40 years of breeding for improved disease resistance in dairy cattle

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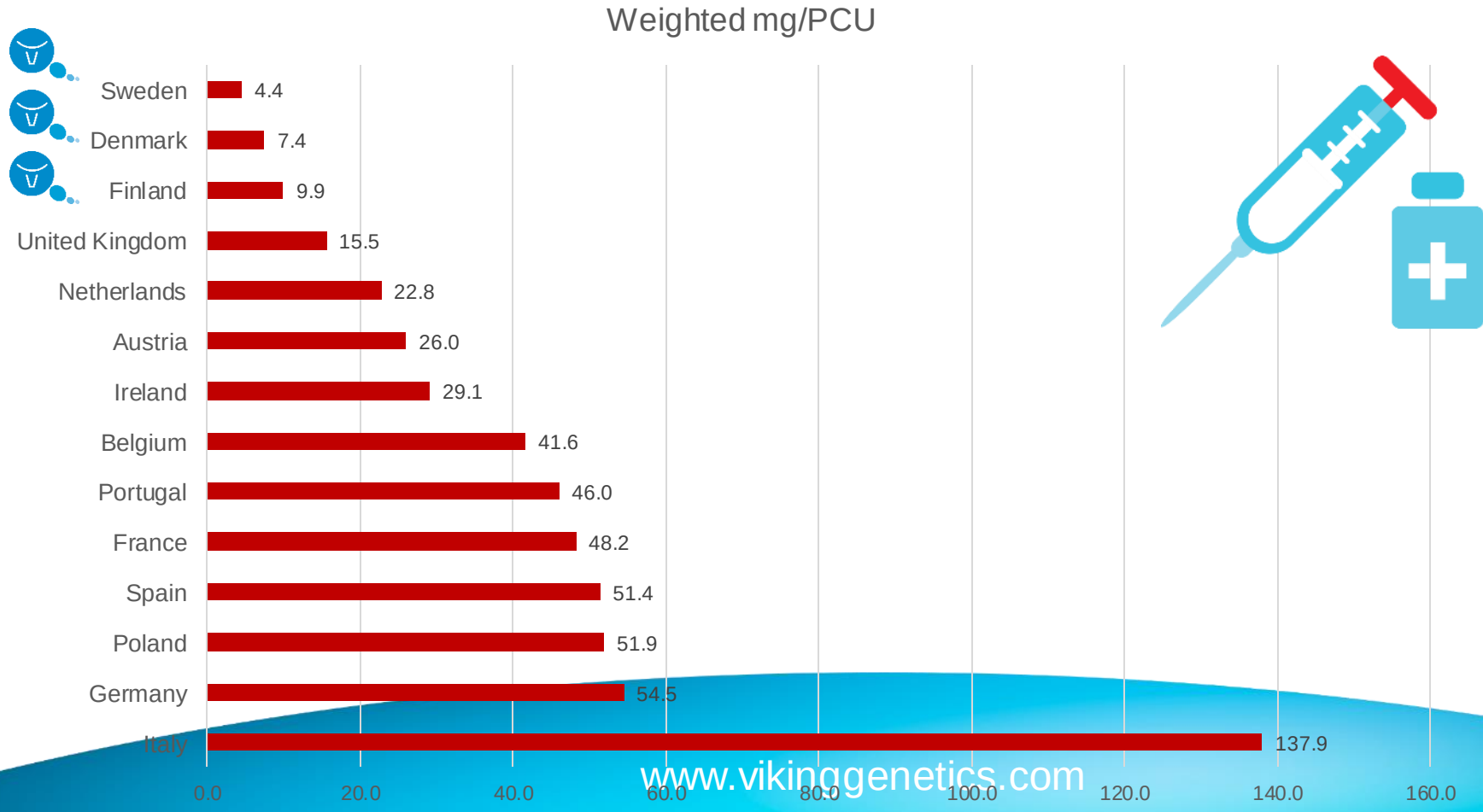
Nordic countries: low use of antibiotics because …

- Strict legislation regarding treatment of farm animals
  - Health agreement schemes – permits treatment of some diseases
- Very high management level
  - High milk production requires healthy animals
- Selective breeding for improved animal health
  - **Udder health**
  - Claw health
  - Metabolic and reproductive disorders

