

RESULTS 2020

SEGES DANISH PIG RESEARCH CENTRE

Piglet Life project:

Increased focus has boosted survival rate

Mission Accomplished:

Less phosphorus – better economy

Grading gilts

produces bigger litters and
sows with greater longevity



SEGES

Danish Pig Research Centre



Welcome to Results 2020

SEGES Danish Pig Research Centre works tirelessly to improve your business and its bottom line. In this year's Results we cover the latest, promising results from feed for gilts and sows, amended phosphorous standards due to new regulations and how sows can look after more of their own piglets. As well as the latest scientific findings, you can also read about the important testing station, Grønhøj, and about DanBred's breeding work for which SEGES Danish Pig Research Centre is responsible.



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Thank you to Gudp and the Pig Levy Fund for supporting a number of projects.



Innovation will future-proof Danish pig production

Every day SEGES Danish Pig Research Centre seeks to create results that are important for you.

SEGES Danish Pig Research Centre is firmly focused on creating solutions that ensure that Danish pig production remains among the global elite, especially as far as quality and productivity are concerned. The aim is to provide you with the knowledge and tools needed to deliver a better bottom line result, higher welfare and to meet environmental requirements now and in the future.

PROJECTS THIS YEAR

Our most recent innovation projects have focused on more efficient production, the phasing out of medicinal zinc and better training of employees. Our work is decided by the Sector Board of the Danish Agriculture and Food Council Pig Production. This comprises nine pig producers and one adviser following input from an Innovation

Council. The Innovation Council is made up of a number of pig producers whose driving force is to lead the way in the development of the skills required in the industry.

“The Sector Board knows the industry inside out and keeps abreast of current events. Our colleagues and our industry are always at the forefront when we decide on the areas for development in the years ahead – all of which is to ensure that our pig producers are equipped with the right tools to future-proof production,” says Erik Larsen, Chairman of the Sector Board of the Danish Agriculture and Food Council Pig Production

As a pig producer, you always have the opportunity to suggest topics relevant to future production.

PIGLET LIFE PROJECT: Increased focus has boosted survival rate

AS PART OF THE OVERALL EFFORT TO BOOST THE NUMBER OF SURVIVING PIGLETS IN THE FARROWING UNIT, THE PIGLET LIFE 2.0 PROJECT WAS LAUNCHED IN DECEMBER 2019. THE RESULTS HAVE BEEN SO GOOD THAT THE PROJECT WILL CONTINUE FOR THE REST OF THE YEAR.

There is a squeal somewhere in the housing unit: a squeal that makes Anne-Lene Charlotte Papp, Supervisor at Heinemose Farm, dart from one end of the unit to the other. She gets the sow to rise and saves the piglet from being squashed.

“Once you know what to listen for, you can hear the difference between a squeal from a piglet struggling to access the teats and a squeal from a piglet about to be squashed. If it’s the latter, we take immediate action to get the piglet away from the sow,” she says.

That, and much more, has become part of the routine in the unit after the farm joined Piglet Life 2.0. Indeed, the extra effort pays off in the farrowing unit. This is evidenced by the results from the 56 participating farms in the project. For almost a year, the participants have been working to boost the piglet survival rate at their farms – for both animal welfare and the bottom line.

“So far, participants have managed really well. Many have already increased the survival rate and they’re all making a huge effort to establish a high level of welfare

in the farrowing unit,” says Project Leader Dorthe Poulsgård Frandsen from SEGES Danish Pig Research Centre.

GOOD RESULTS FROM PRODUCERS

The vast majority of participants have achieved a significant improvement in the piglet survival rate. At Heinemose Farm, the survival rate has risen by around 7 percentage points since joining Piglet Life 2.0.

“It’s great to see that we can make a difference to the piglet survival rate by putting in the extra effort and working together towards our common goal. We’re dealing with live animals so of course we have to make sure that as many as possible thrive,” says Anne-Lene Charlotte Papp.

