Longevity – international perspective – Nordic Countries?

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Longevity - definition

MacMillan Dictionary: **the fact of having a long life or existence**

permanence
the state of happening or existing for a long time or for all time in the future
continuity
a situation in which something happens or exists for a long time without stopping or changing
survival
the fact or state of continuing to live or exist, especially in difficult conditions
stability
a situation in which things happen as they should and there are no harmful changes
continuation
a situation in which something continues without stopping
preservation
the process of trying to make a situation or state continue without changing
longevity
the fact of having a long life or existence
consistency
the ability to remain the same in behaviour, attitudes, or qualities
eternity
the whole of time, with no beginning and no end
constancy
the quality of staying the same

Statements using longevity

- The worldwide problem of the welfare state is mainly due to retirement ages not being raised in line with increased **longevity**.
- Q: And you have both enjoyed career **longevity**?
- The primary aim of Chi Kung is to prevent disease and promote **longevity**.
- This greatly extends the cycle life of each battery between charges, and generally extends battery **longevity**.
- To increase **longevity**, stainless steel bar may be specified.
- Now we can reveal the amazing health secret thought to be responsible for the remarkable **longevity** of the Japanese.
- Machine wash at 60 degrees, although as usual, 40 is better for improved **longevity**.
- In dry storage seed **longevity** is over 15 years.
- Then so far as regards **longevity**, the period of a worker-bee's existence is not measured by numbering its days but simply by wear and tear, the marvellous intricacy and wonderful perfection of its framework being so delicate in construction that after six or seven weeks of strenuous toil, such as the bee undergoes in summer time, the little creature's labour is ended by a natural death.

Longevity in Dairy Cattle

- Some problems with using the term Longevity in dairy cattle

- How do we define longevity?
- How do we express longevity when measure it?

- Is it a goal to live as long as possible?
- Is a goal to be as economic as possible?
- What about quality of life?
- What about quality of products (milk, meat and off-spring)?
- Do meat production interfere with this goal?
- What about green house gasses emission?

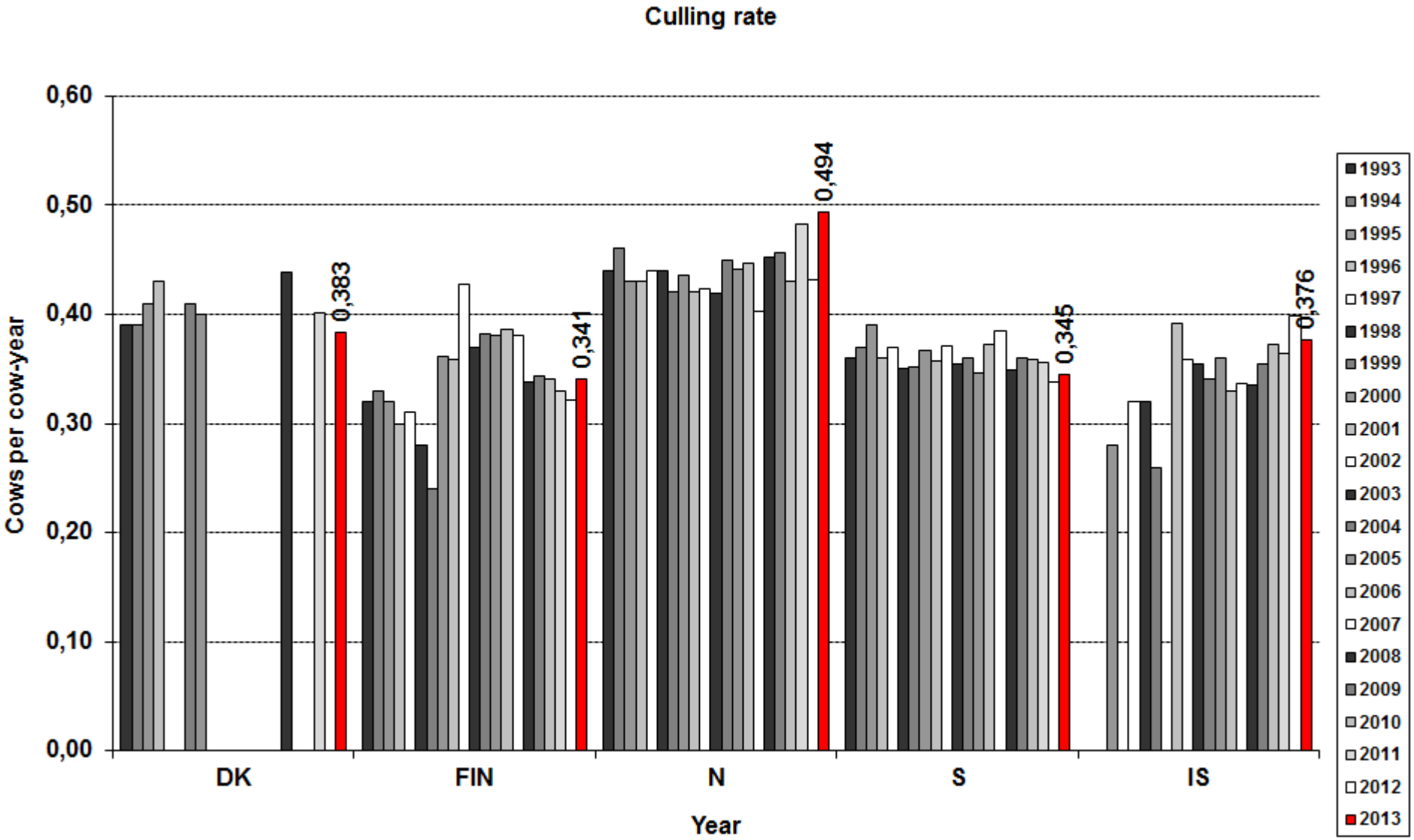
- Longevity is coming more and more into breeding programs, animal welfare assessment and green house gasses emission worldwide!

- More so in other countries than the Nordic ones??

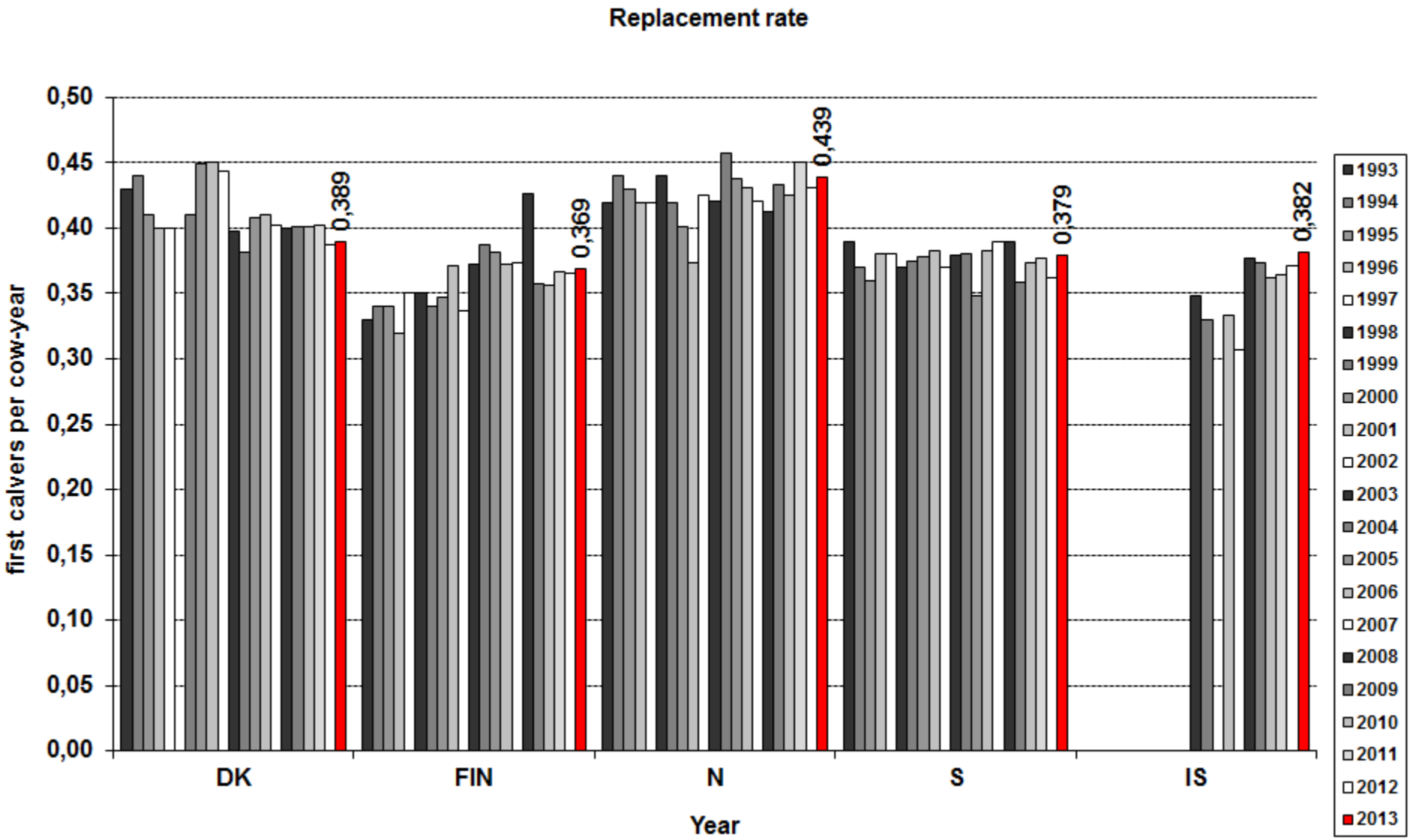
Literature search

- Google Scholar list **21,200 paper** with the term “longevity dairy cattle”
- 951 during 2014
- 1,800 during 2013
- 1,730 during 2012
- 1,520 during 2011
- 1,430 during 2010
- **6,730 since 2010 (estimated to 2020 appr. 15,000 to 20,000)**
- 8,670 from 2000 to 2010
- 2,390 from 1990 to 1999
- 855 from 1980 to 1989
- 455 from 1970 to 1979
- 322 from 1960 to 1969
- 174 from 1950 to 1959
- 106 from 1940 to 1949

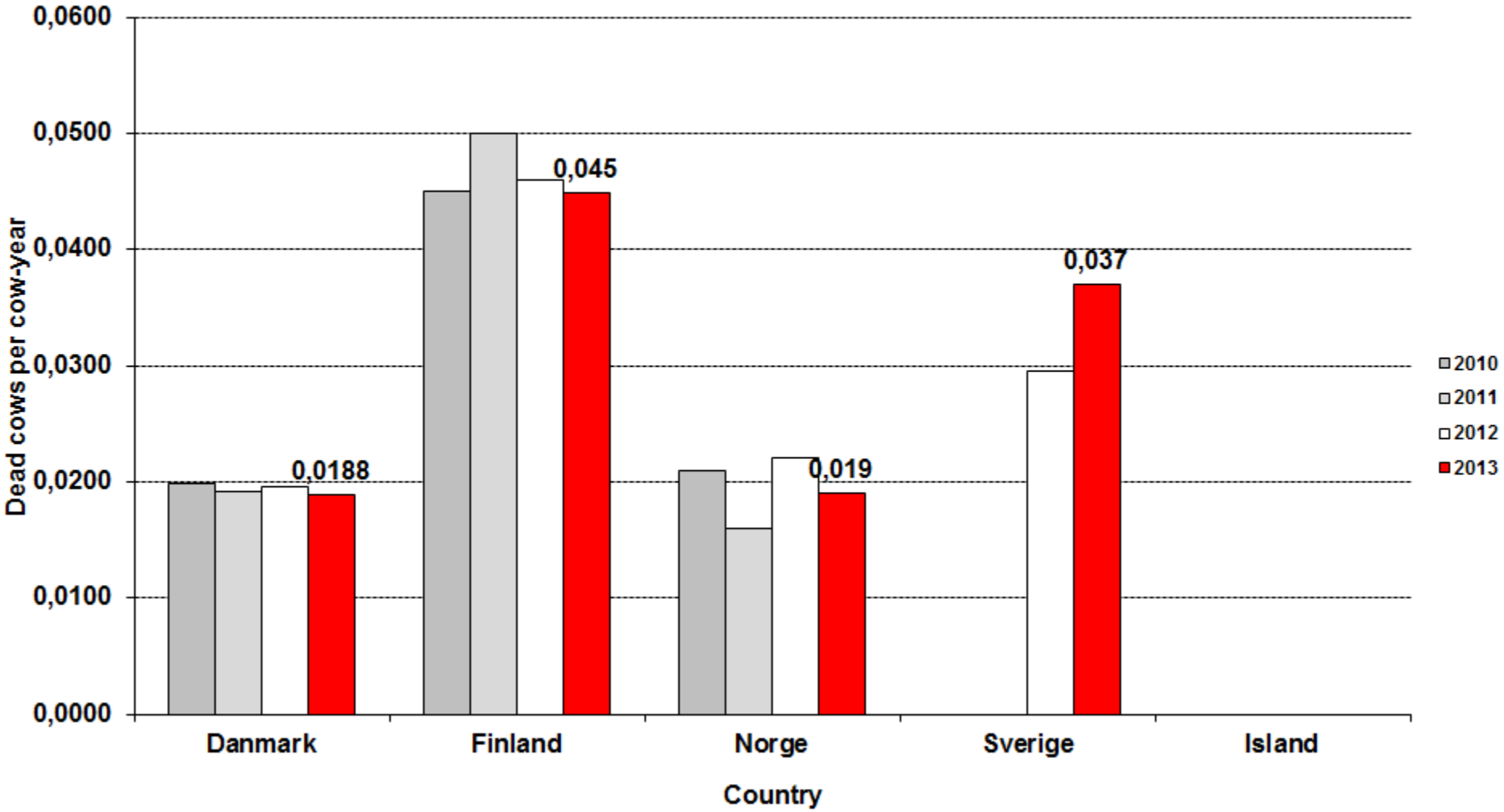
Removal rate (culled/cow-years)



