Department of Animal and Aquacultural Sciences
NORWEGIAN UNIVERSITY OF LIFE SCIENCES

More than 30 years of health recording in Norway

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Aims

- Describe the Norwegian Cattle Health Recording System
- Illustrate how information from this system is used for
  - genetic evaluation in Norwegian Red
  - improved health management at herd level
- Phenotypic- and genetic trends for important health traits
- Future possibilities and challenges regarding dairy cattle health recording

Health recording in Norway

- Since 1975
- Includes >98 % of dairy cows in Norway
- Integrated part of the Norwegian Dairy Herd Recording System (NDHRS)
- Each animal has their individual health card
  - follows the animal from birth to slaughter
- Recording of all veterinary treatments
  - Disease codes (diagnoses), date of treatment, vet id
  - Can describe symptoms and treatment.

History

Started in 1975

- Norwegian Red (NRF)
- Norwegian Veterinary Association

Health Code/Card Commitee

- 1975 – 1994

From 1979: TINE SA included

- Health data in NDHRS

From 1980: Ministry of Agriculture

Norwegian Cattle Health Service

- Established 1994
- Collaboration between:
  - Dairy cooperative TINE SA
    (main contributer and manager)
  - Breeding organisations
    - Geno and TYR
  - Beef cooperative (Nortura) and organisations (KLF)
  - Norwegian Veterinary Association (DNV)
  - Ministry of Agriculture (withdrawed from 1996)
- Common code system for all production animals

Norwegian Cattle Health Service

- Aims:
  - Improve animal health and welfare
  - Improve economy in dairy production
  - Contribute to quality control systems in agriculture
- Tasks:
  - Health recording
  - General advisor services regarding animal health
  - Advisor services at herd level

Nationwide organisation (central ,regional and local)

Each animal has their individual health card

HELSETJENESTEN FOR STORFE

Helsekort ku

Fylke Kommune Gard

Podusent-nummer

Føres av eier/rekter	Sjukdomsregistrering														Kuas avstamning	Registrert av veterinær nr. event. andre = 9997 eier = 9999	For Husdyr-kontrollen
	Fødsel/fruktbarhet					Produksjonssjukdommer											
	Tilbake-holdt etter-byrd	Bør-beten-nelse	Egg-stokk-cyster	Brunst/ omløp		Mjølke-feber	Ketose	Indi-gestion	Spene-skader	Klinisk mastitt		Andre sjuk-dommer og forebyggende behandling (se kodeliste)		Type behand-ling			
Kalving	326	333	334	331, 340, 341		386	385	260	306	Alvorlig/ moderat 303	Mild 304				Mors nr. og navn		
År Dato	Dato	Dato	Dato	Dato	Kode	Dato	Dato	Dato	Dato	Dato	Dato	Dato	Kode	Kode	Fars nr. navn Merknader om symptomer, behandling m.v.	Dato	Innrapp. Dato

05-99

Fødselsår og dato _____ Ku

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Kodeliste for sjukdommer (B-sjukdommer noteres på Helsekort Buskap og rapporteres på foreskreven måte)

