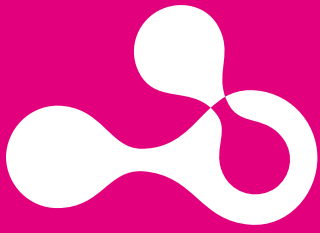


2023-24



Corporate Social  
Responsibility Magazine

# Responsible

## The future-proof pig



 Topigs Norsvin

# RESPONSIBLE

The pig is essentially a very efficient animal. In a time where climate change and the reduction of greenhouse gas emissions have a higher priority than ever, the pig plays an important role in providing premium proteins in a sustainable way.

In 2022, Topigs Norsvin celebrated 100 years of genetic progress. A century of breeding, research and innovation to enhance the natural strengths of our populations and adapt them to the demands of the current day and future generations. Efficiency has always been one of the main themes and in the past decades, sustainability has become ever more important.

Responsible breeding is balanced breeding, which is part of our DNA. We feel it as our responsibility to contribute to a sustainable pig production for future generations. To lower the impact of both our own organization and the pig production chain on the climate, our surroundings and society as a whole. Through balanced breeding, research, innovation service and support we contribute to a future-proof production system that is friendly for pigs, producers, people and the planet.

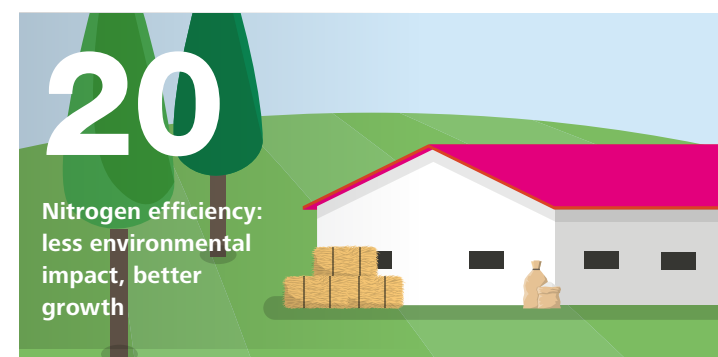
In this edition of RESPONSIBLE magazine, you will read about responsible breeding and responsible pork production. From interviews with our researchers to stories about current and future projects, all with a focus on a sustainable pork production chain today and tomorrow.

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# Optimal efficiency for **lower greenhouse gas emissions**



Geert Venner  
Head of Global  
Technical Services

Topigs Norsvin contributes to reducing greenhouse gas emissions in several ways. The basis is in breeding. The difference is made on pig farms and throughout the supply chain by sharing knowledge and offering support.

In large parts of the world, reducing greenhouse gases is increasingly receiving attention. There are also challenges for pig farming. As a breeding company, Topigs Norsvin contributes in various ways. Reduction of greenhouse gas emissions goes hand in hand with high feed efficiency, according to Geert Venner, Head of Global Technical Services at Topigs Norsvin. "Efficient feed use is important, but that is not the only thing. Loss prevention is also important." For decades, Topigs Norsvin has been applying balanced breeding. That implicitly means lowering greenhouse gasses. "As long as there is variation, we can select and thus improve efficiency."

### Giving practical advice

The choices made by the breeding organization are important, but Topigs Norsvin also takes responsibility further along the production chain. Venner: "It mainly comes down to fully exploiting the genetic potential of our pigs." Topigs Norsvin's advisors support pig producers on this topic. They accomplish this by providing advice and guidance in collaboration with chain parties. This varies from sharing knowledge to giving practical advice on how to do things just a little bit better. This is important for producers because it not only leads to a lower environmental impact but also improves their technical and economic performance.

### The right feed

The right feed for the right pig is important. The more efficiently the pigs utilize dietary nutrients, the smaller the losses. Precision feeding allows to go one step further and feed precisely based on the pig's needs. This also applies to optimize the feed with synthetic amino acids so that the level of protein can be reduced. The goal is to come close to matching the requirements of the animal and avoid unnecessary excretion via urine and feces. "This might also result in healthier pigs with further efficiency improvements." And health is precisely another aspect that makes a difference, as Venner knows. For example, technical top results can be achieved with high-health pigs because there are no pathogenic germs. As a result, nutrients are optimally used for growth. Topigs Norsvin and producers are therefore working together to further



reduce the environmental impact. Venner emphasizes that this also requires cooperation with other partners. The feed industry is obviously important when it comes to feed efficiency. Topigs Norsvin maintains good contacts in this industry and with nutritionists at pork producing companies that produce their own feed.

### Use genetic potential

Topigs Norsvin has a nutritional manual for each genetic product that feed manufacturers and producers can use to make maximal use of the genetic potential of the animals. As genetics is changing rapidly due to genetic progress, these manuals are revised every few years based on the latest genetic products and new insights. "Manuals will be validated in dedicated research farms around the world before they are released."