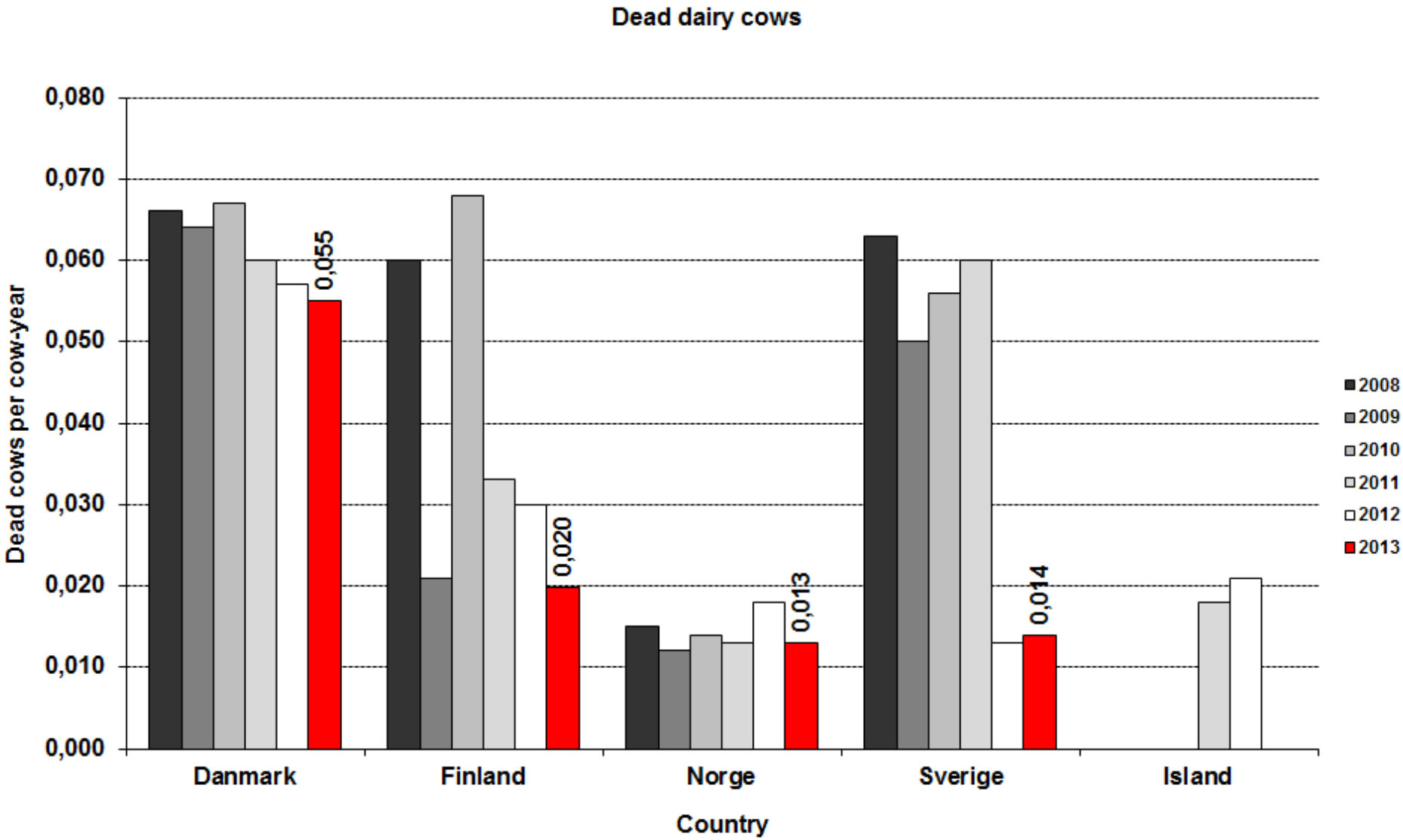
Replacement rate (1st calfers/cow-year)



