Den Europæiske Landbrugsfond for Udvikling af Landdistrikterne:
Danmark og Europa investerer i landdistrikterne

Miljø- og Fødevareministeriet
Landbrugsstyrelsen

Den Europæiske Landbrugsfond
for Udvikling af Landdistrikterne

LDP 2020

Se EU-Kommissionen, Den Europæiske Landbrugsfond for Udvikling af Landdistrikterne

SimHerds funktionaliteter i forbindelse med holdbarhed

Vejen til 6. laktation

16. juni 2017

SEGES

Søren Østergaard

AARHUS UNIVERSITET

First a few key observations about cows leaving

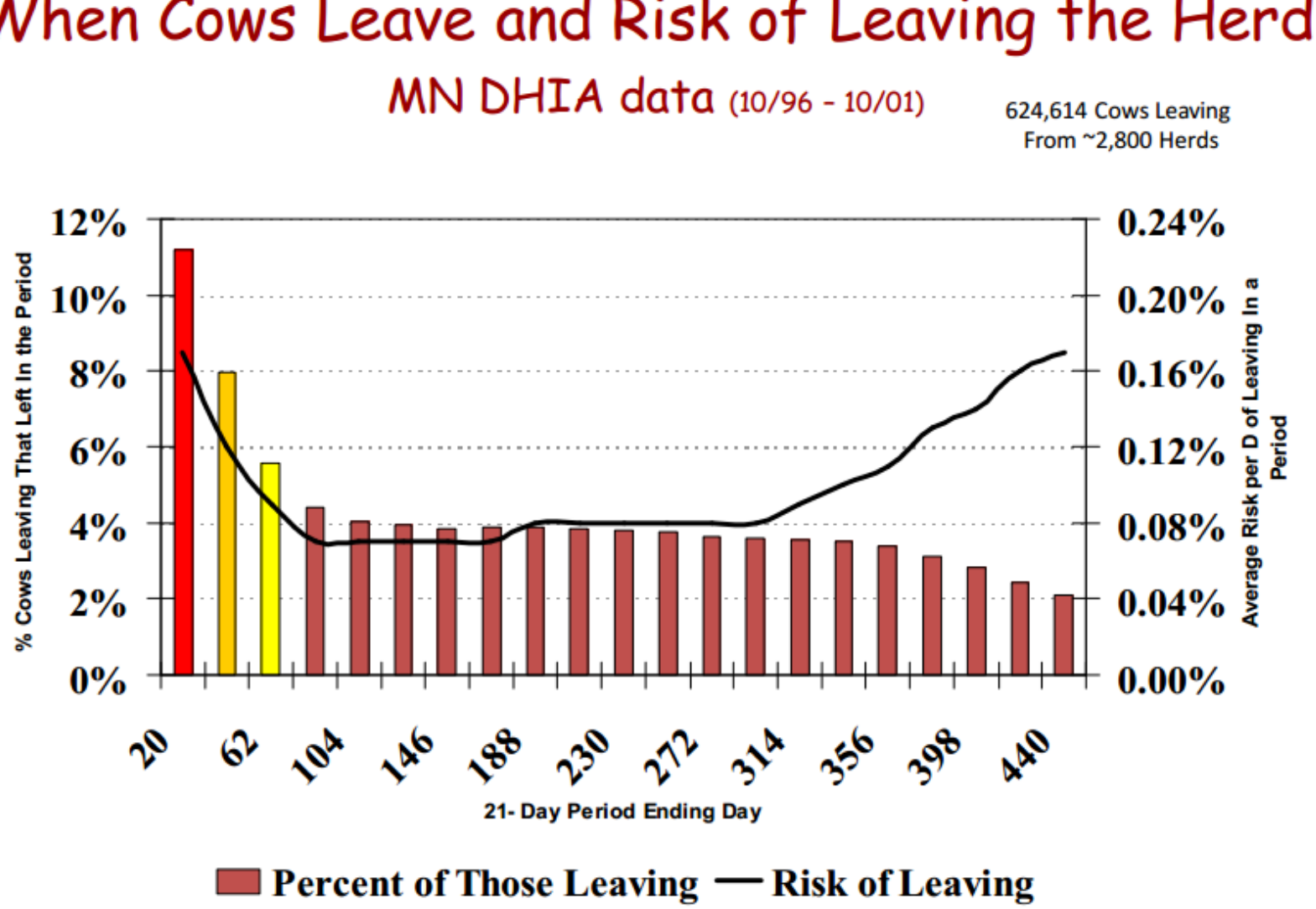


Figure 1. When cows leave the herd and risk of leaving the herd (MN DHIA data, October 1996–October 2001). © MWPS (Midwest Plan Service), Iowa State University, Ames, IA, www.mwpshq.org. Used with permission: *4-State Applied Nutrition and Management Conference. MWPS-4SD16.*

Probability of cows dying or being sold

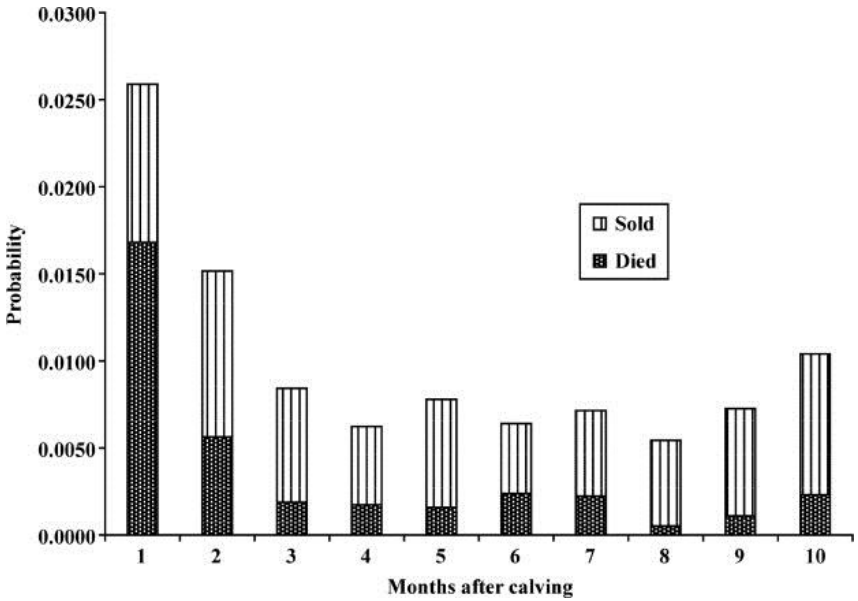


Figure 1. Probability of a cow dying (dotted pattern) or being culled (vertical lines) in 5,500 first lactations in 5 New York State dairy herds.

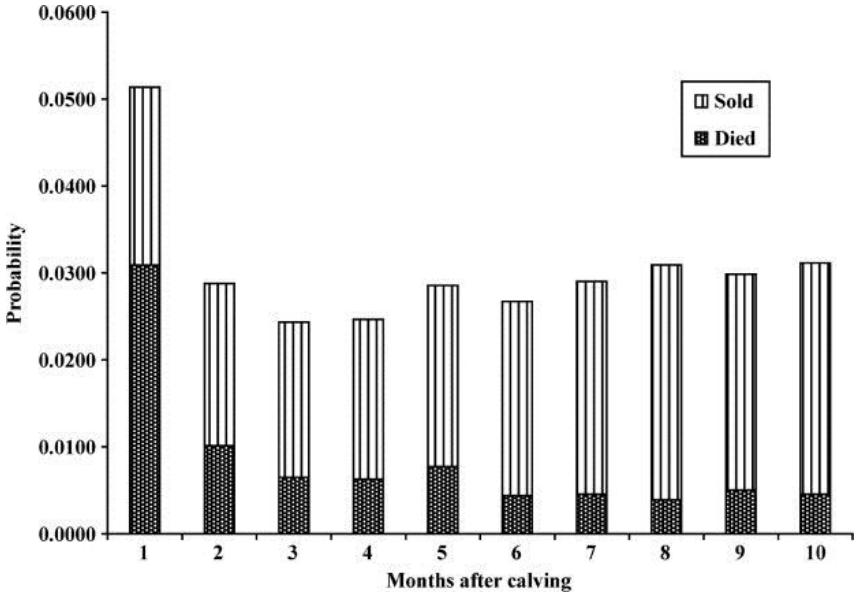


Figure 2. Probability of a cow dying (dotted pattern) or being culled (vertical lines) in 10,645 multiparous lactations in 5 New York State dairy herds.

