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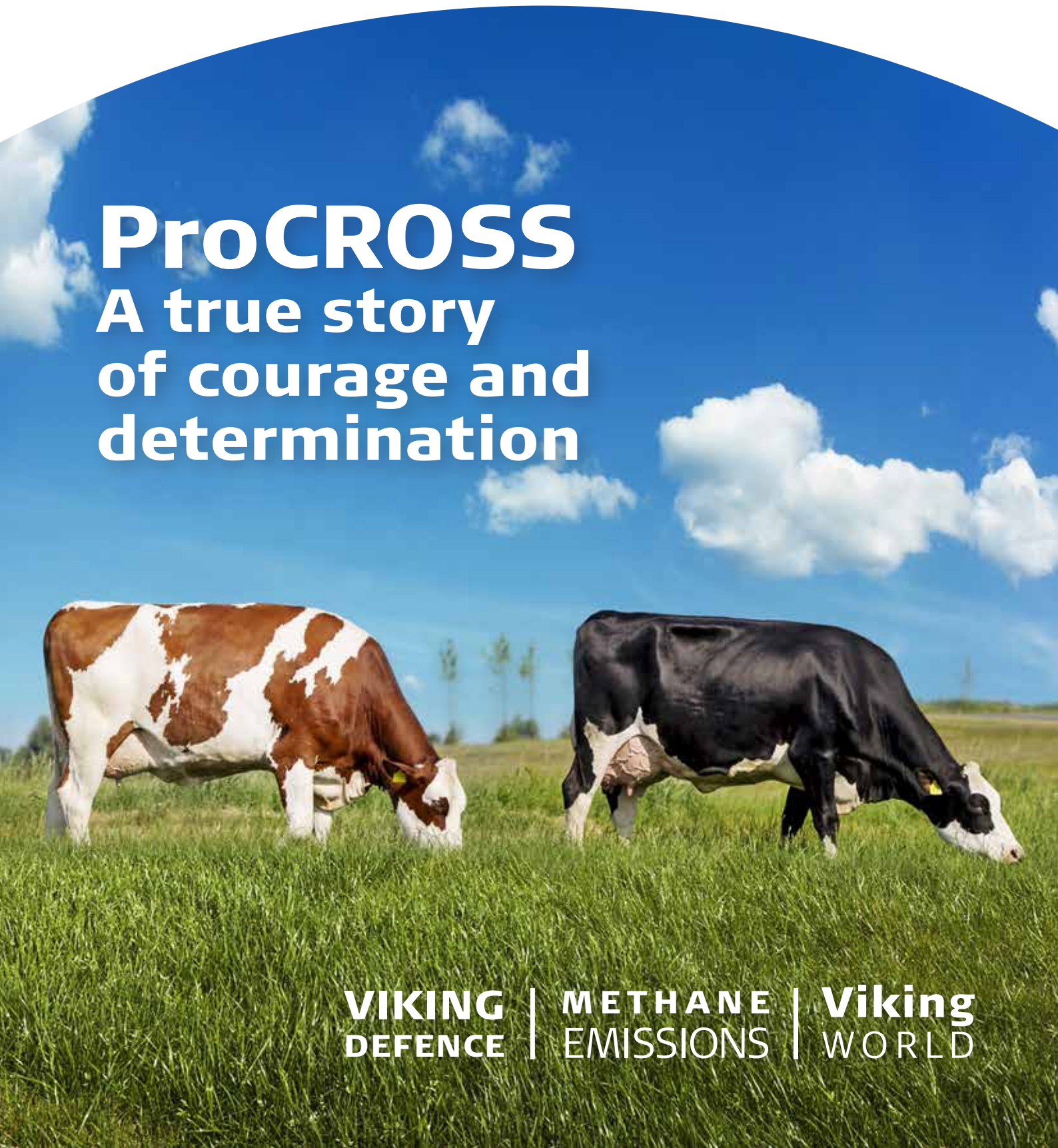
ProCROSS
A true story of courage and determination



VIKING DEFENCE | METHANE EMISSIONS | Viking WORLD

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Cover photo
ProCROSS cows on pasture in Holland. Photo: Els Korsten.

Secure your herd
for the future

As a farmer owned cooperative, we see it as our obligation to ensure that farmers using VikingGenetics are prepared for the future. We always strive to understand global trends within dairy farming and do our maximun effort to find solutions to future challenges. No matter if these challenges are driven by government regulations, consumer demand or by an everincreasing pressure on being a competitive and profitable dairy farmer.

With an early introduction of health traits including hoof health, we have given farmers around the world the possibility of avoiding expensive health related costs and to be prepared for increased pressure to reduce the use of antibiotics.

With our decisive investments in our crossbreeding programme ProCROSS, we can now provide the most well documented concept to improve fertility and health AND production.

We continuously strive to innovate and improve our solutions and we are very proud of our latest achievement, discovering the link between methane emissions and genetics. Again, always trying to be a step ahead.

It is never too late to join the VikingGenetics family and secure your herd for the future.

Happy reading!

Thank you for following us!

David Stenkær Ravnkilde, Head of Business Development, VikingGenetics

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Dairymen in the Oakdale area in USA were experiencing problems with their purebred Holstein herds which were partly due to inbreeding of their cattle. They tried crossbreeding with many breeds. The sucessful ProCROSS programme is now the only scientifically proven crossbreeding programme in the world.

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Lower methane production through breeding

Methane emissions relase both energy and a potent greenhouse gas. VikingGenetics is conducting research with the aim of reducing methane emission - not only to help the environment but also to improve dairy cow efficiency.

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Breeding for High Production with Low Use of Antibiotics is Possible

A natural defence against diseases in the genes of cows has been part of our breeding goal since the 1980s. This goal has been at the heart of our Scandinavian philosophy driven by the fact that Nordic countries have very strict veterinary regulations regarding the use of antibiotics.

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PROCROSS

ProCROSS

A successful option in the dairy business worldwide

1998 was the birth date of the ProCROSS crossbreeding system in Oakdale, California. Dairymen in the Oakdale area were experiencing problems with their purebred Holstein herds which were partly due to inbreeding of their cattle. They tried crossbreeding with many breeds, and found the best combination: VikingRed, VikingHolstein and Montbeliarde. The successful programme is now the only scientifically proven crossbreeding programme in the world.

By Verónica Löfgren, Communicator at VikingGenetics

The economics of dairying in the Oakdale area did not leave room for mistakes or extra expenses. Such a situation moved the founder of the local Artificial Insemination (AI) Company Creative Genetics, Mike Osmundson to take action together with a group of dairymen, and search for ways to survive in the dairy business.

"By carefully listening to our customers, we recognized there were problems with the US Holstein, including calving difficulties, high Somatic Cell Count (SCC) and poor fertility, as well as general diseases and problems with longevity. Many of these problems are a direct result of inbreeding and poor breeding (breeding programs focused on high production only)", Osmundson states.