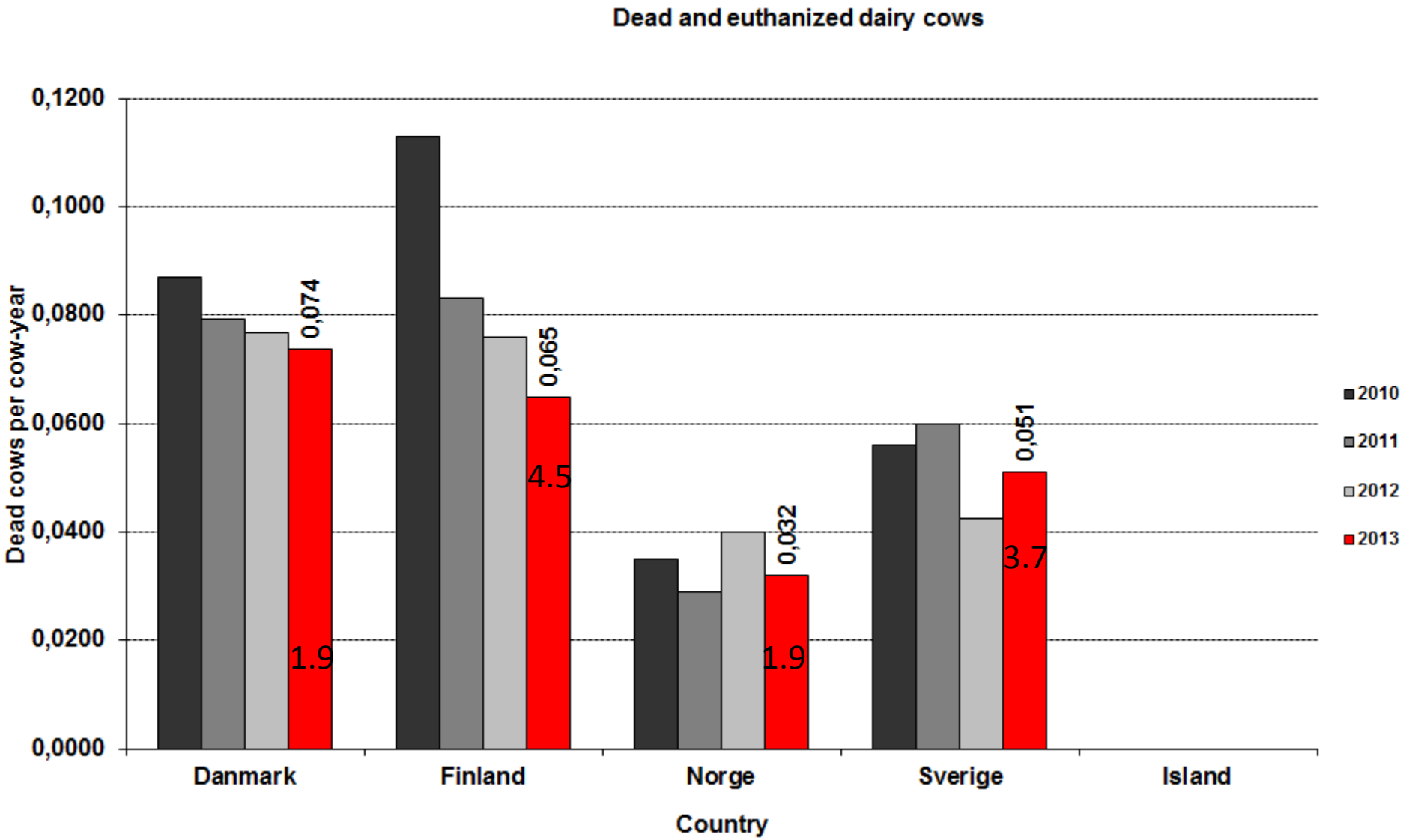
Euthanized cows/cow-year



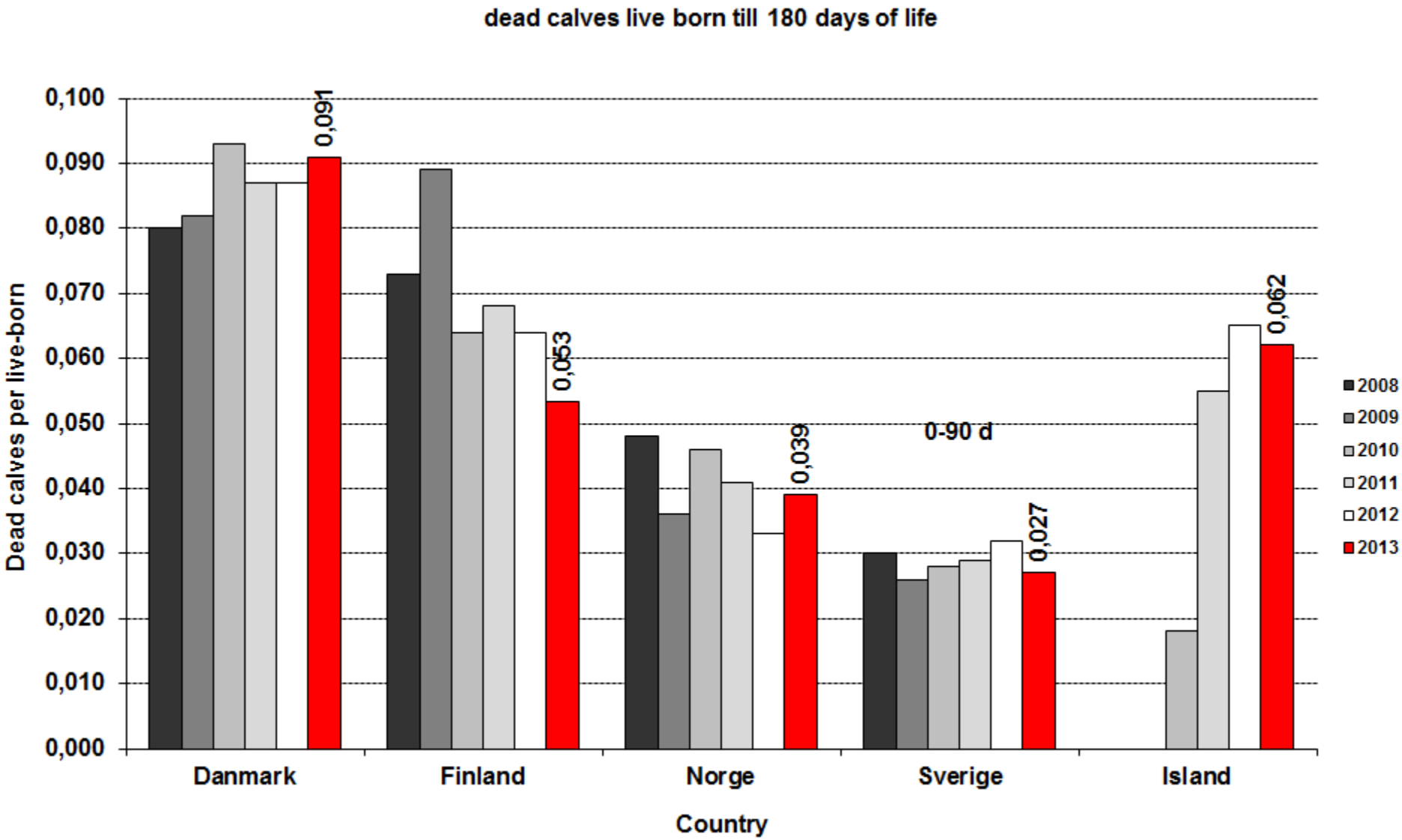
Dead cows/cow-year



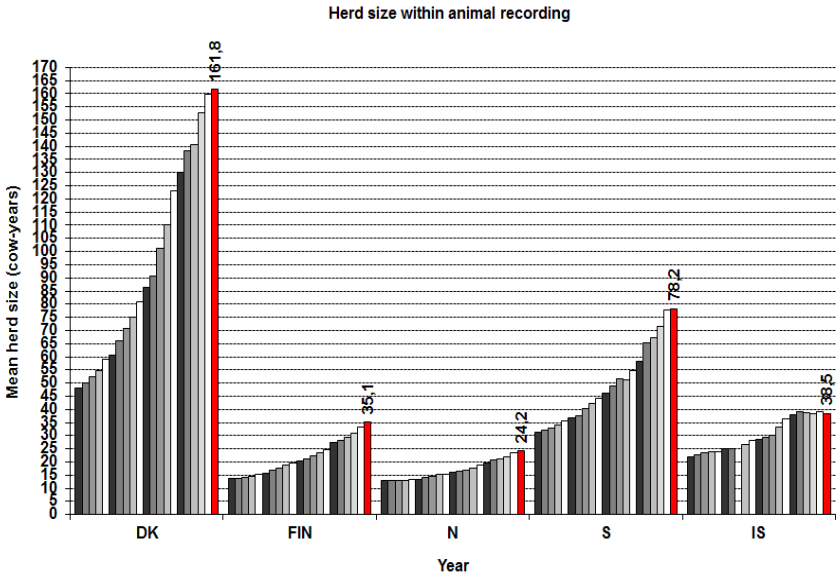
Dead and euthanized cows/cow-year

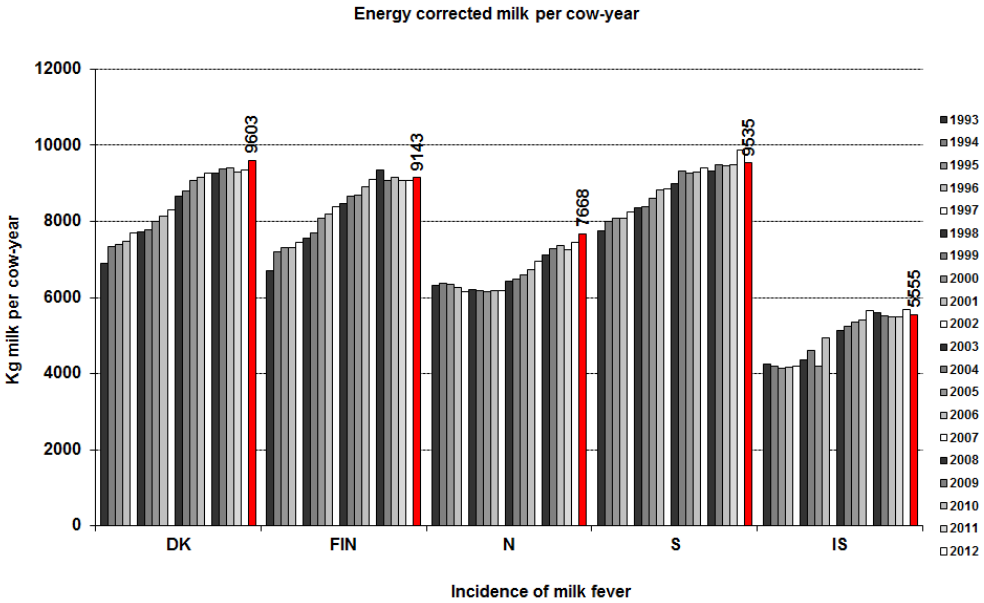


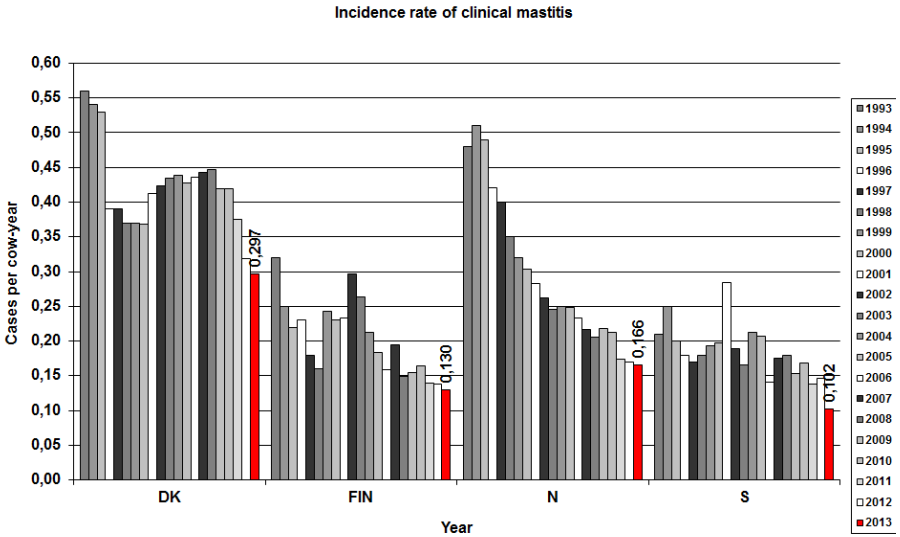
Dead calfes/live-born

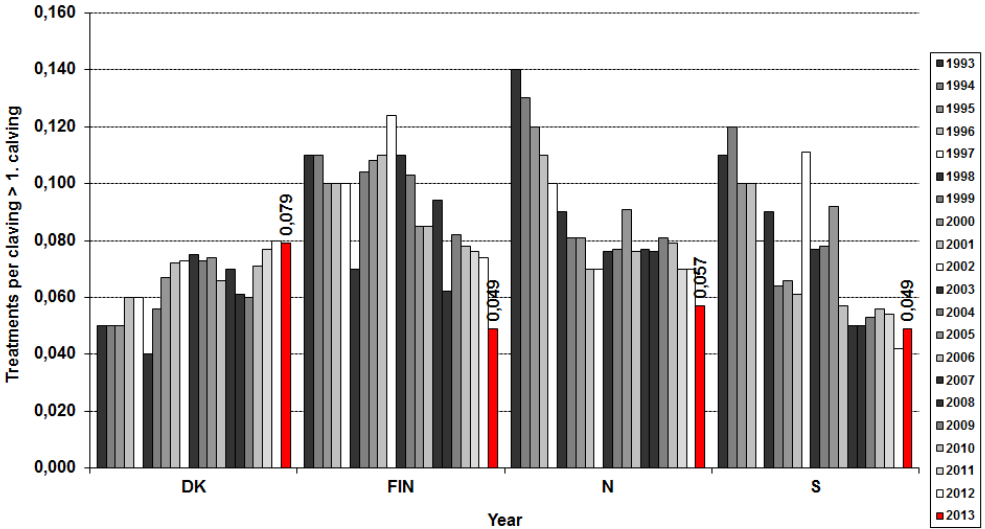


Some reasons for the differences





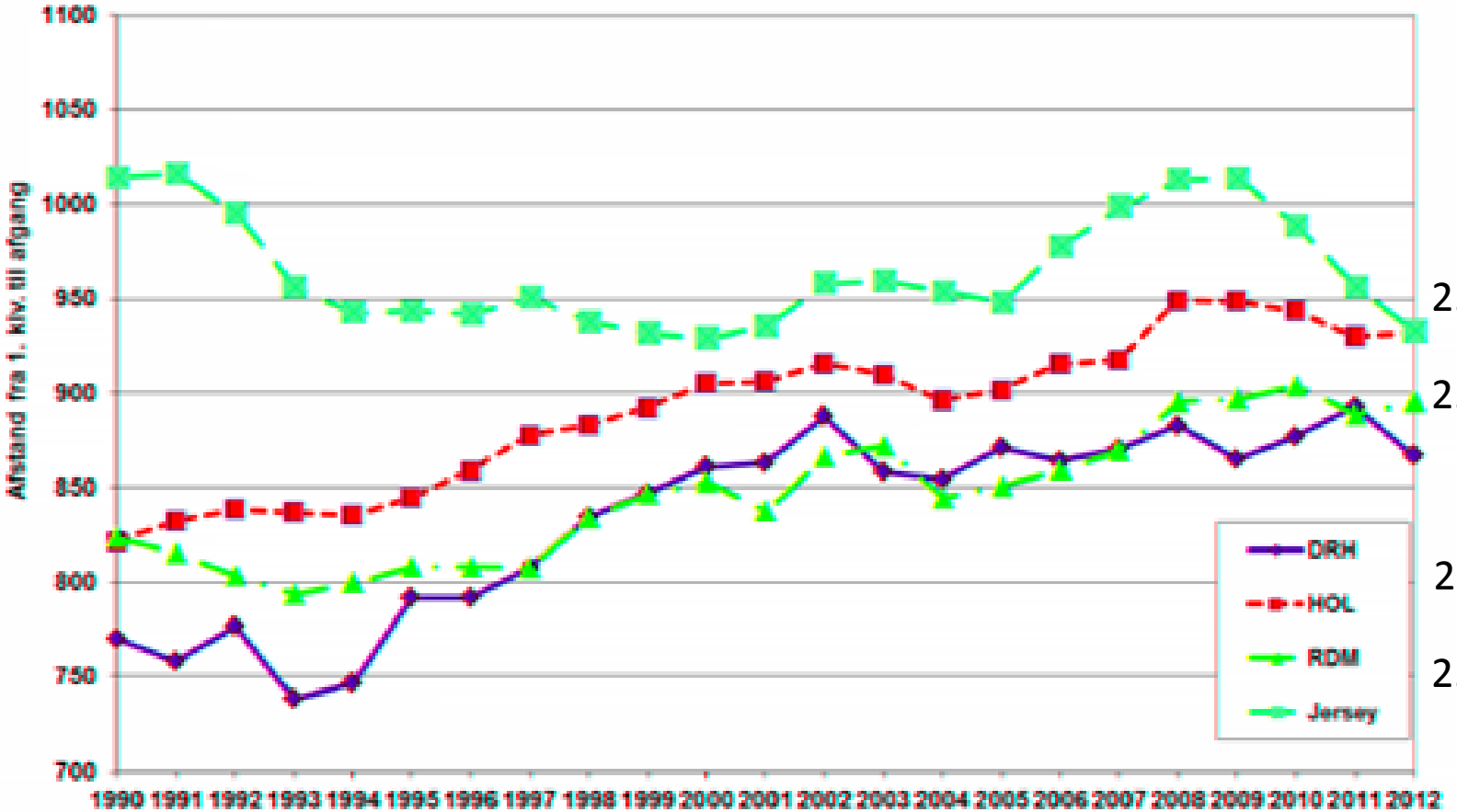




The Age of Dairy Cows

KNOWLEDGE CENTRE FOR AGRICULTURE
Cattle

Cow Longetivity Denmark in months



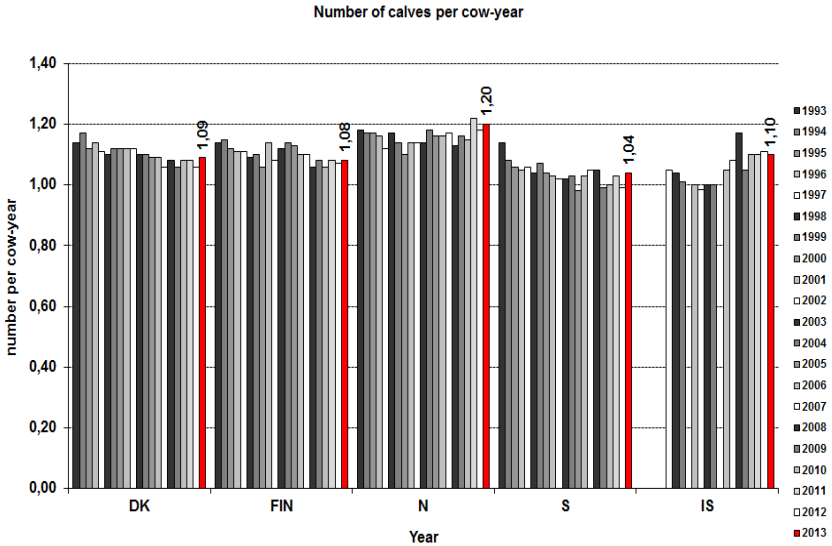
2.6 years

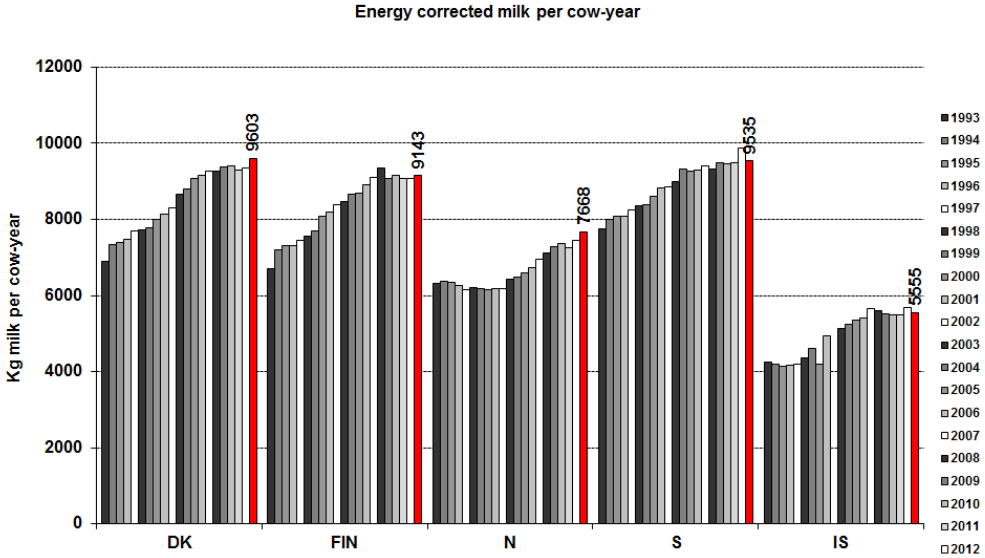
2.46 years

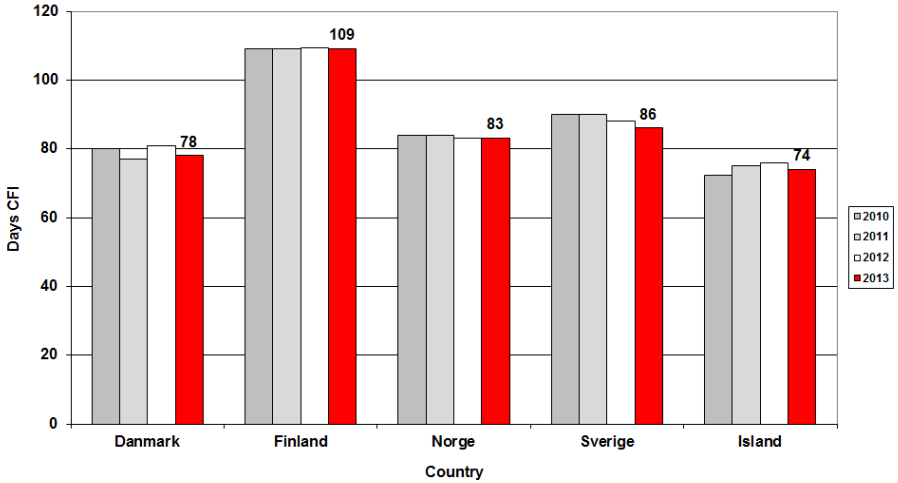
2.2 years

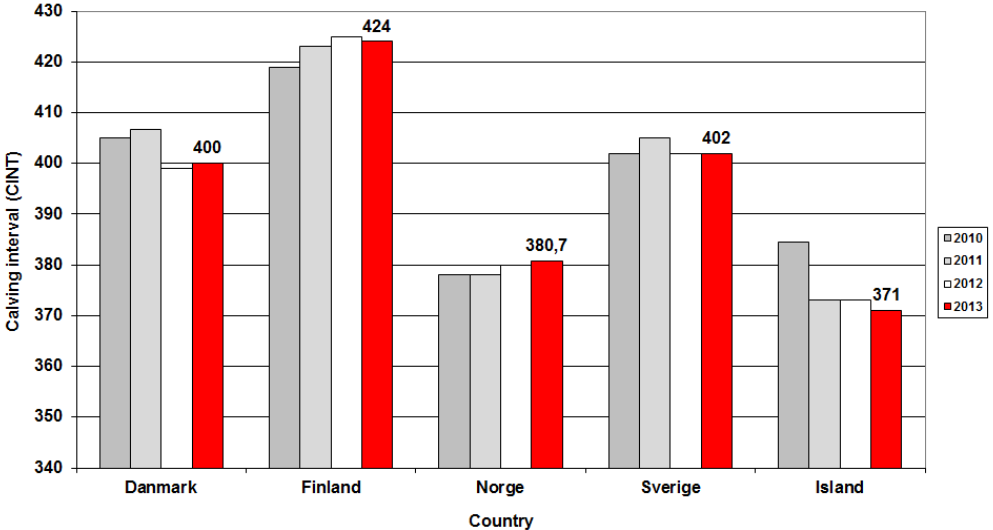
2.05 years

Milk and meat production and fertility









Longevity and breeding

The following conclusions were drawn:

(i) There is some evidence from selection experiments for a significant antagonism between early maturity and longevity.

(ii) Estimates of the genetic correlation between first lactation milk yield and longevity traits show a severe upward bias due to voluntary culling on milk yield. Adjustment of herd life for within-herd milk production is recommended but may not prevent estimation biases in general.

(iii) The relative economic value of longevity compared to milk yield depends on the level of herd life in the population and the actual quota scenario; a rough average is 1:2.

(iv) Type and conformation traits cannot serve as sufficient selection substitutes for longevity traits.

(v) Survival analysis is the adequate method for genetic evaluation of lifetime data.

(vi) Both selection on determinants of involuntary culling and on measurements of longevity may be used as breeding strategies to improve longevity.

After Essl, 1998.

Culling reasons in Nordic countries

Biorsak (individ)	Danmark	Finland	Norge	Sverige
		0 = ei tiedossa = Ingen information		
Reproduksjon Reproduction	5. Reproduktion	14= Huono hedelmällisyys = Dålig fruktsamhet	30:Dårlig fruktbarhet	2 Nedsatt fruktsamhet
Mastitt Mastitis	6. Yver-betændelse	12= Utaretulehdus = Juverinflammation	25:Mastitt	4 Mastit/juverfel
Speneskader Teat leasions		13= Vedinvika/-vamma = Spenskada	32:Spenetråkk	5 Juver/spenskada
Kalvingsproblemer Calving difficulties		17= Poikimavaikeus = Svår förlossning		6 Förlossnings-svårigheter
Melkefever Milk fever		19= Poikimahalvaus = Kalvningsförlamning		7 Kalvnings-förlamning