D. Bar, Y.T. Gröhn, G. Bennett, R.N. González, J.A. Hertl, H.F. Schulte, L.W. Tauer, F.L. Welcome, Y.H. Schukken

Effects of Repeated Episodes of Generic Clinical Mastitis on Mortality and Culling in Dairy Cows

Journal of Dairy Science, Volume 91, Issue 6, 2008, 2196–2204

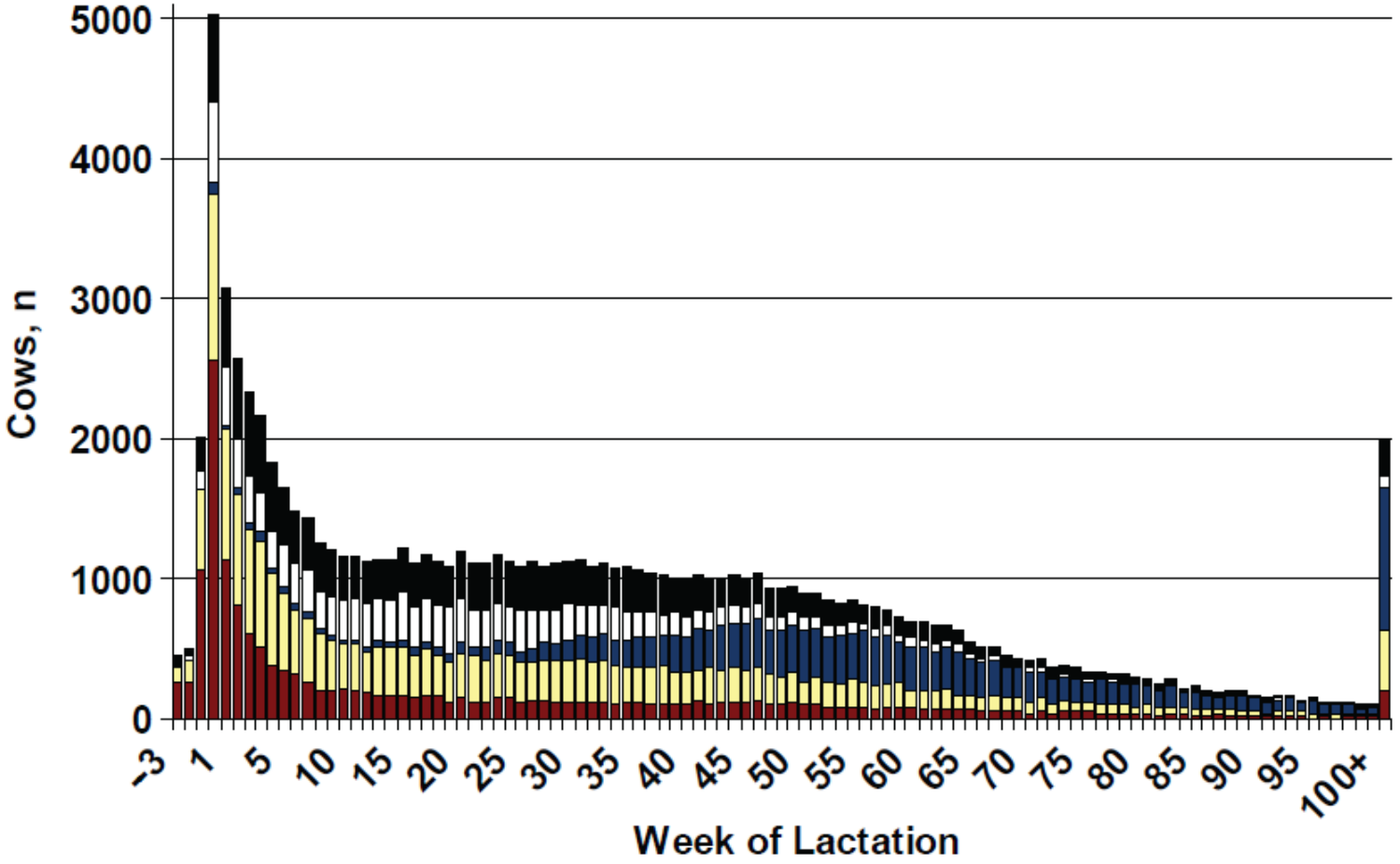


Figure 1. Total number of cows (n) that died (red), or were culled with codes corresponding to reproduction (blue), injury/other (yellow), mastitis (white), and all other reasons (black) by week of lactation.

Dechow and Goodling, 2008. JDS 91: 4630-4639

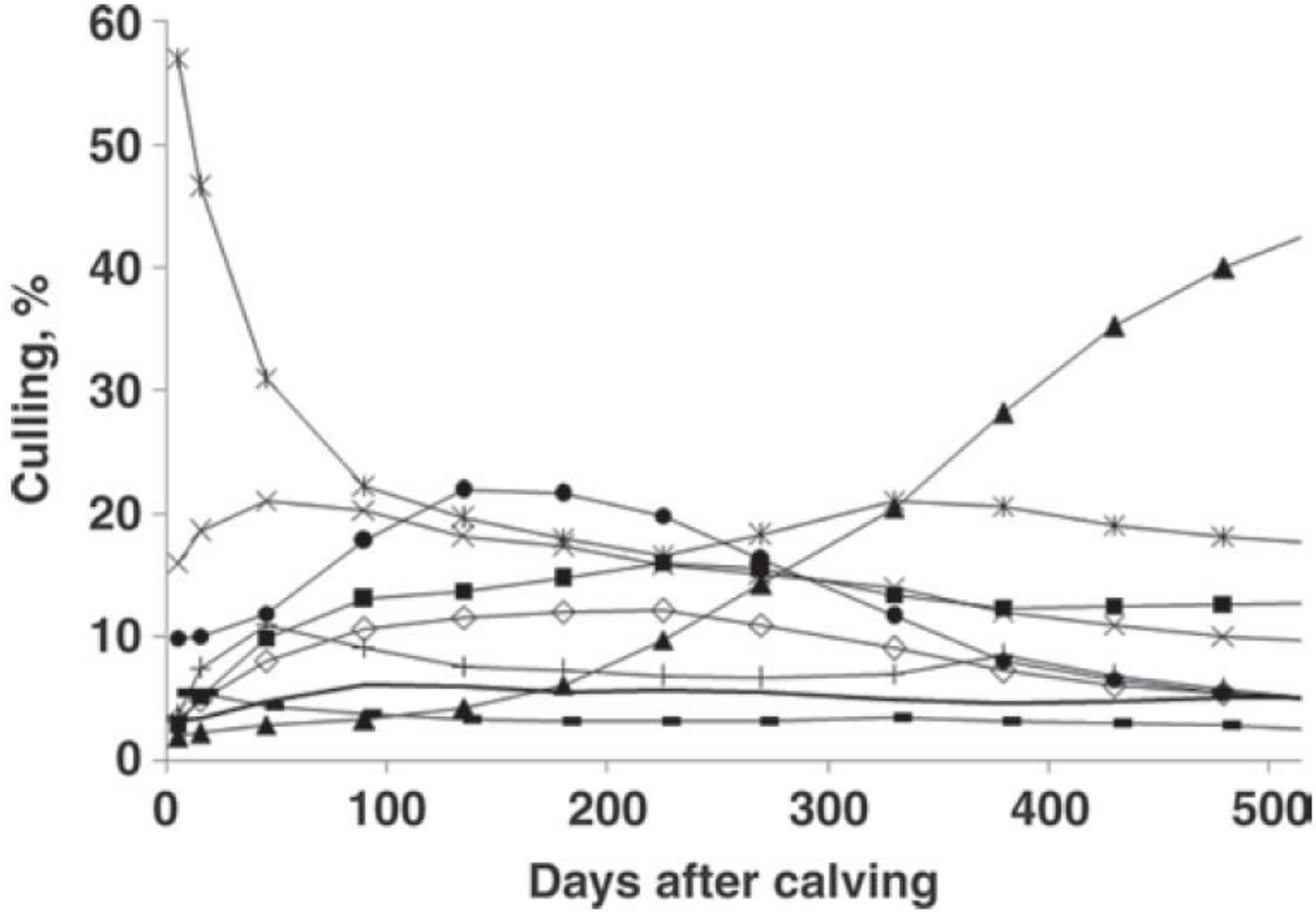


Figure 2. Distribution of culled cows (%) by disposal codes at different stages of lactation (each day is 100%). Disposal codes: feet and legs (◊), low production (■), reproduction (▲), injury/other (×), died (*), mastitis (●), disease (+), udder problems (▬), and reason not reported (clean line).

Pinedo et al. 2010. JDS 93: 2250-2261

SimHerd modeling of cows leaving the herd

When a cow is leaving the herd in SimHerd

Types of culling

- Death
- Involuntary culling
- Voluntary culling

Sub models for cows leaving the herd in SimHerd

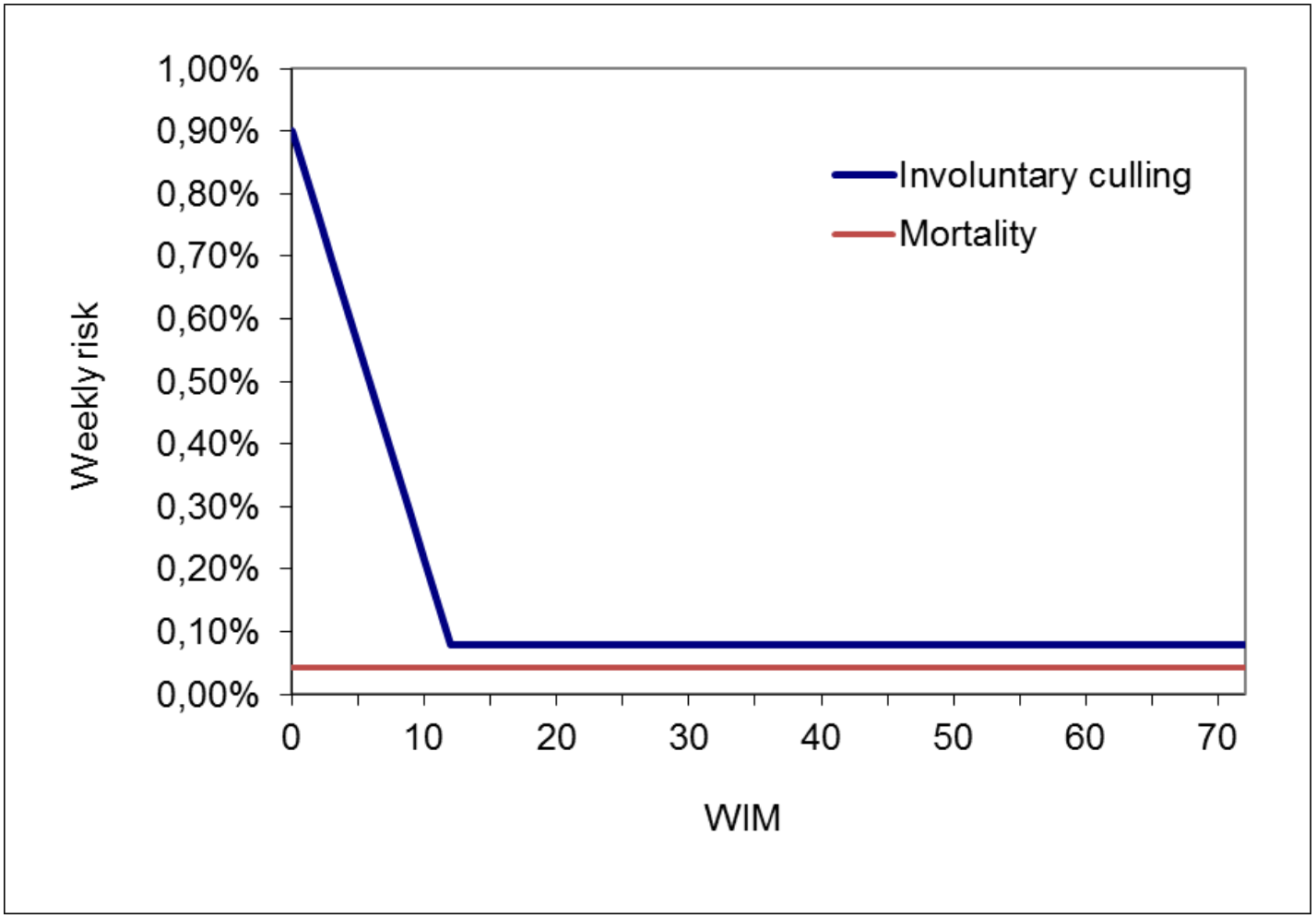
- **Death** – leaving for processing
  - Breed, Diseases
  - Other reasons not modelled directly (health problems, accidents)