TO CONTINUE FOR THE REST OF 2020

Some of the farms that have participated in this round of the Piglet Life project will continue with the advisory process for the rest of the year, which is welcome news:

“Raising the piglet survival rate is a long and tough struggle in most herds. It’s not something that can be achieved in a matter of weeks because it takes time to incorporate and refine new procedures. A number of adjustments need to be made to the so-called “machinery” so patience and perseverance are required. It’s no good jumping off the horse before reaching the end of the road, when the effects of the initiatives can be measured on the survival rate. I’m therefore very pleased that many farms have recognised this and want to continue the process with their advisers,” says Dorthe Poulsgård Frandsen.



EXPERIENCE YOU CAN USE

Experience shows that more piglet lives can be saved if nursing sows and litter equalisation are deployed several times a day. Stockpersons should be present in the units for several hours of the day, e.g. carrying out evening rounds and/or on staggered hours on big farrowing days. Greater supervision helps to ensure that newborn piglets receive colostrum and heat during farrowing.

If you would like to know more about our recommendations for improved survival in the farrowing unit, you can read more at [Farestaldsguide.dk](https://www.farestaldsguide.dk).



DKK 278:

the increased margin per year sow by raising the survival rate and weaning 0.7 more pigs per litter at current prices.

Down to the smallest detail to benefit your bottom line

+30%
BREEDING PROGRESS

The assessment of the affect of genomic selection on breeding progress.

DANBRED WAS THE FIRST BREEDING COMPANY IN THE WORLD TO USE GENOMIC SELECTION IN ITS BREEDING WORK FOR PIGS. ALL BREEDING CANDIDATES ARE TESTED – FOR THE BENEFIT OF DANISH PIG PRODUCERS.

By taking samples of hair from all DanBred breeding candidates, we have a wealth of information about the pigs that can be used to improve breeding progress. The technology, known as genomic selection, was first deployed ten years ago.

"At the start we tested 10% of the breeding candidates, but we test 100% now. The increase is not so surprising because genomic selection enables us to identify the pigs that have the best genetic features. We can use that knowledge to develop the traits of the pigs," says Tage Ostensen, Head of Department at SEGES Danish Pig Research Centre.

IMPROVED BOTTOM LINE

There have been significant advances in breeding progress since genomic selection was introduced into DanBred's breeding system in 2010. There are, of course, a large number of other factors that play a part in the increased economic value of a DanBred pig. Over the past ten years, however, the curve has become steeper and the assessment is that genomic selection has boosted breeding progress by 30%.

"Some of the most valuable traits are also some of the most difficult to measure, e.g. feed conversion and litter size. They benefit the bottom line and also contribute to more sustainable production. In this respect, we

are in no doubt that genomic selection has had a large part to play in the significant progress of recent years," says Tage Ostensen.

DIGGING DEEPER

SEGES Danish Pig Research Centre, which is responsible for DanBred's breeding work, continues to develop new methods to improve genetics. The most recent addition is metabolomic selection. Whereas genomic selection provides an insight into a pig's DNA, metabolomic selection provides even more information about the composition of a pig at molecular level. Using around 10,000 measuring points, we are able to obtain information on which molecules a pig possesses as well as their concentration. This provides an insight into how genes affect a

pig's physiological condition. The aim is to use the information to improve breeding progress.

"Up until now it has been both expensive and difficult to work with genetic selection for the traits the project is focusing on. But we believe that the new method will generate more progress for meat percentage and feed efficiency," says Tage Ostensen.

Metabolomic selection is being developed in collaboration with DanBred, Aarhus University and Nordic Seed with support from GUDP, the Green Development and Demonstration Programme under the auspices of Denmark's Ministry of Environment and Food.