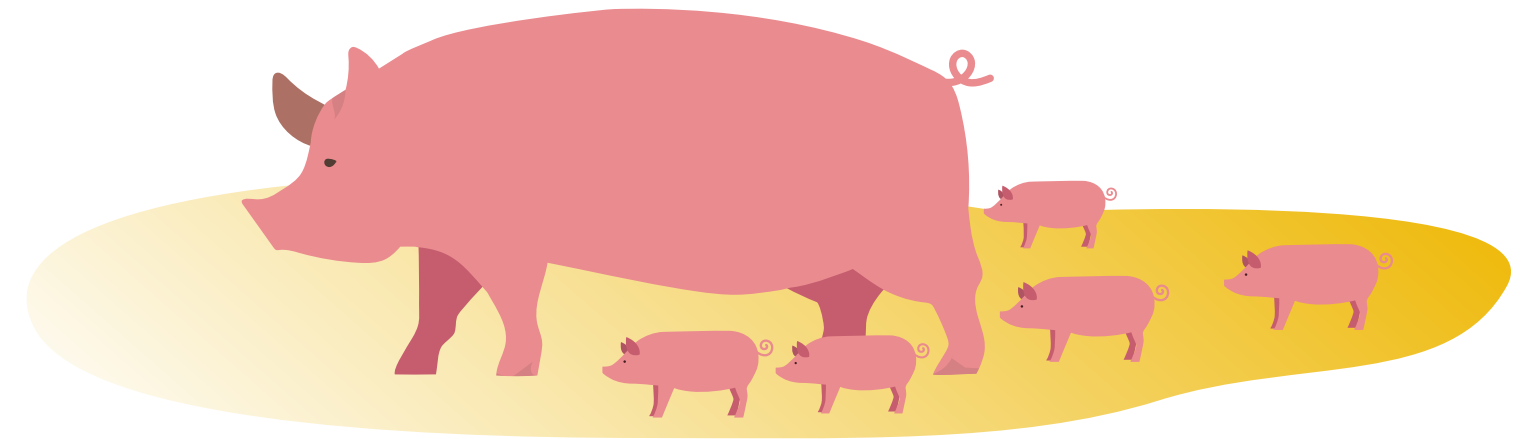
### Feed miles

The origin of the raw materials in compound feeds also determines the environmental impact. For Europe, alternative raw materials like rapeseed and canola grown in Northwestern Europe travel fewer kilometers than raw materials from South America. And in North America, pig production in regions with a lot of corn and soy (the 'corn belt') is beneficial for the environment for the same reason.

"Another option is the use of by-products from the food industry. The pig simply fits in very well with the idea of circularity", emphasizes Venner. "That gets even better by using local by-products and use the manure of pigs to grow crops." ■

# Pioneering animal welfare: **Innova Canada**

Topigs Norsvin is committed to improving the genetics of its pigs to enhance animal welfare through the innovative Innova Canada. This cutting-edge genetic nucleus farm, located in Manitoba, Canada, will feature a new facility dedicated to breeding the Z-Line. Equipped with state-of-the-art technology, it will enable focus on different aspects of welfare and innovation, such as observing behavior, free farrowing, cameras for data collection, customizing the automated feeder, and more.



According to Claude Verrier, Genetic Nucleus Production Manager, the Innova Canada nucleus will benefit from the years of experience and knowledge of their colleagues in Europe. "Europe has been at the forefront of animal welfare initiatives and has already made significant advancements with these systems. By adapting these new technologies to our location, we aim to improve the environment for our (Maternal Z-line) sows."

“ The wellbeing of our animals and staff are always up front and center. ”

#### Investing in welfare

To aid the journey towards better animal welfare, investments were made throughout the facility. As Verrier explains: "We decided to stay with the stall-system for breeding after which they are moved into one of the group pens which have open gestation. This allows the sows to walk freely so they have exercise and enrichment. Sows are fed twice daily. They stay in gestation until 3 to 4 days pre-farrow, after which they will move to our free farrowing area in the farrowing department. Once they farrow the sow and her piglets can walk around freely, piglets can start suckling or find comfort in the free farrowing heated nanny, where they are free from drafts or chilling."

#### Benefiting from Norwegian experience

For over two decades, both herd health and productivity have been fundamental aspects in regards to Norway's view on animal welfare. The country requires loose housing of sows by law, and Innova Canada takes advantage of the knowledge and experience gained by their Norwegian partners. Dan Olsen, Topigs Norsvin geneticist based in Norway, explains:

"Our position in Norway allowed us to have a long-term perspective on defining breeding goals. In Norway we realized early on that prioritizing animal welfare is always more cost-effective in the long run. Innova Canada holds great potential, particularly for Norway where the smaller size of farms makes it harder to finance the investment required for large data collection. However, the ability to use cameras and machine-learning based on data will greatly improve the quality of life for the sows and our selection process."

The combination of knowledge in Norway and knowledge gathered in Innova Canada presents a unique opportunity for the future of TN70 sows. Olsen adds: "The combined knowledge leverages the strengths of each, allowing both to learn from each other and attain the best of both worlds. All countries are moving towards better animal welfare, and it is crucial to maintain the position of delivering the best."

#### Individual feeding

Innova Canada will also incorporate a user-friendly Maximus feed system, which allows for endless programming options for each individual sow. This technology is made possible through RFID scanning, which makes it easy for employees to adjust digitally. The feed system also has two water sources for each sow, including a water drinker and the option to add water to the feeder for wet feeding.

#### Big project

In addition to these features, Innova Canada will also have a fully automated LED-lighting

system and a climate-controlled ventilation system. The water will be treated with on-site treatment plants, and its quality constantly monitored. The advanced features make it possible to include new traits to the breeding programme, like feed conversion in the farrowing house and other opportunities for economic improvement. Verrier adds: "It's a big project and once we finish construction, we're happy to move in and start working. The wellbeing of our animals and staff are always up front and center so we will keep doing what we can to achieve the best result." ■

# Unlocking the secrets of maternal instinct with **advanced monitoring**



Topigs Norsvin has initiated several projects to improve the survival rate of piglets during lactation, while at the same time improving the sow's welfare. Currently, sows are usually kept in crates to avoid them lying on the piglets. However, there are individual differences in the occurrence of crushing events. Therefore, the goal of Topigs Norsvin is to identify the characteristics of sows that exhibit better maternal instincts. An important step in opening opportunities for free farrowing.

“ The general goal is to enhance the survival of piglets. ”

**Lisette van der Zande, Researcher at Topigs Norsvin, focuses her efforts on the installment of monitoring cameras and the subsequent data gathering at Innova Canada. She explains:**

“We will gather large datasets on maternal behavior during the lactation period in the free farrowing housing system that will be installed at our new nucleus Innova Canada. Our aim is to identify the indicators for good maternal behavior and correlate that with the pre-weaning mortality rate. At the moment we can only measure the total mortality. However this only shows us the final results but doesn't tell us the possible causes. In due course we will utilize this data to select sows with better maternal instincts, effectively increasing the genetic progress and robustness of our TN70 sows. To gather these data sets, 40 cameras will be installed in free farrowing pens. Because watching hundreds of hours of video of every sow is way too time consuming, our team is searching for a way to automate that process, mainly by creating and using algorithms.

