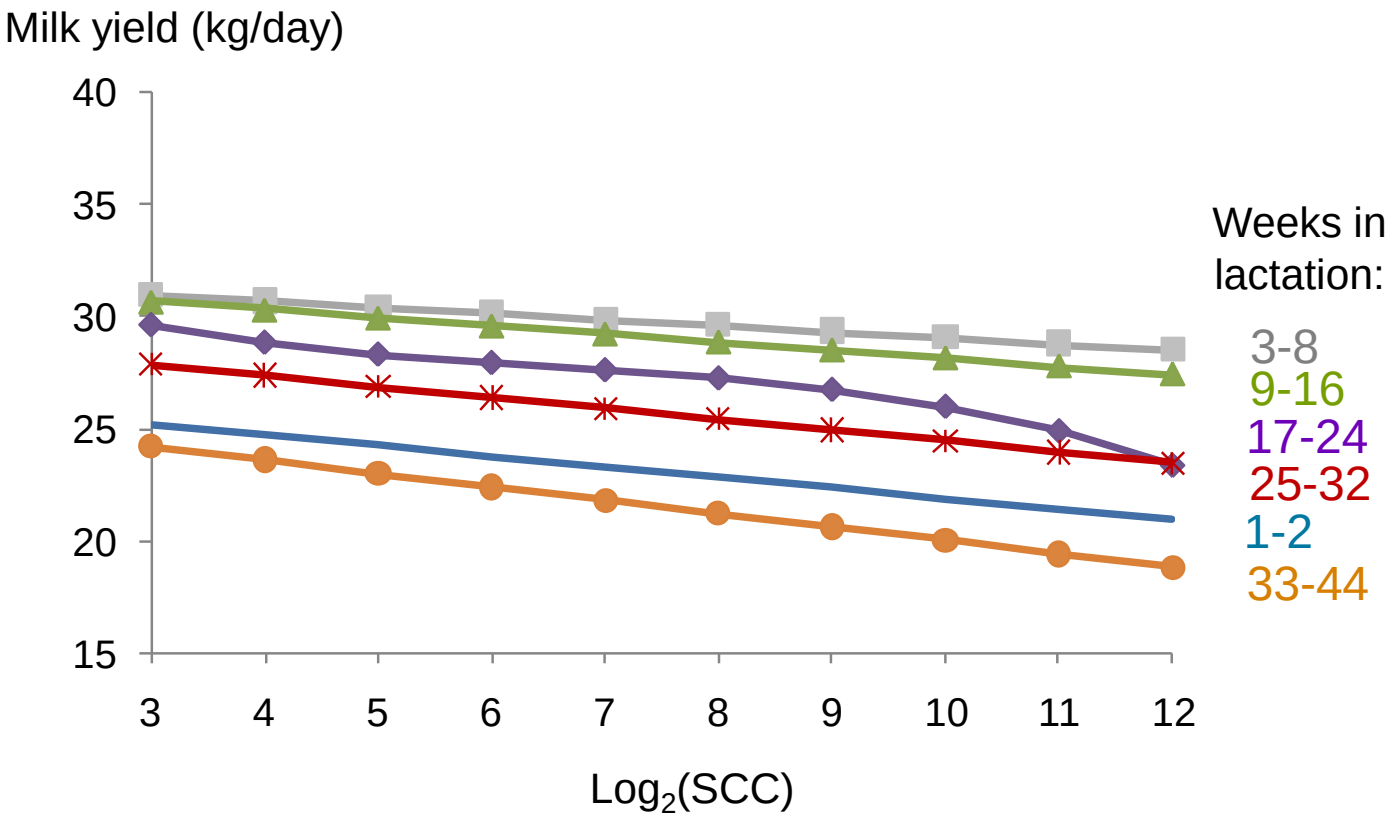
SCC: Log_2-transformed and centered on the median