	LL	YY	DD	Average DLY-finisher
LP5 (live piglets day 5/litter)	0,35	0,23		0,29
Daily gain (g/day) 30 kg – slaughter	19	23	19	20
Daily gain (g/day) birth – 30 kg	2,8	1,8	-0,1	1,1
Feed conversion (feed units/kg gain)	-0,043	-0,053	-0,037	-0,043
Sow longevity (proportion)	-0,03	0,01		-0,01
Lean meat percentage (%)	0,29	0,18	0,13	0,18
Fertility & Survival, paternal effect			0,10	0,10
Conformation (points)	0,01	0,01	0,25	0,13
Killing out (kg)	0,00	-0,03	-0,06	-0,04

	Overall value, DKK
LP5 (live piglets day 5/litter)	1,61
Daily gain (g/day) 30 kg – slaughter	2,60
Daily gain (g/day) birth – 30 kg	0,12
Feed conversion (feed units/kg gain)	5,74
Sow longevity (proportion)	-0,47
Lean meat percentage (%)	1,85
Fertility & Survival, paternal effect (live piglets day 5/litter)	0,53
Conformation (points)	0,39
Killing out (kg)	0,19
Total per year on average:	12,56 DKK

Is the grass greener on the

other side?

A RANGE OF ALTERNATIVE SOLUTIONS IS BEING CONSIDERED BY DANISH AGRICULTURE SO THAT WE CAN ACHIEVE THE OBJECTIVE OF A CLIMATE-NEUTRAL FOOD INDUSTRY BY 2050. ONE OF THE INITIATIVES IN PIG PRODUCTION IS TO FIND ALTERNATIVES TO IMPORTED SOYBEAN MEAL AND OTHER PROTEIN SOURCES.

In collaboration with Aarhus University Foulum and Danish Crown, SEGES Danish Pig Research Centre has been studying whether pigs have the same productivity fed on green protein and other Danish protein sources as on soybean meal. This has now been tested and the conclusion is clear:

"Pigs respond well to green protein. The production results are on the same level as when we use traditional feed," says Senior Scientist Else Vils from SEGES Danish Pig Research Centre.

The results from the trial have shown that it is

possible to produce pigs fed on green protein and other protein crops grown in Denmark with no adverse effect on the quality of the meat.

"There is no difference in taste and quality compared to pigs fed on ordinary feed. Productivity and meat quality are both parameters that we need to keep tabs on," says Else Vils.

Meat from pigs fed on broad beans and rapeseed cake was a little more tender than meat from pigs fed on soybean meal and green protein. This is the only minor

difference that was detected in the meat quality.

ENORMOUS POTENTIAL

Grass as a source of protein has huge potential in terms of reducing the carbon footprint of pig production. There are, however, still many uncertainties in the calculations.

"Compared to soybean meal, green protein is expected to reduce a pig's carbon footprint. But before we know the final carbon footprint from industrial production, it's difficult to say by how much," says Else Vils.

In the trials, the pigs were fed on green protein produced at Foulum's demonstration facility. This means that the process has been more expensive than Else Vils expects it will be when industrial production is up and running. There is still some way to go, however.

"This is the next step on the journey towards being able to use the feed widely. Production methods and forms need to be optimised as does the cultivation of the grass and its yield," she adds.

FEED TRIAL WITH 347 INDIVIDUALLY FED PIGS DIVIDED INTO THREE GROUPS.

The groups received different protein sources in their feed:

GROUP 1:
9% soybean meal and 9% sunflower meal

GROUP 2:
9% green protein, 9% broad beans, 2% rapeseed cake

GROUP 3:
2% broad beans, 14% rapeseed cake

Green protein is produced by biorefining green biomasses, typically grass, clover and alfalfa.

Grading gilts produces bigger litters and sows with greater longevity

BY MEASURING THE BACKFAT OF GILTS, WEIGHING THEM AND SEPARATING OUT THE LIGHTEST AND LEANEST, IT IS POSSIBLE TO PRODUCE MORE UNIFORM GILTS BEFORE SERVICE. THIS PROVIDES FOR GOOD RESULTS – BOTH IN RELATION TO LITTER SIZE AND LONGEVITY.