Infeksjonssjukdommer
211 Listeriose
215 Ondartet katarrfeber
218 Pasteurellose
221 Sjodogg
239 Piroplasmose
242 Kopper og koppelignende sjukd.
243 Miltbrannsmfysem
245 Smittsom diaré (f.eks. Corona)
246 Smittsom luftveisinf. (f.eks. BRSV)
249 Andre
Brysthuleorganer, blod og bloddannende organer
250 Hjerte-/karsjukdommer
251 Luftveissjukdommer - uspesifisert
252 Lungeorm
259 Andre
Fordøyelsesorganer med lever, bukspyttkjertel og endokrine organer
260 Indigestion unntatt 261, 268 og 385
261 Kolikk/leieforandring/løpedreining
262 Kvast/fremmedlegeme
265 Mage-/tarmbetennelse
266 Parasittære sjukdommer
267 Tannlidelser
268 Trommesjuke
270 Leversjukdom
279 Andre
Hud og hudorganer, inkl. klauver
280 Avhorning etter skade o.l. (regulær avhorning 780)
281 Forfangenhet
282 Klauvlidelser unntatt 281
283 Lus
284 Nydannelse
285 Skabb
286 Sår, kontusjoner forårsaket av innredning, unntatt 306
287 Sår, kontusjoner unntatt 286 og 306
288 Uspesifikke hudlidelser
299 Andre
Jur og spener
300 Agalakti (mjølkemangel)
301 Agalakti (mangelfull nedgivning)
302 Fjerning av ekstraspener
303 Mastitt, klinisk, alvorlig eller moderat
304 Mastitt, klinisk, mild
305 Mastitt, subklinisk
306 Speneskade
307 Nydannelser (eks. papillomer)
308 Jurødem
309 Sår mellom jur og lår
310 Behandling ved avsining
319 Andre
Kjønnsorganer - Obsterikk
320 Børframfall
321 Børslyng
322 Forlenget drektighet,fødselsinduksjon
323 Fødselsvansker
324 Misdannelser
325 Skjedeframfall
326 Tilbakeholdt etterbyrd
327 Nydannelser
329 Andre
Kjønnsorganer - Reproduksjon - Urinveier
330 Abort
331 Anestrus
332 Brunstsynkronisering
333 Bør- skjede- og eggledderbetennelse
334 Eggstokkcyster
335 Kastrering/sterilisering
336 Urinveisbetennelse
337 Nydannelse
338 Nyresjukdom
340 Stille brunst
341 Symptomløs omløping
349 Andre
Nervesystem og sanseorganer
350 Cerebrocortical nekrose - CCN
352 Øyebetennelse
354 Meningitt/encephalitt
359 Andre
Skjelett, ledd, bånd, sener og muskulatur
360 Bånd-, sene- eller seneskjedesjukdommer
361 Frakturer
364 Leddsjukdommer
365 Muskeldegenerasjon
366 Utglidning/bekkenskade/parese
379 Andre
Ikke organrelaterte sjukdommer
380 Abscesser/flegmoner (inkl. lymfangitt)
381 Adferdsavvik
382 Forgiftninger
384 Hypomagnesemi/graskrampe
385 Ketose
386 Mjølkefeber
387 Paretiske tilstander utenom puerperiet
388 Vitamin- /mineralmangel - unntatt 350, 384 og 387
389 Legemiddelbivirkning
399 Andre

Forsøkskoder 090-099 brukes etter spesiell beskjed

Forebyggende behandling
Kodes ved å legge til 500 på de vanlige kodene og rapporteres på foreskreven måte
Eksempel på de vanligste:
606 Vaksinering mot ringorm (*Trichophyton verrucosum*)
766 Parasittære sjukdommer
780 Regulær avhorning
803 Mastitt (vaksinering)
885 Ketose (f.eks. fôrtilskudd)
886 Mjølkefeber

Koder for type behandling
(Når antibiotika-behandling inngår skal denne alltid kodes)

Konvensjonell terapi
1 Ingen behandling
2 Penicillin
3 Penicillin/DHS
4 Andre antibiotika
9 Andre konvensjonelle legemidler (ikke antibiotika)
Forsøkskoder
10-97 Forsøkskoder (tildeles etter beskjed)
Alternative terapiformer
88 Akupunktur
89 Urtemedisin
90 Homeopati
91 Kombinasjon av flere alternative terapiformer
92-99 Homeopati kombinert med kode 2 til 9
Eksempel Homeopati og penicillin=92

Organ-related health code system (% of all treatments)

1. Infectious diseases (1 %)
2. Respiratory, cardiovascular and hematopoietic systems (3 %)
3. Digestive system (6 %)
4. Skin and claw (7 %)
5. Mammary system (41 %)
6. Reproductive system/obstetrical conditions (8 %)
7. Reproductive and urinary systems (13 %)
8. Nervous system and sense organs (0.2 %)
9. Musculo- skeletal system (3 %)
10. Non-organ related (16 %)

+ Prophylactic treatment

Examples

Mammary system (41 %)	**No of records**
Agalactia	129
Severe/moderate clinical mastitis	30689
Mild clinical mastitis	15920
Subclinical mastitis	1826
Teat injuries	2219
Dry cow therapy	4512

Reproductive and urinary systems (13 %)	**No of records**
Abortion	401
Aneastrus	3566
Heat synchronization	2998
Silent heat	3770
Metritis, vaginitis and salpingitis	2086
Cystic ovaries	2519
Castration	568
Repeated breeding	492