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Culling reasons in Nordic countries

Biorsak (individ)	Danmark	Finland	Norge	Sverige
Klauv Bein Claw and feet problems	8. Klov- eller lemmelidelse			8 Klövsjukdom
		15= Jalkarakenne = Ben konformation = Konformationen i extremiteterna	22:Beinproblemer	9 Benlidande
		16= Jalkasairaus = Ben sjukdom = Sjukdom i extremiteterna		
Kasting/abort Abortion				11 Kastning
Alder Age	18. Alder	22= Vanha = Gammal		12 Hög ålder
Lav melkeytelse Low yield	1. Lav mælkeydelse	21= Huono tuotos tai jalostusarvo = Dålig produktion eller dåligt avelsvärde	34:Dårlig avdrått	13 Låg avkastning

A

Culling reasons in Nordic countries

Biorsak (individ)	Danmark	Finland	Norge	Sverige
Lynne Bad temper	15. Temperament	25= Huono luonne/sopeutumattomuus = Dåligt lynne	20:Dårlig lynne	14 Lynnesfel
Ulykke Accident	17. Uheld/ Tilskadekomst	11= tapaturma = Skada		15 Olycksfall
Stoffskiftesjukdom Metabolic disease	7. Stofskifte- eller fordøjelseslidelse	18= Ruuansulatuskanavan sairaus = Sjukdom i matsmältningskanalen		16 Ämnesoms.-sjukdom/ acetonemi/ foderleda
Annen sjukdom Other diseases	9. Andre sygdomme	20= Muu sairaus = Anna sjukdom	33:Andre sjukdommer	17 Annan sjukdom
Lav melketid Slow milking speed	16. Malketid	24= Huono lypsettävyys = Dålig mjölkbarhet	23:Låg utmjølkingshastighet	18 Svårmjölkad, exteriör
Agalacti				19

A

Culling reasons in Nordic countries

Biorsak (individ)	Danmark	Finland	Norge	Sverige
Agalacti Agalactiae				19 Svårmjölkad, nedsläpp (agalakti)
Dårlig jur Conformation of the udder	2. Yverets eksteriør	23= Huono utarerakenne = Dålig juver konformation	21:Dårlig jur	31 Missbildning, spenar/juver
Høgt celletall High somatic cell count (SCC)	14. Forhøjet celletal		31:Høgt celletall/(mastitt)	35 Hög cellhalt
Annen årsak Other reasons	4.Andet/Ukendt	26= Muu syy = Annan orsak	36:Annen individårsak	50 Övrig utgångsorsak
Lekkasje Leakage of milk			24:Lekkasje	

A

Culling reasons in Nordic countries

Biorsak (individ)	Danmark	Finland	Norge	Sverige
			35:Dårlige bruksegenskaper	
		27= Teuraseläin emolehmätarkkailussa = Slaktdjur i dikokontroll		
		28= Huonot emo-ominaisuudet = Dåliga amko egenskaper		
Paratb	19. Paratuber-kulose (Aug 2008)			
Leddbetennelse	Leddbetennelse (kalv)			
Diare	11. Diarre (Kalve)			
Lungebetennelse	12. Lunge-betændelse (Kalve)			
Annet	13. Andet (Kalve)			
	20. Ikke registreret årsag			