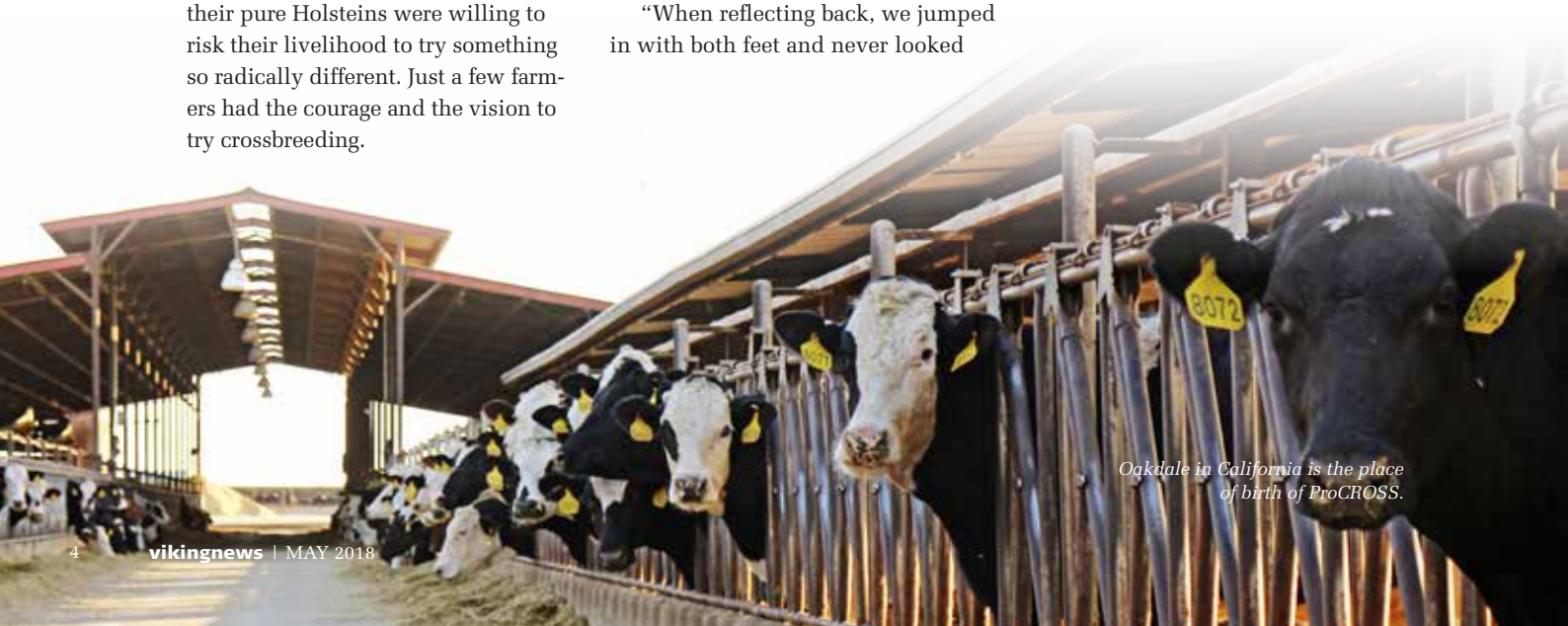
To convince other farmers to do crosses was tough, not all the farmers going through many troubles with their pure Holsteins were willing to risk their livelihood to try something so radically different. Just a few farmers had the courage and the vision to try crossbreeding.

"In 1999, we felt like our cattle had reached the point where poor health and fertility were taking away the joy of farming and our profit. After many conversations with a few local friends, we began crossbreeding our herd. The first few years were a trial to determine which breeds would be successful or not successful", remembers Kevin Prins, who is co-owner of pioneer herd Prins Dairy with 600 ProCROSS cows.

A group of nine local dairies, decided to follow Creative Genetics in a joint venture of trying many breeds to determine a crossbreeding programme. With due time, the best breeds rose to the top and were wanted by the dairymen involved. The three breeds were the Holstein, VikingRed and Montbeliarde. This would evolve into the only University proven crossbreeding programme in the world known as ProCROSS.

"When reflecting back, we jumped in with both feet and never looked back. Today, our programme is a three-breed rotation using Holstein, Montbelliarde and VikingRed. We are very happy with it and wouldn't have it any other way". Kevin Prins together with his wife, Lori, recognizes.

"Everything starts with thinking, that becomes a thought and that gives birth to an action", Mike Osmundson says while describing the beginnings of ProCROSS. It was right after nine California dairies started to use the three-way cross that the University of Minnesota started a trial to define the pluses and minuses of the system. "The ProCROSS breeding programme is the only one in the world that has two University trials that prove it is profitable and another one that has proven that it's more feed efficient than pure Holsteins, producing more fat and protein", Osmundson states.



Oakdale in California is the place of birth of ProCROSS.

"For me, this process brought success to dairy farmers. ProCROSS is a long-term programme that offers solutions to health problems, reproduction, inbreeding, longevity and SCC. But it is a long-term commitment and that is important to understand", he adds.

Be prepared for the surplus

"All of a sudden you will have too many calves, cows and heifers. This is because of small gains in areas such as more calves being born alive, a lower cull rate, along with better reproduction and reproduction efficiency of the older cows. You will have to plan ahead of time because your herd will grow quicker than you think. It's going to happen", Osmundson tells about the effects of the good reproduction. "When old cows don't leave as quick, and cows calve more often, you have to think faster", he says.

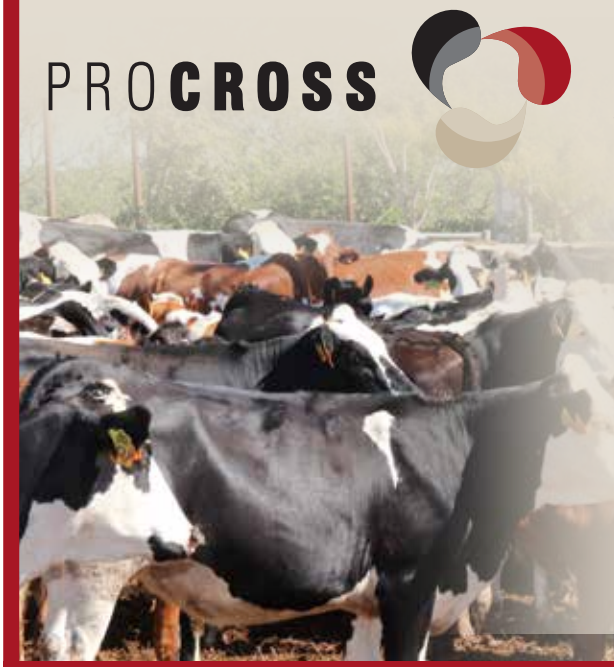
Heterosis, the hidden gift

Each of the three breeds contains several very strong attributes which contribute to the ProCROSS system. They are also unrelated in their genes which produces additional hybrid vigor (heterosis), which will increase longevity 25-28%, reduce units per pregnancy and lower the SCC. The best part about the ProCROSS system is that the heterosis effect is a bonus that is totally free. This will provide better beef values, better components, longer lasting cows which will improve your lifestyle.

With over 18 years of experience using ProCROSS, the ProCROSS pioneer herds and Creative Genetics state that it is very important to stick with the plan. "Once you have decided to use ProCROSS, follow the plan, and be determined to do it faithfully. and just do it!", Osmundson says.

There will be many voices telling you to stop, Kevin Prins says, "but don't lose your enthusiasm because when you get to the end, you'll be extremely happy". ●

PROCROSS



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PROCROSS

Superior health and production

powered by ProCROSS cows at Oulton House Farm herd in UK

The Oulton House Farm philosophy is plain and simple: lots of milk from healthy cows, as the manager of the farm, Sally Lea sums up.

By Verónica Löfgren, Communicator at VikingGenetics

10 years' crossbreeding experience has shown them the path to achieving outstanding results. Owned by Arthur Palmer, the farm has 430 cows and outperforms the average herd in the United Kingdom in terms of both health and production.

Sally Lea, who is also a veterinary surgeon, says there are rarely any cases of mastitis in the herd. A huge advantage if you consider that there are 32 cases of mastitis per 100 cows in milk per year in the UK - according to the NMR (National Milk Records) survey of 2017. In the meantime, lameness at farm level in the UK is 22% in an average performing herd, but can be 42% in the worst performing herds. These numbers are considerably lower at Oulton House Farm where they have less than 5% cases of lameness.

The high health quality of the herd is not the only reason why Oulton House Farm stands out from the crowd; their production figures are something else they are very proud of. Lea explains that last year, they had an average production of 9,412 kg milk, compared to the average in England + Wales of 8,430 kg milk.

This win/win for Oulton House Farm is also reflected in the bottom line; less money spent on health-related treatment and more income from high yield production. The exceptional performance at Oulton House Farm has not been achieved by accident – it is thanks to a significant change in the breeding strategy that Palmer implemented 10 years ago.

"Arthur had a pure Holstein herd, and he decided to cross 40 cows with VikingRed. He noticed in the first lactation that these crosses enhanced milk production and that they hardly had sore feet or mastitis. They actually produced more milk than the pure Holsteins we had, and were back in calf without problems," Lea says.

Sally Lea, manager of Oulton House Farm, Newport, Shropshire. The farm has 430 ProCROSS cows.

The farm has no problems with reproduction with a conception rate of 47% on a rolling 12-month basis. Replacement is 20% and heifer calving starts in July, while cows do this in August

Palmer, with the help of manager Lea and two other employees has been implementing the whole ProCROSS system since 2015 choosing the best bulls from VikingRed, VikingHolstein, and Montbeliarde. "When we are selecting bulls, we choose mainly bulls with high production indices because we know we already have the health traits, that's why we are doing crossbreeding with ProCROSS," she says.

