

# CSR.

TOPIGS NORSVIN  
CSR MAGAZINE



# Balanced Breeding for robust and strong pigs

Societal demands for pig farming with a low environmental impact and a high level of animal welfare are continually developing and increasing. Combining these two in one economically feasible production system requires genetic material of the highest standard.

In order to thrive in modern systems, pigs need to be robust and strong. This is important not only for efficiency, but perhaps even more for other aspects, including welfare and food safety: robust pigs are healthy pigs that do not need antibiotics to cope with their surroundings.

Topigs Norsvin aims at balanced breeding. In our dictionary this means that every piglet is raised by its own mother. It also means that pigs are capable of healthy and efficient high-level production under a wide range of farm conditions.

For Topigs Norsvin, Total Feed Efficiency (TFE) under all circumstances is one of the answers. TFE is an index reflecting the amount of feed to produce 1 kilo of pork. Not just in the finishing pen, but throughout the system, from the rearing of gilts and the production of piglets up to the finishing stage.

TFE is a crucial factor in reducing the environmental impact of pig production. At Topigs Norsvin we are constantly working on further improving the TFE of our genetic lines, making use of modern production systems and standards. We want our pigs to perform well under all circumstances and push down mortality. Developments such as group housing, loose farrowing systems and larger farms imply new demands on pig performance and robustness.

The industry is changing, but our genetic lines are constantly in development as well. New techniques offer endless possibilities. Video imaging-based precision phenotyping is an example of such a new technique. We use these new techniques to improve our genetic lines and to develop new ones. The TN70 sow is a good example of a sustainable pig that excels in robustness and balance.

In this magazine we want to show how Balanced Breeding enables us to respond to societal trends and developments in the industry. I am proud to be part of Topigs Norsvin, which enables me to make a contribution to this next step forward in pig farming.

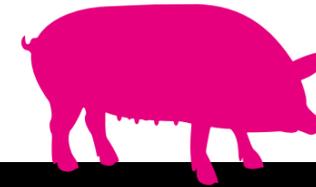
**Hans Olijslagers**  
Chief Technology Officer Topigs Norsvin



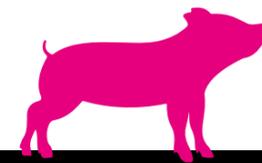
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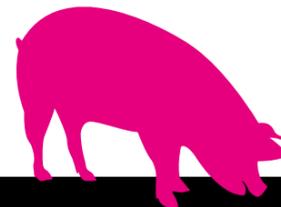
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# A good start



The moment of inseminating a sow marks the start of the production of pork. However, the actual production of pork starts earlier; with the production of semen at the AI station. Developments in technologies to improve genetic gain and dissemination of superior genetics are going fast, but acceptance for some technologies is required.

A focal point on the male side of fertility is to produce more doses of semen per ejaculate. This allows for faster and broader dissemination of genetic progress. "We used to produce about 20 doses from one ejaculate in the past, but now we can go up to 60 or even more. I expect this will even substantially increase in the future." Marleen Broekhuijse, reproduction researcher explains: "Due to improved semen processing and insemination technology as well as continuous monitoring of boar fertility we can go down to even less than one billion cells per dose. This leads to broader genetic dissemination and more sows being inseminated with semen from top boars."

### ELIMINATE DEFECTS

Production of more doses per ejaculate means that fewer boars are used. Checking boars to make sure they do not have a random genetic defect is essential. Boars with deleterious variants like reciprocal translocation are to be eliminated. This is where the expertise of Barbara Harlizius, senior researcher in genomics, comes in. She searches for defects in the genome causing problems such as infertility, embryo death, mummification and small litters. "Due to abnormalities in the DNA of the semen, sows produce no or smaller litters. New techniques at both DNA level and chromosome level enable us to monitor negative variants in much more detail. These help us to develop new tools to lower the risk of smaller litters and lower fertilization rates." Another aspect of the work of Barbara Harlizius is the possibility to select pigs carrying genes that contribute to vitality and robustness in a broader sense. This means that animals are able to cope with challenging aspects such as diseases. Once identified, these pigs can be used in breeding programs and contribute to a robust and sustainable production.

### NEW POSSIBILITIES

Senior researcher Louisa Zak also foresees rapid development of female reproduction technologies. Researchers can introduce a novel genetic variation into the DNA of pigs by using gene editing and by means of invitro embryo technology superior genetics can be rapidly disseminated. Embryo Transfer (ET) is an essential step in making these technologies successful. At this moment, the use of ET is limited. "However, it is expected that problems that now prevent large-scale use, like collection of embryos and their being highly perishable, will be solved in the next few years", Louisa Zak explains. "ET has many benefits over transport of live animals, including a reduced risk of pathogen transfer. It also facilitates the introduction of new genetics without disturbing the health balance of the livestock. Embryos minimize the carbon footprint, as a single flask of embryos can contain all the new stock that a farmer needs. Finally, ET also contributes to faster dissemination of the newest genetics, enabling producers to work with the best genetics and so most efficiently produce robust animals."

### BIG STEPS BUT ACCEPTANCE REQUIRED

These technologies offer enormous opportunities to improve genetic progress and dissemination of the best genetics in the near future. They will make it possible to accelerate genetic gain, create new genetic variation and disseminate those genetics more efficiently than ever before. However, most techniques may give rise to discussions in society. It is clear to Topigs Norsvin that ethical discussions on what is possible with new techniques is required. We also realize that at this moment the general public is unaware of the present and future possibilities and what impact they may have. Acceptance of these technologies by society is required before they will be applied in the production of pork for consumption. ■

From left to right: Marleen Broekhuijse, Barbara Harlizius and Louisa Zak



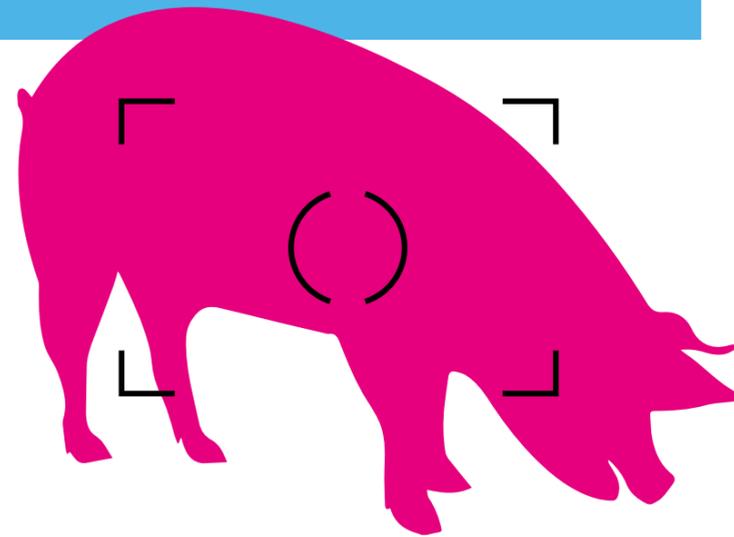
# Precision phenotyping

New techniques offer new possibilities for precision phenotyping. This makes it possible to select based on traits that are invisible for the human eye. These traits may raise the level of animal welfare or contribute to a higher feed efficiency and higher quality of the carcass and meat. In short, traits invaluable for more sustainable pig farming.