Median SCC in different stages of lactation



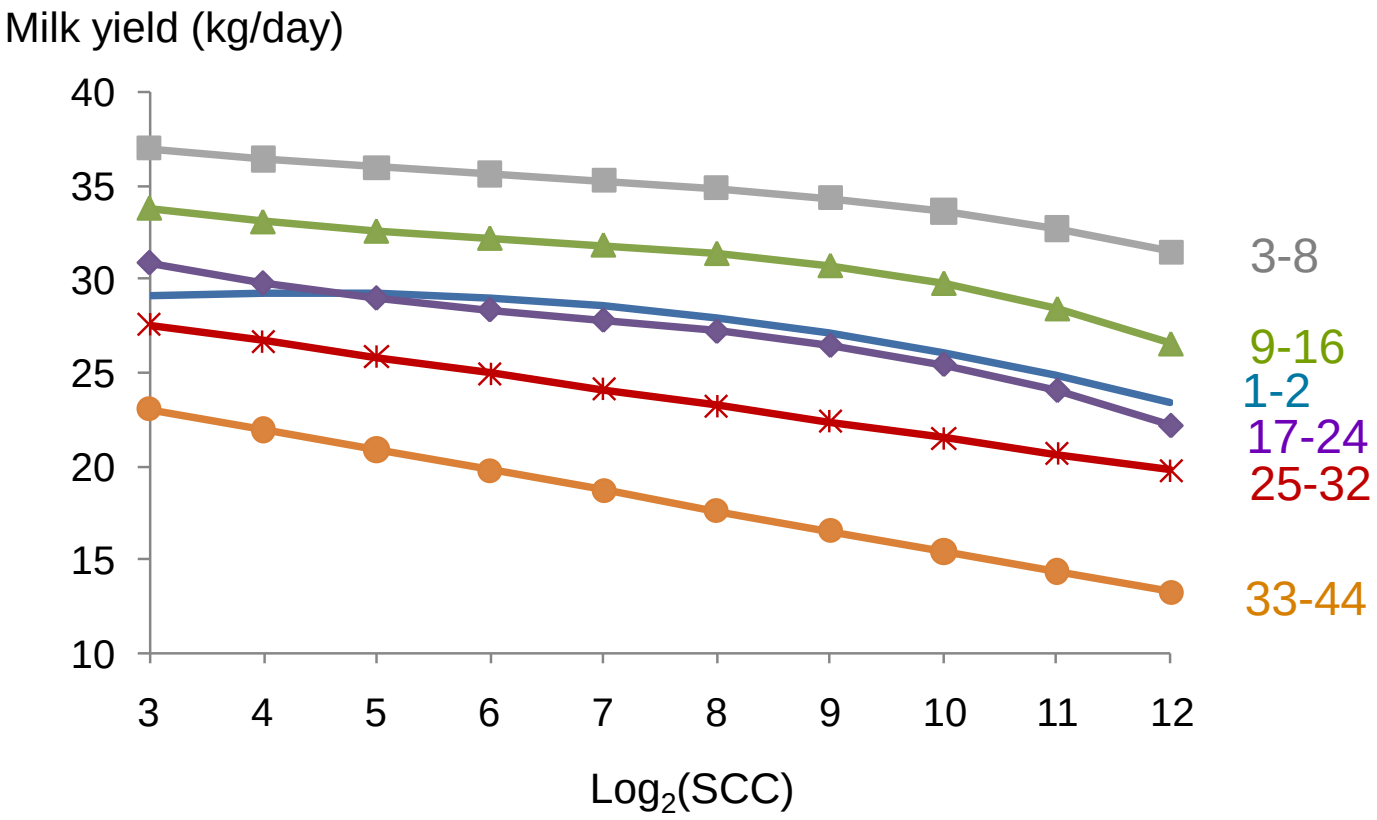
Regressions of daily milk yield on SCC in different stages of lactation