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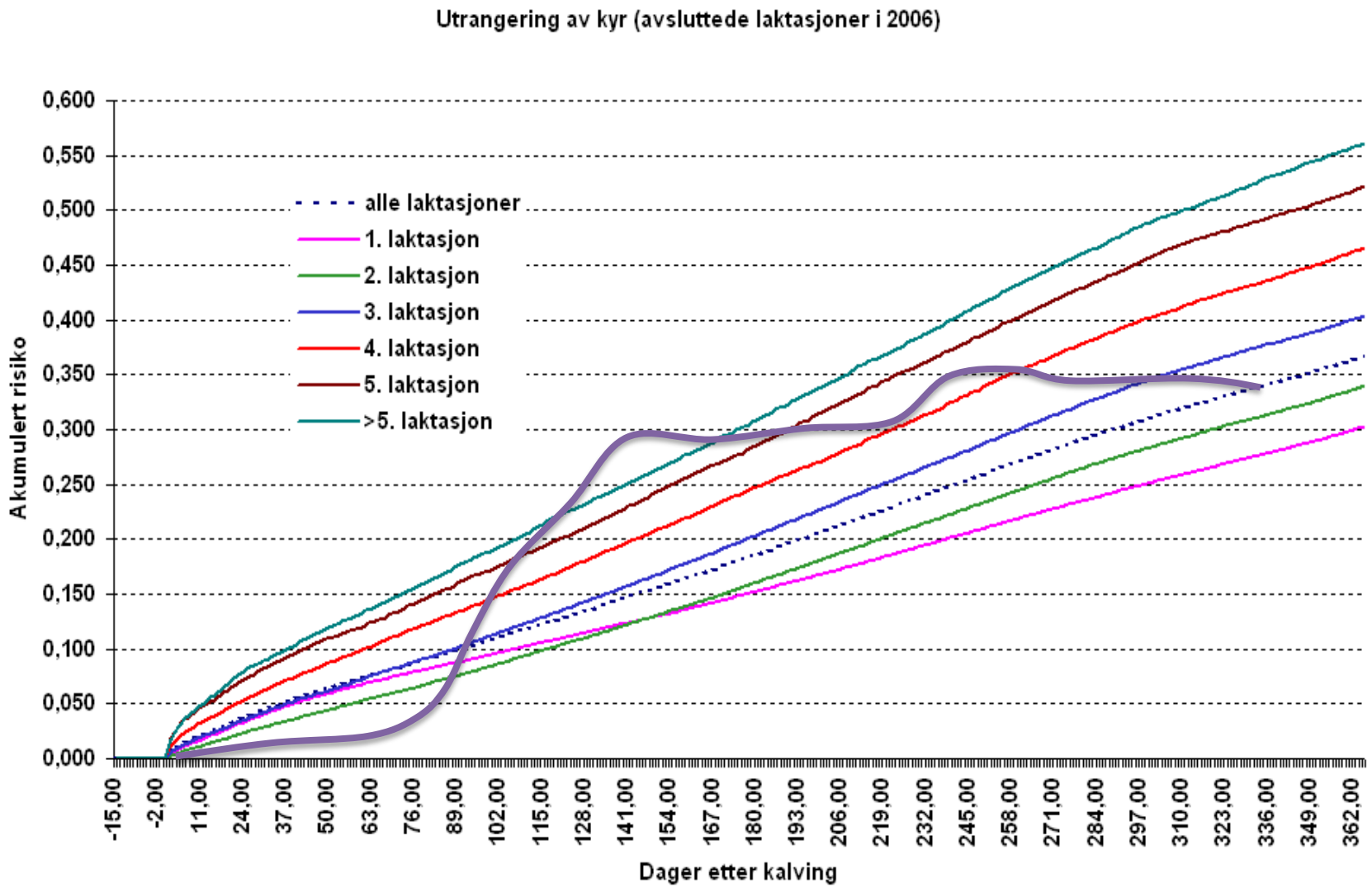
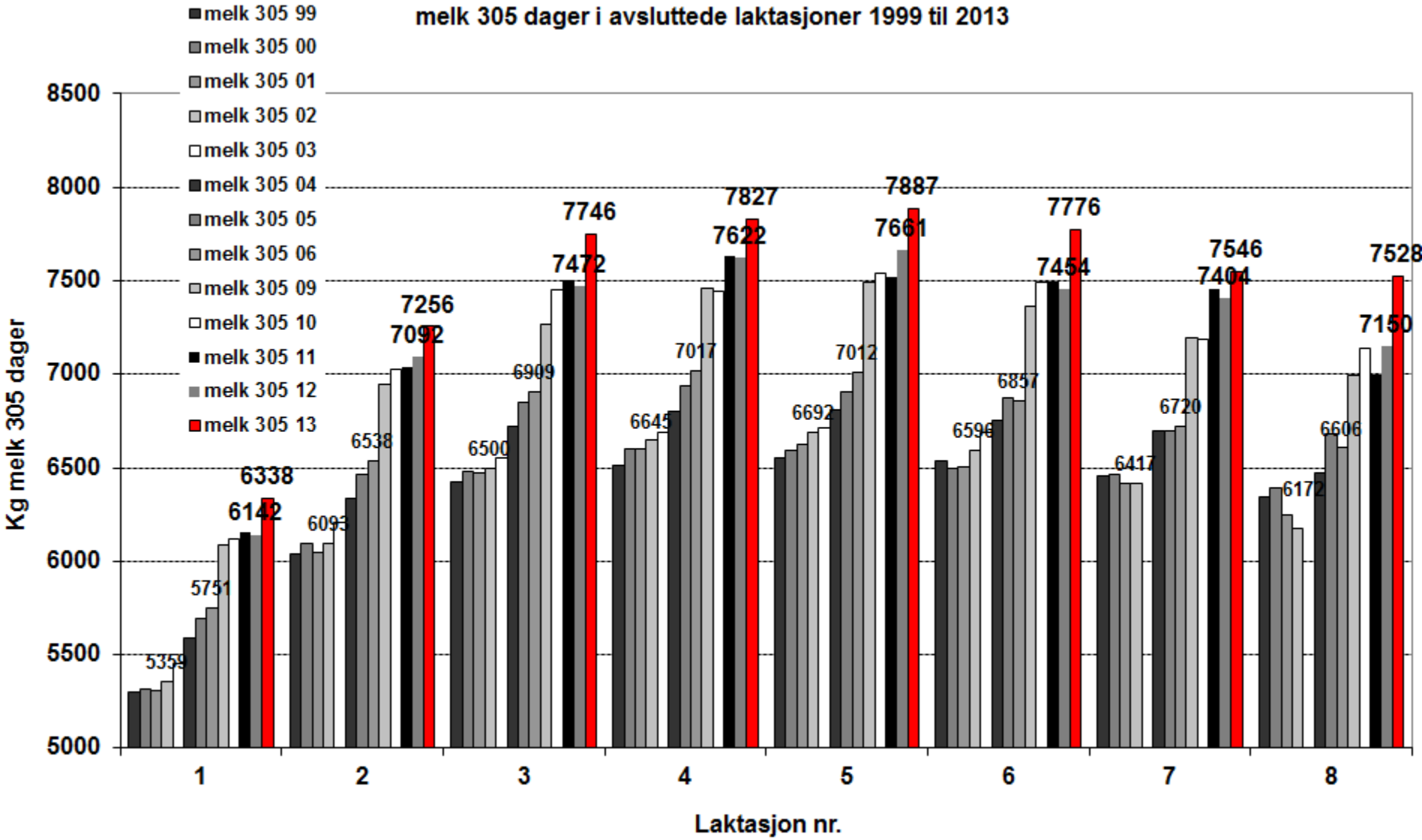
Culling (herd) reasons in Nordic countries

Biorsak (besetning) Herd factors (only in Norway)	Danmark	Finland	Norge	Sverige
			40:Ledd i driftsopplegg	
			41:Kvotetilpasning	
			42:Fôrmangel	
			51:Annen driftsrelatert årsak	

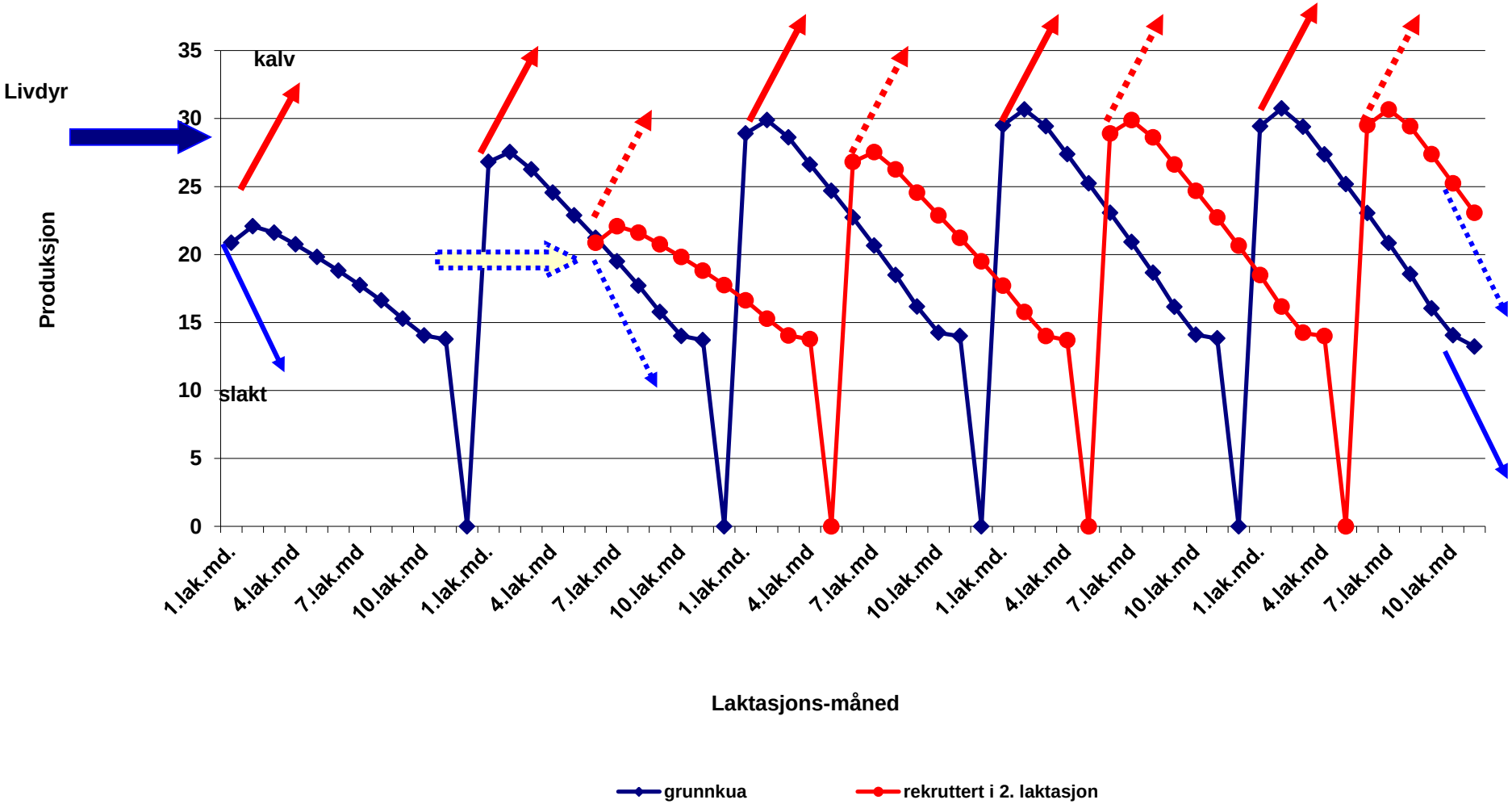
Removal in survival analysis (N)



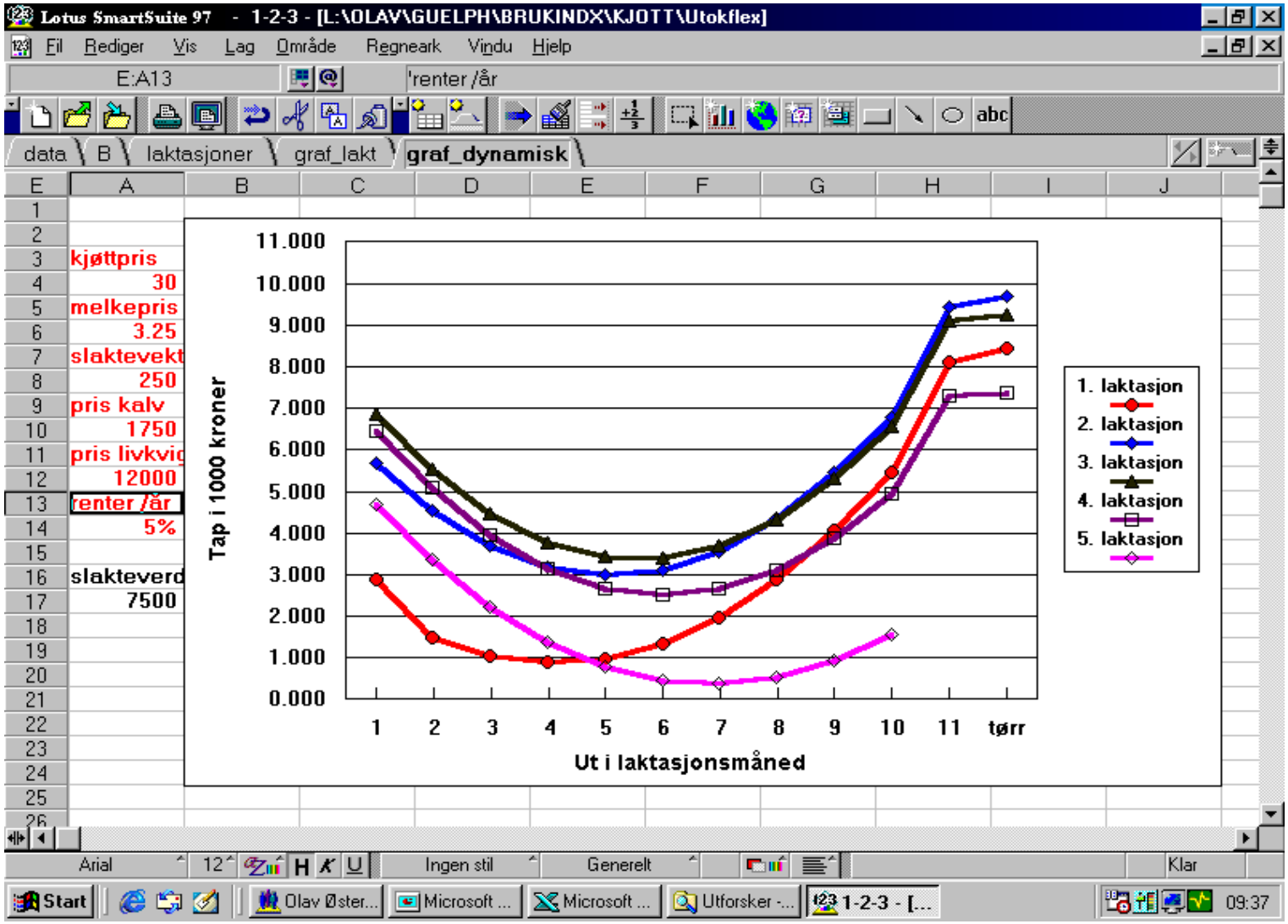
Milk production according to parity



Production and removal – what is optima time!