Future plans for the herd

After starting to use ProCROSS, mastitis and lameness problems were significantly reduced. The plan now is to increase the number of cows from 430 to 450, and Palmer is planning to build a new barn. ●

ProCROSS cows on grass at the Oulton Farm.

Lower methane production through breeding

By Jan Lassen, Project Manager R&D at VikingGenetics

Methane emission release both energy and a potent greenhouse gas. VikingGenetics is conducting research with the aim of reducing methane emissions – not only to help the environment but also to improve dairy cow efficiency. Research into methane emissions has been pursued in parallel with research into feed efficiency.

Feed efficiency and methane emissions

To date, over 5,000 cows have been measured for methane emissions. This has been done to enable genetic analysis of the trait. It is already known that on average 6% of the energy a cow consumes is released as methane, but this can vary from 2% to 12%. If some of this variation is due to genetics, we will be able to select for lower methane emissions. Lower methane emissions will mean that more energy is available for milk production, reproduction and immunity.

Genetic relationship confirmed

The results show that there is genetic variation for methane emissions. Approximately 20% of the total variance is due to genetics, and this is in the same magnitude as many of the other traits we currently select for in NTM. The relationship with other traits such as reproduction and health has also been investigated. The conclusion drawn so far is that there are no negative consequences in selecting for lower methane emissions in these traits. Cows with high genetic merit for milk production also have higher methane emissions but at the same time better efficiency. However, this needs further investigation.

The Innovation Fund Denmark's Grand Solution Prize was given to the researchers that confirmed there is genetic variation for methane emissions on cattle breeding. Left: Senior Researcher Peter Løvendahl, Department of Molecular Biology and Genetics, Aarhus University, Project Manager Jan Lassen, Viking Genetics and Chief Scientific Officer Henrik Bjørn Nielsen, The Technical University of Denmark. Photo: Maiken Kestner.

New index

VikingGenetics aims to develop an index for methane emissions. This index could be registered in the NTM, but only if the index offers an economic value which is not the case today. Farmers would not gain any benefit from selecting for lower methane emissions or to feed for lower methane emissions. This economic value could come from improved efficiency. If methane were used as an indicator for feed efficiency, it would have an indirect economic value. ●

How do the cows produce methane gas?

Cell walls of grass consist of cellulose. Only ruminants can digest cellulose and when a cow eats grass, methane gas is produced as a by-product. Methane gas is one of the greenhouse gases that cause global warming and is 25 times potent a greenhouse gas as carbon dioxide. Oil and gas extraction, gas distribution, mining, asphalt and rubbish dumps are also sources of methane emissions.

VIKING DEFENCE™

Select the right bulls to boost your herd

Achieving better genetic level in your herd starts with the right decision on which bulls to use as sires of the next generation of cows. The reason is simple: quality bulls result in improved overall herd performance and increase your income.

With the lowest use of antibiotics in Europe and the world, VikingGenetics' bulls have proven to be the most profitable choice in the market when it comes to breeding for healthy and productive cows.

Selecting the right traits for you is very easy with our 5-star system. The level differs between the breeds, as VikingHolstein, VikingRed and VikingJersey have different starting points in terms of genetic level for various traits as well as different development of the genetic trend over time.

The stars help you finding the best bulls in each of the three health traits covered by VikingDefence: Udder Health, General Health and Hoof Health, as well as for production. Make your selection!

VR HERBERT

EBV 103 ★★☆☆☆
EBV 108 ★★☆☆☆
EBV 111 ★★☆☆☆
EBV 116 ★★☆☆☆

9,301 kg milk 305 days 4.53% F, 3.58% P

20% less mastitis

22% less sole ulcer

14% less heel horn erosion

VR FABU

EBV 106 ★★☆☆☆
EBV 118 ★★★★☆
EBV 108 ★★☆☆☆
EBV 111 ★★★★☆

8,986 kg milk 305 days 4.59% F, 3.66% P

44% less mastitis

16% less sole ulcer

11% less heel horn erosion

VR VILJAR

EBV 103 ★★☆☆☆
EBV 122 ★★★★☆
EBV 108 ★★☆☆☆
EBV 110 ★★★★☆

9,301 kg milk 305 days 4.43% F, 3.54% P

54% less mastitis

16% less sole ulcer

11% less heel horn erosion

VH RIVER

EBV 107
EBV 113
EBV 116
EBV 116

10,404 kg milk 305 days
4.06% F, 3.46% P

30% less mastitis

11% less ketosis

47% less sole ulcer

VH GREJS

EBV 117
EBV 113
EBV 109
EBV 113

10,634 kg milk 305 days
4.02% F, 3.39% P

30% less mastitis

26% less ketosis

24% less early reproductive disorders

VH SYLVEST

EBV 113
EBV 113
EBV 120
EBV 112

10,207 kg milk 305 days
4.11% F, 3.52% P

30% less mastitis

20% less ketosis

59% less sole ulcer

VJ LUTTER

EBV 105
EBV 110
EBV 115
EBV 115

6,955 kg milk 305 days
6.21% F, 4.24% P

18% less mastitis

14% less sole ulcer

14% less digital dermatitis

VJ JAMES

EBV 104
EBV 107
EBV 113
EBV 117

7,099 kg milk 305 days
6.09% F, 4.20% P

12% less mastitis

12% less sole ulcer

12% less digital dermatitis

VJ LAGO

EBV 106
EBV 110
EBV 118
EBV 112

6,984 kg milk 305 days
6.13% F, 4.20% P

18% less mastitis

17% less sole ulcer

17% less digital dermatitis

General Health
Udder Health
Hoof Health
Production index

Breeding for High Production

with Low Use of Antibiotics is Possible

Dairy farmers in the Nordic countries clearly understand that breeding is a crucial part of ensuring a successful dairy business and just as important as finance, feed and management.

By Lars Nielsen, Head of Breeding at VikingGenetics

A natural defence against diseases in the genes of cows has been a part of our breeding goal since the 1980s. It has been at the heart of our Scandinavian philosophy driven by the fact that Nordic countries have very strict veterinary regulations regarding the use of antibiotics.

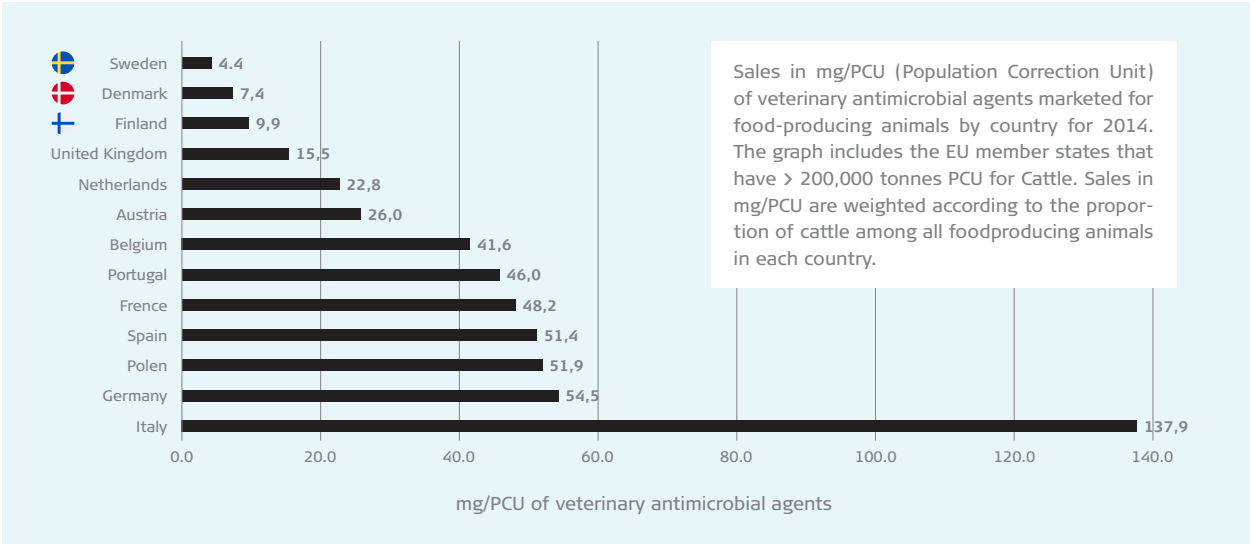
With limited access to antibiotics, the dairy industry in the Nordic countries has been compelled to find other ways of keeping cows healthy.