- *primiparous cows*



Regressions of daily milk yield on SCC in different stages of lactation

- *multiparous cows*



Absolute test-day milk loss at various SCC

	Weeks of lactation					
SCC (x 10^3)	1-2	3-8	9-16	17-24	25-32	33-44
Primiparous cows						
200	+0.5	-0.5	-0.7	-0.7	-1.0	-1.2
500	-0.2	-0.9	-1.2	-1.3	-1.6	-2.0
1,000	-0.6	-1.2	-1.6	-2.0	-2.1	-2.6
Multiparous cows						
200	+0.8	-0.7	-0.8	-1.1	-1.7	-2.2
500	-0.3	-1.4	-1.6	-2.1	-2.9	-3.6
1,000	-1.3	-2.1	-2.5	-3.1	-3.7	-4.7

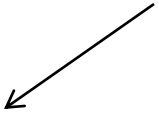
Relative to 400 000 cells/ml

Relative to 50 000 cells/ml

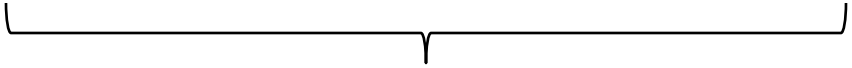
Christel Nielsen
Swedish University of Agricultural Sciences

Relative test-day milk loss at various SCC

	Weeks of lactation					
SCC (x 10^3)	1-2	3-8	9-16	17-24	25-32	33-44
Primiparous cows						
200	+2.1	-1.8	-2.4	-2.4	-3.6	-5.2
500	-0.7	-3.0	-4.0	-4.6	-6.1	-8.7
1,000	-2.7	-3.8	-5.3	-7.3	-7.9	-11.3
Multiparous cows						
200	+2.8	-2.0	-2.4	-4.0	-6.8	-10.8
500	-1.1	-3.8	-4.8	-7.3	-11.4	-17.9
1,000	-4.9	-5.8	-7.7	-10.8	-14.8	-23.2

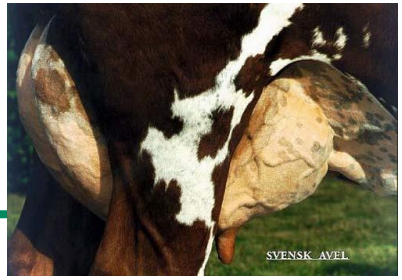


Relative to 400 000 cells/ml



Relative to 50 000 cells/ml

Comparison with daily milk loss caused by clinical mastitis



Loss in week of diagnosis

Primiparous cows: 5 kg
Multiparous cows: 1-8 kg

Hagnestam et al. (2007)

Loss in remaining lactation

Primiparous cows: 1-2 kg
Multiparous cows: 2-3 kg

Hagnestam et al. (2007)

Milk loss at SCC = 500 000 cells/ml

	Weeks of lactation					
	1-2	3-8	9-16	17-24	25-32	33-44
Primiparous cows	-0.2	-0.9	-1.2	-1.3	-1.6	-2.0
Multiparous cows	-0.3	-1.4	-1.6	-2.1	-2.9	-3.6