## Camera

One of the most important instruments for precision phenotyping at Topigs Norsvin is a camera.

With video imaging-based precision phenotyping the camera replaces the human eye in monitoring, registering and interpreting characteristics or behavior. Video cameras are much better at daily estimating the weight of an animal or registering deviations in its movement. These are important characteristics for total feed efficiency and longevity respectively.



## Game Camera

Game cameras offer an extra asset: they are unsurpassed in registering movement and interpreting behavior.

For example, game cameras can even recognize fighting in the pen. The next challenge we are now working on is to link the images obtained to individual animals, so we know which pig is responsible for the turmoil. This information is important for selection based on social characteristics. These traits are getting increasingly important not in the least with respect to animal welfare.

## CT scanner

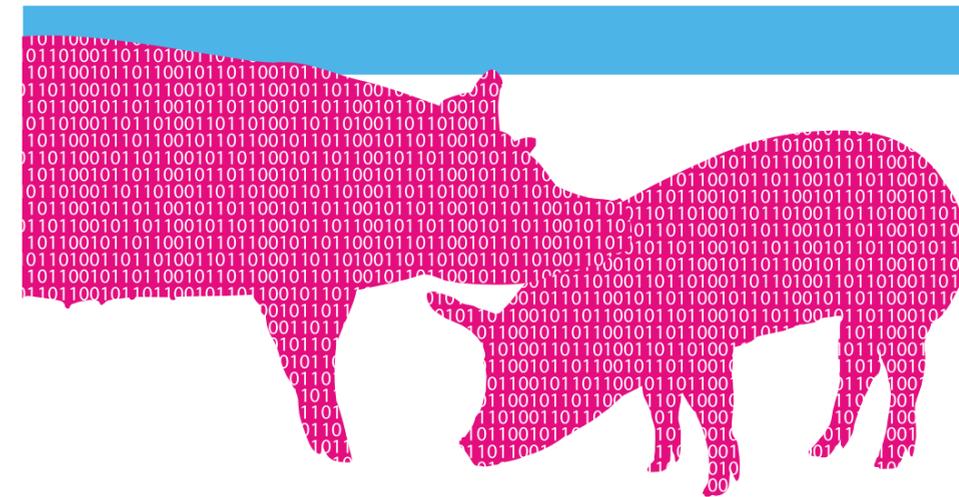
CT scan technology opens even more doors, because it offers the possibility to look inside a live pig.

This has ethical advantages over dissection and it allows for much faster definition of breeding values, as we do not have to produce offspring in order to find out the hereditary characteristics of an animal. The CT scanner can, for example, easily determine the number of vertebrae, which is correlated to the number of teats and, consequently, to the number of piglets a sow can raise by herself. Additionally, the CT scanner is better at diagnosing osteochondrosis than the vet and it can also measure the size and form of organs. This gives information about longevity and disease resilience traits.



## Pig atlas

Topigs Norsvin collects the actual and historical CT scan data in the Pig Atlas, which currently includes data from over 25,000 pigs of the Norsvin Duroc and Norsvin Landrace. This Atlas will also be available to other Topigs Norsvin lines next year. The Pig Atlas is an important tool for accurately predicting the carcass conformation of pigs, which may help making pig farming more sustainable and produce pork more tailor made to the consumers demands.



## MACHINE LEARNING

The described techniques produce a huge amount of data. The next step is to convert this into usable and valuable management information. The possibilities are nearly endless: a higher level of animal welfare, increased food safety, more efficiency and less environmental issues, just to name a few. Video imaging is step 1 of precision phenotyping and interpretation is step 2. It is machine learning: the calculation tools learn to determine which data is important. This is a matter of numbers: with a large

amount of data it is possible to predict what will happen next. Based on a large amount of images, researchers can develop formulas to help the computer interpret the images. This is a laborintensive process, but the computer will eventually be able to collect and interpret data independently and translate this into accurate predictions, for instance: there will be tail biting tomorrow. Precision phenotyping registers a large amount of data in a short time, puts it in a perspective and uses the appropriate tools to very accurately predict the characteristics of pigs. ■

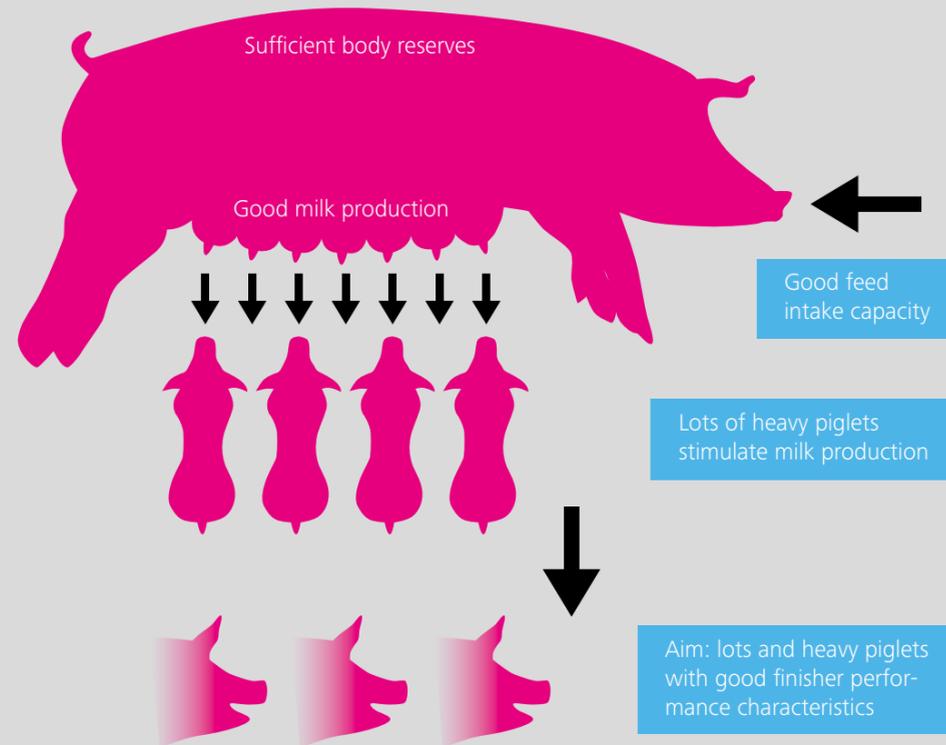
# Robust sows that are good mothers for strong piglets

Topigs Norsvin breeds sows that produce strong and robust piglets. They also produce many big litters, as they are robust and strong themselves. All this is the result of the balanced breeding program of Topigs Norsvin, which combines all aspects of mothering abilities, piglet vitality, health and robustness of both sows and piglets. This enables us to follow our credo: every extra piglet born should be nursed and weaned by its own mother.