The Nordic tradition in breeding for healthy cows is reflected in the latest report from the European Medicines Agency (EMA), from 2016: "Sales of veterinary antimicrobial agents in 29 European countries in 2014". According to this report, Sweden, Finland and Denmark are the EU member states with the lowest use of antibiotics in livestock, far below the rest of the EU. (Table 1).

For instance, the use of antibiotics in cattle breeding in the UK is of particular concern. The Department for Environment, Food & Rural Affairs in the UK is aiming for a reduction of 20% of mg/PCU (Population correction unit) by 2020, based on a plan dating from 2015.

According to The Alliance to Save Our Antibiotics in the UK, only 40% of inframammary antibiotics are used for sick cows, which means that 60%

TABLE 1: SALES IN MG/PCU (POPULATION CORRECTION UNIT) OF VETERINARY ANTIMICROBIAL AGENTS MARKETED FOR FOOD-PRODUCING ANIMALS



Source: Report made by the European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption, 2016. 'Sales of veterinary antimicrobial agents in 29 European countries in 2014'. (EMA/61769/2016).

Lars Nielsen, Head of Breeding at VikingGenetics

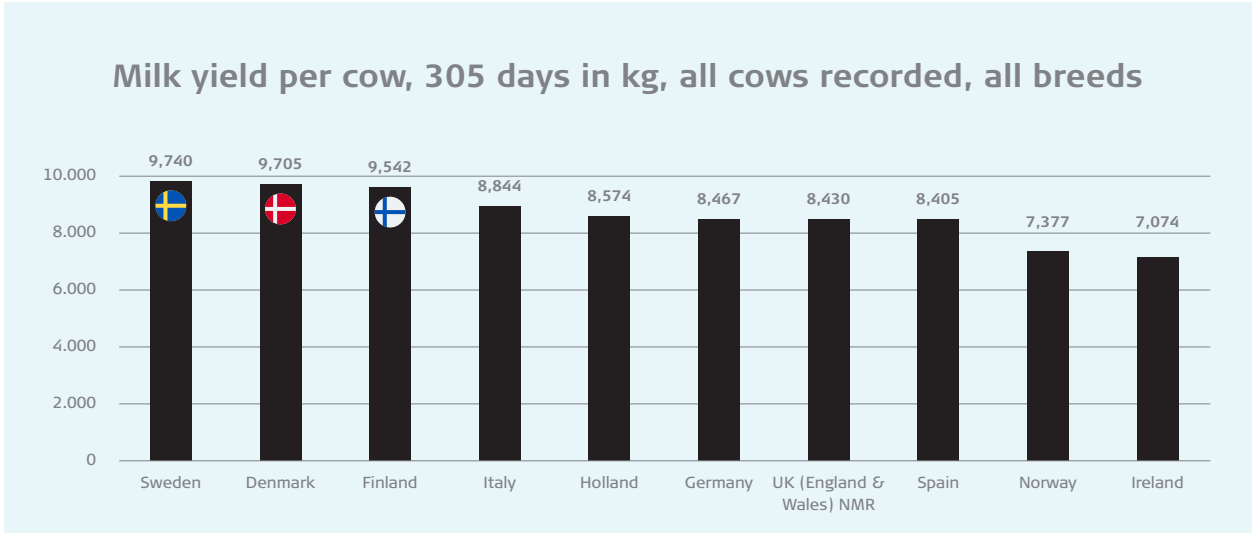
of such use is in healthy cows (for prevention and growth promotion reasons). In addition, 85% of non-organic farms routinely use non-selective dry-cow therapy with at least two antibiotic treatments per cow, per year.

High Milk Yield

In contrast, Scandinavian farmers not only have the lowest use of antibiotics but also the highest milk yield per cow over 305 days, in kg all recorded cows and all breeds, according to the International Committee for Animal Recording (ICAR). See Table 2. Sweden produces an average 9,740 kg of milk, Denmark 9,705 kg and Finland 9,542 kg compared to an average in the United Kingdom (England + Wales) of 8,430 kg, Spain 8,405 kg, Norway 7,377 kg and Ireland 7,074 kg.

Strict veterinary rules in the Nordic countries with restricted use of antibiotics have forced the farmers to find other ways of keeping their cows healthy. Good management and breeding for better health have shown them the path to ensuring success in their dairy business. ●

TABLE 2: MILK YIELD PER COW, 305 DAYS IN KG, ALL COWS RECORDED, ALL BREEDS



Three-way crossbreeding,

most profitable cross on pasture-based system in Australia

A study made by Dairy Australia, the national service body for the dairy industry in Australia, compared the different crossbreds with purebred herds on a pasture-based system. The results confirm that the three-way crosses with Reds are the most profitable.

By Verónica Löfgren, Communicator at VikingGenetics

Crossbreeding in Australian dairy herds has been gaining field and an expert panel from the Dairy Australia InCalf presented the findings from a recent research on crossbreeding. This project looked at farmer attitudes and use of crossbreeding, examined the industry data on production, fertility, and udder health. They also analysed the longevity of crossbred and purebred cows and modelled their long-term economics.

"The most common breeds for a three-way cross on dairy farms are Holstein, Jersey and Red, and before this study, there have been no figures about this performance", Jo Coombe, researcher at the University of Melbourne's School of Veterinary Science, states. The researchers analysed data from more than 23 million lactation records from almost 900,000 cows on 18,207 farms.

"In terms of the three cross, there is no significant difference in volume of milk; however the protein, fat, protein percentage, the survival (how long the cows are in the herd) conception rate (CR), the six weeks In Calf Rate (6wICR) these three breed cows out performed the backcross animals (two cross system)", she adds.

The researchers also made a comparison on purebred herds, two-breed and three-breed crossbreeding on economic performance with Richard Shephard's model (veterinary consultant and leader of the Dairy Australia's In-Calf Project).

"You can have higher gross margin on the same amount of milk. How can this be possible? The answer is that the crosses are more fertile! That means that the cow lives longer in the herd and the effect is that she depreciates less each year. That change in depreciation cost is pure profit into the farmer's hand", Richard describes.

He adds that besides taking the depreciation if you manage your farming system appropriately you make fewer replacements to keep your herd together so this is less money in rearing costs. "Within a herd that requires 25% replacements, is $500 per cow, per year cost in replacement. So, together the reduced depreciation plus reduced rearing costs are extra income for the cross breeding cows", Richard Shephard states.

Among the conclusions regarding three-way crossbreeding, Shephard emphasized three of them: the long-term decision, the smaller size of the cows and the importance to select only the best bulls of every breed. ●

RICHARD SHEPHARD'S ECONOMIC MODEL ON COW DEPRECIATION PER YEAR

Why do we have a higher gross margin on a crossbred farm than a purebred farm if the farm produces the same amount of milk?

HF cow: $2000 cow lasts 4 years and sold at $800 = $300 depreciation / year

X cow: $1400 cow last 6 years and sold at $650= $125 depreciation / year

HF: Holstein Frisians, X: crossbred cow

RICHARD SHEPHARD'S ECONOMIC MODEL ON COW REPLACEMENT PER YEAR

Crossbreds need fewer replacements – less mating/ rearing costs.

HF: $500 cow/year in replacement costs (25% replacement per animal)

X: $330 cow/year in replacement costs (17% replacement per animal)

HF: Holstein Frisians, X: crossbred cow

Interesting times ahead
for world milk markets

After the milk crisis of 2015-2016, demand for milk on international markets eventually outpaced supply, and prices began to recover. This is the first market-driven growth period in Europe since the removal of production quotas.

By Olli Niskanen, at Luke, Finland with data from the International Farm Comparison Network (IFCN).

World milk production in 2016 was 845 million ECM tones, according with data from the International Farm Comparison Network (IFCN). This was the smallest increase in production since 1997, 1.1% compared to 2015. Over the period 1996-2015, the annual average production increase was 2.4%. This low growth rate is largely due to the tough financial situation in 2015-16 in all the main milk production areas. European Union (EU) measures to reduce milk production also had little effect on limiting growth, or at least postponing it.

The shift in balance between supply and demand eventually led to price increases. In 2017, growth in demand was focused on full fat rather than skimmed milk powder (SMP) however, which suffers from significant EU intervention measures leading to SMP mountains, that has to be sold at some point.