#### **More than 1000 sows**

“The general goal is to enhance the survival of piglets. During monitoring we see sows and piglets as two different entities in the free farrowing crates. Variables we're focusing on include the frequency the sow will change her posture, the location of the piglets and the distance to their mother, or signals the sow gives to her piglets before laying down to suckle.

“Before any definitive conclusions can be drawn, we need data of more than 1000 sows. This means gathering data for a year minimum. As soon as we know what phenotype we're looking for, implementation of this information in our selection process can go fast. However, at Topigs Norsvin we always strive to improve, which is why we want to build on this monitoring system and our algorithms. For example, there is a lot to gain by researching the correlation between SINS (Swine Inflammation and Necrosis Syndrome) in piglets and tail biting, and natural nest-building instincts in sows. Enabling us to better our genetics in combination with animal welfare.” ■



Lisette van der Zande  
Researcher

# Breaking the bite to tackle damaging behavior

Roos Vogelzang manages a project researching damaging behavior in rearing gilts. The project focuses on gilts with SINS (Swine Inflammation and Necrosis Syndrome) from birth to rearing age. The aim is to find a genetic solution against skin damage for both purebred and crossbred animals, improving both animal welfare and economic performance.

## Improving the robustness of all lines

“The project was initiated due to the growing concern for animal welfare and the forthcoming ban on tail docking in Europe. To address biting behavior and avoid economic losses, we know that solutions must be found within Topigs Norsvin and the rest of the industry. Damaged animals with wounds or bitten tails are often unproductive which can result in reduced growth and eating. Our goal is to improve the behavior of our lines”, explains Vogelzang, Genetics Advisor for the Dutch market at Topigs Norsvin. The team is halfway during the 2-year data gathering stage.

## Tracking development

The research is conducted at 3 different farms. On each farm, the researchers follow 2000 purebred and crossbred gilts from birth until the end of rearing. Within 24 hours after birth, piglets are checked for signs of SINS, have their weight recorded and pedigree noted. Vogelzang: “We also check for damage on the tail, ears, and flanks at 7 and 10 weeks of age, and again at 14 and 18 weeks old and at the end of rearing. We categorize the damage into 4 categories and keep weighing the gilts to track their development. The gilts are scored proportionally based on the number of litters, ensuring continuity and tracking their development over time. Most of the scoring is done

by BSc interns. Once all data is available MSc students will take over. There will be so much data you could write a PhD thesis on it.” In addition to the farm observations, 6 climate boxes are used to monitor the impact of climate on the gilts.

## Collecting data

A protocol to score damage to gilts ready for breeding has already been rolled out and links to this research by collecting data on tail, ear, and flank damage using the same 4 to 7 scale. In total 90,000 gilts have been scored each year. The data gathering protocol resulted from a study that discovered that 14% of the total effect of tail and ear damage is explained by genetics (4% direct and 10% indirect).

Vogelzang: “We have to validate that 14%. If this is true, it means that us geneticists can make a big difference, but that we will never manage to solve the problem on our own. We have to tackle the rest together as an industry.” ■

## Complexities of biting behavior

The problem of biting behavior in pigs is complex and multifactorial, involving factors such as feed quality, water quality, climate, lighting, and genetics. Pigs may have a genetic predisposition to develop SINS, which can lead to itching and therefore scratching, making them more susceptible to being bitten. Biting can also be caused by stress due to physical discomfort and interactions with pen mates. The research aims to identify the genetic and environmental factors that contribute to biting behavior, and might ultimately develop a worldwide protocol for scoring SINS or damage on many farms, with the goal of reducing biting behavior in the future.

## ‘Gene editing: not ready for commercial pig breeding’

Although gene editing is by some perceived as the future for plant cultivation, in the pork industry it is in its infancy. For good reasons, in our opinion.

Gene editing is a promising technology. It could contribute to major issues such as human health or food shortages. However, the application of gene editing in practical pig breeding programs, meant for the food chain, is, for now, a no go, for several reasons. Technologically, economically, ethically and societal.

In many parts of the world, the pork industry faces huge and growing challenges when it comes to societal acceptance. As gene editing causes a lot of opposition and ethical concerns, the application in commercial pork chains would be a serious threat for the future of pork consumption. This concern has been expressed by retailers across the world and we fully support this. Even more so, because we know the technological process of gene editing in pigs is complex and research so far shows a very low success rate. The pig industry can not afford a scandal associated with this.

Economically, the costs are more than just the costs of gene editing and building new populations. Since GMO pork products will never be accepted in all global markets, there will always have to be a non-GMO-population. Building two populations at the same time is very costly. Not only will it put a halt to genetic progress for about four years, it will also involve too much money for an economically feasible business.

Finally, the application of gene editing to improve resistance to viruses, such as the PRRS-virus, is potentially dangerous for the (human) health situation. Viruses faced with complete resistance have been known to show mutations, sometimes with zoonotic potential, and PRRSV is known for its high mutation rate and adaptability. With a century of experience in genetic progress, we know the importance of balanced breeding. Genetic progress that contributes to society and the industry, today and tomorrow.

We are not against gene editing as such. For certain major issues, such as fighting genetic diseases in humans or fighting food security with drought-resistant crops, gene editing can be a game changer.

The applications currently being investigated for pig breeding programs are no game changers. They merely increase the speed of genetic progress. Progress that can also be accomplished in a natural way, as proven by innovative breeding programs, such as our own. And in our opinion, genetic progress that can be established naturally, should be established naturally. ■



CTO Hans Olijslagers



# Labor-friendly pigs

## a result of clear choices

— A labor-friendly pig herd requires clear choices in breeding. Topigs Norsvin weighs characteristics that do not necessarily result in a higher number of piglets. They do contribute to robust, self-reliant pigs that require less labor and to a socially accepted sector.