How heavy should gilts be to ensure the optimum litter size? And what is needed to ensure that sows have the desired longevity?

Initially, the weight of the sows was deemed to be the most important parameter in terms of longevity and litter size. Then it was discovered that the age of the gilts had a role to play. SEGES Danish Pig Research Centre has since closely investigated the relationship between weight, age and the latest parameter, backfat.

As a result, Senior Consultant at SEGES Danish Pig Research Centre, Thomas Sønderby Bruun, can now make a clear recommendation:

"Fundamentally it's all about optimising the gilts prior to service. To ensure optimum performance, feeding them to prepare for subsequent pregnancy is essential. In this way, you'll get the maximum benefit," he says.

The conclusion is that getting the right amount of backfat on the gilts – without them becoming too heavy – is the key.

"There is a clear correlation between litter size and the weight of the gilt. We found that for every 10 kg heavier a gilt is when serviced, the litter size increases by 0.4 total born pigs per litter. At the same time, there is a clear link between the thickness of the backfat

and the longevity of the sow in the form of the percentage of sows serviced for a second litter," says Thomas Sønderby Bruun.

One of the recommendations, therefore, is to try to feed the gilts with the recommended feed curve which ends at 2.9 FU per sow and with feed having a moderate lysine and protein content.

"If a gilt does not have the correct weight or thickness of backfat at service, then an error has occurred. It's a good idea, therefore, to separate the gilts when their average weight in the pen is around 100 kg so the gilts that are too lean and light are not inseminated in the first round, but later on when they have the desired body condition although at a slightly older age than planned", says Thomas Sønderby Bruun.

OPTIMISED GILT FLOW AND BETTER GILT UTILISATION

At Varde Midt Farm, Supervisor Rasmus Sørensen sees significant advantages in taking a focused approach to the feeding of his gilts prior to service.

"Before our trial got underway, we often had some large gilts. They produced excellent litter sizes for their first parity, but then a large proportion failed to return to oestrus after weaning and were taken out of production. Our sows also became very large, which is not a sustainable solution," he says.