- **Involuntary culling** - leaving for slaughtering
  - Breed, Parity, DIM
  - Other reasons not modelled directly (health problems, ugly, stupid, do not fit in)
  - Time of leaving the herd
    - When event is triggered

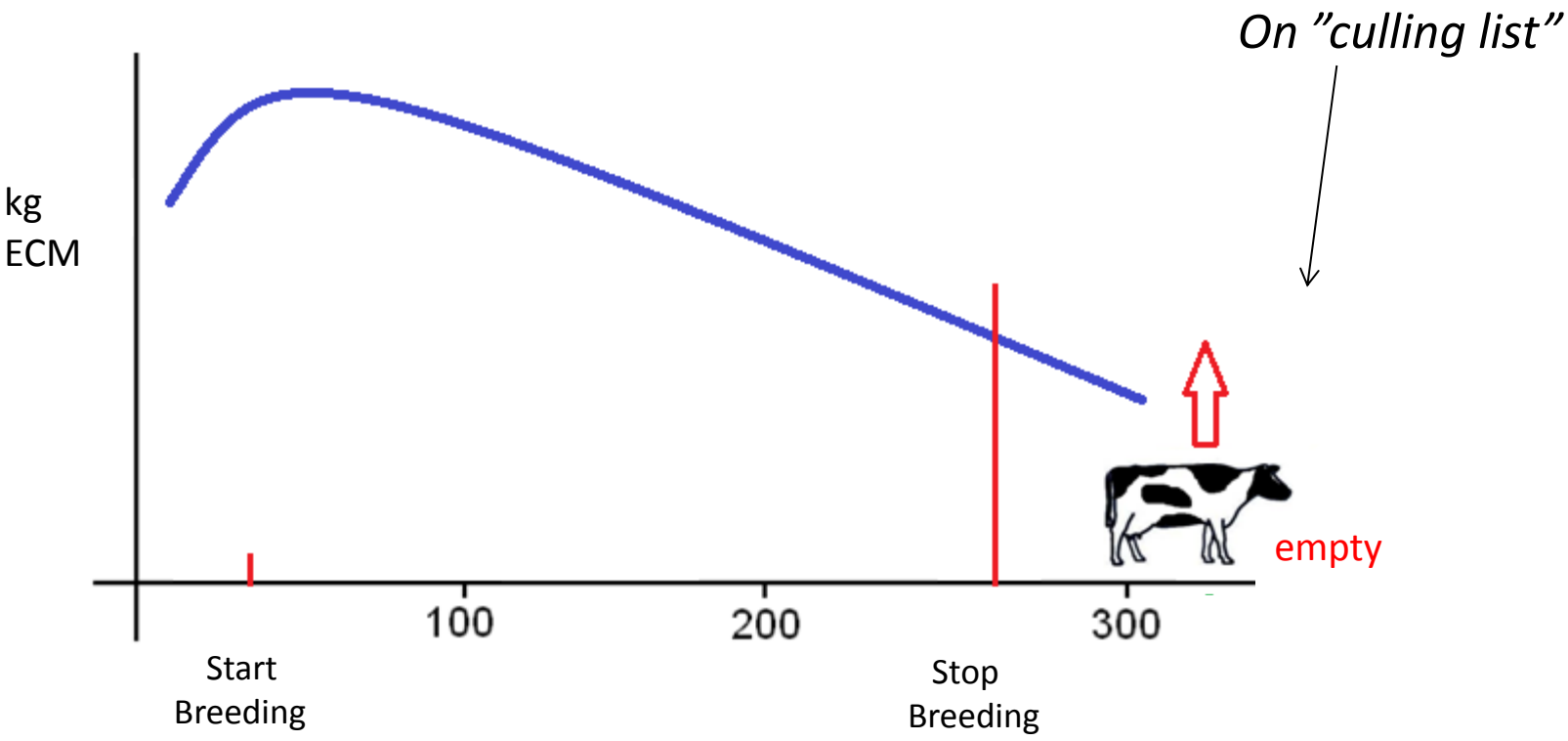
Sub models for cows leaving the herd in SimHerd

- **Voluntary culling** - leaving for slaughtering
  - Put on culling list
    - No pregnancy
      - Insemination period
        - » Breed, parity, disease, milk yield
      - Failed to conceive
  - Time of leaving the herd
    - Milk yield in herd mates
    - Pregnant heifers
    - Absolute threshold for low milk yield (e.g. 10 kg) or advanced DIM

Involuntary culling and mortality (residual) in SimHerd (Death due to modelled diseases not included)

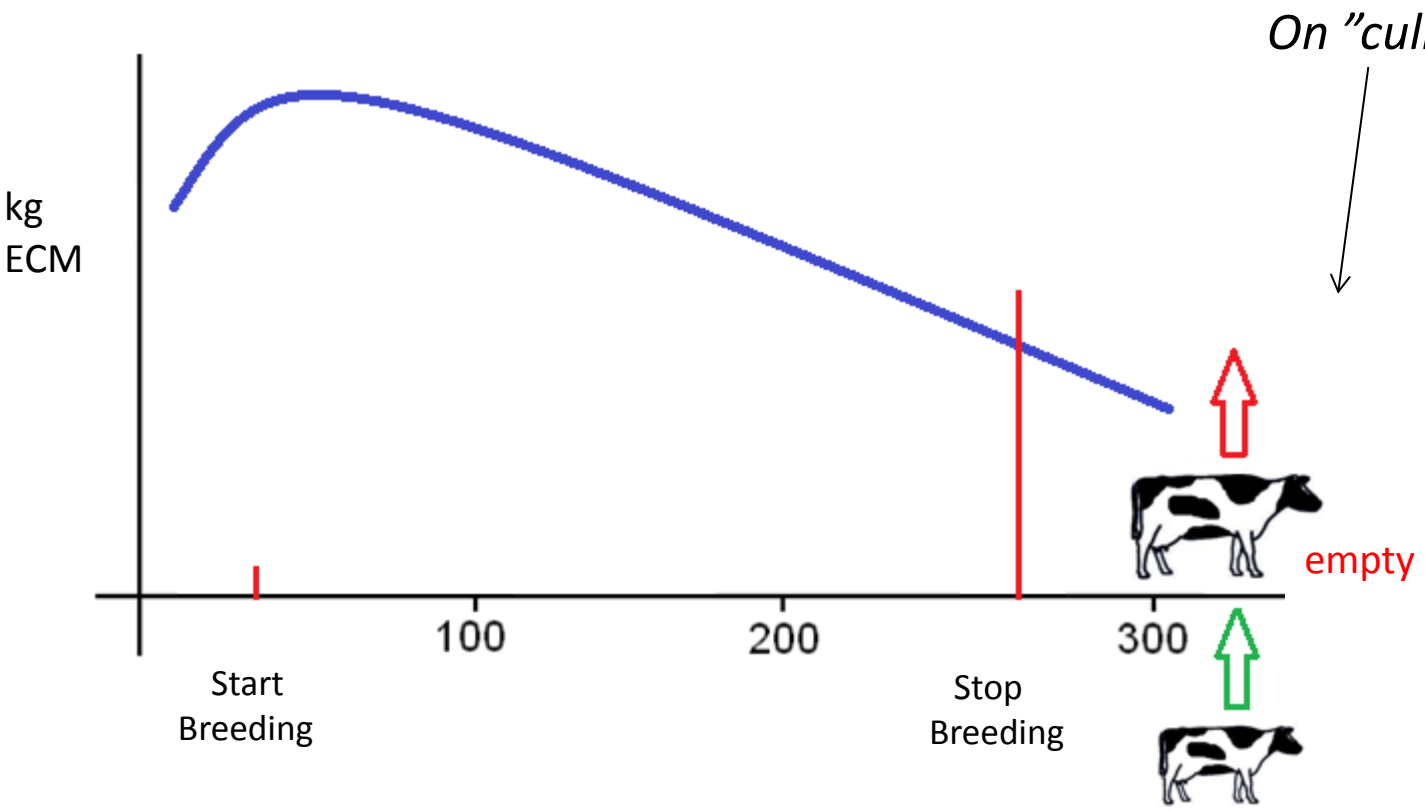


Involuntary culling in SimHerd



- Cow has exceeded ”max number of days open” → culling list
- Stop breeding depending on cow MY level, health and parity

Involuntary culling in SimHerd



Cow has exceeded ”max number of days open” → culling list

The lowest yielding cow on the list is culled **when** a new heifer is ready to come in