High work performance has always been important in pig farming. It has become even more important in recent years. In many countries, pig farms are still increasing in size, which means more need for labor. At the same time, there is a general shortage of (qualified) personnel that is not easily resolved.

### Balanced breeding

For decades, Topigs Norsvin has been working on pigs that produce easily because of breeding choices and technical support. These include low mortality and self-reliant sows. In addition, the barn staff has fewer piglets to move to another sow or give the new-borns additional feed. That may sound simple, but it is not, emphasizes Ron Hovenier, service geneticist at Topigs Norsvin. "The easiest thing is to focus completely on maximum piglet production. That is the trait with the highest heritability and variation. Topigs Norsvin consciously chooses not to take the easiest way. Selection on characteristics such as stillborn piglets, maternal qualities, and number of teats is much more difficult. Some are even negatively correlated with live-born piglets. But in the long run, the producer has more benefits that way. It is the basis for balanced breeding with animals that are easier to keep and require less labor. This is also good for the social acceptance of the sector."

### Healthy pig herd

To work easily and with pleasure, a healthy pig herd is required. Topigs Norsvin therefore breeds for high general resistance and robustness, resulting in low mortality and animals that are easy to work with. "These pigs continue to perform, even if a disease spreads through the farm."

According to Hovenier, specific disease resistance does not lead to the required results. "It is unavoidable that sooner or later a pathogen will make the animal sick. In addition, disease resistancy is in general a recessive trait, meaning both parents must be negative. This limits the options for terminal boars."

Technical support advisors help pig farmers exploit the potential of the sows and finishing pigs. "Sows in good condition, that produce for a long time, are good for both a higher yield and ease of work. To do this, everything on the farm must be right: from rearing gilts to biosecurity. Working on better results in cooperation with other advisors and people in the barn is really motivating", Hovenier sees at pig farms all over the world.

### Social behavior of pigs

According to Hovenier, the tradition of breeding on robust, self-reliant pigs started decades ago and will continue. Positive practical experiences from producers and specialists indicates to him they are on the right track. In the main global production areas, Topigs Norsvin systematically looks whether the chosen route is the right one and/or whether new genetic trends are needed. "That is a continuous process."

Of all the interesting fields of research, he highlights one specific: using camera and analysis techniques to gain insight into the social behavior of pigs. This can be included in the selection. "We already know that animals with a positive factor for social interaction do better in the group and show less aggression." This is important as pig farming will continue to receive new welfare measures, such as entire tail preservation. In this way, breeding contributes to future tasks while also providing people with good results and job satisfaction. ■







# Measuring how genetics perform **in practice**

On nucleus farms, the circumstances are such that sows can reach their full potential. But how do these sows perform in practice? In order to breach the disconnect between the nucleus and commercial circumstances, Topigs Norsvin partners with a large US producer to collect data on animals in a commercial setting. Genotypic and phenotypic information is routinely collected and exchanged with Topigs Norsvin's database. The farm serves as a reference population to improve longevity and robustness.

“ Uterine prolapse added to breeding goal. ”

Measuring the performance of Topigs Norsvin sows under commercial conditions cannot be conducted at the nucleus level. Rather, the nucleus environment is optimized, so that sows can express their full genetic potential. Therefore, the pristine condition of a nucleus farm does not reflect commercial circumstances. “Our partner farm is thus a fantastic resource for genetic research and trait development, that not all genetics companies have”, explains geneticist and researcher Jenelle Dunkelberger.

#### Focus on survival

“We use the data to estimate breeding values”, explains Dunkelberger. “Shoulder sores, for example. Susceptibility to these is part of the selection index. Shoulder sores are indicative of the sows’ body condition. In our most recent data, which comes to our database in a continuous flow, we saw piglet survival improve. Litter size went up as well, but not as fast.” Topigs Norsvin geneticist Jette Wennekes confirms this trend. “A large litter is nice, but only when the sow can take care of her piglets. A large litter can result in unwanted side effects, such as piglet mortality. The focus is not only on litter size, but also on piglet survival, both during farrowing and during the weaning period.”

#### Reasons to replace

Other data from the partner barns provide insights into when and why they are forced to replace their sows, the sows’ body condition after weaning, and uterine prolapse. Wennekes: “The reasons for replacement vary: there can be leg or reproductive problems, or shoulder sores. The higher longevity a sow has, the more profitable she can be for a producer. This information cannot be gathered at our nucleus farms. At these farms, you want to create genetic progress. This means sows are replaced faster to lower the generation interval, which is directly related to genetic progress.”

#### Uterine prolapse

Data on the susceptibility to uterine prolapse is also measured. Sow mortality in the US is a serious issue that keeps increasing for yet unclear reasons. Dunkelberger: “It is devastating for barn staff to find a dead sow. Sow mortality is also an important economic and animal welfare issue. A couple of years ago, we launched a research project to investigate the potential genetic basis of uterine prolapse using data collected from our partner farm throughout the past ten years. Results from that project show that host genetics plays a role in susceptibility to this issue. In response to this, selection against susceptibility to uterine prolapse was added to the breeding goal in 2021.” ■

# Breeding for improved digestibility helps global protein challenge

Global access to protein is becoming more and more challenging for humans and animals. At this last level, Topigs Norsvin contributes with breeding.



According to Topigs Norsvin geneticist Kristine Hov Martinsen, the global protein challenge lies in the access to protein for both humans and animals. "There is a global scarcity of resources at the moment, and three factors are major drivers for this scarcity: human population growth, competition for feed resources and climate changes making the plant production in the field increasingly difficult", she explains. "The competition between protein for human and animal feed will get to a breaking point at a certain moment", adds Topigs Norsvin geneticist Rob Bergsma. "This will increase the price for protein in animal feed, which in turn puts pressure on the protein levels in animal feed."