Greater price fluctuations between countries

The average price of milk at a global level was 24.4 euro cents per ECM kg in 2016. The lowest price recorded was 18.1 and the highest 95.5. Global milk price increases filtered down to farm level at varying speeds in different countries, mainly driven by national production systems and the political environment. The price of milk has never fluctuated as wildly as now, a sure sign of change in markets.

In 2017, the countries that gained the most from increased prices were relatively high exporters of butter. The average price of milk rose to 31.7 euro cents per ECM kg in 2017. Some small fluctuations in farm gate prices also contributed to a higher milk fat percentage value, but as market situations are changing all the time and production cannot immediately react to these, adjustments are not very significant.

Europe face new challenges

Demand driven growth on world markets remains slow. The price differential between fat and protein has reduced general price growth in many countries. In Europe, we have entered the first growth period since the removal of production quotas. Production can now grow with increases in demand.

It's somewhat inevitable to suppose that there will again be a surplus of production when the market situation eventually changes again. Hopefully, farmers in central and eastern Europe will bear this in mind when planning future investments. ●

You can read the whole article at www.vikinggenetics.com

Time for fine-tuning

at the organic farm Lövåsa in Sweden

Lövåsa farm is beautifully situated near Kinnekulle, Lidköping, Sweden, in an area where there are many intensive, organic farms, not so much thanks to the abundance of natural pasture land, but more for the quality of the soil that is ideal for this type of farming and the fact that the cold winters eliminate bugs and fungi.

By Camilla Rosman, Marketing Manager at VikingGenetics

Dag Arvidsson grew up on the farm he owns. He runs it with his sister and seven employees. Arvidsson has been a dairy farmer since 1993. The new barn at Lövåsa built in 2012 houses 430 cows, mainly Holsteins, in organic dairy production.

Milk production is around 10,000 kg, and after expanding the herd, all heifers born are genomically tested and only the best NTM-heifers are selected as dams for the next generation. Over the last five years, the farm has enjoyed excellent development and now it's time for some fine tuning.

"My breeding goal is not about maximising production or to develop show cows but to have a herd with high performing dairy cows. No extremes, just good working cows," Arvidsson says.

Pioneer in genetic advances

Arvidsson is an early adopter when it comes to new genetics, first buying embryos 20 years ago. "Two years ago I started to genomically test all females and use the bottom 30% of the herd for beef. This is the fastest way to make genetic progress in the herd," he says. Sexed semen, X-Vik, is used to some extent, but he recognizes that using this more can enable even quicker progress in the herd.

Arvidsson and his team meet with their breeding advisor four times a year and go through the herd's KPIs and plan upcoming females to be inseminated with young high NTM sires. "I can see a difference every year in terms of better production and healthier animals. Work becomes fun when you monitor development and can see progress. That is what drives me," he explains.

As udder health is an important part of their daily routine, this is a "must" when selecting bulls. In the past 12 months only 3% of the cows have been treated for mastitis. This is reflected in the clean and dry floors, good environment and really low level of hoof diseases in the herd.

The next goal is to cut costs even more per kg of produced milk. "You can always do a little bit better, and by monitoring this KPI we can save more money while keep-

Dag Arvidsson with Erika and Jessica Zetterlund (twins) and Anna Davidsson.

» I believe in VG's breeding goal, the indices and the surrounding process and I can see it works in my own herd «

Dag Arvidsson who is checking the cows at the barn together with Anna Davidsson, one of the employees at Lövåsa farm.

ing our cows healthy, it's a win-win situation for us and for the cows," Arvidsson says.

The Lövåsa farm team is heavily involved in the dairy business. "It is important to include employees. In return you get people who are proud of the figures and feel a sense of responsibility for the business," Arvidsson says. "If they want to take a course and learn how to inseminate, I encourage them. By so doing, we can achieve really good figures for age at calving and calving interval. You get it all back," he adds.

The breeding goal for Arvidsson and his business is exactly what VikingGenetics promote. Good economics with robust healthy, high yielding cows. "I believe in VG's breeding goal, the indices and the surrounding process and I can see it works in my own herd," Arvidsson says in summing up why it is important to have reliable registration data from dedicated dairy farmers, like him, in the Nordic countries.

Arvidsson is also a member of EDF (European Dairy Farmers), a club of progressive and visionary dairy farmers looking for inspiration. EDF acts as a platform for exchanging ideas, experiences and knowledge at international level. "I see this as a great opportunity to learn from others and gain inspiration," Arvidsson says.

The farm exudes a feeling of inspiration and satisfaction. It is a business with so much potential. A lovely herd, an enthusiastic team that enjoy their work and with a genuinely inclusive atmosphere. A classic case of a great leader making a great team. ●

Lövåsa Farm

- 430 milking cows
- 8 employees
- 6 Lely robots
- Production: 10,000 kg milk, 3.8% fat and 3.3% protein
- Age at calving: 23.8 months
- Calving interval: 11.9 months

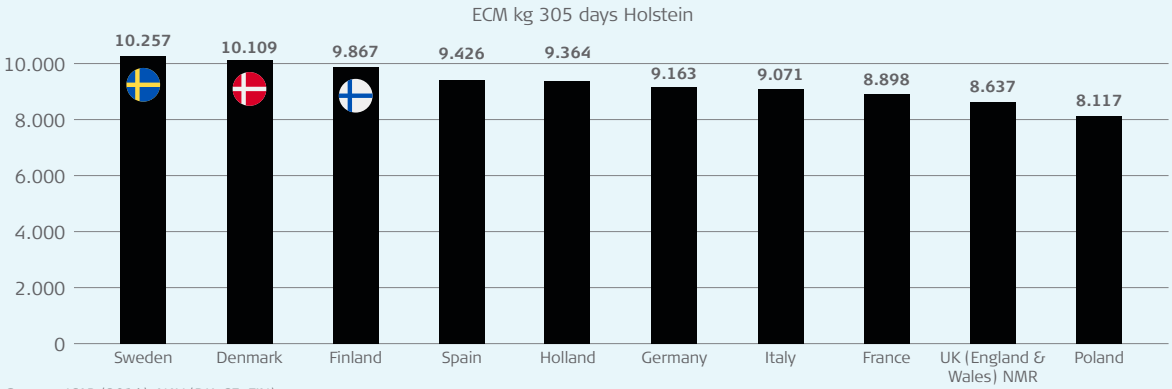
NB: To be certified as an organic farm, the cows have to be in pasture for four months and with 50% of roughage from grazing.

VikingHolstein is much more than a Holstein

Did you know that the Holstein cow in the VikingGenetics area is the highest producing cow in Europe? Measured by energy corrected milk in 305 days. Take a closer look at the numbers that back up this statement.

By Claus Langdahl, Breeding Manager VikingHolstein at VikingGenetics

TABLE 1: ECM PER COW, 305 DAYS - HOLSTEIN



Source: ICAR (2016), NAV (DK, SE, FIN).

The whole picture about our VikingHolstein is interesting, you can see it from a phenotypic level and also from a genetic point of view. Our goal in the VikingHolstein breeding programme is to produce a high yielding cow which is, at the same time, healthy and fertile. Not an easy task because we know there is a negative correlation between health, fertility and production. With this in mind, it is amazing that independent calculations from the International Bull Evaluation Service show that the production level of major Holstein populations are exactly the same.