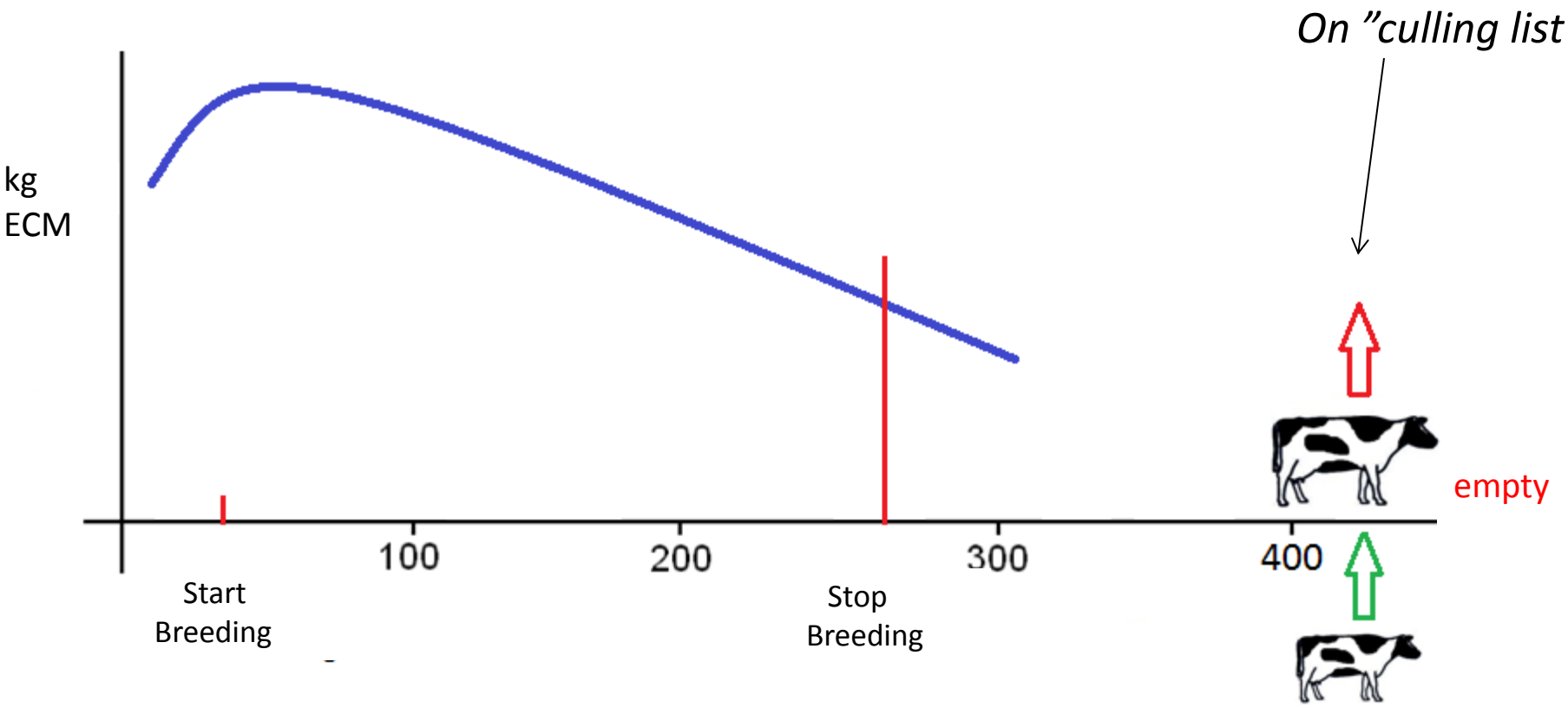
Reproduction and Culling in SimHerd

Mechanistic

More heifers available

=

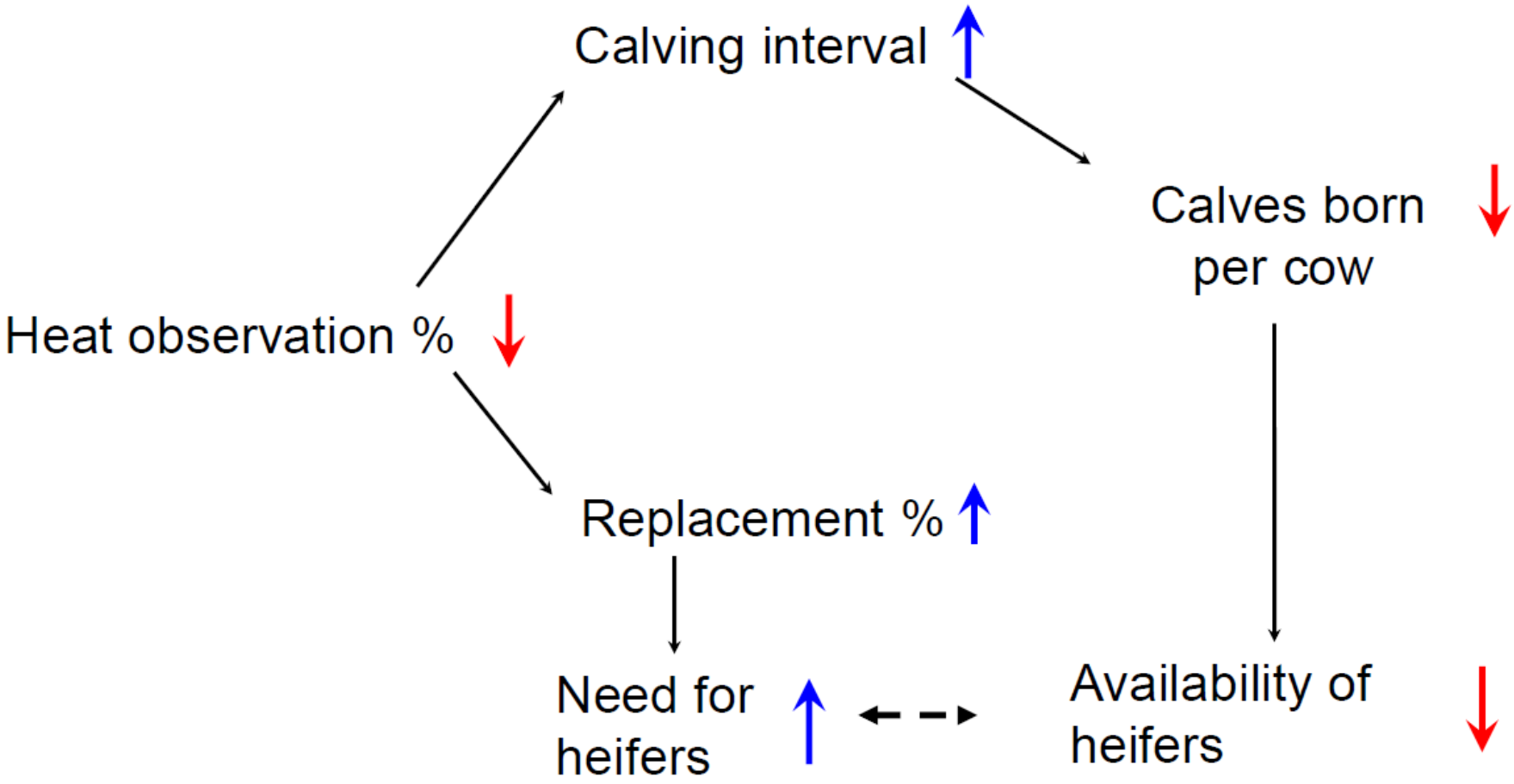
Faster replacement



Cow has exceeded ”max number of days open” → culling list

The lowest yielding cow on the list is culled **<u>when</u>** a new heifer is ready to come in

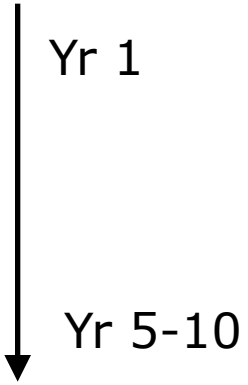
Examples of mechanisms and dynamics in a herd



Need for heifers **rises** immediately, difficulty with replacement increase **additionaly after 3 years** when **availability** of heifers **falls**

The complex and lengthy effect on culling after a change in reproduction efficiency