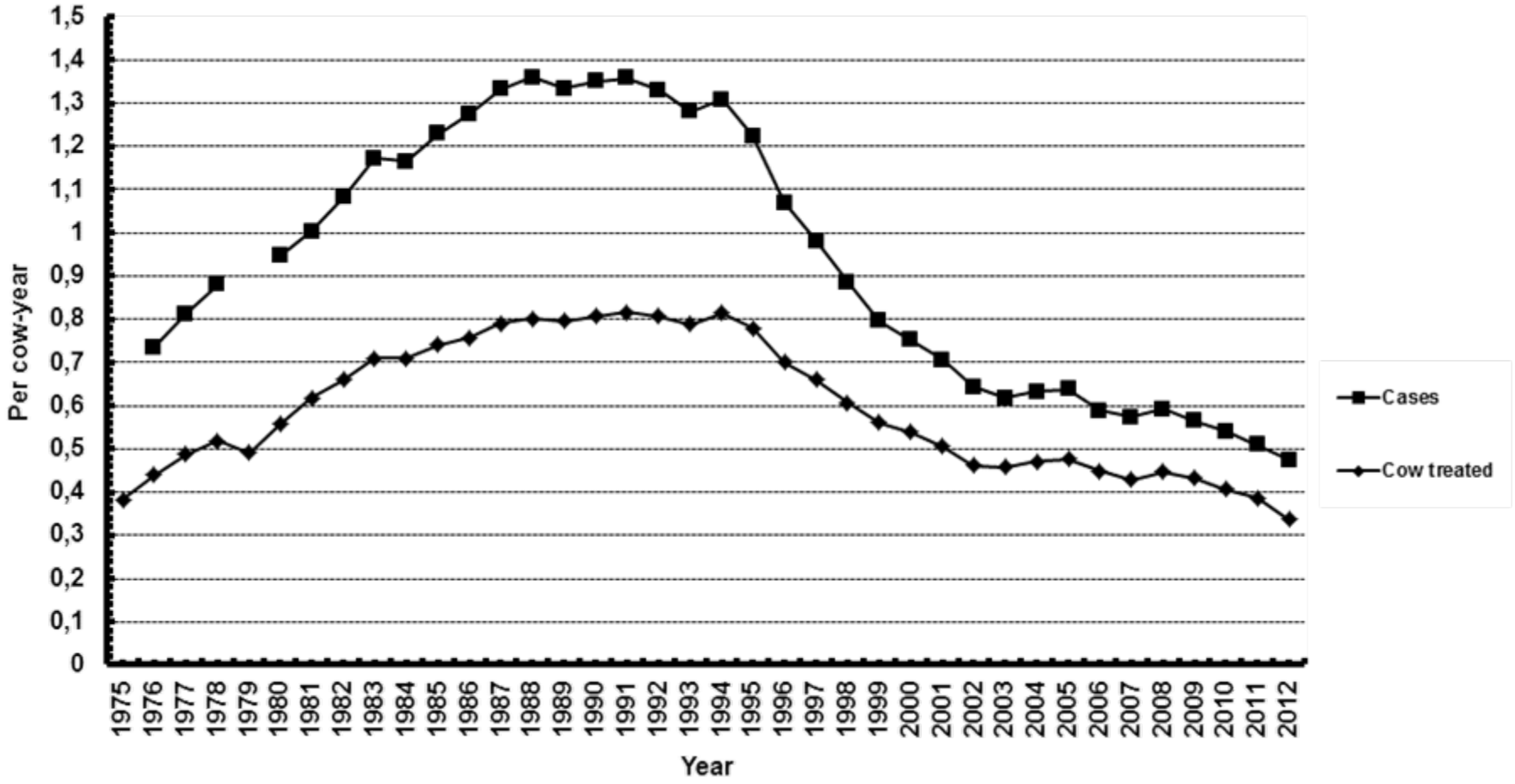
Health recordings in Norway

- The most frequent diseases (2011):

	No of records	Records per 100 cow-year
Severe/moderate clinical mastitis	30,689	13.8
Mild clinical mastitis	15,920	7.2
Milk fever	11,284	5,1
Ketosis	6,855	3,1
Retained placenta	5,992	2,7