Five aspects of balanced breeding.

## 1 Search for pigs with healthy and efficiently working intestines

Our researchers and breeding specialists are real experts when it comes to understanding the factors influencing the piglet production and their underlying genetic mechanisms. They discovered that litter weight is an important factor in breeding heavier and stronger piglets and longevity of the sows, as it is a determining factor for the milk production of the sow. A sow that receives too little feed during gestation eats more during lactation in order to produce sufficient milk for her piglets. However, this mechanism has its limits. When the sow has to produce too much milk, she needs to metabolize too much body fat and even muscle mass. This has negative consequences for the sow, which leads to fertility problems and a shorter life. In other words, there is a relationship between milk production, fertility and longevity. We identified the genetic background of this natural mechanism and implemented this in our breeding program. It is possible to increase the milk production capacity while limiting the consequences for the sow by selecting for longevity and a constant interval between weaning and insemination.



We take this into account in our breeding program. This leads to stronger piglets and a lower mortality rate. Strong piglets will be high-quality finishers, experience improved animal welfare and require less looking after. They will also convert feed to meat more efficiently. >>

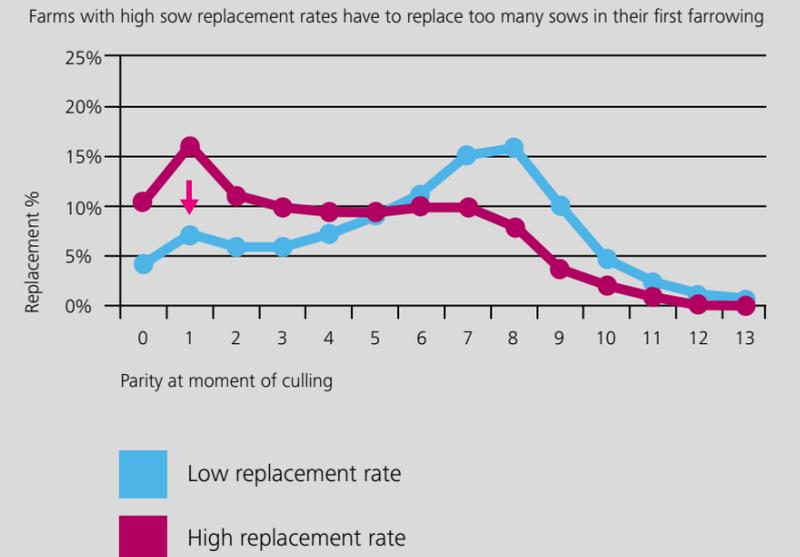
**Conclusion:**

- a balanced breeding objective can increase the milk production capacity
- it is possible to breed for both a good milk production of the sow as well as a good performance of the finisher

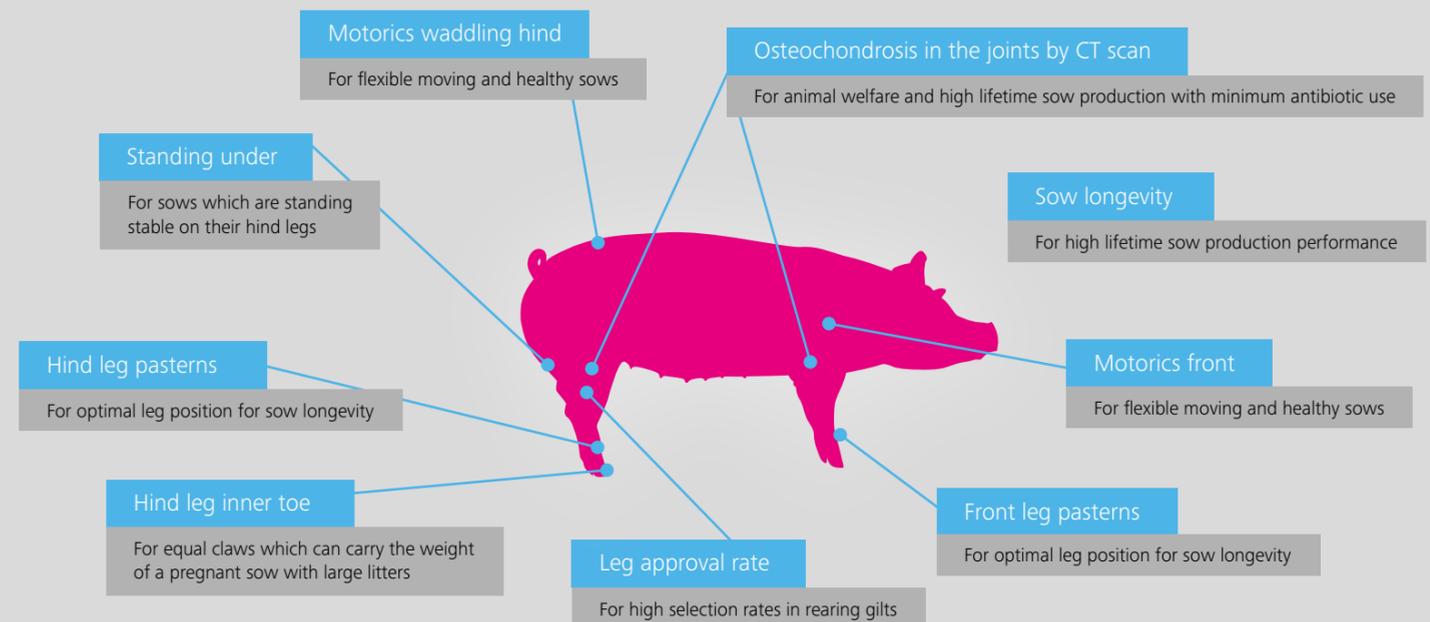
## 2 A strong mother that produces for a long time

A good sow not only produces at a high level, she also produces many litters. Sow longevity is a complex matter. Longevity is influenced by many traits such as leg quality, fertility, condition and so on. As many factors play a role in longevity, this trait is addressed in our breeding goal in several ways.

