Proven by Geno,
Norway

NORWEGIAN RED

Since 1935

Breeding for better lives

Why crossbreeding with Norwegian Red?

Norwegian Red will increase the level of health and fertility in all crossbreeding programs and will give dairy farmers increased profit and reduced workload.

1 **Profitability**
Milk production components, feed efficiency, days open, lifetime production.

2 **Efficiency**
Health, calving ease, less labor, cope better with any kind of stress.

3 **Sustainability**
Animal Welfare, feed efficiency, low antibiotics use.

Filippo Bozzini, Italy.

Farmers worldwide are benefitting from Norwegian Red genetics

In more than 30 countries the Norwegian Red breed has increased the level of health, fertility and component yields thereby giving dairy farmers more robust and profitable cows.

Increase profit

Reduce workload

Dairy crossbreeding

An increasing number of commercial dairy farmers worldwide are experiencing the benefits of dairy crossbreeding.

Crossbreeding is considered an effective way to increase the efficiency of milk solids production. It allows farmers to breed better cows – and it's a quick way to achieve genetic gain. Crossbreeding provides dairy farmers with the best of both breeds.

Effective crossbreeding begins with two different breeds that complement each other genetically. Dairy cross-breeding systems should make use of the number of breeds optimal for conditions at each specific dairy operation. Whether choosing a 2-way or 3-way cross each dairy farmer should make a plan and choose a cross-breeding system that suits their facilities, climate, milk market, economic circumstances, nutritional regime and level of management.

Advantages of crossbreeding

- Heterosis or hybrid vigour, crossbred animals perform better than the average of their parent breeds
- Additive effects of breeds complementarity
- Opportunity to use a wider range of genetic material
- It's the reverse of inbreeding
- Robustness of animals
- Improved lifetime production
- Better genetics faster

The Norwegian Red

The Norwegian Red is a high-yielding dairy breed developed in Norway since 1935. Breeders have strongly emphasized functional and production traits since the 1970. This balanced breeding goal has resulted in excellent production combined with world-leading performance In health and fertility traits.

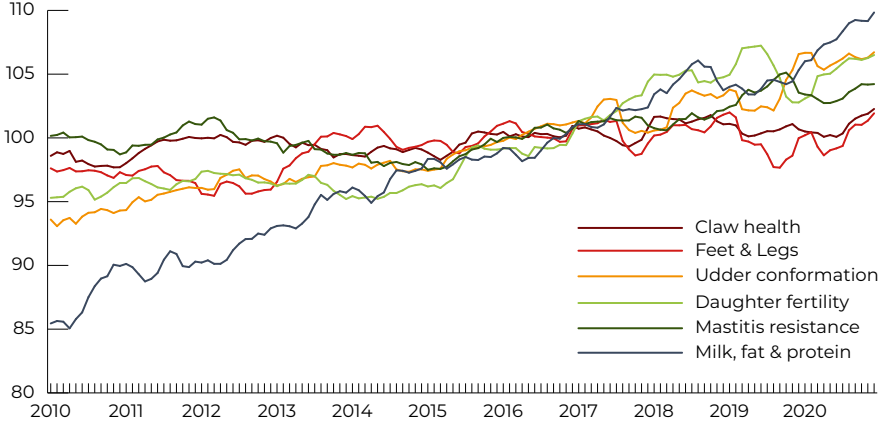
Positive genetic trends for health and fertility as well as production have been possible due to the very comprehensive data collection system in Norway.

Norwegian Red will increase the level of health and fertility in all cross-breeding programs and will give dairy farmers increased profit and reduced workload.

Norwegian Red cow in 5th lactation.