## Genetic improvement

Another difficulty lies in conflicting demands. "If we want to have pigs deal with space and raw materials very effectively, we need to put them in a very small pen, instead of having them roll outside in the mud, which is the other end of the spectrum", says Topigs Norsvin geneticist Egiel Hanenberg. "We need to find a balance. Genetic improvement in the field of feed conversion is one of the ways we can improve on this balance. If the animal is more efficient in utilizing protein, we can use feed with a lower protein level, which makes growing protein sources locally easier."

## Research in Norway

Hov Martinsen recently finished a project on the genetic improvement of feed utilization in pigs. This project was conducted by the Norwegian University of Life Sciences and Topigs Norsvin was a partner. In the project, she collected fecal samples at a testing station in Norway. She measured the nutrients in pig feces and the

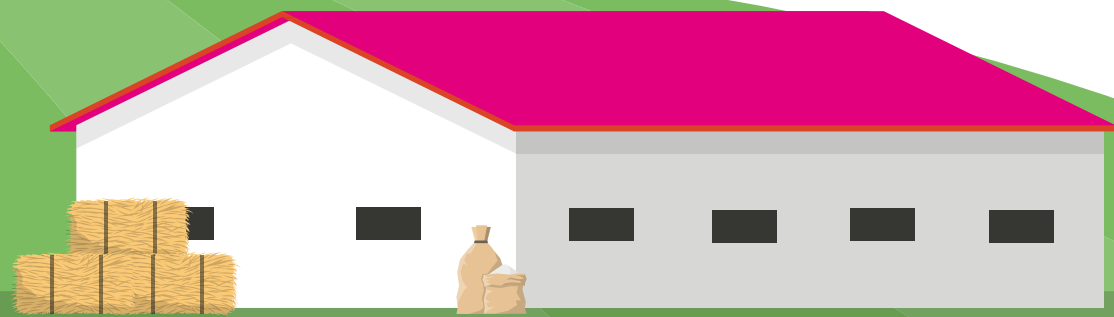
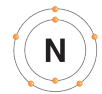
nutrients they were given in their feed and then calculated the individual digestibility of nutrients. She estimated significant genetic variation in the digestibility traits whereas heritabilities were moderate. One of her conclusions was that breeding pigs for improved feed efficiency improves the digestibility of protein and dry matter. "In addition, by improving the digestibility of protein, greenhouse gas emissions can be reduced", she explains. "There is less excretion into manure and less evaporation from fields and manure storage. This means less nitrous gas evaporates into the atmosphere. Furthermore protein is an expensive feed ingredient, so making animals more efficient in utilizing this nutrient, money can be saved by reduced feed costs."

## For industry and for environment

Breeding animals for improved digestibility is thus very relevant, especially in the light of the current global protein challenge. If animals digest feed nutrients more efficiently, it will reduce the amount of protein needed in their feed while yielding the same or even better quality of pork. This would reduce the competition for protein ingredients for direct human consumption, and reduce the environmental footprint from the pork production. These are advantages for the global pork industry and eventually, for our impact on the environment. ■

# Nitrogen efficiency:

less environmental impact,  
better growth



Improving the nitrogen efficiency of pork production is an important factor in reducing emissions and optimizing pig growth. “By zooming in on nitrogen efficiency, we can make a real impact on improving the true efficiency of pork production”, states Topigs Norsvin Research Manager Feed and Feeding Lisanne Verschuren. What is nitrogen efficiency and how can research contribute to improving it?

## What is nitrogen efficiency and why is it important?

“Nitrogen efficiency is an indicator of the amount of nitrogen that is used by the body, instead of being excreted into the environment. Although nitrogen is often associated with negative effects on the environment, it is in fact an essential building block for plant growth. It becomes a problem when there is too much of it. This damages the environment and it is of course a waste of essential building blocks.

Optimizing the nitrogen efficiency is closely related to the feed composition and the way the pig’s digestive system works. Nitrogen is a component of essential amino acids: proteins that animals need to grow. For optimal growth, pigs need amino acids in exactly the right proportions. If only one type of amino acid is insufficiently available, the body will not be able to use the other available amino acids to their full extent. Instead, the body will use those proteins as a source of energy and excrete the components that can not be absorbed, among which nitrogen, in the manure and urine. When talking about optimizing nitrogen efficiency, we talk about optimizing the pig’s growth and at the same time minimizing the nitrogen excretion.”



Lisanne Verschuren  
Research Manager Feed and Feeding

“ By looking at the biology of the pig, we can set much better guidelines for optimal feeding. ”

## Is nitrogen efficiency more important than feed conversion?

“I would say that focusing on the nitrogen efficiency is a more advanced way of optimizing the pig’s growth. The usual approach of feed efficiency focuses on the amount of feed the animal consumes, but we can learn much more from looking at the composition of the feed. Quality instead of quantity, so to say. By looking at the biology of the pig and understanding how the pig grows and which processes happen inside the body during that process, we can set much better guidelines for optimal feeding.”

## How is this related to genetics?

“In our research we look, among other things, at the genetic growth capacity of pigs. How much can a pig grow per day and what are the exact amounts and proportions of proteins and energy needed to fully use that capacity, without exceeding the amount the body can use for growth? This information can be used today to improve tomorrow’s nitrogen efficiency.

We also research genetic differences in protein digestion between the different lines, using NIRS technology to analyze manure samples, because we know some animals have a better nitrogen efficiency than others. This could be valuable for our breeding programmes, although by combining this information with researching microbiota and blood metabolites, we have also learned that environmental factors are at least as important in determining an animal’s nitrogen efficiency as are genetics.”

## How can pig producers profit from this research?

“Based on the guidelines for optimal feeding, we provide manuals for feed producers and pork producers for different Topigs Norsvin lines, so that they know how to feed for optimal nitrogen efficiency. By applying those guidelines, they can reduce their emissions and optimize the pigs’ growth, reducing feed costs.