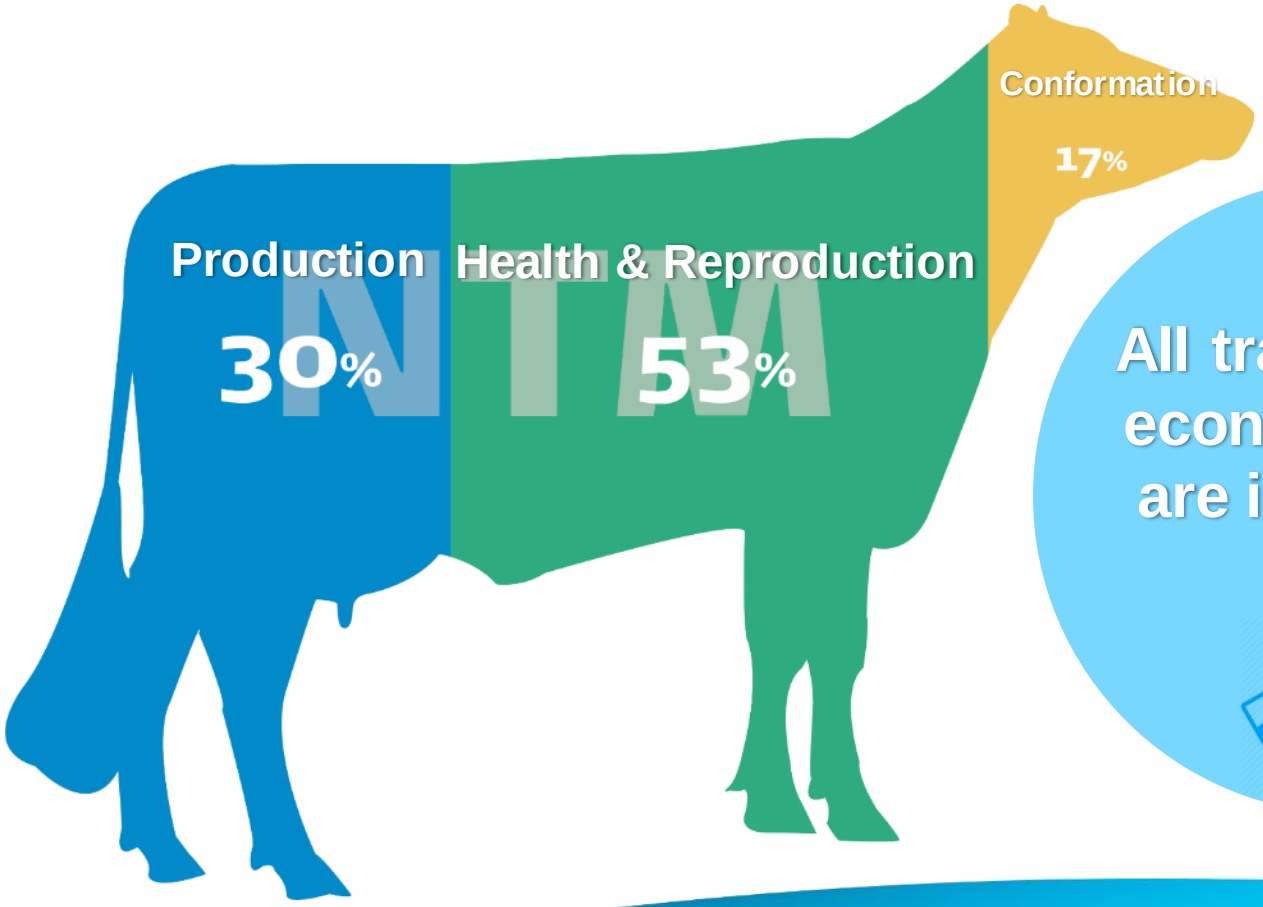
Sale of antibiotics in European countries

Sales in mg/PCU (Population correction unit) of veterinary antimicrobial agents marketed for food-producing animals 2014 weighted according to the proportion of cattle in the countries EU member states



Source: *European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption; 'Sales of veterinary antimicrobial agents in 29 European countries in 2015'*

Nordic Total Merit (NTM)