- Diseases with 1-2 records per 100 cow-year (2011):
  - Claw diseases, teat injuries, dry cow therapy, dystocia, silent heat, and cystic ovaries

Recorded veterinary treatments / treated cows per cow-year



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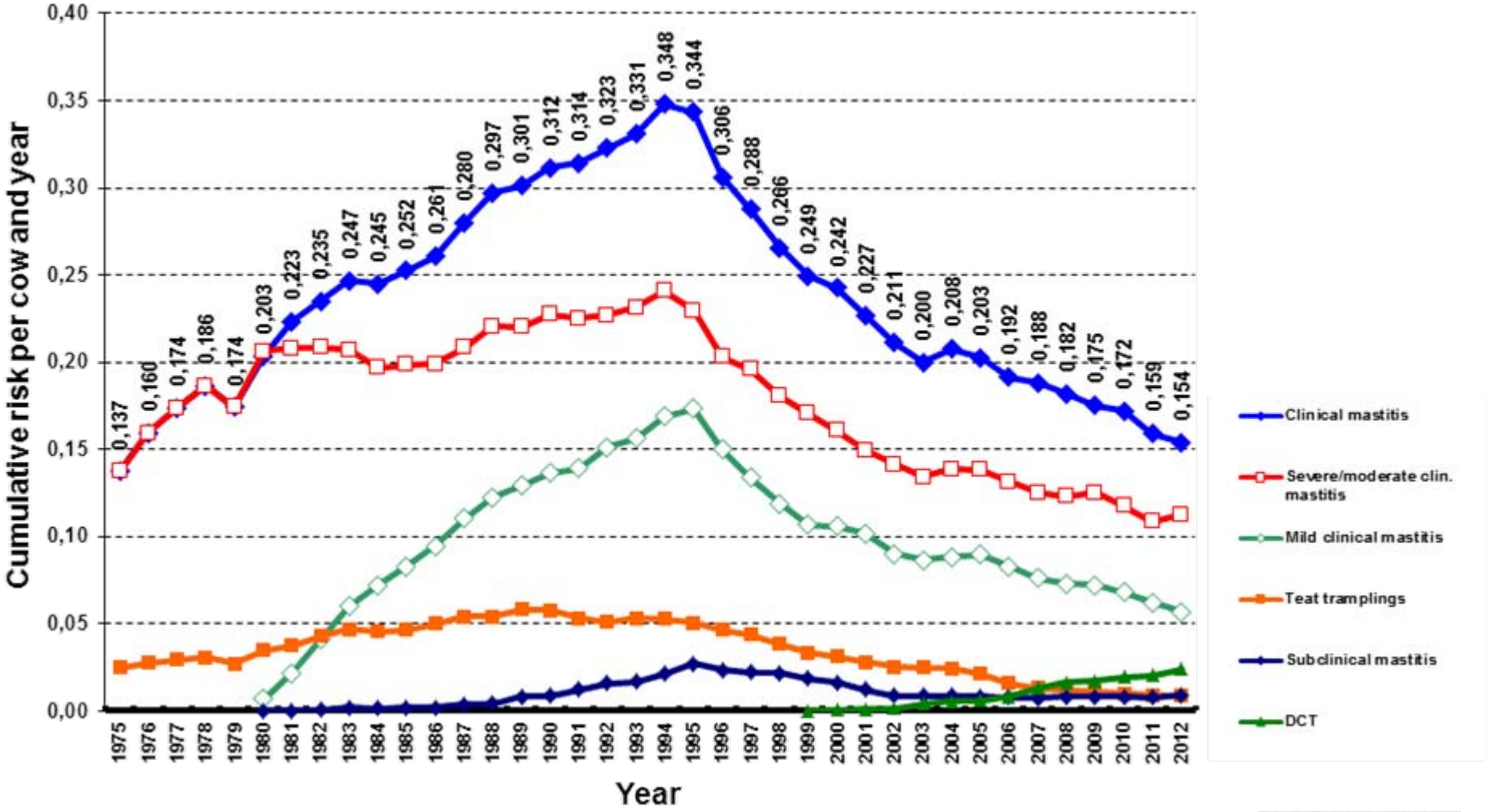
Recorded veterinary treatments of mastitis per cow-year



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Decreased frequency of veterinary treatments after 1994

- Genetic improvement
- Action by the farmer's organizations to reduce the unnecessary use of antibiotics
  - changed the treatment strategies
- Establishment of Norwegian Cattle Health Service,
  - development of mastitis control programs, advisory- and herd management tools.