We could, in future, make even more progress if we manage to apply the results to our breeding programmes, making even more of an impact. Although we actually found that today’s pigs already have a higher score for nitrogen efficiency, suggesting that our current breeding programmes in fact also contribute to improving nitrogen efficiency.” ■



# Combating PRRS by breeding **generally robust pigs**

Porcine Reproductive and Respiratory Syndrome (PRRS) is a serious pig disease that causes economic losses in the pig production sector. Topigs Norsvin participates in continuous research on how to make pigs genetically more resilient against the virus. Breeding pigs for overall enhanced robustness is one of the ways to combat PRRS.

PRRS is hard to control through vaccination. According to Topigs Norsvin geneticist and researcher Jenelle Dunkelberger, vaccination has limited efficacy. "In addition to traditional disease control strategies such as strict biosecurity, Topigs Norsvin sees much more potential in genetics to combat PRRS."

### Traditional breeding strategies

PRRS is just one of the pathogens with which pigs have to deal in their lifetime. This means that focusing on breeding pigs that are overall better equipped to deal with pathogens is a logical path for Topigs Norsvin. "We use traditional breeding strategies to achieve this overall robustness," Dunkelberger explains. "Gene editing technology is still under deliberation in several parts of the world in terms of allowance and regulation and for Topigs Norsvin the application of gene editing in practical breeding programs is a no go."

### Constructing a breeding goal

Breeding for general resilience starts with constructing a breeding goal, according to Dunkelberger. "Breeding values for PRRS resistance have been part of Topigs Norsvin's selection index since 2018. The breeding values are based on a major gene associated with PRRS resistance. We also have breeding values for piglet survival, vitality

and feed digestibility. Topigs Norsvin is now very close to adding breeding values for overall robustness to disease to the selection index, creating not only more PRRS resilience, but also more general resilience."

### Genotypes and phenotypes

Over the past couple of years, Topigs Norsvin has conducted a series of large scale trials to generate genotypes and phenotypes needed to calculate breeding values for overall robustness to disease. An animal's phenotype is the set of observable characteristics or traits, which results, among other things, from its genotype. This is its complete set of genetic materials. Dunkelberger: "Getting an animal's phenotype information is a challenge when it comes to robustness. You need to collect data on animals at the moment they are going through a disease. Animal welfare considerations then come into play: in the case of doing a PRRS challenge you run the risk of transmitting the disease. We evaluate growth rate mortality, clinical signs, and antibiotics. We are also very interested in responsible antibiotic usage. If we can breed pigs that are naturally more robust to disease challenge, this leads to better welfare, healthy and successful pigs and reduces the amount of antibiotic treatments needed, which addresses the antibiotic usage goals that we have." ■





# Raising happy pigs: Topigs Norsvin's mission for improved animal welfare

Romy Hendricks is a Nutrition Specialist at Topigs Norsvin with the Nordics and the United Kingdom in her portfolio. In addition, she chairs a task force which focuses on understanding the market's needs and concerns, specifically regarding abnormal behavior in pigs. To gain valuable insights, the task force develops non-genetic support material for both advisors and producers with the aim of creating a better life for pigs and creating awareness within the industry and farmers. We spoke to her regarding this project.

#### *What is the goal of the task force?*

"Abnormal behavior affects the animal's productivity and health, which leads to increased veterinary costs and culling. Promoting better animal welfare also contributes to efficiently reach slaughter weight and reduce these unnecessary losses, feed costs, ultimately resulting in significant savings. We strive to address observations of abnormal behavior by providing practical and easily transferable non-genetic support material. Adhering to the motto of the task force "Prevention is better than cure", we prioritize both preventative and curative measures for all our genetic lines. Our ultimate goal is to have healthy pigs, as any suffering is frustrating for both pigs and farmers alike. By focusing on both prevention and cure, we aim to create a robust, socially adaptable and high-performing sow or finisher with a strong emphasis on health."

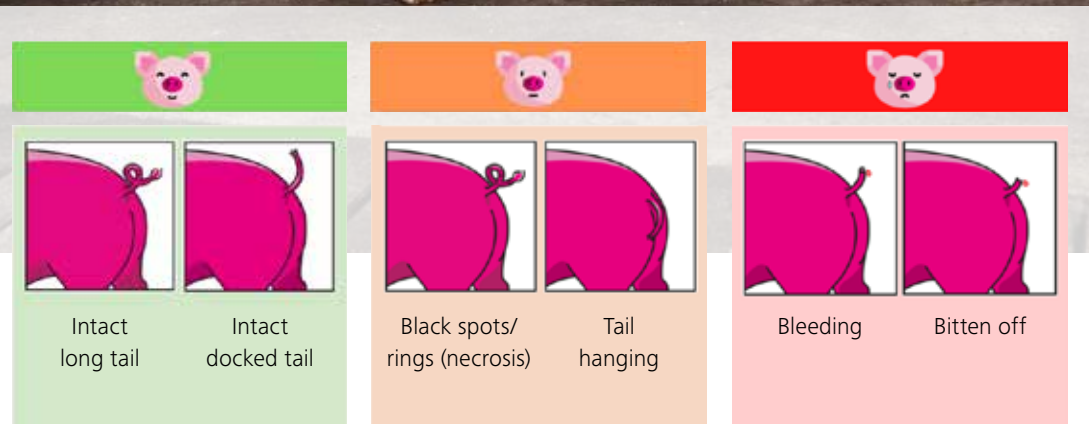
#### *Was the task force inspired by any existing practices?*

"Norway sets a high bar for animal welfare and serves as a model for us. Legislation ensures, for example, all pigs have intact tails and loose housing in which they can be their social selves. We can learn a lot from Scandinavia and its focus on animal welfare. Consumer preferences also influence standards, such as the upcoming ban on tail docking in several European countries. Tail biting is a challenge for everyone, which is why we want our advisors to work together with producers to reduce risk factors and promote social behavior. Ultimately, the task >

“ By focusing on both prevention and cure, we aim to create a robust, socially adaptable and high-performing sow or finisher. ”



Romy Hendricks  
Nutrition Specialist



The happy pigs monitoring tool is developed to score tail biting and behavioral characteristics.