Research has shown that the rearing and the first litter of the sow are important. Farms with high sow replacement rates see that they have to replace too many sows in their first farrowing. If the sow cannot cope with big litters and high milk production, she will get in trouble and will not be able to produce a new litter. Another aspect of longevity is sows dying during their productive lives. This is highly undesired from animal welfare and economical perspectives. We have recognized this and included six traits in our breeding goal. This shows at farm level. Our genetics is well-known for its high longevity and low mortality. >>



Topigs Norsvin pays a lot of attention to the exterior of the sow. Animals are scored on several traits who are used in the breeding values

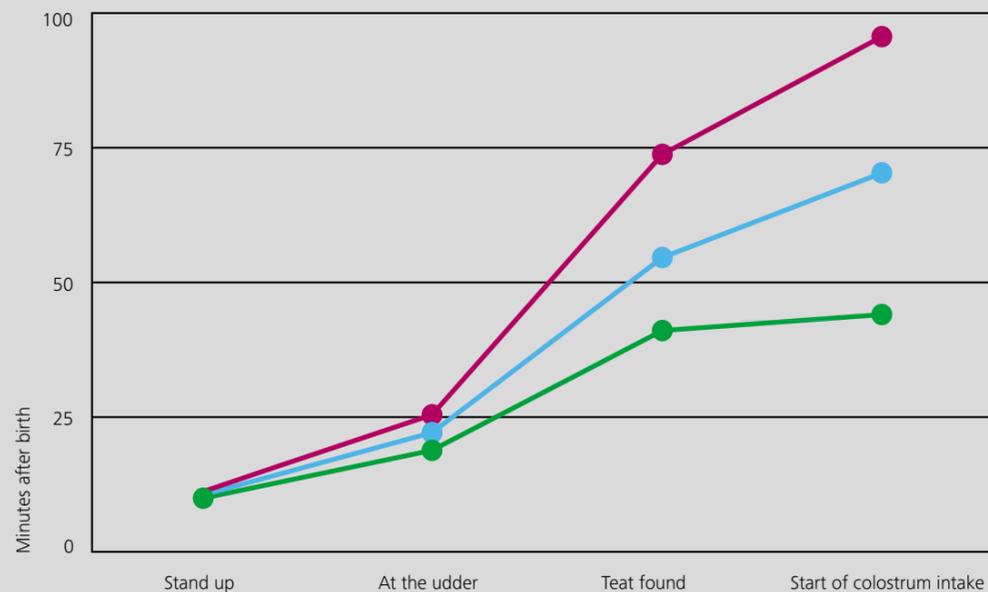




### 3

## Mothering abilities help the piglet for life

Piglet activity related to the breeding value for mothering abilities



- Low breeding value mothering abilities
- Average breeding value mothering abilities
- High breeding value mothering abilities

A good mother is more than an effective milk producer. From research we know that a good mother has a higher glucose level in the blood before farrowing so as to provide nutrients to the unborn piglets. Her behavior also significantly contributes to the survival of her offspring. A calm mother prevents crushing her piglets, gives them time to drink colostrum and stimulates her piglets to come to the udder by her behavior. Our researchers found that she does

this, for example, with her voice, her behavior, the way she lies and the shape of her teats.

A sow's character is heritable. We found genetic variations and breed on these. There is a clear difference in the time that piglets need to start drinking colostrum. Without interventions by the caretaker, piglets of sows with a high breeding value for mothering abilities started drinking colostrum about 45 minutes after birth. With piglets born

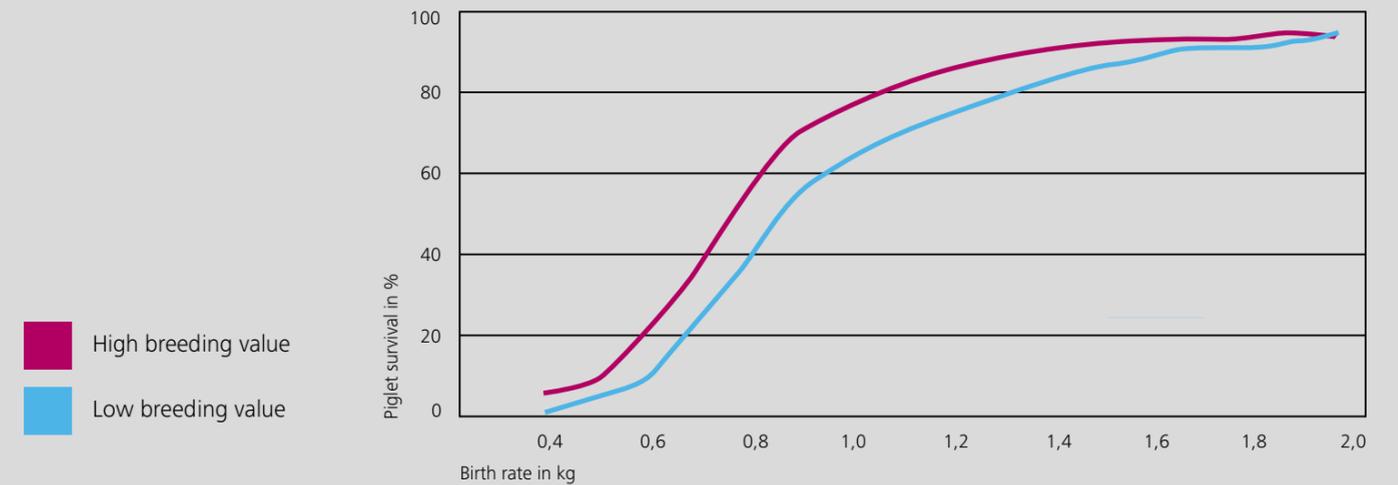
from a sow with a low breeding value this took over 90 minutes. See the graph.