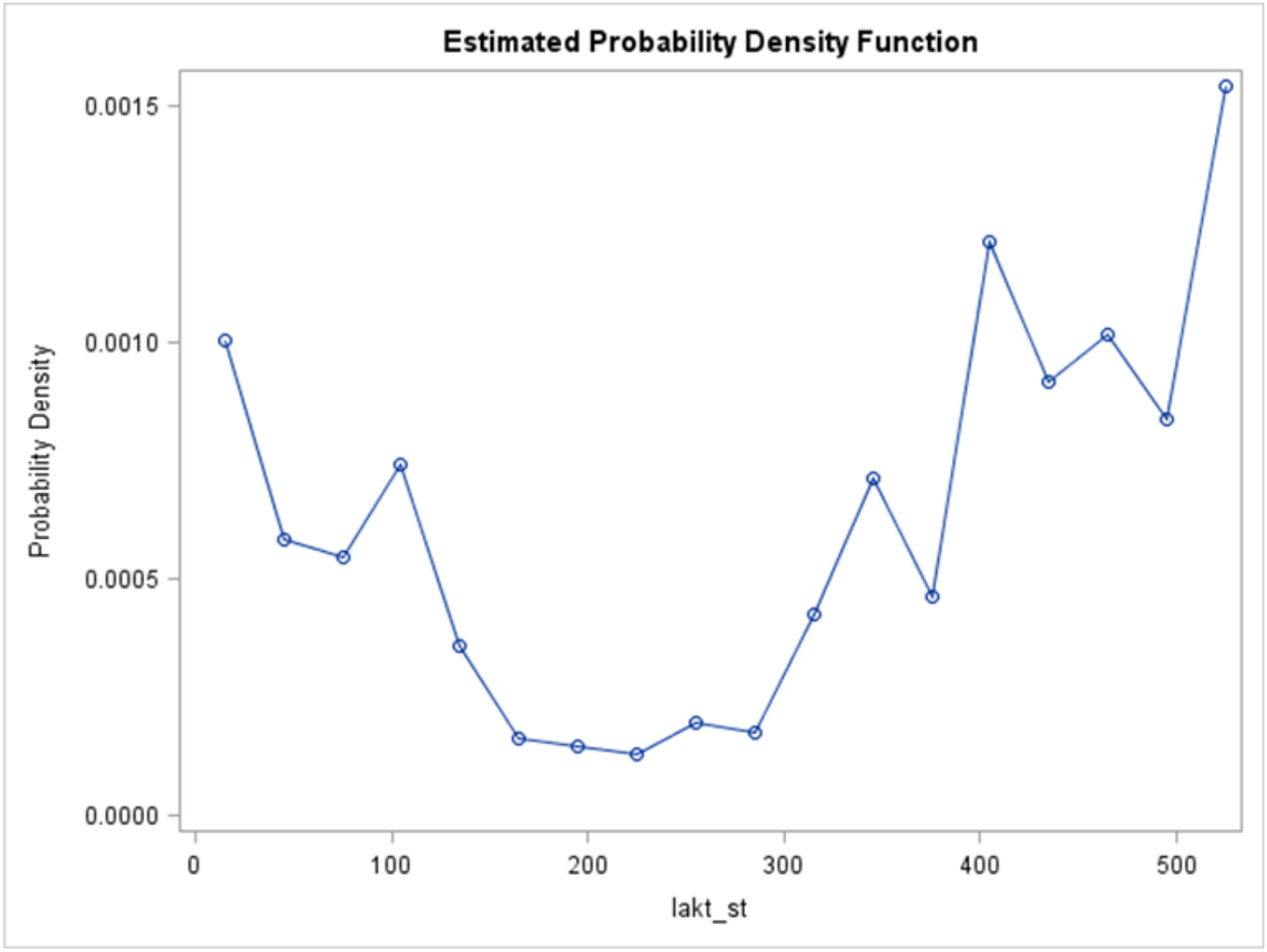
- Improved repro affect the herd slowly:
  - More cows get pregnant
  - **Less cows are culled due to lack of pregnancy**
  - Shorter calving interval
  - More calves and heifers
  - **Earlier culling of cows**
  - New distribution of parities and DIM



Examples of culling/longevity simulated with the SimHerd model

Culling profile: (not standard output from SimHerd)

Scenario with replacement rate of 0.38 and mean DIM of 209
(Profile adjustment mainly through involuntary culling profile)



SimHerd simulation: Good health herd

Scenario: Reduced involuntary culling rate: 30 tkr/yr

Besætningsdynamik og ungdyr (gns. af år 6 til 10)

	Nudrift	Scenarie	Forskel	
Antal årskøer	200	200	0	
Antal kælvninger	212	214	1	
Udskiftningsprocent	39,2	38,3	-0,9	
- Antal ufrivillige udsætninger og dødelighed	35	30	-5	
- Antal frivillige udsætninger	44	47	3	
Antal malkeår pr. ko	2,5	2,6	0,1	1/udpct
Livsydelse i alt pr. ko, kg EKM	25063	25785	722	Årsydelse/malkeår
Dødfødsel, pct.	6,5	6,3	-0,1	
Kalvedødelighed efter fødsel, pct.	7,0	6,8	-0,2	
Antal fødte tyrekalve (renracet)	103	104	1	
Antal fødte krydsningskalve (kvier + tyre)	0	0	0	
Antal købte kvier	0	0	0	
Antal solgte kvier	2	5	2	

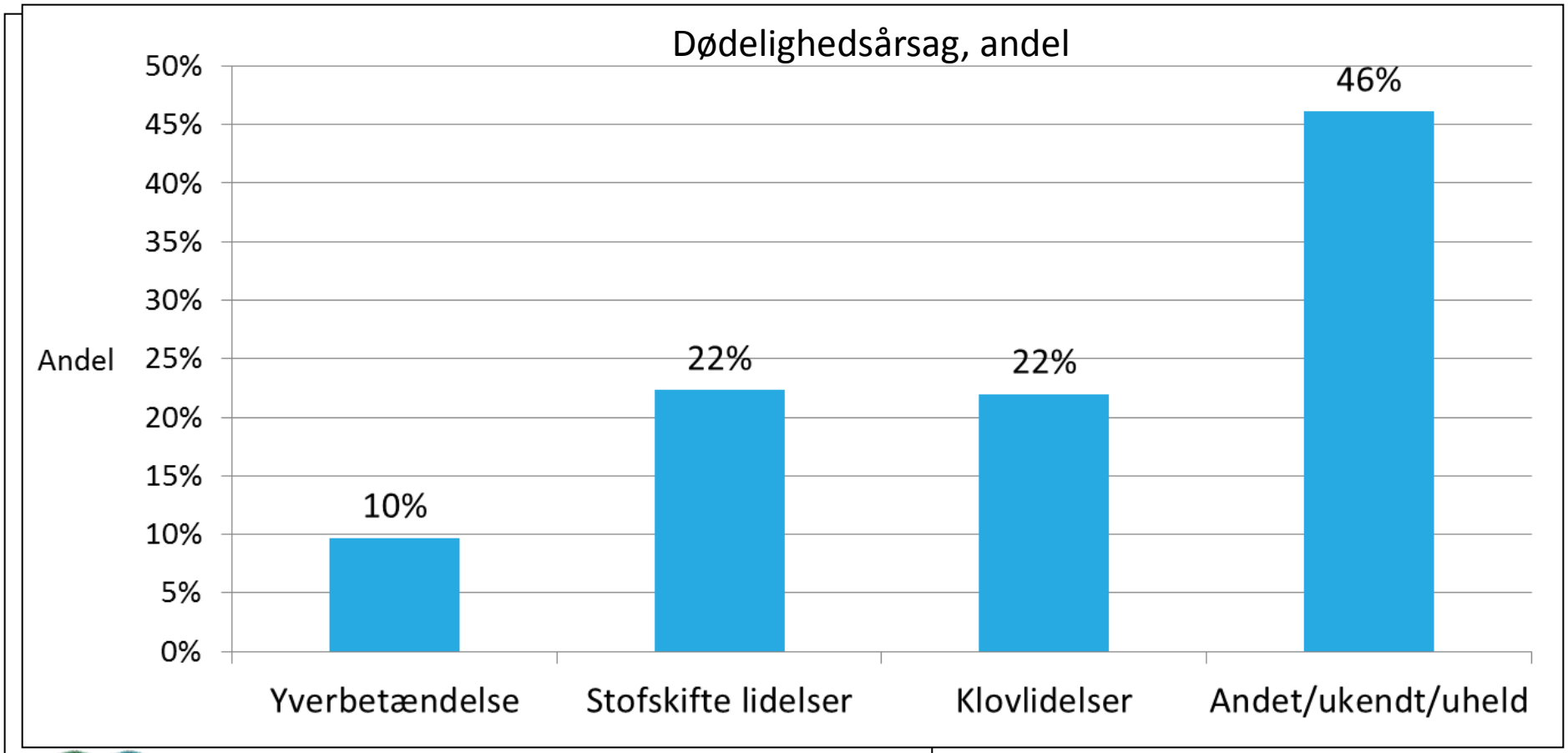
SimHerd simulation: Average herd

Scenario: Reduced cow mortality (other causes): 55 tkr/yr

Besætningsdynamik og ungdyr (gns. af år 6 til 10)

	Nudrift	Scenarie	Forskel
Antal årskøer	200	200	0
Antal kælvninger	212	215	2
Udskiftningsprocent	39,2	38,8	-0,5
- Antal ufrivillige udsætninger og dødelighed	35	30	-5
- Antal frivillige udsætninger	44	48	4
Antal malkeår pr. ko	2,5	2,6	0,0
Livsydelse i alt pr. ko, kg EKM	25063	25472	409
Dødfødsel, pct.	6,5	6,5	0,1
Kalvedødelighed efter fødsel, pct.	7,0	6,9	0,0
Antal fødte tyrekalve (renracet)	103	103	0
Antal fødte krydsningskalve (kvier + tyre)	0	0	0
Antal købte kvier	0	0	0
Antal solgte kvier	2	5	2

1) Hvad giver en halvering af ko dødelighed?