MEAN RETENSJON PAY-OFF (RPO) NO



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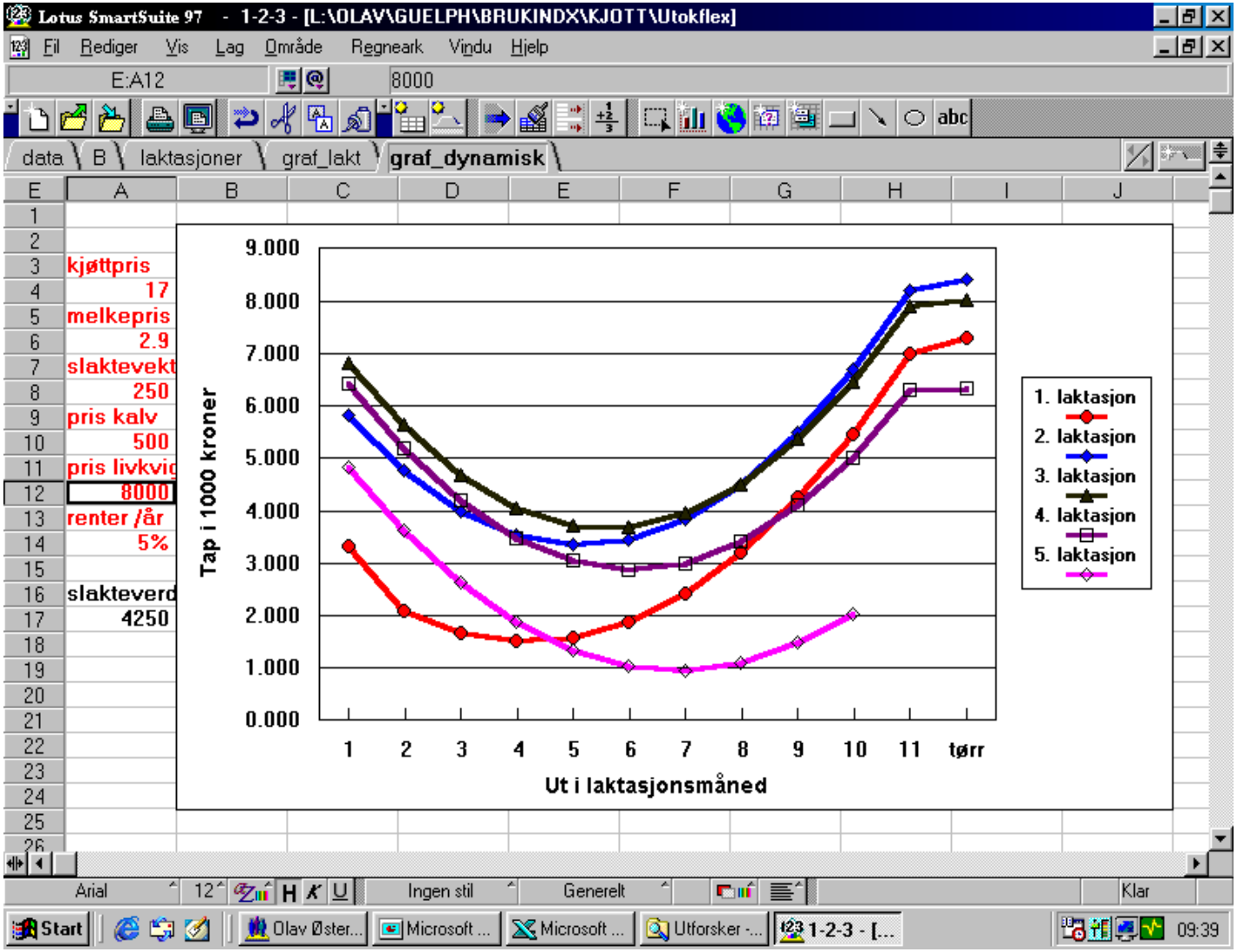
MEAN RETENSJON PAY-OFF (RPO) SE



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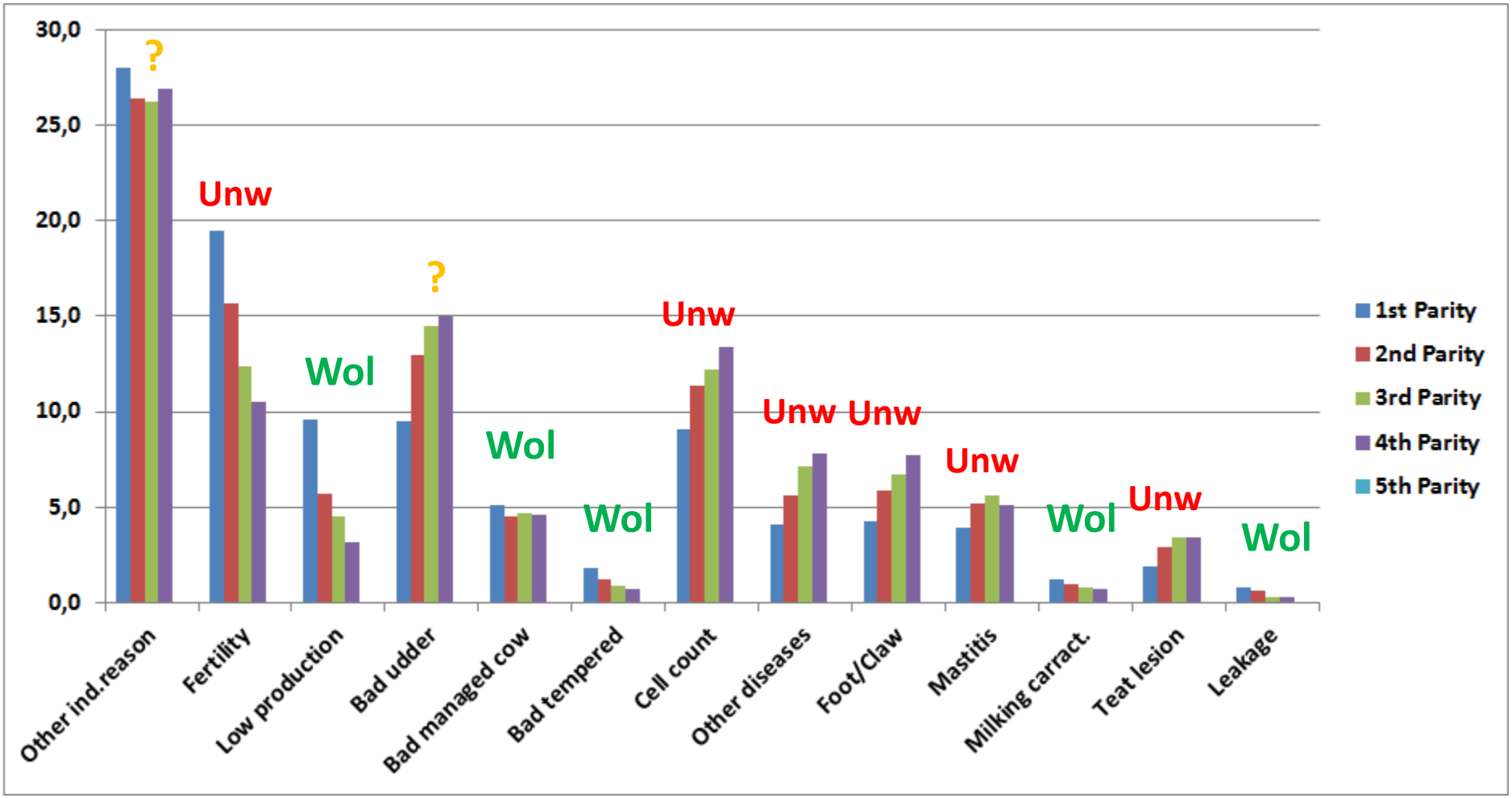
What is economic optimal removal strategy?

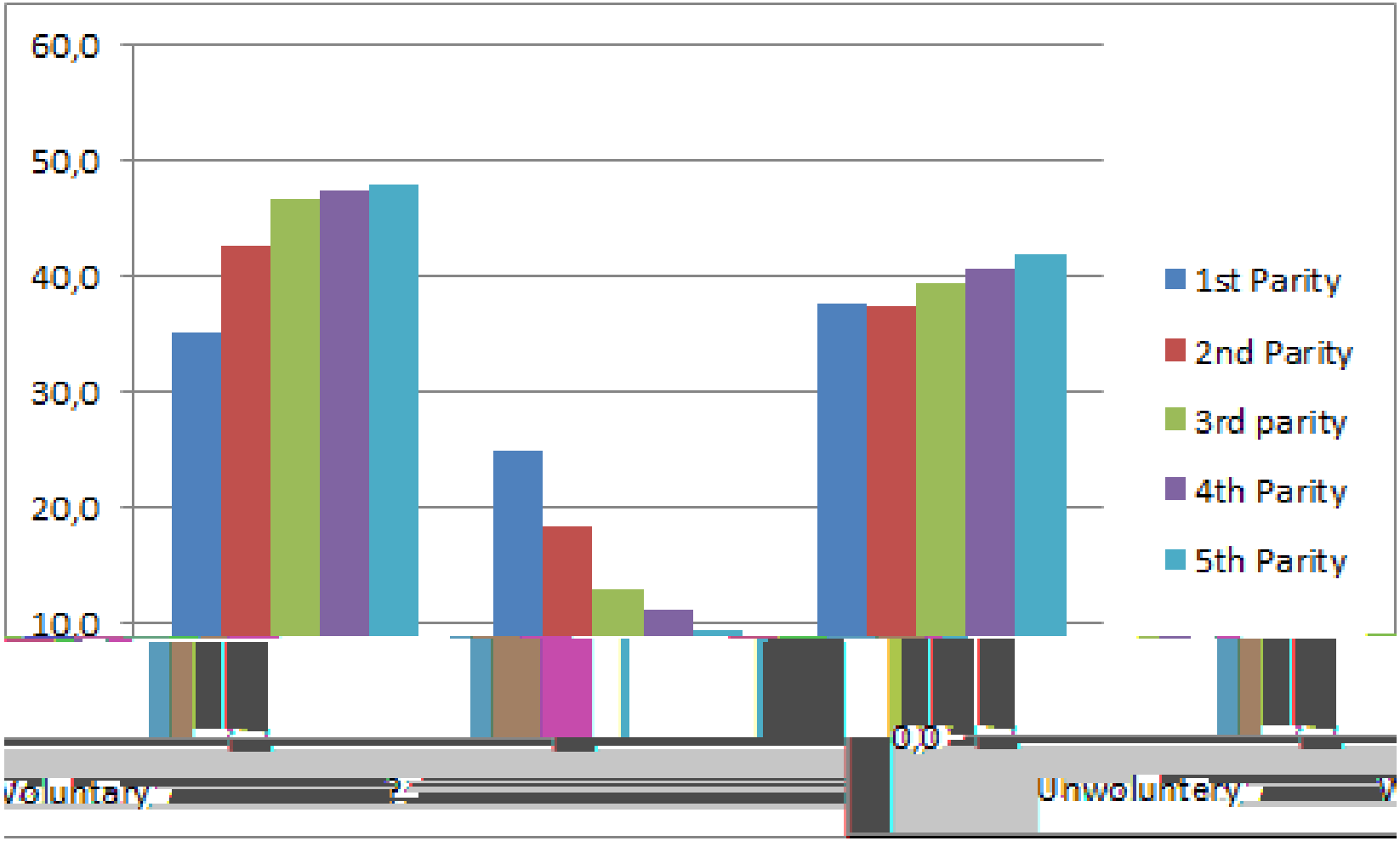
1. Keep the herd healthy – do not let the disease role your culling decision – that's too important – you should manage your-self
2. If so – you should select your production animals 4 to 6 months into the first lactation according to voluntary culling reasons
    1. Those animals could be put into the meat production unit and bred with beef breeds which also need milk production
3. Those you have selected should stay in your herd as long as economic feasible – at least for 5 lactations.