➢ **Health recordings crucial tool**

Recent developments health recording

- **Direct recording from veterinarians**
  - Veterinarians submit health data directly to the central database (NDHRS) since 2008
  - Since January 2012: Report all use of medication to the Norwegian food authorities
  - More than 60% of the health data are now reported directly from veterinarians to NDHRS
  - Increased the number of recorded calf- and young stock health events
  - Reduced the lag-time from the day of treatment to the event is recorded in the central database

Recent developments health recording

- **Recording of claw health at claw trimming**
  - Introduced in 2004
  - Integrated part of the NDHRS
  - 70,000 claw records from 3000 herds in 2012
  - The claw trimmers record whether the cow has normal (healthy) claws or if one or more of 9 claw disorders are present
  - Systems for electronic recording and direct transfer of data from claw trimmers to the central database will soon be available

Recent developments health recording

- **Mastitis pathogens**
  - Data from mastitis laboratory
  - Recorded in NDHRS since 2000
  - Studies of pathogen specific mastitis
- **Health recording for dairy calves**
  - Improved recording on calves and young animals in recent years
  - Dehorning and prophylactic treatment for parasites were the most frequent health events
  - Respiratory disease is the most frequent disease in dairy calves in Norway.

Data quality

- Medicine for animals can only be distributed and prescribed by veterinarians in Norway
- Data quality confirmed by a recent project (Espetvedt et al., 2013)
  - only 10-12 % of the health events were unreported
- Comparisons of retail sales of intramammary antibiotics and the incidence rate of clinical mastitis over 30 years revealed parallel curves (Østerås et al., 2007)

Use of health data for dairy cows

- Herd management
- Important tool / source of information for veterinarians and advisors
  - Health records on cow and herd level are electronically available for farmer, veterinarian and advisor
- Breeding program for Norwegian Red
  - Genetic evaluation of health traits
- Research
  - Animal breeding and genetics
  - Epidemiology
  - Identify factors affecting animal health
- Government
  - Monitoring health situation
  - Statistics

Norwegian Red

- Population size: 240.000 cows in the recording system (98%)
- 10.500 dairy herds
- 95 % of the dairy cows in Norway are Norwegian Red
- 90 % of calves have an A.I. sire
- Selected for a broad breeding objective with emphasis on functional traits like health and fertility over the last 40 years

Selection against mastitis

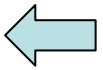
- Direct selection
  - Veterinary treatments of clinical mastitis
  - Health recording system
- Indirect selection
  - Genetically correlated traits e.g. SCC
  - Genetic correlation far from 1
- Genetic markers
- Genomic selection
  - Phenotypic records still required
  - Reference population

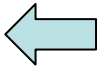
Selection against mastitis

- Heritability of mastitis is low
  - Many daughters needed in progeny testing to obtain reliable breeding values of sires
- Unfavorable genetic relationship to milk production
  - Genetic correlation **0.4** between 305-d protein yield and mastitis in 1. lactation Norwegian Red
  - Selection for increased milk yield -> genetic deterioration of mastitis resistance
- Positive genetic correlation between mastitis and other diseases
  - Selection against mastitis -> genetic improvement of resistance to other diseases as correlated response

Relative weight on traits included in the **total merit index** used for selection of Norwegian Red sires

Trait groups	Relative weight
Milk production	28
Mastitis	21
Fertility	18
Udder conformation	15
Leg conformation	6
Growth rate	6
Temperament	2
Diseases other than mastitis	2
Milking speed	1
Calving difficulty	0,5
Stillbirth	0,5