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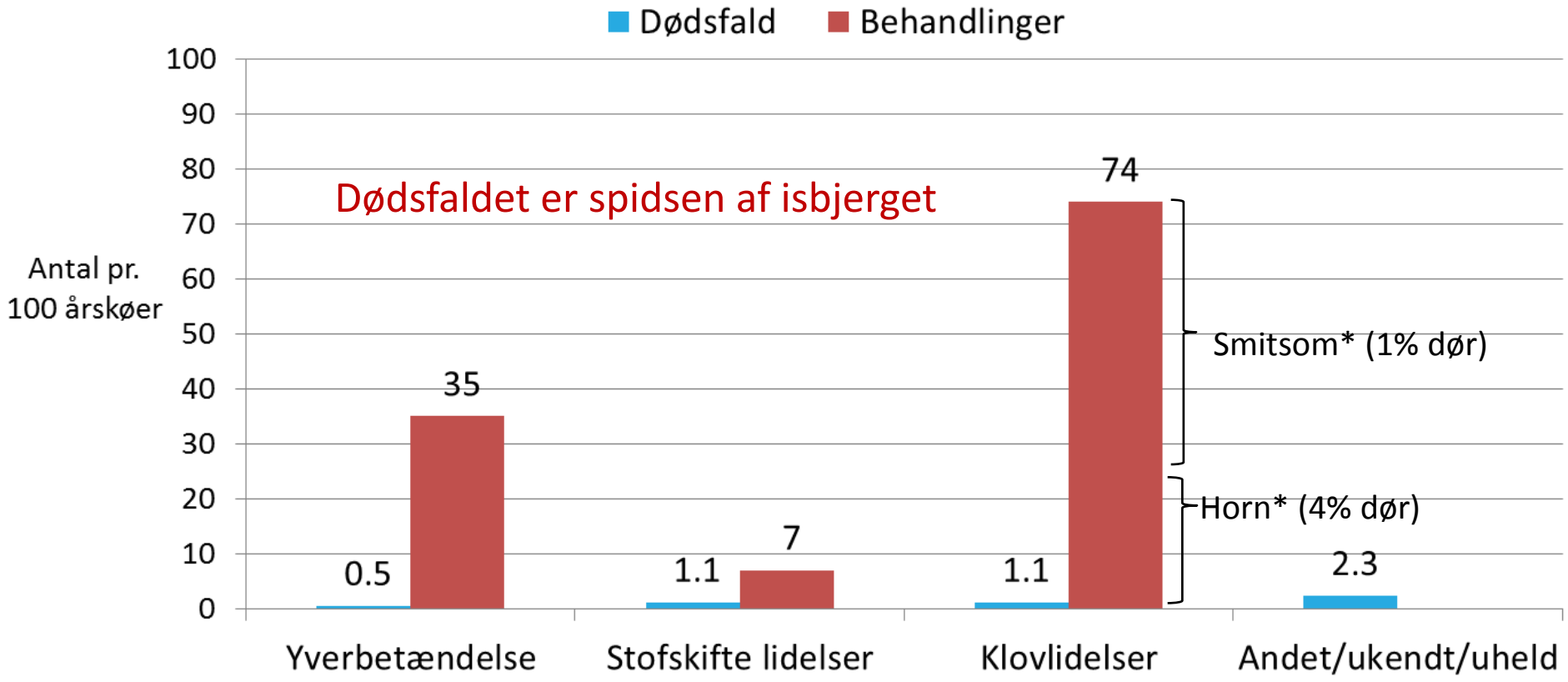
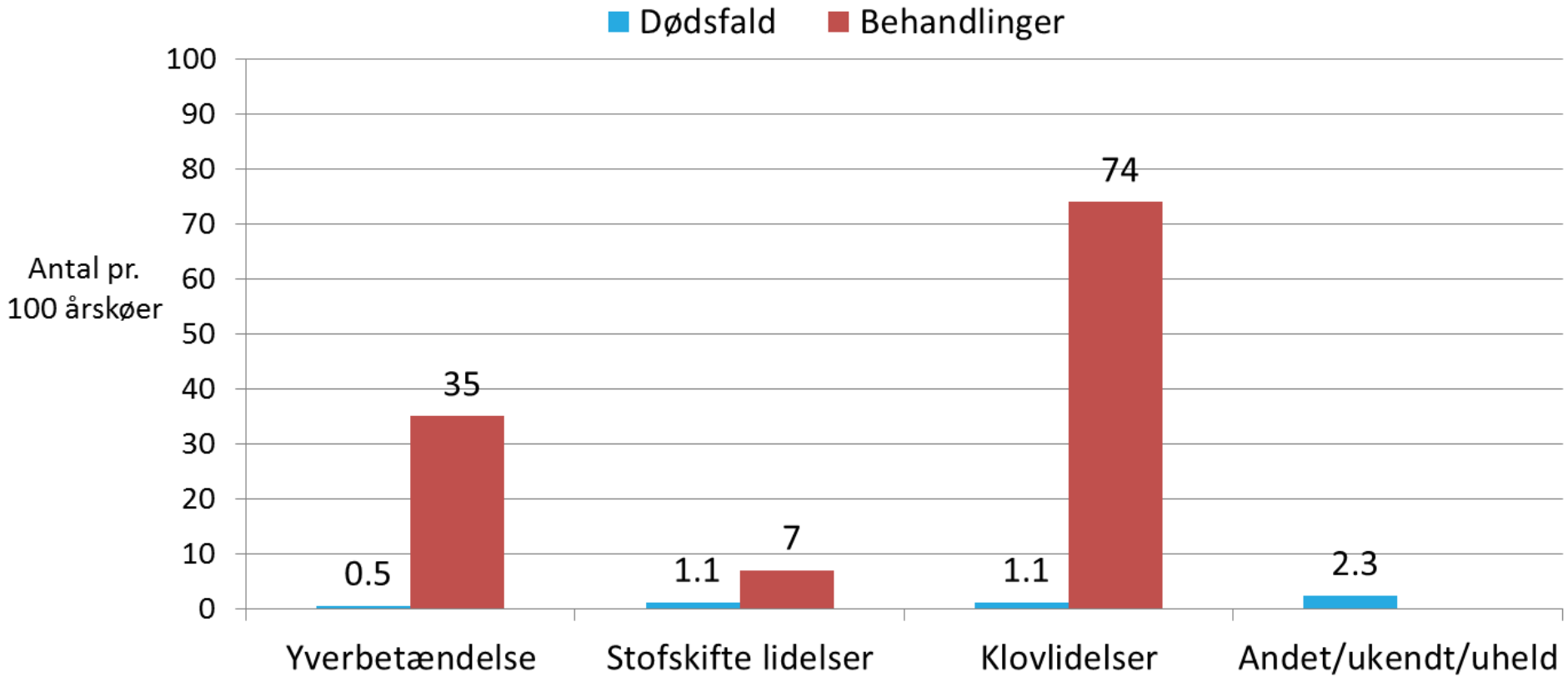
Sidst bekræftet: 20-04-2015 Oprettet: 20-04-2015 Revideret: 20-04-2015

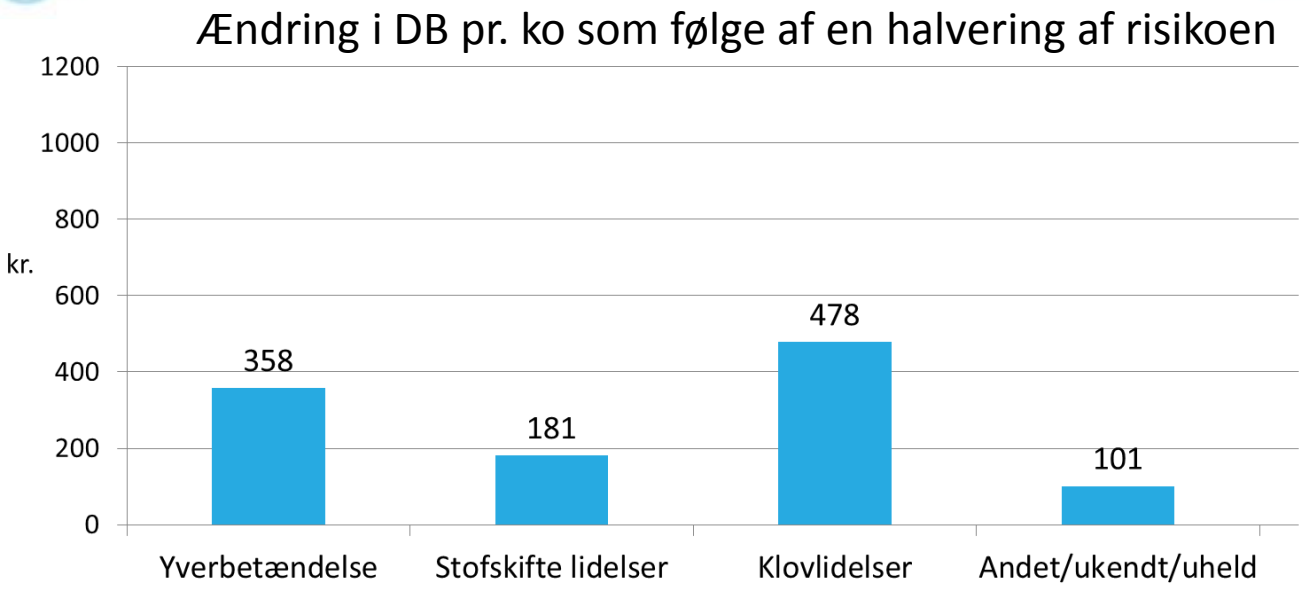


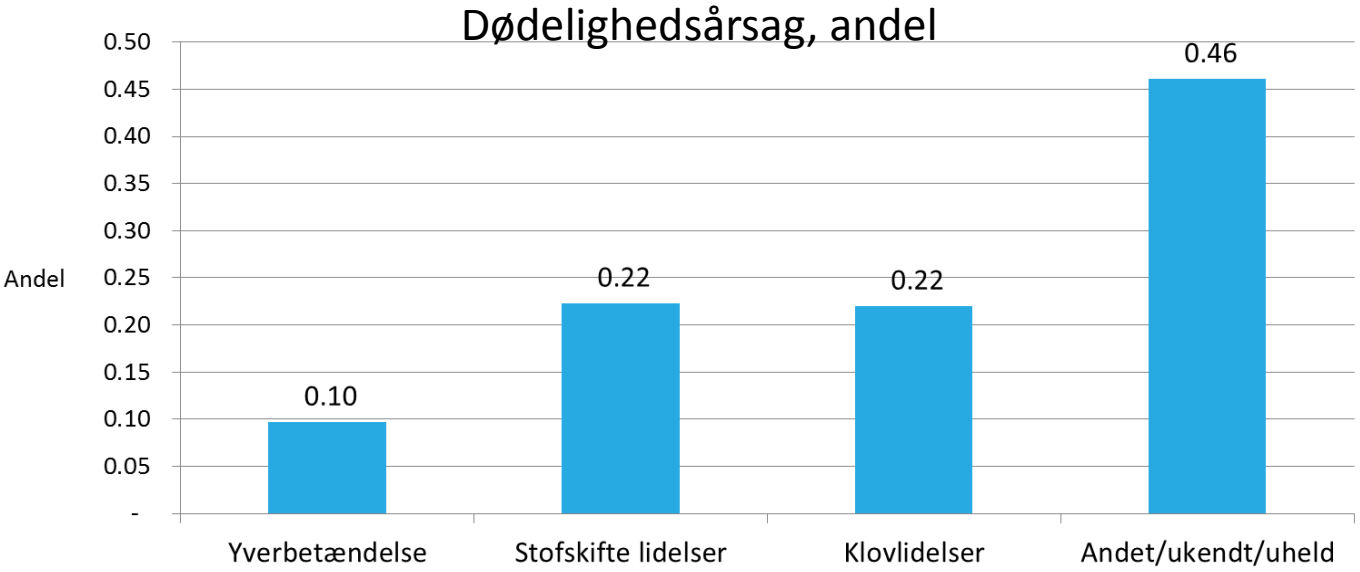
* Hyppigheden pr. årsko af DD er 3 gange større end forekomst ved klovbeskæring, som blot er et øjebliksbillede (Ettema 2009, PhD afhandling)