Piglets that get colostrum quickly and in sufficient amounts have a flying start, as they get a health boost and enough energy to develop fast. This perfect start pays off. These pigs have higher survival rates and perform better compared with pigs that had a start with less or later colostrum even in the finishing stage. >>

### 4

## Strong piglets in every aspect

When a piglet with a low birth weight has a high breeding value for vitality, it has a better chance of survival

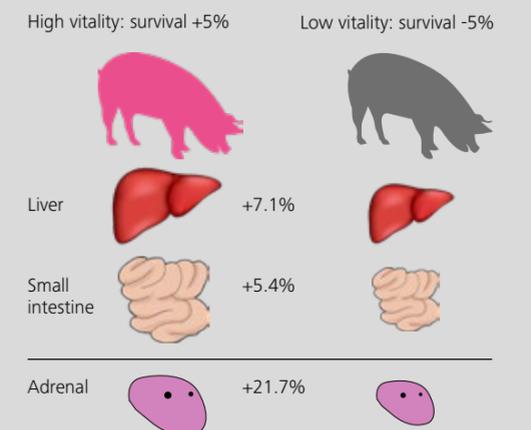


- High breeding value
- Low breeding value

Strong and robust piglets are an important trait in the breeding program for our female and sire lines. This is why we started to implement our piglet weighing and vitality protocol 15 years ago. Every born piglet is weighed. Nowadays we weigh about 750,000 piglets per year. This pays off tremendously. For example, research has shown that piglets with a high breeding value for

piglet vitality have higher cortisol levels in their blood just before birth, which stimulates the organ development before birth. They also have longer and better developed intestines as well as more energy reserves at birth, e.g. in the form of fat reserves and higher glycogen levels in blood and liver. Stronger and better developed piglets at birth results in a higher survival rate. >>

### Organ development



### 5

## A healthy pig: no defects



Topigs Norsvin pays a lot of attention to congenital defects. Even though these defects are rarely seen in our pigs, we want to minimize these. Piglets born with these defects are less productive and require more labor. The most important thing is, however, that they damage animal welfare, the health and the performance of the pig. We found genetic regions explaining phenotypic variation for many of these defects and are using this information in our breeding program to reduce the prevalence of these unwanted defects. We also breed healthy pigs at another level. New traits that we are busy implementing in our breeding goals are disease resilience in general and some specific pathogens. This increases the resistance to pathogens in the pigs and when they get sick anyway, they are better capable to cope with the disease and recover faster. ■

# Less boar taint with breeding

Boar taint can be reduced in many ways. One of them is by breeding. Topigs Norsvin has achieved significant results in this area. In all of our sire and dam lines, boar taint has been reduced with the use of outstanding selection methods, smelling sessions, the use of genomic selection and the application of the latest statistical models. Thanks to these techniques, it is possible to reduce the inheritance of boar taint without a loss in the reproduction characteristics of sows.

From 2006 to 2017 boar taint was reduced with 35% to 57%. This means that now only 2 to 3.5% of the progeny of Topigs Norsvin terminal boars cause boar taint.

Genetic trend for the percentage of progeny with boar taint for the sire lines



With the introduction of Nador boars more than five years ago, Topigs Norsvin created the possibility to realise even lower boar taint scores still. Nador boars are selected terminal boars that have an extra low heritability for boar taint. As a result of this, progeny have a 40% lower chance of boar taint compared to non-Nador boars.

Topigs Norsvin continues to breed for the reduction of boar taint and over the coming years major steps will be taken to reduce boar taint even further. ■

# Power Piglets: sustainable survivors

Good health and high survival rates are desirable qualities for piglets in terms of efficiency as well as sustainability. From this point of view, a piglet's ability to adapt well to different conditions is of great importance, particularly because Topigs Norsvin breeds piglets for the global market. Sustainable piglets are survivor piglets.



The health and welfare of a piglet, both in the farrowing pen and in the weaner pen, are challenged by many factors from four main categories, being diseases, climate, feed and labor. Topigs Norsvin 'Power Piglets' are bred to cope well with challenges from all these categories.

## Low susceptibility to diseases

Although methods to further raise the hygiene level are continually improved, it will never be possible to keep all pathogens out of the farrowing and weaner pens. Therefore, immunity continues to be crucial. Good innate immunity can actually be bred into the piglet. At Topigs Norsvin this is done mainly by selecting those piglets that survive challenge best. What causes some piglets to be more resistant to diseases than others? Our researchers identify those traits at the genetic level, so these can be used to breed piglets with a higher immunity level. Higher in general, but also with respect to specific pathogens and their corresponding health problems, such as respiratory diseases. This also leads to less need for treatments and antibiotics. Best performance even in times of disease outbreaks is an important characteristic of Power Piglets.

## Different climatic conditions

As Topigs Norsvin piglets are born at farms all over the world, they are to thrive in different climates. Moreover, some countries show strongly varying climatic conditions between seasons. In Canada, for example, the temperature varies between 30 degrees in summer and minus 30 degrees in winter. Some countries have high seasonal variations in day length. Sow and piglets must be able to cope with this. We believe that truly robust piglets can cope with these diverse climatic conditions. Climatic stress is therefore a good test for the robustness of our piglets, which they prove to withstand with great success.

## Good digestion of various feeds

Good feed efficiency is undoubtedly one of the most important traits of a pig. Not only in the finishing phase, but in every stage of the pig's life, including the weaner phase. However, this efficiency not only depends on the piglet, but also on the composition of its feed. Some feeds contain more fiber and are harder to digest. Topigs Norsvin breeds for pigs with a high feed efficiency for a broad range of feeds, including those with a high fiber content. This is more sustainable as it enables pigs to digest different kinds of locally produced feeds or feeds that are by-products from other industries. For piglets this specifically means that

they have to develop healthy intestines with a good microbial population. By testing for intestinal microbes we can tell if a piglet will be able to digest many different feeds after weaning.

## Fend for themselves

Another challenge for piglets is the tendency of pig farms getting larger. This makes 'low-maintenance' piglets highly desirable. Like with climatic resistance, robustness plays an important role here as well. True Power Piglets do not need much looking after. Consequently, piglets do not only need to be active and grow well, they also have to be social as social piglets are more likely to allow each other enough time to suckle or, in a later stage, feed and do not bother each other as much. This leads to fewer injuries and better growth across the entire barn.

Knowing how piglets cope under different challenges enables Topigs Norsvin to continuously select even more robust piglets and do research into their specific traits. Additionally, monitoring piglet performance under stressful conditions provides good proof of the robustness of a specific generation of piglets. Only piglets that keep up their performance in spite of challenges deserve to be called Power Piglets. ■



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Immunity continues to be crucial.  
Good innate immunity can actually  
be bred into the piglet.