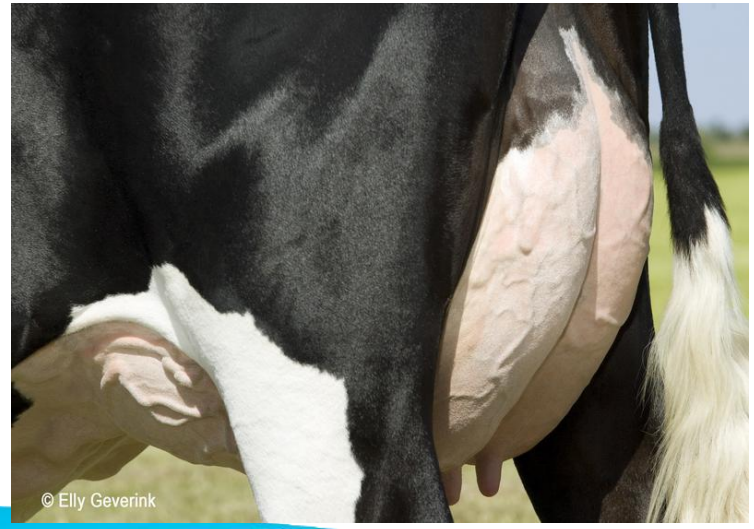


All traits with an economic value are included in NTM

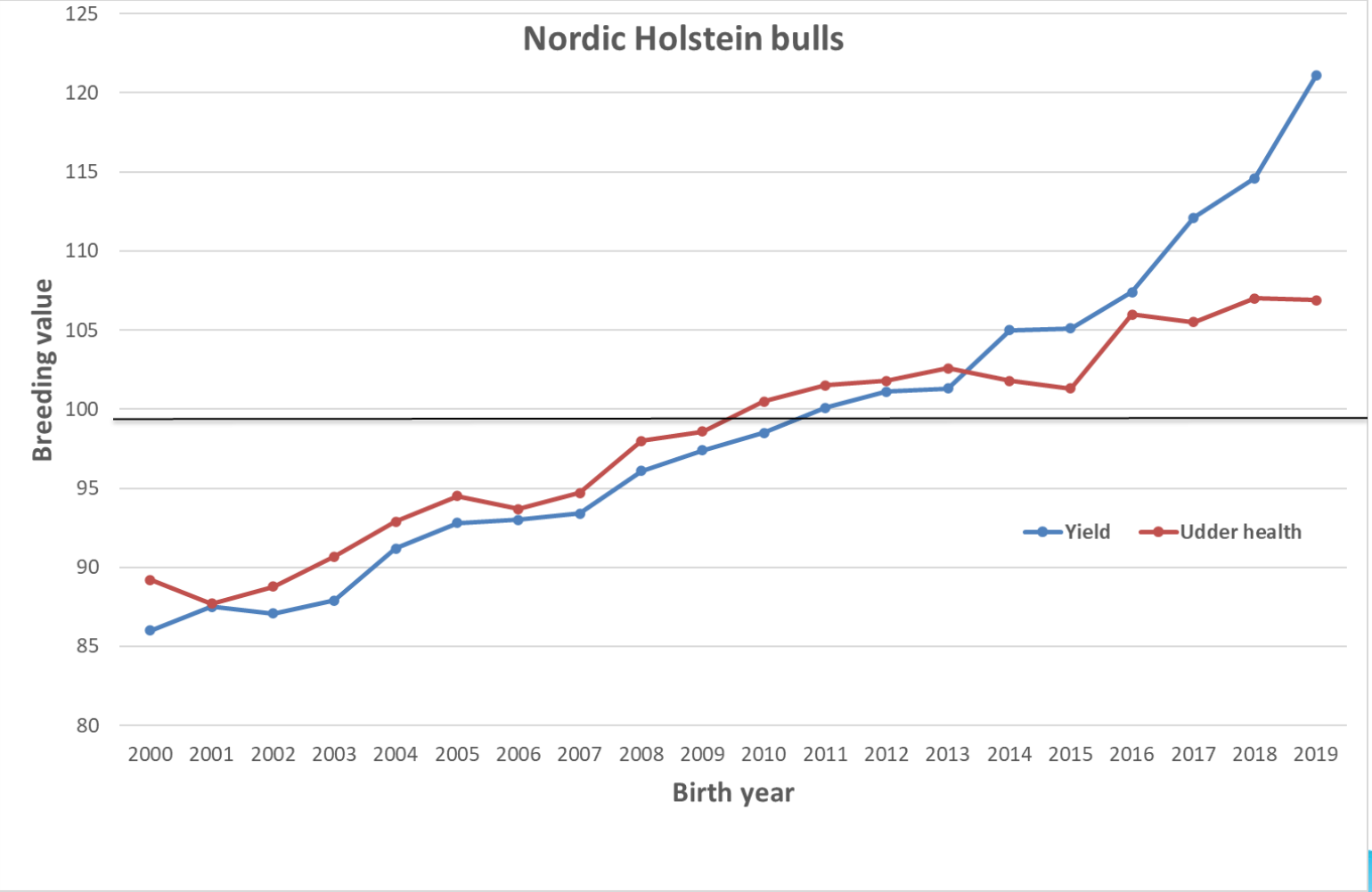
>90 traits combined in **14 trait groups**

Case: udder health

- Low heritability: udder health 4% (milk yield ~30%)
  - Phenotype = 4% breeding + 96% environment
- Unfavorable correlation with yield: yield ↑, mastitis cases↑
- Genetic trend
- Effect of breeding
- Direct vs. indirect selection