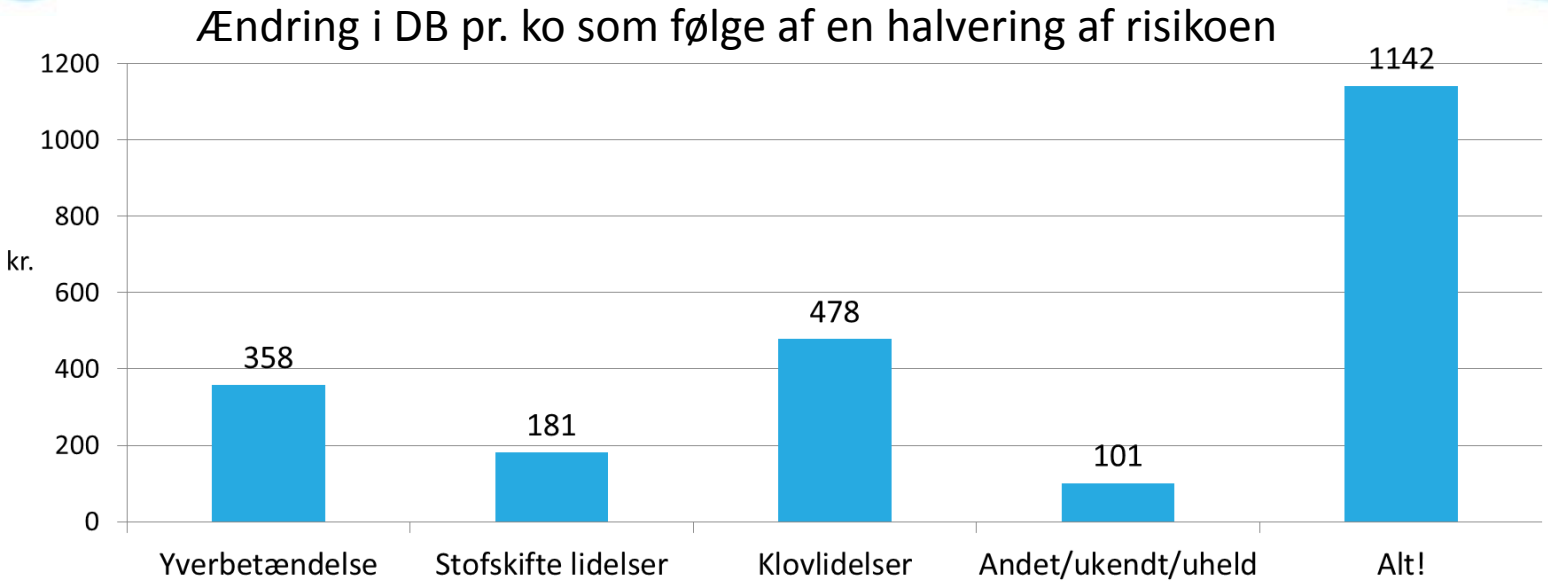
For hver halt ko der dør, er der 67 som halter rund, som falder i ydelsen, som skal behandles, som ikke bliver drægtige…



Hvad skal vi gøre, for at halvere dødeligheden?


Ændring i DB pr. ko som følge af en halvering af risikoen
kr.
1200
1000
800
600
400
200
0
358
181
478
101
Yverbetændelse
Stofskifte lidelser
Klovlidelser
Andet/ukendt/uheld


Dødelighedsårsag, andel
Andel
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
-
0.10
0.22
0.22
0.46
Yverbetændelse
Stofskifte lidelser
Klovlidelser
Andet/ukendt/uheld


Ændring i DB pr. ko som følge af en halvering af risikoen
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1200
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478
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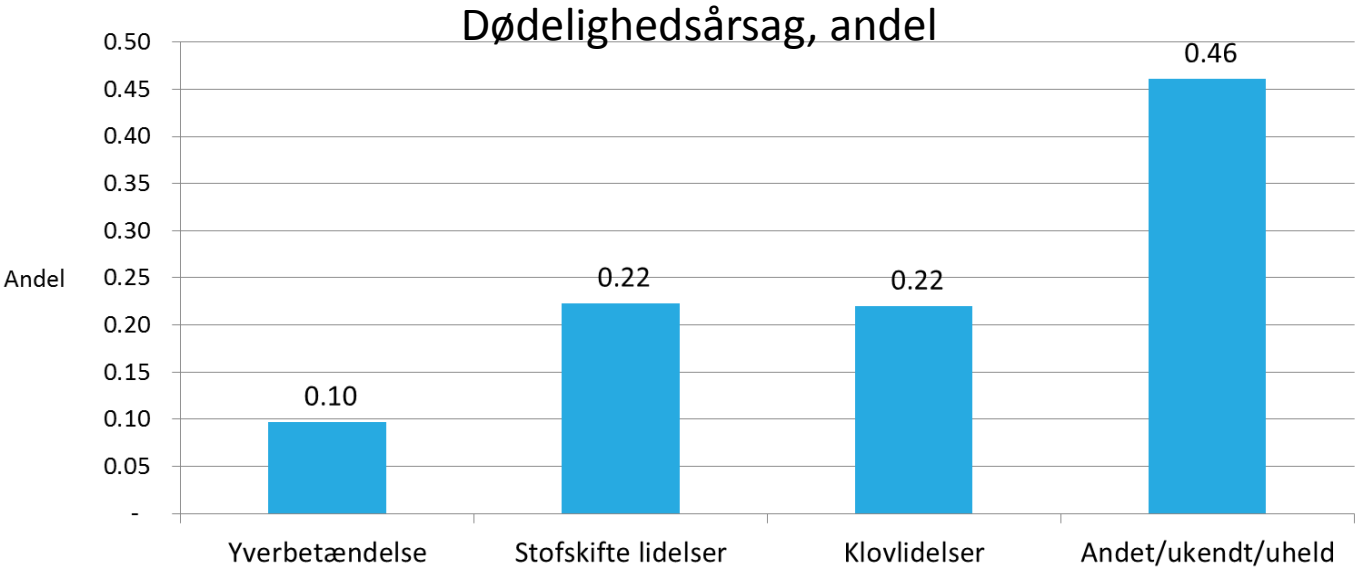
Yverbetændelse
Stofskifte lidelser
Klovlidelser
Andet/ukendt/uheld
Alt!