> force's goal is to make sure our genetic lines meet the correct requirements. To have a social sow with good maternal or finishing characteristics and no abnormal behavior."

**Which disciplines are included in the task force?**

"As a task force we work closely with our veterinarians, reproduction specialists, nutritionists, and geneticists who closely monitor the different crucial factors that impact animal welfare. Ensuring the health and welfare of our animals in the supply chain is a shared responsibility of all involved, from producers to processors. But by working together, this goal can be achieved."

**How does the task force promote happy pigs and improve pig health and wellbeing?**

"We created non-genetic support material in which we considered several key factors for pig health and wellbeing such as health, enrichment, housing, feed and nutrition, resource management, and climate and didn't show abnormal behavior like tail biting or aggression. All of these factors are incorporated to promote 'Happy Pigs'.

Meaning pigs that are healthy, live well together, eat well, drink well, and are kept in a good climate. By focusing on these factors, producers will see a significant decrease in labor per pig, as they will be able to spend less time on direct care and more time on prevention and observation."

**Non-genetic support material? How does this work?**

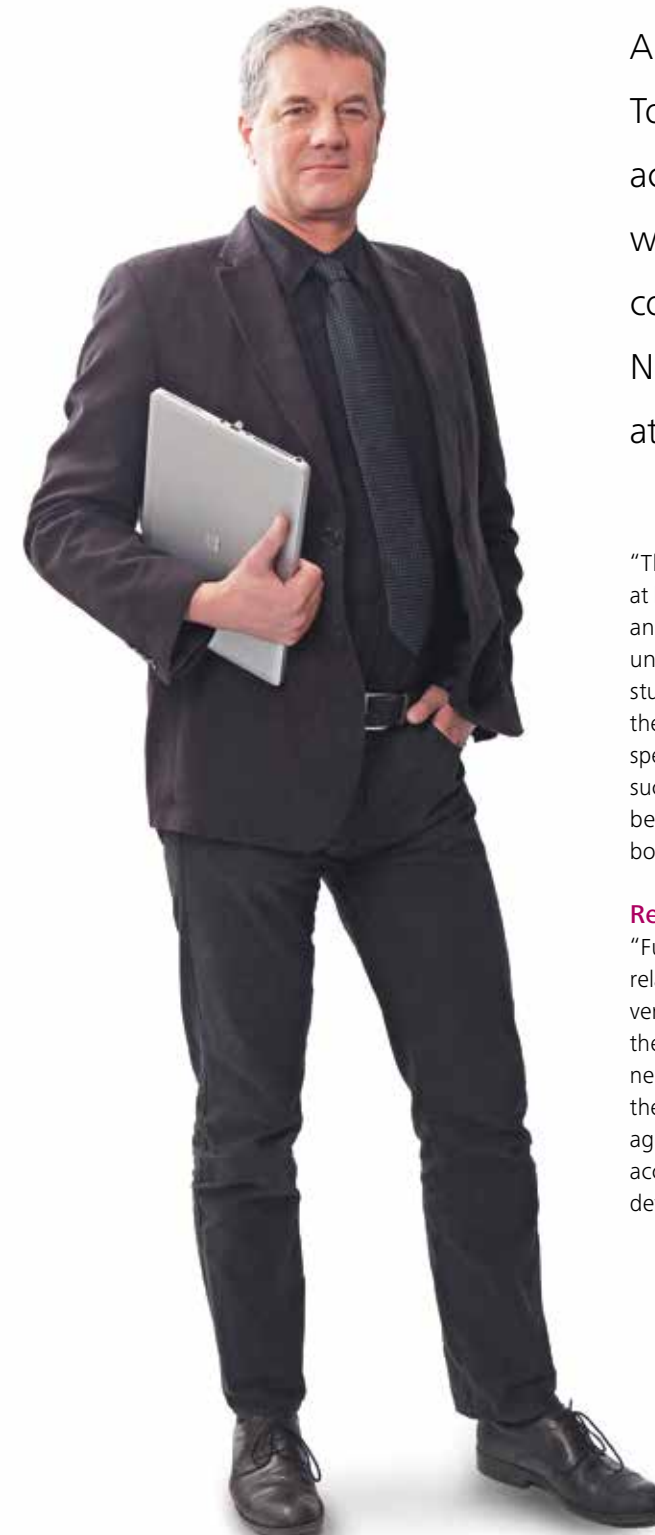
"The task force has developed a manual with infographics to help understand abnormal behavior in relation to animal welfare. In case of tail biting, a monitor has been created where three categories (Green, Orange, and Red) can be seen with tail and behavioral indicators. By using this monitor, a baseline can be set about the status of the farm at that time. It is accessible to barn managers and employees and includes QR-codes for more information and tips based on their observations. The manual is designed to encourage problem identification through sensory perception and promote consideration of animal welfare. Furthermore, the included 'Pigbone Tool' provides an overview of factors that contribute to tail biting. It starts from the tail and moves up the metaphorical spine,

highlighting all the indicators that could be relevant. By having a comprehensive understanding of these indicators, barn staff can work preventively or curatively to reduce tail biting and aggressive behavior."