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## Search for pigs with healthy and efficiently working intestines

Together with Wageningen University, Topigs Norsvin is investigating the possibilities of using organoid technology. With this project more in-depth research is done in order to find the effect and influence of intestines on feed efficiency and health/robustness of pigs. In this project intestinal organoids of breeding boars with high and low breeding value for feed efficiency are gene-sequenced and tested on feed efficiency and health. Aim is to find ways to use organoid technology as a predictor of feed efficiency of the animal. ■

## 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). ■



## Partner in Breed4Food

Topigs Norsvin is one of the partners of the Breed4Food research consortium, a world-leading center for research and innovation in livestock genetics. Breeding of animals requires high investments in R&D and long-term commitment to meet changing consumer demands in order to increase the efficiency within the food chain, reduce the ecological footprint, minimize the use of antibiotics and contribute to food safety, better health and welfare of livestock. By combining forces, four Dutch breeding companies create more possibilities for developing new tools with respect to this. Read more about Breed4Food at [www.breed4food.com](http://www.breed4food.com). ■



## Ethical sessions at Topigs Norsvin

New technologies are developing fast and facilitate making big steps in breeding. Topigs Norsvin uses these new technologies to substantially contribute to innovation and making genetic progress. An important condition for the application of these new possibilities is acceptance of them by producers, pork buyers and society. One of the things we do is organize group discussions to find out what the opinions about these new technologies are. In 2017, we organized a few meetings with our producers in the Member Council and our employees. Attendants discussed and rated new technologies on a scale ranging from 'don't' to 'do'. All this resulted in an overview of feelings, thoughts and arguments that will be topics for further discussion and evaluation. ■



# The Norwegian approach

## Pioneer in sustainability driven by political choices

Across the world, Norway's approach towards pig breeding is seen as promising. The emphasis is on strong pigs for sustainable farming, backed by explicit political choices. This delivers valuable insights also for other markets where consumers demand animal welfare and sustainability.

"We experience a rapid growth of international interest in our approach", says Olav Eik-Nes, Director of Norsvin, the Norwegian partner in Topigs Norsvin. Especially for markets with a growing demand for pork produced in a sustainable way this approach offers interesting perspectives.

### POLITICAL CHOICES

The driving force behind the Norwegian approach lies, according to Eik-Nes, in the political choices the country has made with respect to agriculture. Norway wants to produce its own food in its own way. Keeping the farmers on the land and spreading economic activity over the country are important objectives as well. This leads to very specific conditions for pig farmers.

### ANIMAL WELFARE

First there is a broad set of rules on animal welfare. To name a few:

- tail docking is prohibited;
- loose housing, including farrowing, has been mandatory since the year 2000;
- it is not allowed to wean piglets younger than 28 days;
- pigs must have a minimum amount of space, hay as additional feed and playing materials.

### HEALTH

Another important element is animal health. The Norwegian pig population has been free from 'serious contagious diseases' for decades. Besides, prevention of immunity to bacteria such as MRSA is high on the agenda. When the MRSA bacteria is found on a farm, the entire stock is eliminated immediately. Antibiotics and hormones in feed are forbidden in Norwegian pig farming.

### SMALL FARMS

The size of farms is also regulated. At present, the maximum number of animals at one farm is 105 sows or 2100 finishers. In total, the 2300 pig herds in Norway count 1.6 million finishers, producing 136,000 tons of pork annually. "Due to the high costs our meat is much more expensive in comparison with other European countries", says Eik-Nes. The Norwegian average price for pork is about 25 Krone (€2.68 or US\$ 3.15), twice as high as in Denmark. The Norwegian consumer is willing to pay for the Norwegian type of pig farming. Needless to say there is practically zero export of Norwegian pork.

### BREEDING

The political choices have had a major impact on pig breeding in Norway.

"In our breeding program, now part of the Topigs Norsvin program, the emphasis is more than usual on traits essential for sustainability", Eik-Nes comments. Examples are the high weight and the rapid growth of piglets born from the Norsvin Landrace sow and their ability to thrive in loose housing conditions. "Of course this is not only a matter of genetics, the management by the farmer plays an important role as well", adds Eik-Nes.

### ISLAND

The first impression of the Norwegian approach to pig farming may be that of an island: produce pork in a specific way only for the Norwegian consumers. When taking a closer look, it becomes clear that this situation has produced very interesting genetic opportunities, which the world is now discovering. The merger of Norsvin and Topigs is a very good example of this. Eik-Nes: "We are happy to experience that the results of our breeding activities now play a role in making pig farming more sustainable, also outside our country. We sometimes seem to be an island, but as you know, Norway can be reached over land." ■

# True Robust Finishers are **social and never smell like a boar**



Robust Finishers are the crown on the breeding work of Topigs Norsvin. Robustness is actually our main breeding goal, but what makes a Robust Finisher? There's more to this than just excellent feed efficiency and good health. Also good social behavior and a negligible chance of boar taint are important traits for finishers.



Pramod Mathur

Pramod Mathur and Lisette van der Zande are working on different aspects of pig breeding at the research center in Beuningen, the Netherlands. One of their tasks is to develop criteria for selecting Robust Finishers. An important element in this is immunity of finishers and piglets. Best performance even in times of disease outbreaks is an important characteristic of robust finishers. Higher immunity levels prevent the animal getting sick and needs treatments and antibiotics. However, other aspects such as behaviour and meat quality also play a role. Mathur and Van der Zande run specific studies on social behaviour as well as on controlling boar taint.

#### **SOCIAL PIGS PROMOTE GOOD GROWTH**

Proper social behavior is a relatively new breeding goal. Mathur explains why it is actually crucial for good growth and health: "There are certain behaviors that we classify as being undesirable. Those are behaviors of pigs harming each other or causing arousal. Such stressors have a negative effect on the growth of pen mates and, of course, behaviors such as tail biting cause injuries that may lead to infection. When a group of pigs behaves better, all pigs in the pen grow better and this improves the overall end result and raises the animal welfare level."

#### **SELECTING CIVILIZED PIGS**

Van der Zande adds that whereas selecting for good social behavior is important, it is certainly not easy. "The animals most easy to spot are the victims, the ones that are harmed or that do not grow really well, because they are not given sufficient space at the feeding station. The aggressors are often much less visible. We can see that a tail has been injured, but it is not always easy to identify the pig that is responsible for this." Moreover, Mathur adds that selecting the 'best behaving' pigs does not mean selecting the most docile pigs. "Some pigs are very passive. That is not a desirable quality, because passive pigs just lie around and do not go to the feeding station often enough. Therefore we also have to look for a good balance in social behavior. We do not want aggressors in the pen, but we also want pigs that are motivated to take in enough feed. That is the kind of finisher we want to select."