305-day yield loss

Healthy test-days:
Weeks 1 and 2: SCC = 400 000
Later lactation: SCC = 50 000

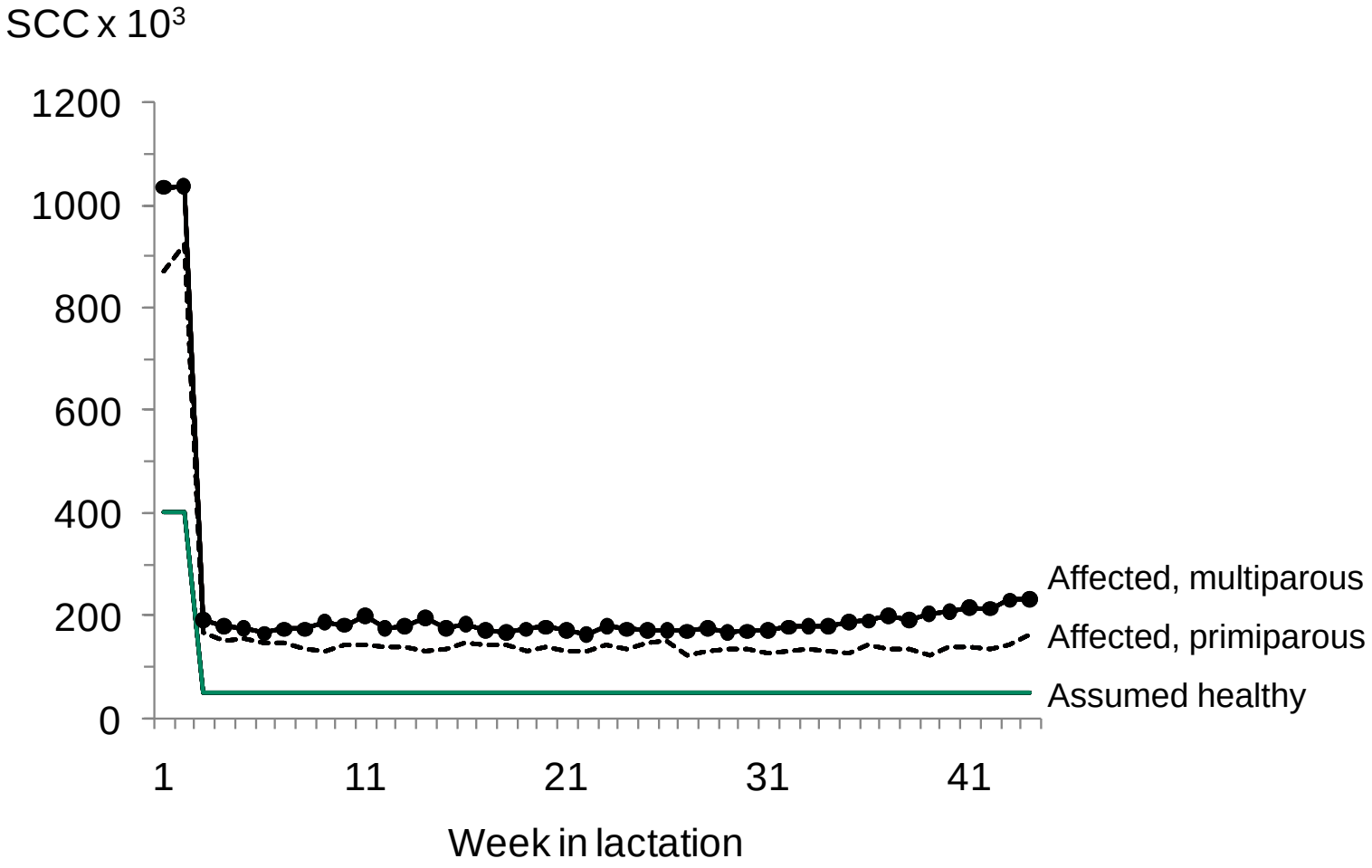
Affected test-days:
Weeks 1 and 2: SCC > 400 000
Later lactation: SCC > 50 000

Week-specific geometric averages of SCC

SCC-curve in lactations affected
with subclinical mastitis

SCC-curves

- lactations affected with subclinical mastitis and lactations assumed healthy



305-day milk loss

Lactational loss = sum of weekly loss weighted by prevalence

Primiparous cows	*Multiparous cows*
98 kg milk 1% of lactational yield	306 kg milk 4% of lactational yield

In cows with clinical mastitis:

(Hagnestam et al., 2007)

0-705 kg milk 0-9% of lactational yield	0-902 kg milk 0-11% of lactational yield

Conclusions

- Daily yield loss caused by increased SCC was most severe in late lactation
- Both absolute and relative daily yield loss were higher in multiparous than in primiparous cows
- Lactational yield loss was three times greater in multiparous than in primiparous cows