VikingHolstein - The best among Holsteins

- Highest production in Europe - VikingHolstein average for production is 10,310 kg milk, 3.99% fat and 3.37% protein
- Superior udder health and fertility and still with the same genetic production capacity as other Holstein populations
- VikingHolstein has an average size
- Ready to work on improving the economics of dairy farming around the world

A healthy Holstein cow is a high producing cow

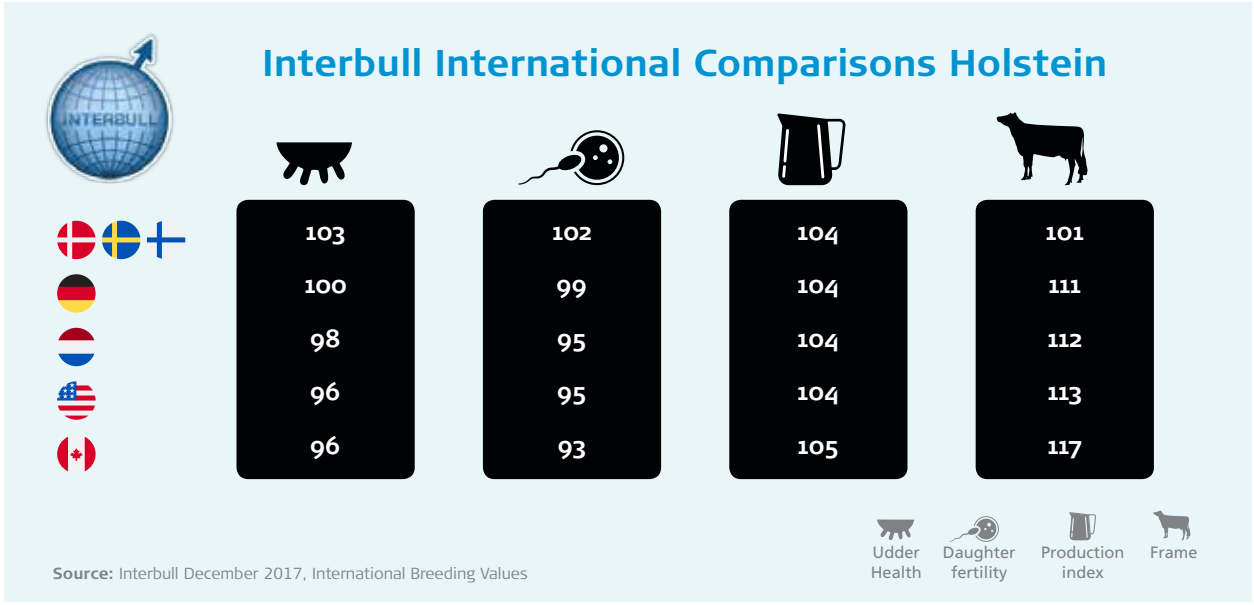
VikingHolstein cows have excellent resistance to mastitis with a low average (11.7%) incidence of clinical mastitis per lactation in the first three lactations. Clinical mastitis is the most common clinical disease in modern dairy businesses around the world and among the top culling reasons worldwide.

The VikingGenetics breeding philosophy and reliable data have made it possible to have superior health and excellent female fertility in combination with high production. Independent data from the International Bull Evaluation Service shows this very clearly in Image 1 that refers to a comparison between major Holstein populations around the world.

Sometimes average is best

Have Holstein cows become too big? Well, it depends of course on the preference of the farmer, but the fact is that an average size cow is a more economical cow than a big Holstein cow. Holstein cows from VikingGenetics are average size and therefore a perfect choice for many farmers regardless the production environment. They are smaller than other populations of Holstein cows, which means more efficient; less feed for

IMAGE 1: VIKINGGENETICS BULLS ARE THE TOP PERFORMERS IN UDDER HEALTH AND FERTILITY AND KEEP HIGH PRODUCTION FROM OPITMAL SIZED COWS.



maintenance and better longevity. In the same image, we can see a massive difference between VikingHolstein and the other Holstein populations in the comparison. ●

An average size cow is better

We don't want too big a cow or too small a cow. At VikingGenetics we see the advantages of a normal size cow. Big size has a negative correlation with longevity. A smaller cow needs less food to maintain her weight, and less weight means e.g. less pressure on hooves.

Polled bulls with high NTM

The Holstein selection program includes a goal of selecting at least 10 polled bulls per year. Last year, 12 bulls were selected with an average NTM of +28. One of them is homozygotic polled. The NTM level is very close to the overall selection average which is as it should be.

Right now **VH Monty P** is a star with +34 in gNTM and not only among polled bulls. In the near future, more bulls will be available where you can get the polled gene as an additional trait without losing genetic progress. ●

VH Monty P – polled bull from VikingGenetics with gNTM +34.

Higher reliabilities for genomic indices

By Auli Himanen, Breeding Manager VikingRed at VikingGenetics

In early February, NAV (Nordic Cattle Genetic Evaluation) has achieved an improvement in genomic breeding values and females are now included in the reference population for daughter fertility, calving traits, hoof health, general health and longevity. This inclusion has made a huge impact on the reliability of genomic breeding values. The biggest increase is for general health and hoof health. See Table 1.

We have 8,900 bulls and 33,500 females in the RDC (Red Dairy Cattle) reference population today, and more cows are continuously being genomically tested. There are two reasons for this: firstly because breeders are now more interested in genomically testing their heifers and using the result for management purposes to select the best heifers for the next generation. Secondly because VG started subsiding female genomic testing of red cows back in 2013, and many of these farmers have continued to do tests. Annually, around 10,000 females are genomically tested in this project.

As you can see in the table below, reliabilities increased sharply in February, for example fertility has increased from 43% to 61% reliability. ●

Table 1. Mean reliabilities from official run in January compared to February 2018. (197 RDC AI bulls born 2015-16)

		Fertility	Calving	Birth	Hoof health	General health	Longevity
RDC	Jan 18	0.43	0.45	0.60	0.34	0.38	0.38
	Feb 18	0.61	0.56	0.68	0.52	0.52	0.51

OPU shortens generation interval

Hollola is the centre for the top VikingRed heifers in the Viking countries today thanks to the highly developed know-how in embryo production and OPU (=Ovum Pick Up) in Finland.

Hollola barns work in very close cooperation with Luke (Finnish National Research Institute) when it comes to OPU.

The eggs are collected at Hollola once a week and transported to Luke lab to be fertilised, cultivated and frozen.

Heifers are also used for normal embryo flushing if they have not produced enough embryos for the breeding scheme with OPU. They can start OPU production again when pregnant. The production of OPU embryos in this step is mainly done with X-Vik semen to produce heifer calves.

The goal of OPU production is to shorten the generation interval. Genomic breeding schemes today go very quickly and by using OPU you can shorten this by three months. ●

A couple of heifers in the VikingEmbryo programme.

Get used to higher NTM levels for the best Jersey bulls

By Peter Larson, Breeding Manager VikingJersey at VikingGenetics

By adding data from females to the genomic Jersey reference population for five new health traits, the reliability on these breeding values has increased significantly. As a result, the standard deviation has also increased and bull breeding values are now more spread. Best bulls are not in the mid 20s any longer, - they are now higher than +30 for NTM.

Bulls still breed the same way, but breeding values are more reliable and it is easier to distinguish between bulls.

The highest ranking bulls are two VJ Haley sons, VJ Hawk and VJ Hirts, gNTM +31 and +29, respectively.

VikingJersey is expanding its international activities

An increasing number of Jersey females are genomically tested in the Nordic countries. In addition, over the last six months, hundreds of Jersey females from The United States of America (USA), South Africa, Tbe United Kingdom (UK), Belgium, The Netherlands, Norway and Russia have been tested on the Nordic Total Merit (NTM) scale.

These action represents a big advantage for breeders, when selecting the best animals and when making combinations with VikingJersey bulls. The results have shown that a number of females are at a very high NTM level, and VikingGenetics encourages owners to flush these animals.

As a result of testing foreign Jersey animals in the Nordic system, two foreign bulls have been purchased by VikingJersey. The first was VJ Hurling from Ireland and the second one is VJ Lukaku from Belgium.

We are currently testing bull calves in the USA, and have more pregnancies and embryos on the way to America for implantation. The aim is to have bulls based there to ensure availability of semen. The bull calves have been selected to suit the American dairy system.

A good news is that the Norwegian Jerseys cows will soon have a NTM classification. This is expected to result in closer breeding cooperation.

VJ Nucleus herd breeding new top animals

Since the first bull calves out of VikingGenetics owned donors were genomically tested, a year ago, 12 bulls have been selected for the VikingJersey breeding programme.
This is a very high success rate, and therefore is important to encourage the donor programme and Ebryo Transfer (ET) in general. VikingGenetics has selected three sons with different sires from one donor and a half-sister has now entered the nucleus herd.

A good example of making better use of genetics in the nucleus herd was the new top bull VJ Hodja with gNTM +33. He is the result of an extremely poor embryo, with a broken shell, that would never have resulted in a pregnancy in the field.

Denmark's top three
high-producing herds

LARS REMME

- Owner of the highest yielding organic herd in Denmark.
- 200 Holstein cows
- Yield: 13,479 kg milk
- Three full time employees
- 325 hectares

What is your focus when breeding?
After building a new barn with cubicles in 2000, I no longer need to worry about feet and legs – the cubicles have been the solution and a good investment. Instead, I can focus on reaching high production and general health and udder health. I would like to have cows that can take care of themselves –invisible cows. In addition, I go after cows that do not grow too big – I breed to get them a bit smaller because they have started to take up too much space in the milking barn.