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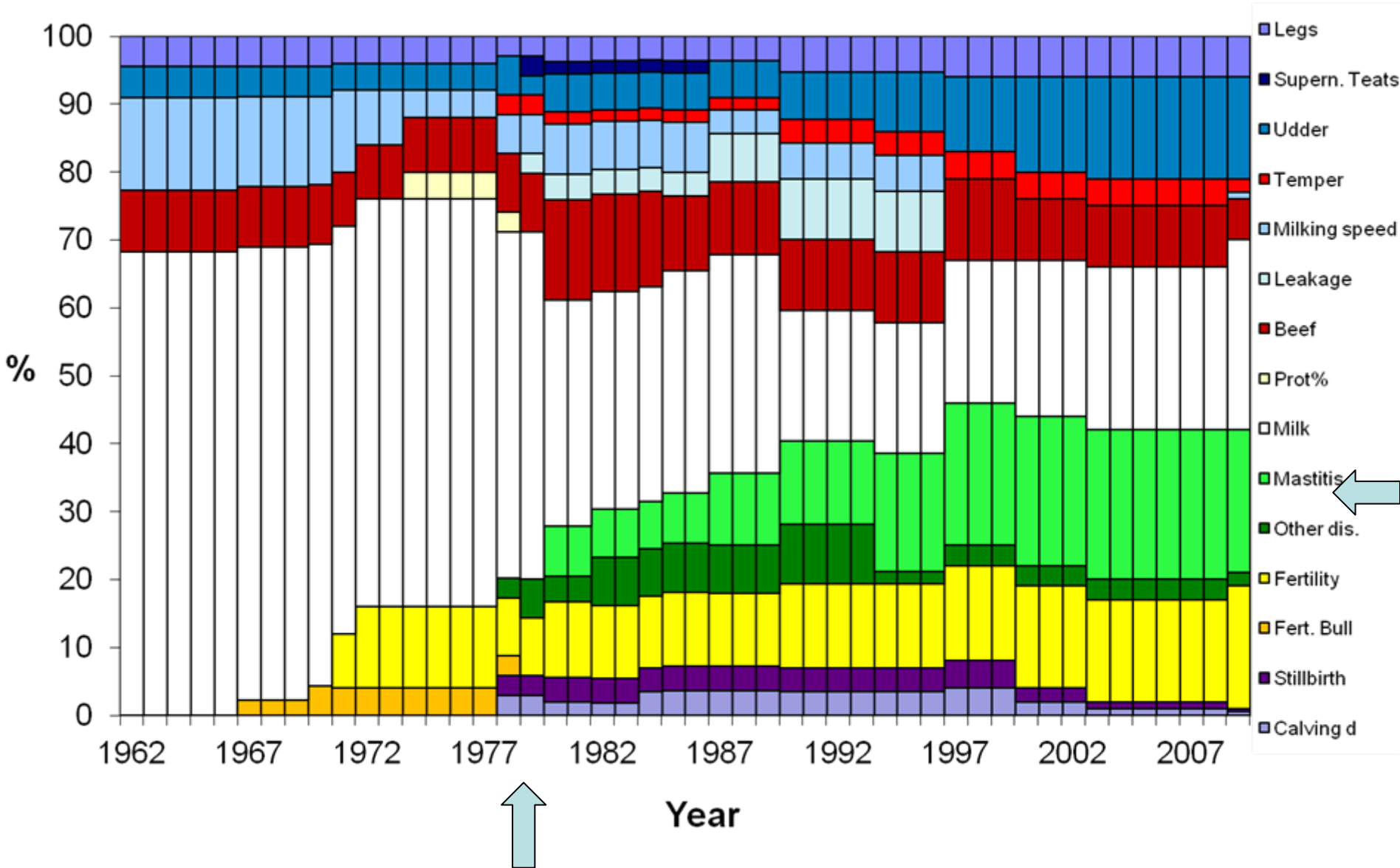