Genetic progress for Norwegian Red in 2010-2020

Positive trend for production, fertility, health and conformation



Quick facts

- Population size 180,000
- Average mature liveweight of Norwegian Red cow is 610kg.
- Average 1.6 inseminations (cows and heifers)
- Average NR in Norway: 8,602 litres of milk (ECM), 4.34% fat and 3.52% protein
- 53% of milk in Norway comes from cows milked in robot systems
- About 80% of the Norwegian Red sires are A2A2 beta casein
- Calving interval 12.3 months
- SCC (somatic cell count) 70,645
- 34% of calves born are polled
- Grazing in Norway: middle of May to middle of September
- 89.3% of cows not treated for clinical mastitis

geno

Geno is the breeding organization of Norwegian Red cattle, the main dairy breed in Norway. It is a farmer cooperative that has been conducting research and development for cattle breeding since 1935. The cooperative system gives the farmer members the power to influence the development of the Norwegian Red breeding program.

Health and fertility have been part of Geno's breeding goal since the 70s. Geno distributes Norwegian Red genetics, complete with its products and solutions to more than 30 countries worldwide.

Our vision is "Breeding for better lives", both for animals and farmers.

The Norwegian Dairy Herd Recording system

Operated by the national dairy cooperative, Tine, figures show that 99% of all cows and 98% of all dairy herds have participated in the Norwegian Dairy Herd Recording System.

Data including health cards, slaughterhouses, laboratory milk analyses, and insemination reports are recorded on an individual animal basis, together with calving information, milk yield records, culling information, etc., recorded by farmers.

All data used for genetic evaluation historically and presently comes from the Norwegian Dairy Herd Recording System. Data, including health records, insemination reports, and veterinary treatments are stored in one national database. The health-card system is an integrated part of the milk recording system, and information from the daughters was used in the genetic evaluation of sires. The data from the health cards are now utilized in our genomic selection scheme.

99% of all cows participate in the Norwegian Dairy Herd Recording System

NORWEGIAN RED

GENOMIC INFORMATION

IOT
INTERNET OF THINGS

ARTIFICIAL INTELLIGENCE

FARMERS

VETERINARIANS

AI TECHNICIANS

MILK LABORATORIES

SLAUGHTER HOUSES

ADVISORS

The Norwegian Red breeding system

The Norwegian Red breeding system HD Genomics is the unique genomics-based breeding program for Norwegian Red which is built on the foundation of Geno's long term progeny testing program.