How can VikingGenetics make a difference in your herd?
VikingGenetics equals good genetics. The cows we have today are so much better than the cows we had 10 years ago. Breeding work has developed massively and this good development should preferably continue.

Being a highest producing herd – what challenges do you see when it comes to reproduction?
Cow reproduction caused me some trouble last year. I had many cystic cows, but reproduction varies a lot in this herd from year to year. I might add that I do give my cows more chances to reproduce than most dairy farmers would. I serviced one of my very good cows 13 times, and of course this will decrease the total reproduction figures for my herd.

BJARNE V. HANSEN

- Owner of the highest yielding herd in Denmark
- 200 Holstein cows
- Yield: 15,410 kg milk
- Four employees
- 170 hectares

What is your focus when breeding?
I use the "mating plan" and usually stick to it. When I order semen, I keep the daily plan in mind with the focus on the udder. High production puts pressure on the udder and therefore having cows with good udders is important to me. I aim for medium sized cows. I have a few show cows in my herd and when it comes to mating them, I look for conformation.

How can VikingGenetics make a difference in your herd?
I especially use my AI Technician for sparring. I strive to be in the barn when he comes by – for the daily contact and to know which animals have issues regarding reproduction.

Having the highest producing herd – what challenges do you see when it comes to reproduction?
I have put the emphasis on high production for a number of years, and this can be a challenge for reproduction, but it is an interesting challenge that can be solved. For instance, I have bought a heat detection system and I am thinking of adding more transponders as they provide good support in reproduction work. It is important to learn more about how we, as a high-producing herd, can improve when it is difficult for the cows to become pregnant. Not all cow cycles are easy to determine which is why more research in this field is important.

Our distributor and owner, VikingDenmark has met the owners of the three highest producing herds in Denmark for a talk about their strategy and challenges with reproduction and breeding goal.

TORBEN THORSEN

- Owner of Denmark's highest yielding mixed herd
- 360 cows – primarily Holstein, plus some crosses
- Yield: 14,608 kg milk
- Three full time employees
- 360 hectares
- Produces 200 calves for slaughter each year

What is your focus when breeding?
I select bulls based on NTM (Nordic Total Merit Index), and they need to have a high production index – preferably around 120. I also focus on mammary. We have a high lifetime production in this herd, so our cows need to be able to last one lactation longer here than with the average dairy farmer and good udders are therefore important. I have had high improvements in production and increases in lifetime production by breeding for NTM. I have used beef for cows with the lowest NTM and still use this for approx. 30% of the cows.

How can VikingGenetics make a difference in your herd?
I have focused on the Holstein breeding goals for reproduction, but looking at the financial aspects, it is much more expensive to cull a cow due to high cell count or poor feet and legs. After all, a cow that is culled because it does not become pregnant has still produced milk one or two years after calving and has reached a good slaughter weight compared to cows that you cull for other reasons. We also aim to focus on teat placement. I have milking robots and therefore I prefer breeding for good teat placement and suspensory ligaments. Plus, it will be very interesting to see the financial benefits of feed efficiency when this index is launched.

Having the highest producing herd – what challenges do you see when it comes to reproduction?
Actually, I do not have any major challenges. A few years ago, I decided to do insemination 90 days after calving and I noticed that the pregnancy rate increased. Previously I had to dry off cows that produced a lot of milk, and then thought I might as well milk them for a few more months.

PICTURES FROM OUR INSTAGRAM COMMUNITY

Red calves from Tom Dunne's herd with 470 cows at Kilworth Farm in Downing, Ireland #farminginireland #dairyfarming

Great snap from one of the Junior Handler courses in Finland before the show season starts off #farmlife #junior #farming

Steaming hot heifers. The crispy winter weather did create that illusion. Photo by @hannasuntiala #heifer #winter #cowlove

Lithuanian breeders interested in crossbreeding

By Seppo Niskanen, Export Manager at VikingGenetics

Our distributor in Lithuania, Gameta, arranged a seminar about crossbreeding together with VikingGenetics in Kaunas in March 2018. The seminar attracted 75 farmers and specialists where the opportunities crossbreeding can offer were the main topic.

Lithuania has 670,000 registered heads of cattle of which 500,000 are dairy livestock. Black and white cows are most common (both local breeds and Holstein). There are approximately 100,000 red cows and a few Jerseys in the country and interest for this breed is increasing. Crossbreeding is quite new in Lithuania. However, local dairy farmers have recently started using a lot of VikingRed and Montbeliarde.

Specialist and senior advisor Morten Kargo of Seges and Aarhus University, explained about the crossbreeding systems in the seminar. He also presented the results of crossbreeding in different countries and with different combinations. He was asked many interesting questions about the breeds and their effects on crossbreeding, which is always important to understand. Crossbreeding has to be planned carefully to get the highest return on crossbreeding, both in production and other traits as well as economics. A presentation about VikingGenetics breeding goal was made to the participants, as well as an explanation about what VG can offer for crossbreeding. There was also big interest about health traits and their importance in breeding. VikingGenetics countries have been working with health traits since the 1980's and the results can be seen in the genetic trends and proofs. ●

Viking bulls making fame in Kenya

By Seppo Niskanen, Export Manager at VikingGenetics

Kenya has one of the biggest cow populations in Africa with around 3.5 million dairy cows in total. Over 70% of these cows are kept by over one million small-scale dairy farmers in Kenya although there are some large commercial herds in the country. The main breeds besides the local breeds are Holstein-Friesian, Ayrshire and Jersey.

Most of the commercial herds are in the highland area. Even though it is close to the equator, the climate is pleasant, not too hot for people or cattle and the soil is good for grass and maize.

In this area, about 200 kilometres from the capital, Nairobi, is where our distributor in Kenya, Hamish Grant is located. Grant's grandfather emigrated here from Britain. Built by British settlers, Gogar Farm is over 100 years old.

The farm has 250 dairy cows. Most are Holsteins but there are also some Ayrshire and Jersey cows in the herd. Gogar Farm has been breeding Ayrshire cattle since the 1930s and the breed is well-known for its good performance. Holsteins have been bred at the farm since the 1970s.

Recently Gogar farm has been using sexed semen with good results. Over 90% of the calves are heifers. "Viking genes improve the health, fertility and production of the herd. The breeding goal for Viking is economic, healthy and fertile cows with easy calvings. That is what we all need," says Grant, proud of what he can offer other dairymen in Kenya. ●

Hamish Grant (to the left) owns and runs the more than 100-year old farm built by British immigrants.

Online mating program **VikMate and genomic testing of females** popular in Norway

Farmers in Norway are showing more interest in using VikMate and genomic testing on heifers as tools to improve their herds. Export Manager Peter Holm Weinkouff recently visited farmers in Norway to advise on VikMate.

Our Export Manager Peter Holm Weinkouff was recently in Norway giving advice on breeding to local farmers in the Jæren area. It was a busy week with visits to both existing and new customers. "These new customers are interested in our VikMate programme to help making mating plans for their herd and for guidance on genomic testing females in their herds", Weinkouff says.

He also visited Knut Undheim who manages a Jersey herd. "His herd is very well run with plenty of lovely Jersey cows in the barn", the Export Manager adds. The herd is a very top performer when it comes to production of kilo fat and protein in Norway.

Another visit was to Erland Harrestad's farm. He is a new customer of VikingGenetics. He manages his herd of 60 Holstein cows with his wife. In the photo, he shows a VH Suarez daughter in her 2nd lactation. "He is very pleased with this cow. He has three other VH Suarez daughters in the herd", Peter Weinkouff explains .

Harrestad has genomically tested many heifers in his herd and will continue to do so. ●

Erland Harrestad with a VH Suarez daughter. .

Meet Brian Mørksted

New Export Manager with solid background in sales

By Tanja Damsgaard Ask, Marketing Dept. at VikingGenetics

In January, Brian Mørksted joined our VikingGenetics sales team as an Export Manager. Mørksted will be in charge of developing the markets in India, Pakistan, Turkey, Bulgaria and Brazil.