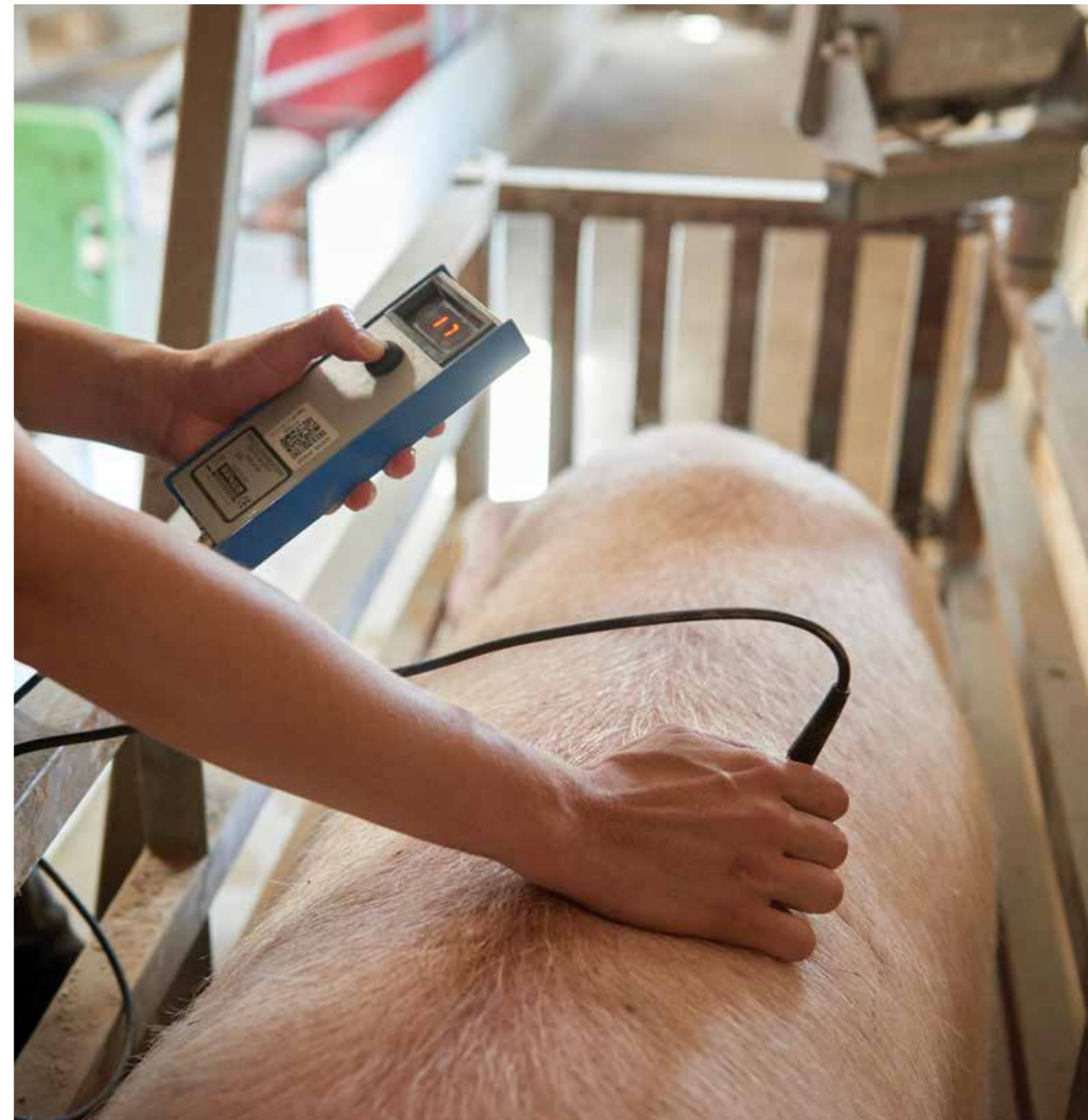
Following Thomas Sønderby Bruun's recommendations, Rasmus Sørensen and his team have tried to prevent their gilts from becoming too old/heavy prior to service.

"We could see that a larger percentage of the gilts in the one herd where we use oestrus synchronisation, reached service for the second parity, and we focused on oestrus synchronisation in the second herd to ensure better gilt utilisation. The percentage of gilts serviced for the second parity will always vary but achieving 95-97% of gilts for service in the second parity is the peak. This should therefore occur in the second herd where we've been around 88%," says Rasmus Sørensen

If a gilt does not meet the defined criteria, it must be held back from boar contact. In the meantime, its feed should be adjusted with a low lysine and protein content to ensure the gilt is within the optimum limit.

There have been changes in the feed strategies for gilts and it has been decided that those that do not have enough backfat are held back.

"It's worked well for us. The only downside we can see is that we can't service all the gilts we would normally want to. On the other hand, we've found that we have better sow longevity and that's more important for us in the long run," says Rasmus Sørensen.



GOOD ADVICE

> Service the gilts when they are 230-240 days old, weigh 140-160 kg and have 14-15 mm back fat.

IT'S A GOOD IDEA THAT:

- > The smallest and leanest gilts are separated from the pens when their average weight is approx. 100 kg in the gilt pens.
- > They are allocated 10-15% more feed than the other gilts.