Dødelighedsårsag, andel
Andel
0.50
0.45
0.40
0.35
0.30
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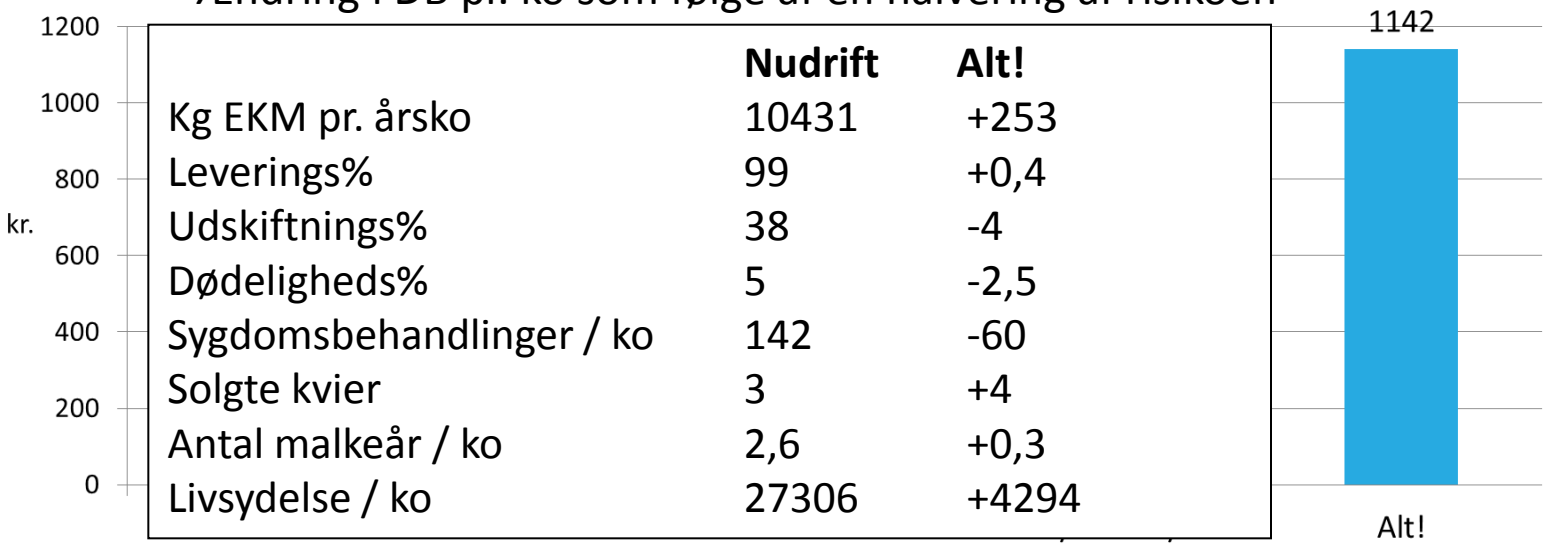
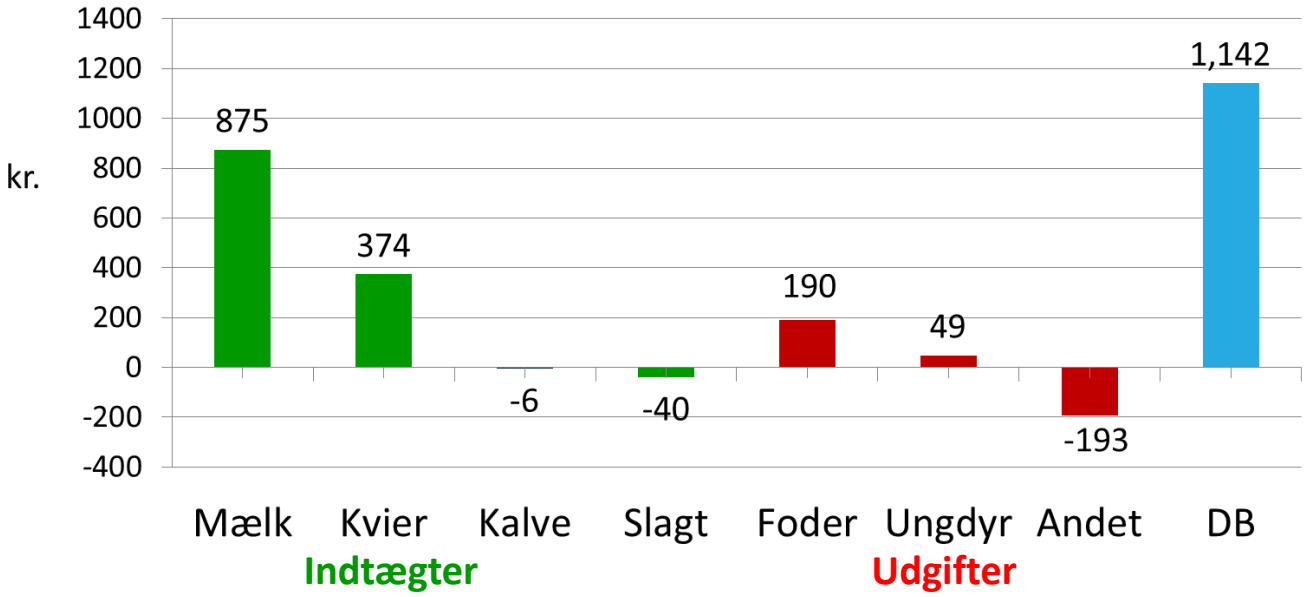
0.20
0.15
0.10
0.05
-
0.10
0.22
0.22
0.46
Yverbetændelse
Stofskifte lidelser
Klovlidelser
Andet/ukendt/uheld

Ændring i DB pr. ko som følge af en halvering af risikoen

	Nudrift	Alt!
Kg EKM pr. årsko	10431	+253
Leverings%	99	+0,4
Udskiftnings%	38	-4
Dødeligheds%	5	-2,5
Sygdomsbehandlinger / ko	142	-60
Solgte kvier	3	+4
Antal malkeår / ko	2,6	+0,3
Livsydelse / ko	27306	+4294





Hvor kommer pengene fra?

Case example

How does calf mortality affect culling in 2 herds

Economic impact of reducing calf mortality in 2 herds:

	Herd 1		Herd 2	
Key figure	Current situation	Scenario Calf mortality x 0.5	Current situation	Scenario Calf mortality x 0.5
# cow-years	213		211	
Dead calves	20		20	
Replacement rate	34		33	
Heifers sold for export	13		0	
Kg ECM / cow-year	10.339		10.138	

Economic impact of reducing calf mortality in 2 herds:

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# cow-years	213	0	211	
Dead calves	20	-10	20	
Replacement rate	34	+0,2	33	
Heifers sold for export	13	+10	0	
Kg ECM / cow-year	10.339	-8	10.138	

Economic impact of reducing calf mortality in 2 herds:

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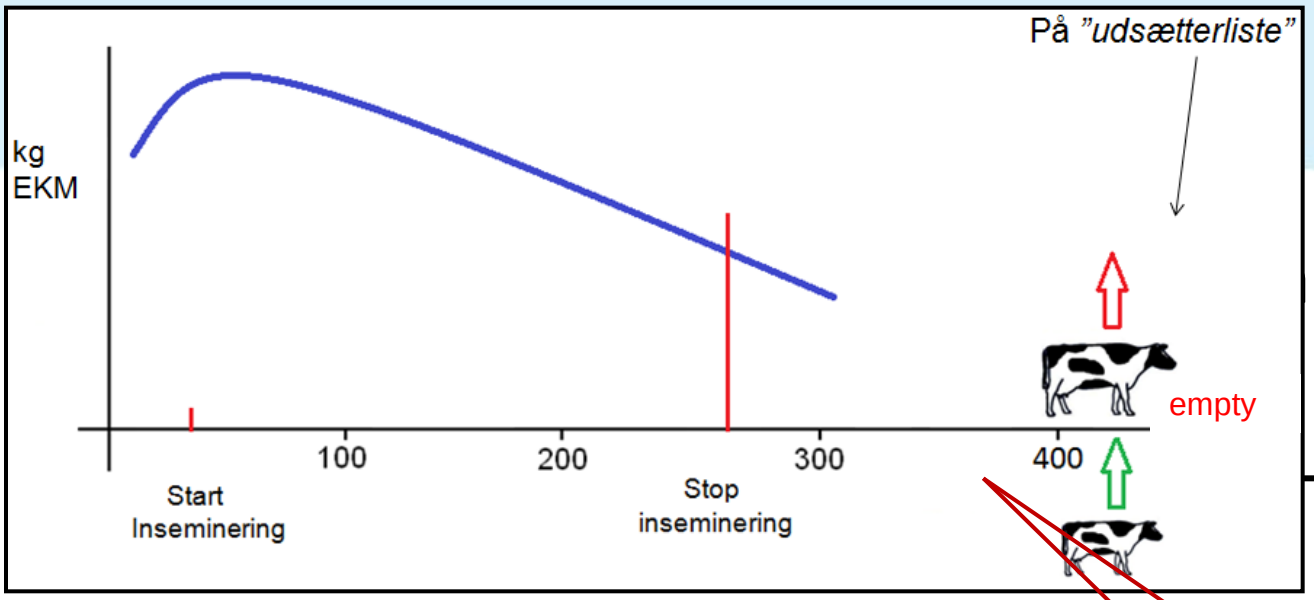
Key figure	Current situation	Scenario Calf mortality x 0.5	Current situation	Scenario Calf mortality x 0.5
# cow-years	213	0	211	+0
Dead calves	20	-10	20	-10
Replacement rate	34	+0,2	33	+4
Heifers sold for export	13	+10	0	+3
Kg ECM / cow-year	10.339	-8	10.138	+108



SimHerd
Improves Your Decisions

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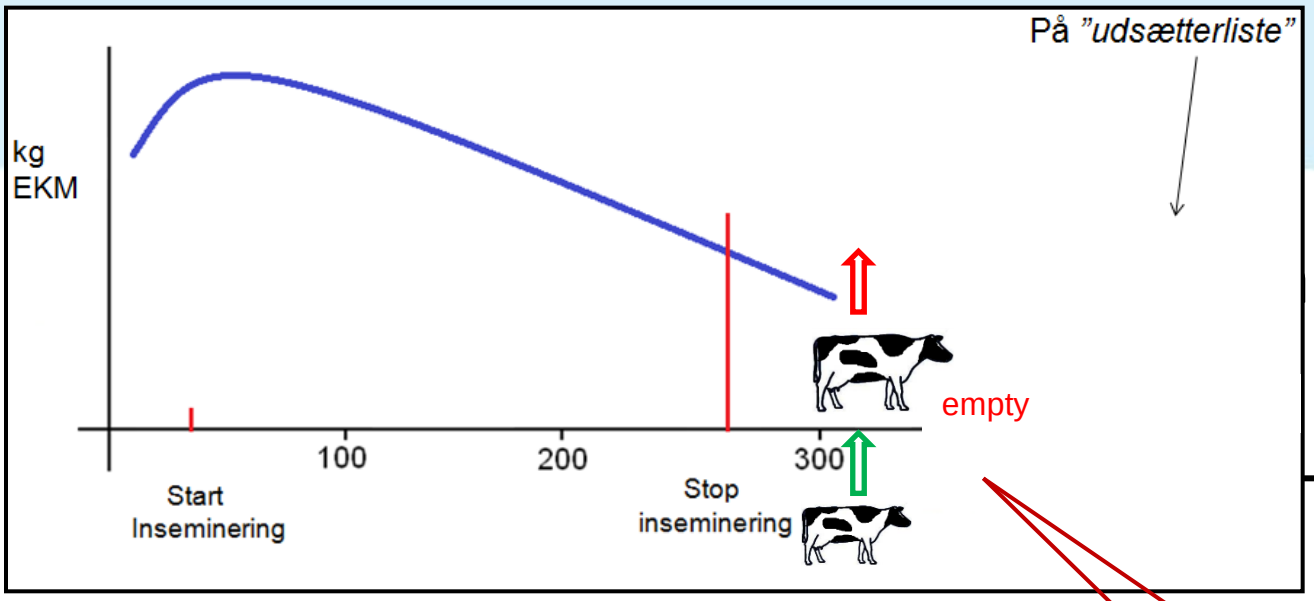

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