#### **NO MORE BOAR TAIN**

Another important quality of a Robust Finisher is the absence of boar taint, especially as castration of pigs is a major welfare issue in European society. Mathur: "Did you know that less than five percent of the boars are carriers of boar taint? And that only one in five people is able to actually smell this on cooked meat? This means that this actually is a minor problem, looking at the figures. Still, we want to get rid of boar taint as soon as possible. It might involve a small number, but bad consumer experiences have a great negative impact on the image of pork." Nador is a special program of Topigs Norsvin focusing on selecting boars with a low chance of boar taint. "When using sperm from a Nador boar, there is a good chance that

boar taint is not bred into the animals. However, boar taint properties can also come from the mother animal. Therefore, we also breed sows that are unlikely to carry genetic properties for boar taint", Mathur explains. Topigs Norsvin implemented boar taint reduction in all lines in 2015.

#### **SMELL AS INDICATOR**

"We actually have a smelling score", Van der Zande adds. "We have experts smelling samples of cooked meat for boar taint. We do this because smell turns out to be a more important indicator for boar taint than the concentration of smell-producing compounds. It is simply the best proof of boar taint being present. This technology of using the human nose as a research instrument was developed by Topigs Norsvin." Mathur: "We do all we can to breed the most robust finishers in terms of feeding efficiency as well as social behavior and boar taint. Even if we have to stick our own noses into it." ■



Lisette van der Zande



## Find new ways to improve the feed efficiency

Topigs Norsvin is involved in a three-year research project that will provide us with new insights, which will help us improve the feed efficiency of finishers. In this project the focus is not just on the individual pigs, but also on the group of pigs in a pen. Even the microbiome (the microorganisms living in the pig's intestinal canal) will be taken in account.

By taking a broader look at feed efficiency, we might find new selection traits that will substantially increase the feed efficiency.

During the project data will be gathered from over 3000 finishers. Apart from genotyping and performance, the microbiome will be determined as well. Blood samples will be taken to gain insight into the metabolite and hormone levels. Fecal samples will be used to determine the microbiome of the pigs and their efficiency of digestion. Feeding stations will record individual feed intakes and cameras attached to the stations will record the weights of the animals. Another set of cameras hanging over the pen will record the behavior of the pigs in the group.

By collecting, combining and processing all this data, the possibility is created to develop and select new traits that are difficult to breed for, such as animal behavior and resilience. ■

## Over 4400 hectares less per year

Topigs Norsvin breeds with Total Feed Efficiency in mind, a concept that reduces the costs for feed not only in the finisher stage, but through the entire production chain. In recent decades, Topigs Norsvin genetics have been bred to reduce all forms of leakage in production systems and to produce the highest level of pork per weight unit per unit of feed. Furthermore, the focus is on highly producing and easy to handle sows as well as on efficient and robust finishers.

We see the results. For example, we know from a benchmark survey including over 600 farms that the total feed efficiency improves by an average of 0.8% per year in the Netherlands. This is 13 grams less feed per produced kilo pork per year. This may sound trivial, but when calculating this effect for the entire Dutch pig industry in which about 16 million pigs are slaughtered on an annual basis, our genetic improvement reduces the need of land to produce the feed (in this case wheat) by over 4400 hectares per year. ■



# Index for robustness, a new tool for pig farmers

The Topigs Norsvin Robustness Index is a new tool to help farmers select the best genetic material. Working with strong animals is part of the company's philosophy on 'balanced breeding'.

### BALANCED BREEDING

"We are increasingly moving towards balanced breeding", says Toon Weerts, breeding program manager at Topigs Norsvin and responsible for the breeding program of the company in North-West and Central Europe. He has been involved in pig breeding for 38 years. "The demand for robust pigs is globally growing. External parties insist on lower piglet mortality, to give an example. This can better be achieved with robust animals than with animals bred only for maximum litter size. Therefore we take a wide range of breeding values into consideration, all of which contribute to breeding a more robust pig."

### WELFARE

Pig farmers want animals that are both strong and yield a high production. These two qualities sometimes compete for priority in genetic predisposition. Stakeholders such as NGOs, governments and citizens demand more attention for animal welfare. One of the ways to address this issue is to work with strong animals. These are the main reasons why Topigs Norsvin gives robustness a central place in its breeding goal for pigs. Not only growth, production and efficiency are important, the genetic predisposition of pigs

to be able to (sometimes literally) stand their ground is essential as well. Besides, the situation in the pen or the care provided by the pig farmer, and a strong and robust physique of a healthy animal are preconditions for good welfare.

### FIFTH COMPONENT

The Robustness Index will be integrated into the existing Topigs Production Index (TPI), the compass used by pig farmers to select the best genetic material. In addition to the existing four scores for growth, feed conversion, bacon thickness and muscle thickness, the TPI contains a fifth component. "Pig farmers can choose for more robustness in the genetic material they use for their business as of the autumn of 2017," says Weerts. The first introduction is in Germany, because this country is at the forefront in automatic animal recognition at the slaughter line. Topigs Norsvin applies the Robustness Index also in the so-called Topigs Selection Index (TSI). The company makes use of the index for the breeding programs at its nucleus and multiplier locations. "In this way we keep distinguishing ourselves in the market with stock material for robust pigs. The market for this is growing and we have faith in this direction for the global pig farming business." ■

### THE INDEX FOR ROBUSTNESS IS BASED ON SIX CHARACTERISTICS, WHICH ARE PARTLY GENETICALLY DETERMINED:

#### 1. LEG QUALITY

Strong, well-shaped and well-placed legs make a pig move easily and literally stand 'firmly on its feet'. It also ensures less leg problems and damage, which is economically favorable;

#### 2. PIGLET DEFECTS

This includes congenital defects, such as umbilical hernia;

#### 3. SLAUGHTER ABNORMALITIES

Abnormalities that are found in the slaughterhouse, such as pneumonia, other lung problems, liver disorders or bone defects, can be linked to genetics. These can best be identified when automatic individual registration takes place at the slaughter line;

#### 4. VITALITY

How many of the live-born piglets actually stay alive?