**How will animal welfare become a top priority for producers?**

"Financial motivation is of course a crucial factor; however, we believe animal welfare should be prioritized based on ethical and moral values. And it can be easily achieved by taking a data-driven approach to identifying the right solutions for your business processes. When in doubt, you can start by implementing some of our provided solutions on a smaller scale. Eventually you will gain the confidence and potentially have enough information to make further advancements. Sharing these experiences with other producers is key to facing the challenges in the industry. This is the same for us as Topigs Norsvin. Education and the increasing social awareness on animal welfare should be a continuous effort to ensure a sustainable future for all parties. Transparency and open communication are the critical components in maintaining a sustainable future for the sector." ■

# Nurturing the future of swine genetics



As the world's leading and innovative swine genetics company, Topigs Norsvin wants to ensure and maintain their position. This is achieved by having a comprehensive research department and by welcoming new talent with open arms. To include everyone in the company's goals, the online knowledge transfer platform Topigs Norsvin Academy, was created. Egbert Knol, Director of Research at the Topigs Norsvin Research Center, explains the importance.

"The Topigs Norsvin research group entertains at least 25 students, ranging from BSc, MSc, Phd and postdocs, both internally and at different universities. It is very international. We have students from every educational level in each of the four research groups which focus on every specific aspect of the pork production chain. The success in attracting these talented students is because we have always been open to collaborate in our research.

**Retaining talent**

"Furthermore, we build strong and long-term relations with knowledge institutes such as universities. Because of this, institutes are offering their best and brightest to learn everything they need to learn at Topigs Norsvin. This is great for the students and for us, because in this day and age it is hard to find and retain talent. To have access to such a great pool of young experts is definitely something to cherish.

**Topigs Norsvin Academy**

"Creating new knowledge is one, but transferring all this knowledge within a growing organization can be challenging. This is where Topigs Norsvin Academy comes into play. This transfer doesn't happen automatically or structurally. So to ensure all team members understand the basics of the genetic engine that drives the company forward we've created the Topigs Norsvin Academy. It offers online e-modules in bite-sized chunks. That way we can ensure that we can share our company's philosophy with all our existing and new employees." ■

Egbert Knol  
Director of Research



“ The sow needs to be able to take care of all her piglets, without help. ”

## Norwegian circumstances require natural robustness

— The societal call for a future with less antibiotic and zinc use in animal husbandry is increasing year after year. The fear of animal diseases affecting humans and possible antibiotic resistance leads to bans on the use of these agents. Farm management and biosecurity are two ways in which pig producers can face this challenge head-on. Breeding is another way. Topigs Norsvin's TN70's are the poster sows for natural robustness.

Topigs Norsvin veterinarian Brad Chappell sees farm management as an important way to reduce antibiotics. "The judicious use of antibiotics is common. If a disease enters the barn, we need to treat the affected pigs. Prevention is the step that comes first. Biosecurity measures can be complemented by vaccines, but these are not always available for every type of disease. They are also labor and cost intensive. Breeding for robustness is another option that is very viable."

### Norway

Topigs Norsvin veterinarian Elisabeth Nordbye operates from Norway, which in many respects is a special pig producing country and very different from, for instance, the US. "In Norway, legislation on the use of antibiotics is very strict", she explains. "This forced pig producers from the 1980's onwards to use animals that can cope without antibiotics and to form the animal's environment in such a way that pathogens have little to no chance to survive. Also, tail docking is forbidden in Norway, so circumstances need to be created to farm with intact tails."

### TN70 sows

"Making sure that pigs can cope with antibiotic free circumstances, however, does not start in the barn but rather as a vision for the genetic program and setting the appropriate breeding goal", says Nordbye. "The most important trait in the breeding goal that Topigs Norsvin has, focus on the condition of the sow. She needs to be able to take care of all her piglets, without help. This means having enough functional teats and milk to feed her piglets. The number and weight of weaned piglets per sow is also a crucial factor. These numbers say something about how the sow functions as a mother. Topigs Norsvin's TN70 sow is a combination of the Z-line (Large White type) and the Norsvin Landrace. The breeding goal for this hybrid sow consists of 41 traits. Over the past years, they have proven to be successful in taking care of their piglets and preparing them for the environment they have to live in once they are weaned."

### Success

The Norwegian herd health, the genetic development for the TN70 sow, batch management system and the size/location of farms are advantageous when it comes to antibiotic use. Nordbye: "We hope that our TN70 sows have as much success in other parts of the world as they do here." ■

# Topigs Norsvin and UN Sustainable Development Goals

The United Nations Sustainable Development Goals are a universal call to action to end poverty, protect the planet, and improve the lives and prospects of everyone, everywhere. The 17 goals were adopted by all UN Member States in 2015, as part of the 2030 Agenda for Sustainable Development, which set out a 15-year plan to achieve the Goals.

Based on EFFAB



**End poverty in all its forms everywhere.**

**Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.**

**Contribution Topigs Norsvin:** Servicing and helping pig producers develop their business and employ staff on company-owned facilities in rural areas.



**End hunger, achieve food security and improve nutrition and promote sustainable agriculture.**

**Contribution Topigs Norsvin:** Selecting cost-efficient animals, which makes pork an affordable source of protein for a wider group of consumers.



**Ensure healthy lives and promote well-being for all at all ages.**

**Contribution Topigs Norsvin:** Selecting lean and robust animals that produce high-quality food with low-fat content and need fewer antibiotics.



**Ensure sustainable consumption and production patterns.**



**Take urgent action to combat climate change and its impacts.**

**Contribution Topigs Norsvin:** Improving the efficiency of pork production by selecting more feed-efficient animals that produce more high-quality protein, and by improving animal health to reduce losses. All of this results in reduced greenhouse gas (GHG) emissions.



**Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.**

**Contribution Topigs Norsvin:** Responsible management and preselection of genetic resources.



We comply with Code-EFABAR

As a breeding company we are at the beginning of the food supply chain. This means that just like all other chain partners we are responsible for supplying safe, healthy and responsible food in a sustainable manner. We take this responsibility seriously and this is why we comply with Code-EFABAR.

Code-EFABAR, the commitment to responsible breeding, is a voluntary Code of Good Practice for and by the animal breeding sector. By adhering to this code, we at Topigs Norsvin demonstrate our commitment to sustainability. For more information, please visit [www.responsiblebreeding.eu](http://www.responsiblebreeding.eu).