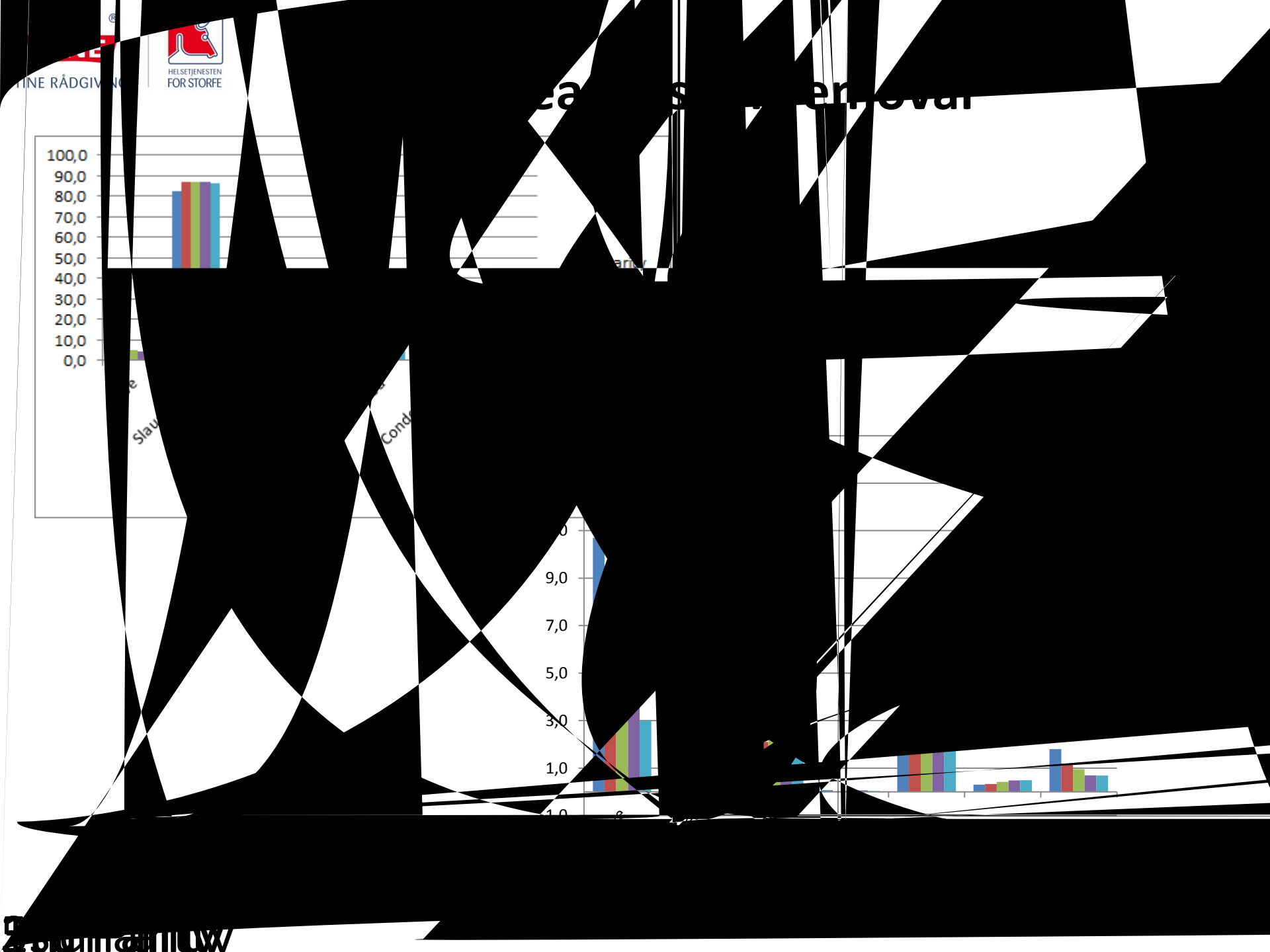
4. With this regimen your culling rate probably optimal would be about 20 %. You would have lots of animals to put on the live market. There will always be a better price on live market than meat market

Culling reasons according to reasons

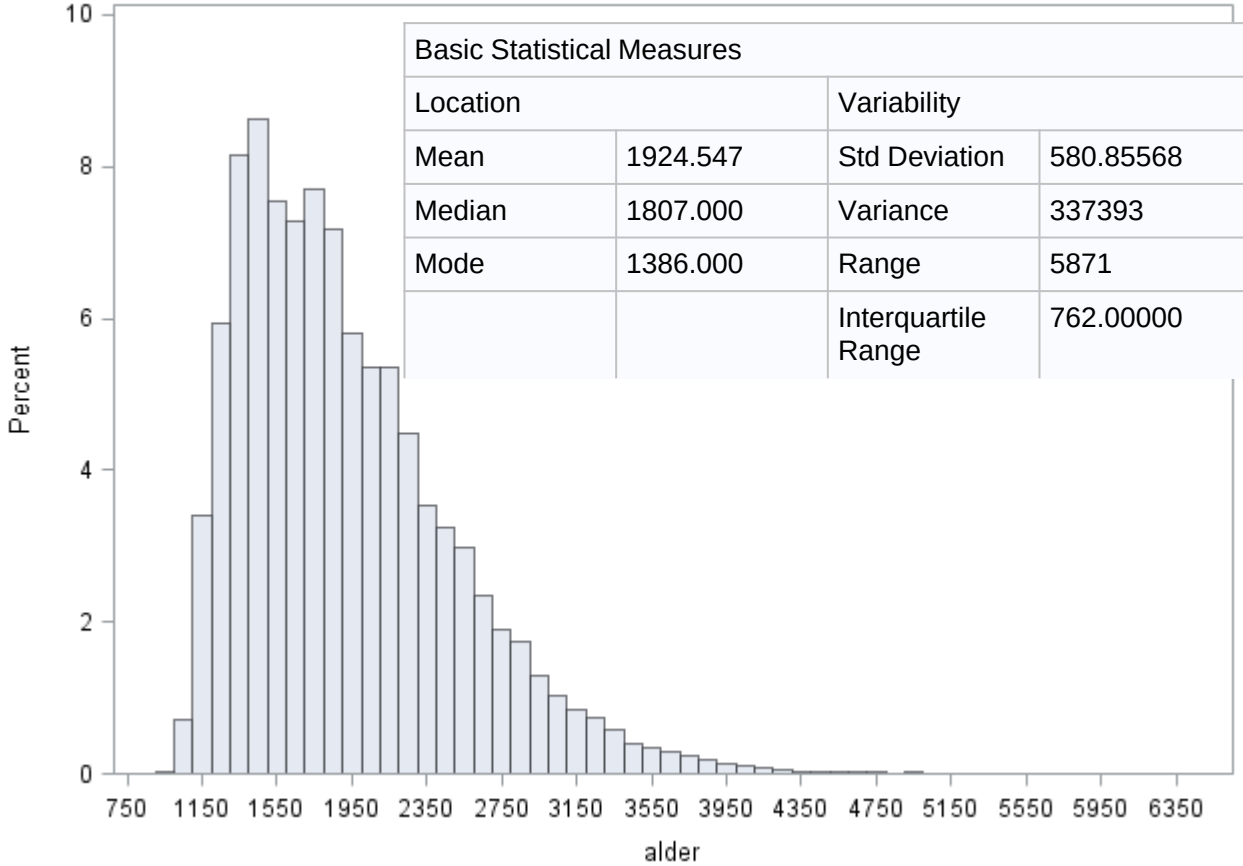


Culling reasons according to group reasons




HELSETJENESTEN
FOR STORFE
100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
9,0
7,0
5,0
3,0
1,0

Age by culling after 1st parity



Basic Statistical Measures			
Location		Variability	
Mean	1924.547	Std Deviation	580.85568
Median	1807.000	Variance	337393
Mode	1386.000	Range	5871
		Interquartile Range	762.00000

Quantiles (Definition 5)		
Quantile	Estimate	
100% Max	6582	
99%	3707	
95%	3028	8.29 years
90%	2712	
75% Q3	2239	6.13 years
50% Median	1807	4.94 years
25% Q1	1477	4.04 years
10%	1298	
5%	1217	3.33 years
1%	1111	
0% Min	711	

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International Activity

- LEAP: Harmonizing the sector to make specific guidelines and measures to assess and record the environmental challenges in husbandry production www.fao.org/partnerships/leap
- GASL: Collectively and coordinate activity to make a sustainable husbandry sector www.livestockdialogue.org

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Japan – Has set demand to make an action plan to reduce GHG in the milk sector

- **Have been focused on water pollution**
- **Goal:**
  - **Environmental management in 50 % of the farms**
  - **Reduce water consumption by 5-15 %**
  - **Fertilizer management planning at 65 % of farms**
  - **Anaerobic fermentation at 30 farms**
  - **Plan for manure management at 95 % of farms**
  - **Heath plan for 95 % of farms**
  - **New technology to reduce pollution by 20-30 % of producers**
  - **Increased energy effectivity by 15 %**

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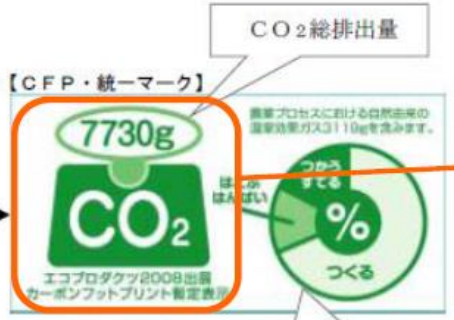
Example of carbon footprint display: rice

5kg rice



CFP Mark used in Japan

段階別のＣＯ２排出構成比

つ　く　る：原料栽培時のデータと製造時のデータ

はこぶ・はんばい：商品輸送と販売時の照明や冷蔵などのデータ

つかう・すてる：使用時のモデルケースのデータと包装資材の廃棄のデータ

Production

Distribution

Use and disposal

(Aeon Co., Ltd.)

- PCR for milk has been prepared and approved
- No milk or dairy products has displayed CFP so far

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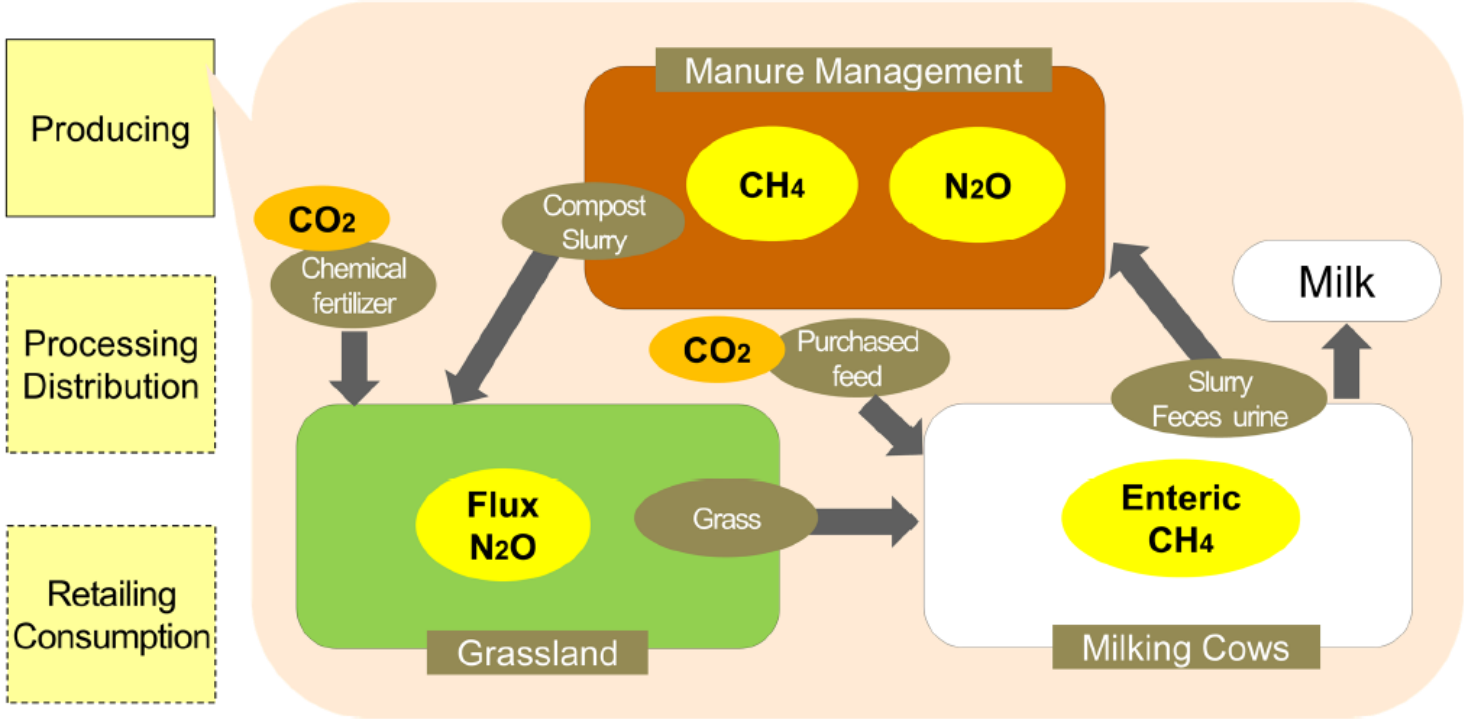
Etter: Takahisa Hinata (HRO) og Akihumi Ogino (NARO)