#### 5. RESISTANCE

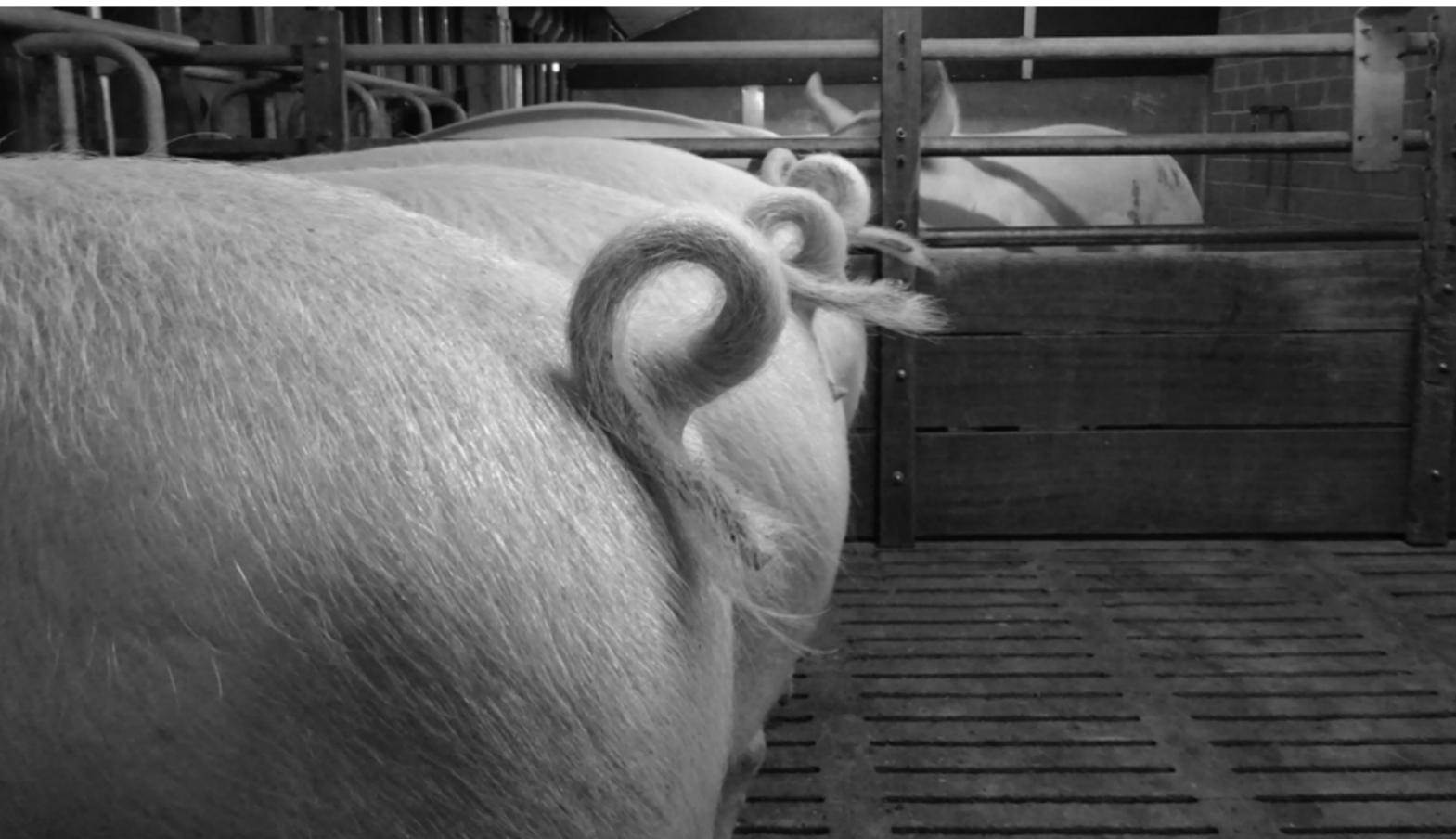
Specific attention is paid to resistance against the PRRS virus;

#### 6. WEAN2FINISHER MORTALITY

Topigs Norsvin has developed a special protocol for objectively determining the drop-out between weaning and slaughtering.

# Genetics is one of the cornerstones for production with entire tails

Friedrich Wilhelm Temme decided to stop cutting tails five years ago. The first questions that comes up when we hear about the decision of this German Topigs Norsvin multiplier from Borgholzhausen near Osnabruck is: Why? Temme answers this question with other questions: "Why not? Why should we cut the tail of a pig?" Read the story of a breeder who wants to be prepared for the customer demands of the future.



Walking about on the farm of Friedrich Wilhelm Temme we see pigs with uncut tails. The tails of all the animals are intact. Most of them have a nice curl and some are hanging straight down. The farmer clearly enjoys the view of the pigs with their tails when he shows us his animals. "It gives me joy and satisfaction to see my pigs like this."

## ROPE

Another thing that is not seen in every farm is pieces of rope hanging down in the pens for the youngest rearing groups. This rope is a kind of alternative for the tail. We see pigs constantly playing with the rope and biting it. Temme: "I experimented with the rope to find out the best way of using it. I discovered that at least one rope has to lay on the ground and the hanging ropes have to hang freely in the pen." Older rearing gilts are given a small amount of straw. This also helps to prevent the pigs from biting each other's tails.

## THINKING AHEAD

Temme is convinced that producing pigs with intact tails will be a fact of life for EU pig farmers in the near future. "EU legislation already forbids cutting tails, but everyone makes use of the exception to the rule that cutting tails is allowed when it is better for the pig's health. It depends on the politicians when this option will be abolished. I want to contribute a bit to the solution and as a breeder I have to think five to seven years ahead."

## TRUST IN GENETICS

Temme breeds TN70 sows. He has a Z-line and he has not cut the tails of his pure lines for over five years now. "My sows and I trust in my genetics having the right character for production with whole tails." In 2014, when the Norsvin Landrace became available in Germany as a result of the merger of Topigs and Norsvin, he also stopped cutting the tails of the F1s. Temme learned that in Norway tails are not cut, so the Norsvin Landrace was bred for a production system in which uncut tails were the standard for many years.



## NO COMPLAINTS

The customers of Temme get TN70s with long tails. Temme has never had complaints about this. The long tails do not cause any problems. Everyone is surprised and also glad that working with uncut tails appears to be possible. "The TN70 sow has a friendly character", Temme states. "The genetic backgrounds of the characters of the Z-line and the Norsvin Landrace line come together in the TN70 and this makes the sow suitable for production with entire tails."

## FARMER AND ENVIRONMENT

One of the traits included in the breeding goals of Topigs Norsvin is behavior of the sow and the balanced breeding approach seems to work for breeder Temme and his customers.

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Everyone is surprised and also glad that working with uncut tails appears to be possible.

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However, Temme does not regard genetics as the only cornerstone that allows for production with entire tails. It also depends on the farmer or the management. The farmer must have the right attitude for it and has to see the fun and satisfaction in it. Temme: "Indeed, the way I work takes extra time, perhaps one hour per day. This is not wasted time, though. While I give the pigs straw, I do an extra check on them and for me it is a joy to walk about in a shed where the pigs are producing well in good health and with intact tails." The third cornerstone is the environment. Here the above-mentioned ropes and straw come in as well as a bit more space for the animals and the right climate in the shed. Temme concludes: "Genetics are perhaps most important here. I would not be able to work this way if the pigs hadn't the right character." ■

Left:  
Friedrich Wilhelm Temme  
Above:  
The farm in Borgholzhausen



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