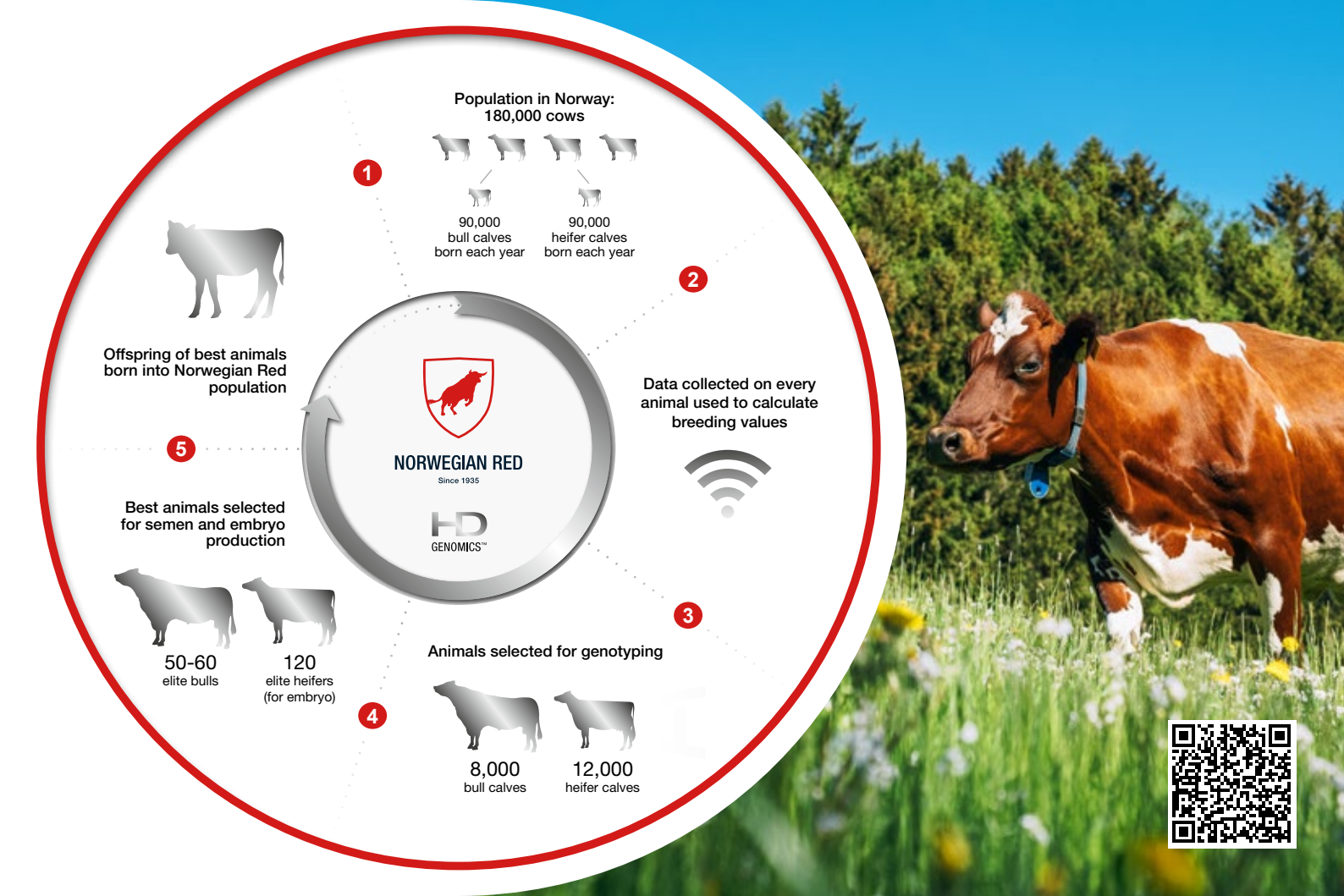
Breeding value calculations by Geno are based on single step genomic prediction. This means that all bulls and cows, both those who have genotype information and those who do not, receive estimated breeding values in the same step.

What is the advantage of single-step genomic selection?

The advantage, over commonly used 2-step methods, is that all available information, such as phenotypes, genotypes, and pedigree information on all animals is included simultaneously in the prediction of breeding values. This results in the highest reliabilities possible for the genomic breeding values of sires.

A group of élite Norwegian Red heifers for embryo production.

A young Norwegian Red élite bull.


Population in Norway:
180,000 cows
90,000
bull calves
born each year
90,000
heifer calves
born each year
1
2
Data collected on every
animal used to calculate
breeding values
3
Animals selected for genotyping
8,000
bull calves
12,000
heifer calves
4
50-60
elite bulls
120
elite heifers
(for embryo)
Best animals selected
for semen and embryo
production
5
Offspring of best animals
born into Norwegian Red
population
NORWEGIAN RED
Since 1935
HD
GENOMICS™

Health and fertility

By keeping a balanced breeding goal for 50 years, Geno has overcome the negative correlation between production traits and health and fertility traits.