Udder health, genetic trend



Genetic effect is permanent and cummulative

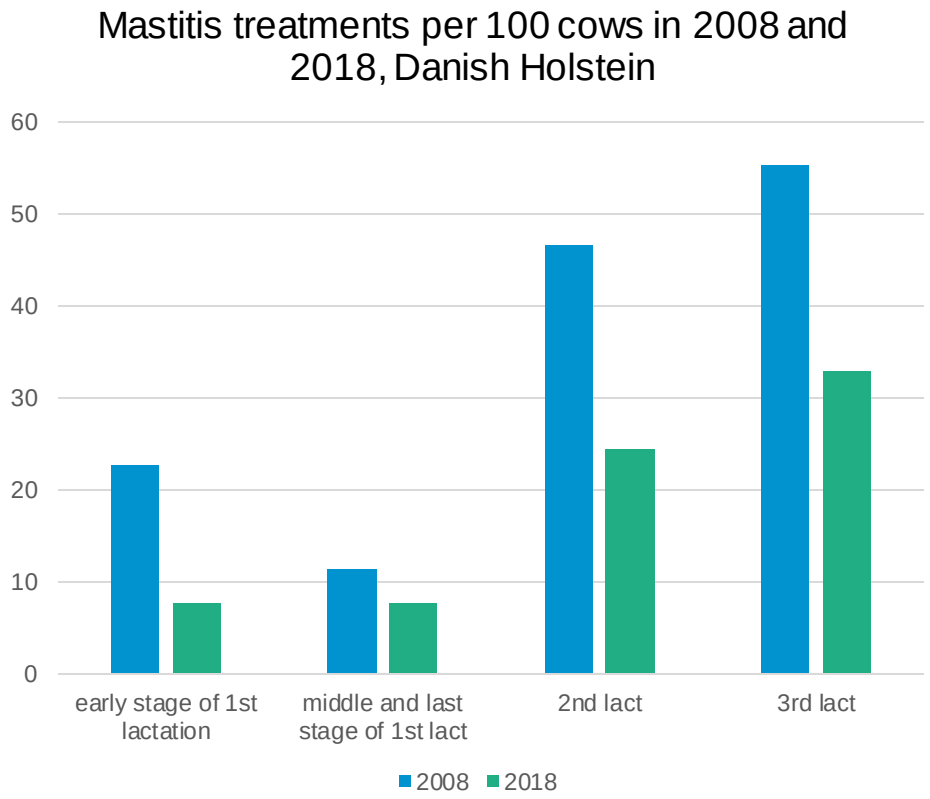
Effect of breeding

Number of daughters with mastitis in relation to the bulls' breeding value for udder health

Breeding value	80	90	100	110	120
Mastitis, %	17.4	14.7	12.0	9.3	6.6

Source: *Nordic Cattle Genetic Evaluation, 2020*

Effect of breeding and management



Simplification: difference between 2008 and 2018

- Less antibiotics used: **4,270 kg**
- Less discarded milk: **17.2 mill. kg**
- Less permanent milk loss: **54.9 mill. kg**

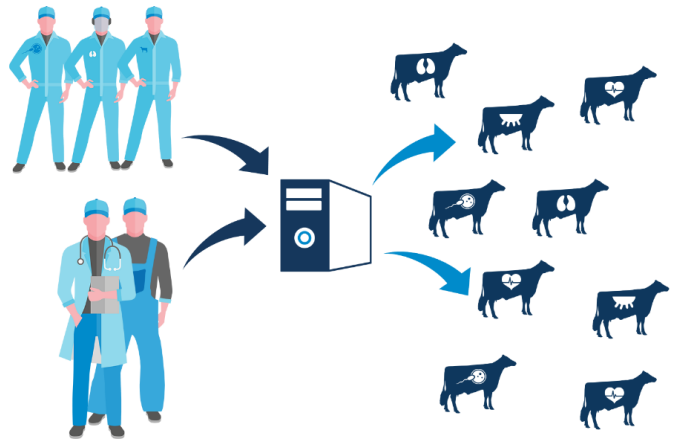
Fact box

- Number of Danish Holstein cows: 325,000
- Distribution on lactations: 1st: 40%; 2nd: 35%; 3rd+: 25%
- Lactation yield, kg: 1st: 8,689; 2nd: 10,162; 3rd+: 10,582
- Milk discarded for 8 days because of treatment with antibiotics
- Permanent milk loss of 10 % restored
- 63 g antibiotics per treatment

Direct vs. indirect selection

- Direct registrations: mammary treatments since early 1980s
- Indirect measures: somatic cell count, fore udder attachment and udder depth
- A[redacted]eeding values → increased genetic progress
- Udder health weighted according to actual cost → balanced breeding goal

DATA IS KING!



Effects of improved udder health

- Fewer treatments → less use of antibiotics
- Better food safety, less discarded milk and better milk quality
- Improved longevity → lower replacement rate
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- Fewer replacement heifers are needed → increased use of beef semen
  - Lower environmental and climatic impact from beef crosses
- Improved economy for herd owner

WIN WIN SITUATION FOR SOCIETY ☺


Thank you!