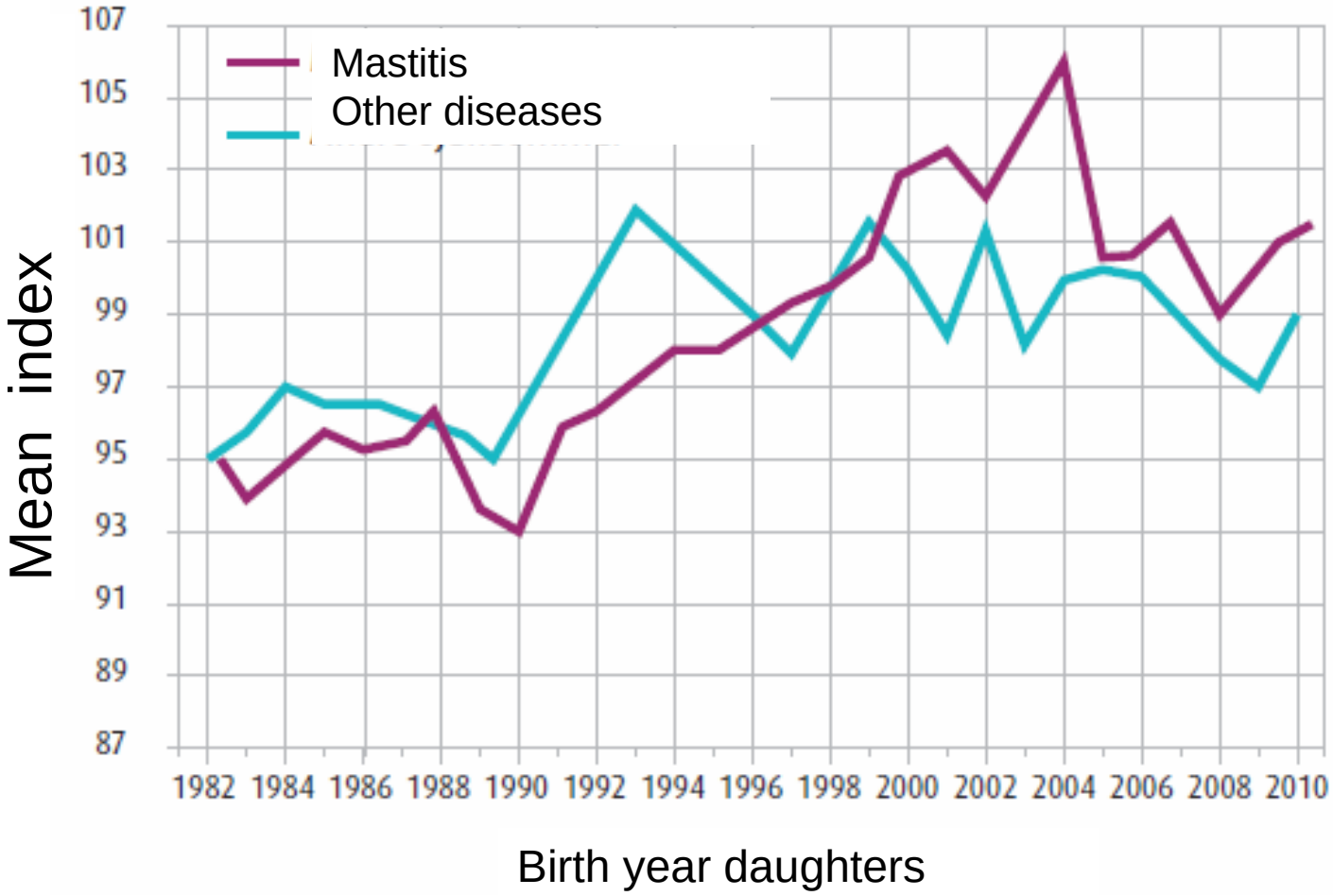
Selection against mastitis in Norwegian Red

- Mastitis included in total merit index since 1978
- Information on veterinary treatments of clinical mastitis (CM) from health recording system
- CM defined as 0/1 in 7 intervals of lactation 1-3

  (-15, 30), (31-120), (121-305) d in 1st lactation, and

  (-15, 30) and (31, 305) d n 2nd and 3rd lactation
- Data from 1978 onwards used for genetic evaluation
- Increasing weight on mastitis from less than 3 % in 1978 to 21 % in 2013

Genetic trends for mastitis and other diseases in Norwegian Red



Selection against mastitis in Norwegian Red

- Genetic change for mastitis from 1990 to 2010 was on average 0.4 index points per year.
- Genetic improvement of mastitis and milk production simuntanously
  - Despite
    - unfavourable genetic correlation
    - low heritability of health traits
  - Because
    - Large daughter groups – reliabile EBV
    - Weight on mastitis in total merit index used for selection of elite sires

CONCLUSIONS

- Improvement of animal health
  - Genetics
  - Preventive measures
  - Epidemiological research
  - Environmental improvements

- Health recordings a crucial tool!

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geno

TINE ®

TINE RÅDGIVING

HELSETJENESTEN FOR STORFE