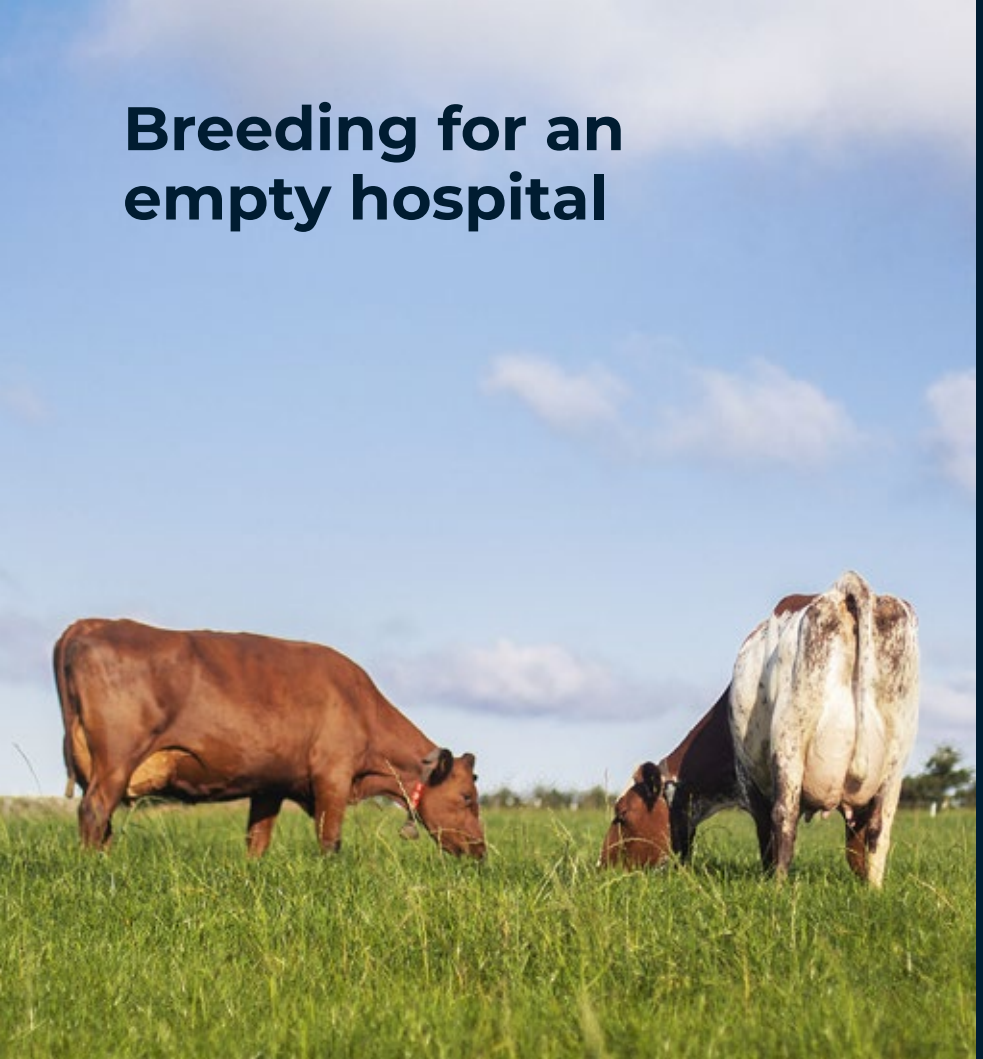
Health traits

- Health traits included in NR breeding goal since 1978
- Selection based on resistance to mastitis and resistance to other diseases (ketosis and other transition diseases)
- Health traits have lower heritability than production traits so genetic progress occurs over many years
- Very low frequency of clinical mastitis (6.6% in first lactation heifers and 16.6% in all cows) and average SCC of 70,645 across all lactations (2020)
- Dramatic genetic progress in resistance to clinical mastitis since 1995 – most cows have zero clinical mastitis

Fertility

- Fertility traits included in Norwegian Red (NR) breeding goal since 1971
- Selection based on non-return rate (conception rate) in cows and heifers and time from calving to first insemination in cows
- Fertility traits have lower heritability than production traits so genetic progress occurs over many years
- Most fertile of all dairy breeds due to superior breeding program
- Norwegian Red cows proved to have longer estrus periods with more of the primary sign standing and more time spent in sexually active groups compared with the Holstein-Friesian breed (J. Dairy Sci.)