Mørksted has a solid background working in distributor sales for most of his career. He has done business on almost every continent. "I have had many different opportunities during my working life. Such as establishing ham production from scratch in Mississippi, chicken production in Thailand, developing seaweed for use in various food products, starting export divisions in Europe for a spice company, as a buyer for Tulip and Danish Crown and most recently Head of Sales for Arla Food Ingredients worldwide," Mørksted says.

He is looking forward to learning more about cattle breeding in detail in the countries for which he is now responsible. "I have had and still have the privilege of learning new business fields, meeting great people of many different nationalities", Mørksted says with a smile.

We welcome Brian Mørksted to our Viking family!. ●

Fertility First

VikingGenetics improving daily dairy life in Australia

As a leading cattle breeding company, we continuously investigate cutting-edge products and services for our clients. In Australia - where our first subsidiary is located - we now offer Fertility First as a progressive tool to put daily dairy business in focus.

By Verónica Löfgren, Communicator at VikingGenetics

The future of your herd begins with the fertility of your cows, that's why breeding for better daughter fertility is a clever investment for the progress of your herd. Besides breeding, you need to work continously with improving managment. Here are some advantages you can get with our solution Fertility First.

- Achieve higher 6-week in-calf rate from AI
- Get more cows pregnant early in the season and with AI sires
- Work with the females you know will become pregnant.

The Nordic countries have a long tradition of breeding for better daughter fertility. The Daughter Fertility index in Nordic Total Merit (NTM) describes a bull's daughters' genetic potential to start or resume their heat cycle after calving, to show oestrus and to conceive on insemination.

Besides breeding, the Nordic countries are way ahead when it comes to fertility checking young animals. Here, we are not allowed to use hormones for synchronising groups of heifers to make inseminations smoother. We have been compelled to find other ways of enabling good fertility. Fertility First brings the know-how from Nordic dairy management for implementation in Australia.

Fertility First consists of a pre-check before the Artificial Insemination (AI) period starts. That is to select the cows that are most likely to become pregnant. For Australian dairy farmer with seasonal calving, it is crucial to have females inseminated and pregnant in a short period.

"The economics of dairy business largely depend on the stocking rate of the herd and that the cows calve at the right time. With a seasonal calving pattern, it is important to have a high in-calf rate," Anna Norgren, Business Manager VikingGenetics Australia, says.

According to the InCalf Fertility Data Project 2011, fertility has been declining over the last 10 years:

- 6-week in-calf rate dropped by 1% per year
- Submission rate declined by 0.6% per year
- Conception rate declined by 0.7% per year

VIKING FERTILITY FIRST™

Angela Wilson, Expert Fertility First at VikingGenetics Australia.

Our strategy to tackle this challenge resulted in an intensive project involving 2,500 cows from 10 herds. Herd sizes ranged from 100 to 500 cows. The cows were classified into five different categories:

1. Cystic Cows, 2. Problem cows, 3. Non-Cycling cows, 4. Do not AI (or "Cured cows" in need of veterinary assistance) and 5. AI Ready (or cows open for Artificial Insemination.)

Two different approaches to fertility service were investigated: traditional and proactive. The traditional approach concerns a rectal examination of non-cycling cows at the start of the joining season, while the proactive approach consists of two rectal examinations of all cows in the herd before the start of the joining season. The proactive approach resulted in more cows ready for artificial insemination (30% of cows classified as "Cured cows").

The results achieved by checking Problem Cows followed by the recommended treatment can enhance the six-week in-calf rate to AI dramatically: a 44% increase relative to the traditional approach.

In conclusion: Calves pregnant with AI sires show 75% with a proactive and 52% for a traditional approach. An important economic advantage "The daughters of Holstein AI-bulls would be 200 Australian dollars more profitable per cow and year than daughters of herd bulls," Norgren says.

The outstanding results of the project led to a structured strategy: Fertility First, now available for farmers in Australia. "We are eager to start with Fertility Plus with our expert Angela Wilson, who has been working in cattle breeding for more than 20 years and who completed a special training course in Denmark earlier this year,", Norgren says. ●

NEW VERSION OF VIKMATE

Optimise your matings based on your customized breeding goals.

At VikingGenetics, we think it is important to contribute to enhancing the quality of life of our customers around the world by providing reliable and innovative technology. By integrating VikRank and VikMate, the new version of VikMate is now able to offer you a tool where you can select the traits you want for your next generation of cows and, at the same time, find the right bulls to achieve your breeding goal, all in the same platform.

This is how the new platform works:

- In VikRank, you can select your own breeding goal by adjusting the weightings of the individual traits on the sliding bars on the right-hand side of the screen.
- When you have set your preferences, you can save your customised breeding goal in VikRank.
- From VikRank, your breeding goal can be easily uploaded to VikMate.
- Once in VikMate, this tool optimises the search for the best bulls to suit your personal breeding goals.

The new version of VikMate is very user friendly and more accessible. You only need one "Log in" to access it and VikMate has also been updated with other functions, such as direct ordering of genomic tests by email.

To find out more about the new VikMate version, please contact your local VikingGenetics distributor at www.vikinggenetics.com/contact-us/buy-semen

VIKMATE
Online mating to enhance your herd

+

VIKRANK
Tailor made for your breeding goal

PROCROSS

A taste of success

with the Giaroli family in Italy

By Claudio Mariani, from Genesi Project, VikingGenetics´distributor in Italy.

The Giaroli family runs a dairy business in Marmirolo (RE), an exclusive area where the world famous Protected Designation of Origin Parmigiano-Reggiano cheese is made. The family has a dairy herd of 500 cows and their story started back in 1929.

Ernesto Giaroli first set up close to where the farm is today, with just three cows. The milk was already being used to produce Parmesan in a local cheese factory and Giaroli's seven sons followed in their father's footsteps. One son, Ello, is now 83. Six of Ello's eight children (six boys and two girls) currently manage the farm and their own cheese factory, that was built in the early 90s.

At present, 13 people work on the farm; three in the milking parlour, twice a day in a 40-place rotatory parlour. The Giaroli family members who work on the farm today are Pietro (59) head of the cheese factory that has four other employees; Luigi (56) in charge of feeding and administration, Elio (53) who looks after fields and crops, Sauro (52) herd manager, Angela (45) who is responsible for milking operations and Ivana (39) who manages the feeding and weaning of young calves.

The farm changed its management and breeding policy three years ago. Now, insemination is based 100% on bulls in the ProCROSS programme. Herd manager Sauro

The Giaroli Family in Marmirolo (RE). The successful family milk around 500 ProCROSS cows.

500 cows are milked twice a day in this 40-places rotary milking parlour.

is pleased with the results, averaging well over 32 milk kg (per cow per day). He says the main goal is to produce the same amount of milk with fewer cows. They want to improve rather than increase the herd. More efficient cows, less labour, lower expenses, higher revenue: as simple as this.

As such, they have set some KPI (Key Performance Indexes) for calving, milking, breeding. Plus most of the daily routines are set so everybody knows exactly what to do and when. Hoof trimming is managed by an external trimmer and all cows have a pedometer for heat detection. Today, heifers receive their 1st insemination at 14 months of age and the average age at 1st calving is 25.8 months. Days open is now set at 120 days but is often even lower through the year.

Healthy calves

There has been a huge reduction in antibiotics use in the last period and Ivana (calf manager) very rarely has to treat a calf today. At the moment, they are considering new facilities for the young stock.

Cheese production

Five people work in the cheese factory producing excellent Parmesan. They produce 36 cheesecloths per day, that each weigh around 38 kg after 12 months maturing. On average, they need 100 milk kg to produce eight kg of cheese, although this can vary depending on the milk composition and its properties, rather than the skill of the cheese maker. Cow feed is also crucial as the use of silage is banned by the Parmesan Consortium because the cheese is matured for longer than 12 months and silage fermentation otherwise could create bumps or holes in the cheese. The milk needs to be high in casein but not too rich in fat.

If you ever go in Italy, we recommend you plan a visit to this friendly family farm: their doors are always open for a cup of coffee and a taste of their special cheese, made with passion since 1929. ●

Piles of Parmesan cheese.

VIKING DEFENCE™

LOW USE OF ANTIBIOTICS & HIGH YIELD IS POSSIBLE

The Nordic countries have the lowest use of antibiotics in the world and are in top position for yield. VikingGenetics´ bulls breed daughters with a natural defence against diseases.

www.vikinggenetics.com/vikingdefence

VIKINGGENETICS®

Breeding for what truly matters