Measuring GHG emission : methods



- Using Life Cycle Assessment (LCA), ISO14040
- Emission factor –National Inventory, Ministry of Environment

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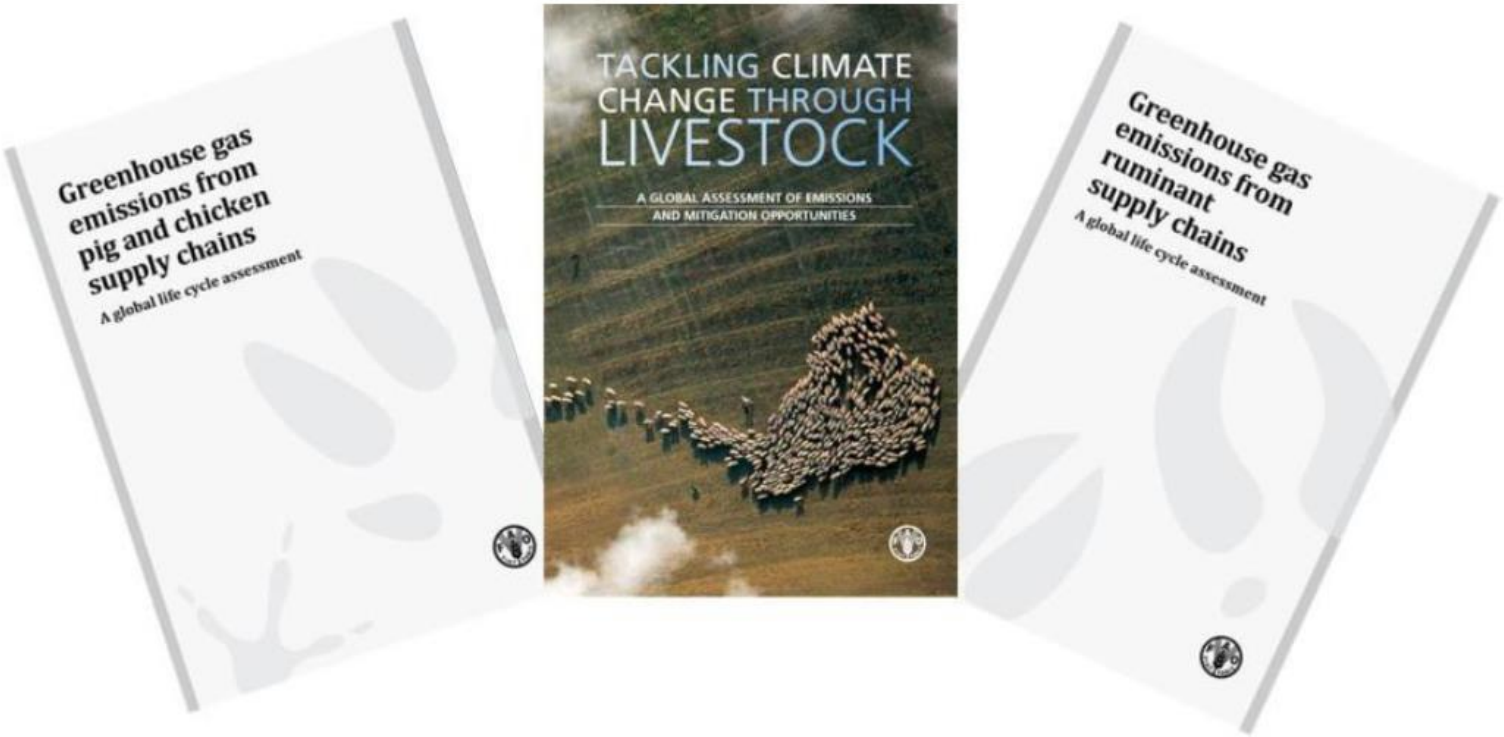
Gerber, FAO



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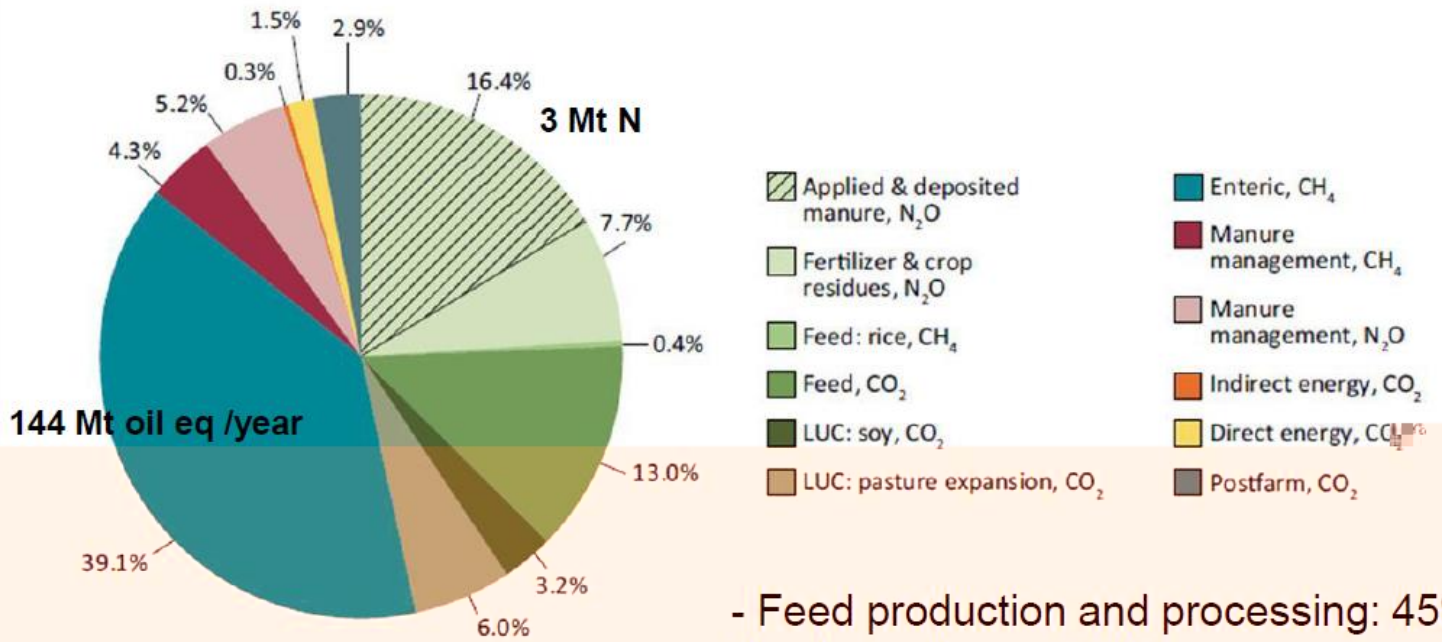
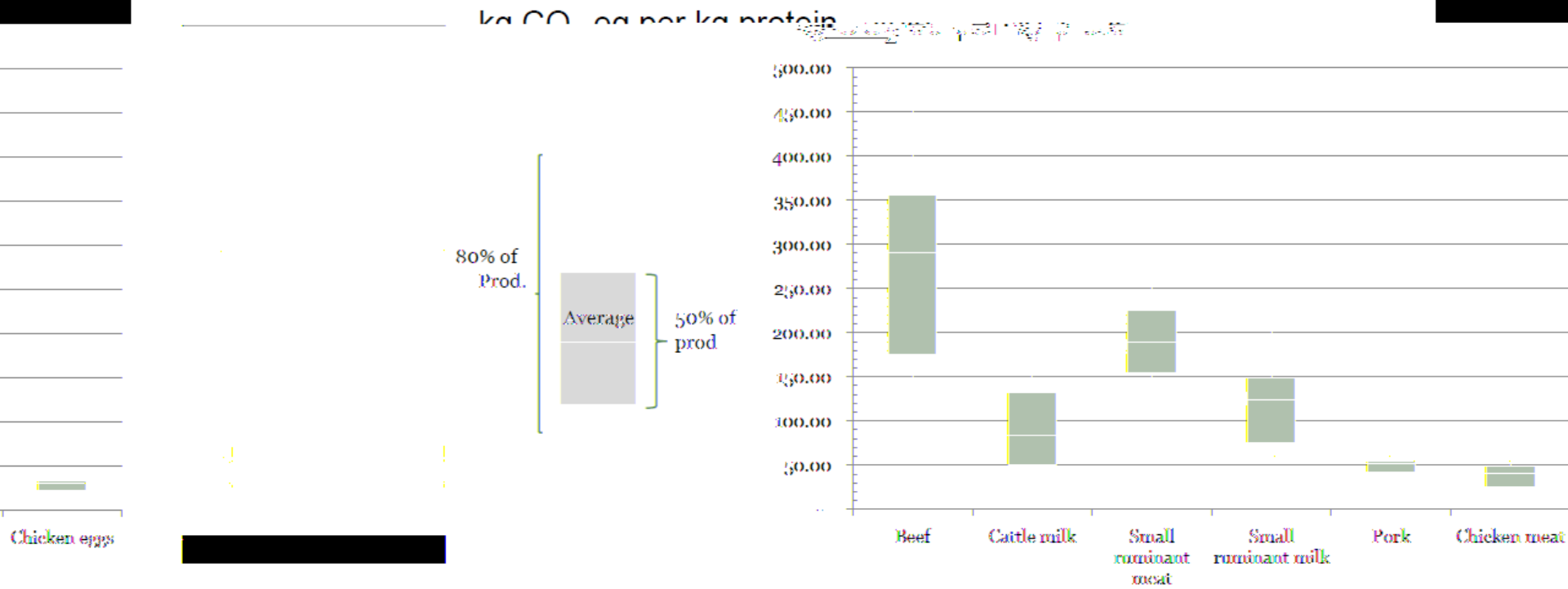
Global emissions from livestock supply chains, by category of emissions



- Feed production and processing: 45% (land use change: 9 %)
- Enteric methane: 39 %
- Manure management: 10 %

Estimated global emission intensities (Ei)



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Dairy Sustainability Framework

11 Global Sustainability Issues

- Greenhouse Gases
- Soil Nutrients
- Waste
- Water
- Soil
- Biodiversity
- Market Development
- Rural Economies
- Working Conditions
- Product Safety & Quality
- Animal Care

Strategic Intent *to define desired outcome for each global issue*

Enablers *that will support the industry in achieving desired outcomes*

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Dairy Industry Sustainability Vision

GHG emissions across the full value chain are quantified and reduced through all economically viable mechanisms

1. GHGs
2. Soil Nutrients
3. Water
4. Waste
5. Soil
6. Biodiversity
7. Market Development
8. Rural Economies
9. Working Conditions
10. Product Safety & Quality
11. Animal Care

Plan → Do → Check → Adjust

Example USA:

INNOVATION CENTER FOR U.S. DAIRY

Reduce GHG emissions of Fluid Milk 25% by 2020

Stewardship and Sustainability Guide for U.S. Dairy

A voluntary framework for tracking and communicating progress

Farm Smart™

2012 U.S. Dairy Sustainability Report

The Framework maps existing activity on key sustainability issues around the world and shows its progress both locally and in relation to the strategic intent as defined by the industry as a whole

Conclusions

1. Longevity is a term more and more popular, both in research, industry and politically the last decade
2. The term is difficult to define in dairy business – and thus difficult to present as figures to be use as breeding goal, benchmarking etc.
3. Must be seen in connection to production system, pricing system, the goal for production
4. It is important for dairy sustainability – thus economics in the production
5. It is important for animal welfare – interpreted with care
6. Could and will be used in animal breeding – have to be adjusted – demand of methods and adjustment procedure
7. Finally important to assess emission of green house gasses

8. Probably the most important assessor for dairy industry in the future as it will absorb both animal welfare and environmental pressure (GHG)
9. The Nordic countries should be careful not to be let behind in this process