Breeding for an empty hospital



Find out the average of all Daughters of Norwegian Red bulls in Norway*

97.2% of Daughters NOT treated for Milk Fever

98.5% of Daugthers NOT treated for Ketosis

98.3% of Daugthers NOT treated for Cystic Ovaries

99.1% of Daugthers NOT treated for Metritis

97.3% of Daugthers NOT treated for Silent Heat (no Sync hormones)

89.3% of Daugthers NOT treated for Clinical Mastitis

* Based on observations of all Norwegian Red cows in Norway

Kirsti Winnberg working on her PhD project “Selection for reduced methane emissions in Norwegian Red cows”

Sustainability

Our goal is to further develop the Norwegian Red as the most sustainable and profitable dairy breed in the world. Improving feed efficiency is one step towards both.

“We are constantly improving our genetic material to suit your current and future needs. By investing heavily in actual feed intake recordings on Norwegian Red, selecting the most feed efficient cow with the highest possible precision will become possible. Geno has also started measuring and monitoring methane emissions on Norwegian Red cows, not only on dairy units but also in our young bull testing station. Our goal is to develop a full Feed Efficiency Index that lets you breed for a more feed and energy efficient cow. This leaves you with a lower-emission herd that increases profitability even more.”

Håvard Tajet, Chief Technology and Innovation Office

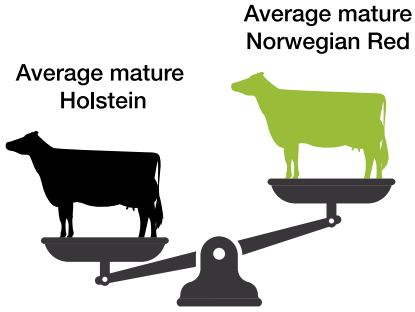
Feed tanks for feed intake study.

Feed$aved™

One step towards improving feed efficiency is to reduce the feed required for maintenance of body weight. Selecting lower body weight will subsequently reduce the feed needed for regular maintenance of routine body function. Breeding for feed efficiency requires a substantial amount of reliable data. Norwegian Red's comprehensive data collection and recording system represents 99% of all NR cows in Norway.

Tracking cow weight from 1.2 million cows ensures high accuracy when selecting for Feed$aved™. Feed$aved™ is a trait that has been carefully developed to help global customers select for reduced feed intake choosing sires with lower dry matter intake (DMI) requirements.

Selection for higher production and Feed$aved™ will result in lower DMI without reducing milk value and in more efficient use of feed.



Increase profitability with Norwegian Red genetics:

Enjoy the benefit from adding 1 extra cow for every 25 cows with the same feed cost while increasing the milk production in your herd.

Photo: Tore Myrstad

Sellable cows and bull calves

By selecting Norwegian Red genetics, farmers will benefit from a dairy breed that can also offer high beef value.

Breed	Carcass growth rate/day (kg)	Carcass Muscling (1-15 scale)	Carcass fatness (1-15 scale)
Norwegian Red	.50	5.2	6.0
Angus	.48	6.2	6.6

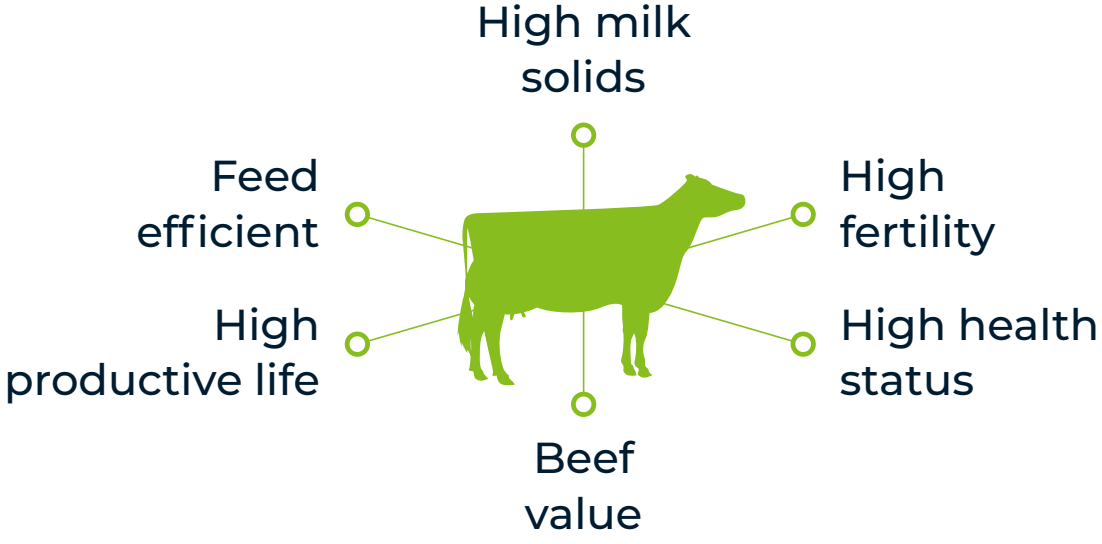
Data from purebred Norwegian Red bull calves raised on beef farms in Norway, compared with Angus (Norway, 2009).

"For me, Norwegian Red is a fantastic breed that is also good for climate and sustainability. I can safely say that NR provides added value for both dairy farmers and a meat producer like myself."

Idar Håland, Norwegian butcher and meat producer.

Improve your herd faster with Norwegian Red genetics

Norwegian Red will continue to focus on offering sustainable and profitable growth for dairy farmers.



International trials with Norwegian Red

Ireland, Moorepark

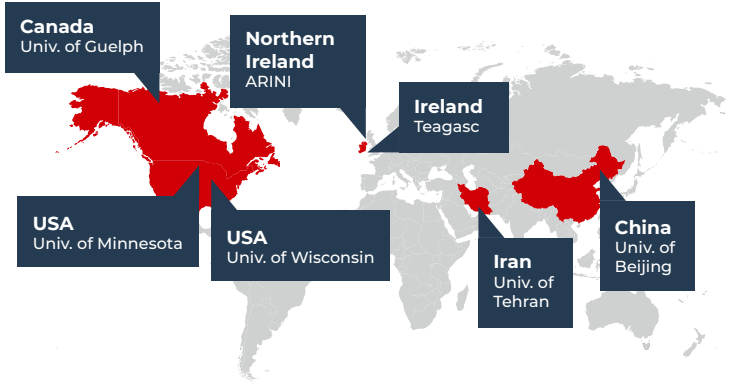
- Average mastitis incidence in 1st lactation cows was 25% less in NR x HF crosses than HF herdmates
- Average 1st service conception rates in 2nd lactation cows were 22% higher for NR x HF crosses than HF herdmates
- NR x HF crosses had a 10% greater survival rate to the 3rd lactation than HF herdmates

USA, Univ. of Wisconsin

- Norwegian Red x Holstein crosses in U.S. commercial herds had a 22% greater survival rate to 4th lactation than Holstein herdmates
- NR x HO crosses in U.S. commercial herds averaged 15 less days open than HO herdmates
- 5.9% less stillbirths in heifers for NR x HO crosses compared to HO herdmates

Canada, Univ. of Guelph

- Despite a reduction in milk volume, 1st lactation NR x HO crosses produced 14 lbs more fat and 4 lbs more protein than did HO herdmates
- NR x HO crosses had a 5% higher non-return rate in heifers and 8% higher in cows compared to HO herdmates
- 5% less stillbirths in heifers for NR x HO crosses compared to HO herdmates



University studies with Norwegian Red.

Photo: Elly Geverink

Photo: Els Korsten

Norwegian Red x Holstein crossbred cows

Photo: Els Korsten

Photo: Luca Nolli

Norwegian Red sexed semen

See faster genetic gain and performance in your herd by breeding from your best cows, therefore maximizing your profits.

Photo: Cutting-edge technology in the RedX production.

Proven by Geno, Norway

REDX

- **Superior Sexed Norwegian Red genetics**
- **Increased relative conception rates***
- **Produce more high value heifers, faster**

REDX™ combines 21st century technology with increased performance gained from Norwegian Red genetics.

* Based on observations made through ABS Real World Data

POWERED BY IntelliGen® TECHNOLOGIES

Ferskvann

geno

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