Housing technologies deliver environmental improvements



DILUTING SLURRY IN THE FARROWING UNIT TOGETHER WITH FREQUENT SLURRY DISCHARGE CAN REDUCE ODOUR AND AMMONIA EMISSIONS. IN ADDITION, REGULAR DISCHARGE IS EXPECTED TO REDUCE CLIMATE IMPACT FROM THE SLURRY. ANOTHER TRIAL WITH HIGHER VENTILATION RATES BASED ON POINT EXTRACTION HAS SHOWN THAT MORE AMMONIA AND ODOUR CAN BE COLLECTED AND REMOVED THROUGH POINT EXTRACTION.

Emissions of various environment-impacting substances from pig housing is a current topic within the industry. One of the ways to reduce emissions from pig housing is to get the slurry produced in the unit into the slurry tanks more quickly. For several years, the method, known as frequent discharge, has been approved as a means of reducing odour emissions from finished pig units with fully slatted floors. It has a documented odour-reducing effect of 20%. A similar effect should also be seen in sow housing. However, the greater solidity and smaller amount of slurry from sows in the farrowing unit - as well as straw in the

slurry container - can present discharge difficulties, which is why it can be necessary to add water to the slurry.

"Adding water is expected to reduce ammonia emissions in the farrowing unit because of the diluted slurry. Our results have shown that weekly slurry discharge in the farrowing unit combined with the addition of water in the slurry containers reduced odour and ammonia emissions by 28% and 18%, respectively, compared to a control unit with a normal discharge strategy with no additional added water. We also expect to see reduced methane emissions," says

Simon Granath, Senior Consultant at SEGES Danish Pig Research Centre.

LOW ADDITIONAL COST

In the trial, water was added to the slurry container after each discharge. A 5 cm water level in the slurry container after discharge results in a total additional cost of DKK 159 per farrowing pen, which corresponds to DKK 40 per year sow.

"With a low additional cost as a result of adding water, the slurry could easily be transported to the pre-storage tank," explains Simon Granath.

EFFECTIVE POINT EXTRACTION

Besides frequent discharge, studies have also been carried out into what effect 10% point extraction has on the collection of ammonia and odour. Point extraction is often necessary to make environmental approval economically viable since a large quantity of the overall ammonia and odour emissions is collected in a small amount of air from where the ammonia and odour can be purified. Research is therefore being conducted into the impact of a higher point extraction of 15% and 20%.

"The idea is that more ammonia and more odour can be extracted at a higher rate of ventilation. This makes it possible to purify a larger amount of ammonia and odour. We do not recommend just turning up the ventilation, however. The idea is that the size of the air purification system can be adjusted in line with the required reduction.

This, however, will require air purifiers with a greater capacity and thus higher installation and operating costs," says Michael Holm, Team Leader, SEGES Danish Pig Research Centre.

The first test has shown that with point extraction of 15% and 20%, 67% and 79% of ammonia emissions and 60% and 78% of odour emissions, respectively, from the housing unit are collected in the point extractor.

SEGES Danish Pig Research Centre will begin the second and final test on point extraction during the autumn. The technology is expected to be on the Danish Environmental Protection Agency's technology list by the end of 2021.

“ More ammonia and more odour can be extracted at a higher rate of ventilation. This makes it possible to purify a larger amount of ammonia and odour.

Michael Holm, Team Leader, SEGES Danish Pig Research Centre.

Do you get the feed you pay for?

EVERY YEAR SEGES DANISH PIG RESEARCH CENTRE TESTS SELECTED FEED COMPOUNDS TO DOCUMENT THOSE WHICH PROVIDE PIG PRODUCERS WITH THE GREATEST VALUE. THIS YEAR, A DISCUSSION ABOUT MINERAL MIXES RESULTED IN THE CONTENT BEING TESTED.

As it can often be difficult to determine whether feed delivers what it promises, SEGES Danish Pig Research Centre examines the feed companies' feed compounds by carrying out an inspection and a test on an annual basis. The inspection involves an analysis of the feed in a laboratory and a test involving the pigs themselves. This year, however, the procedure was a little different: the mineral mixes were tested instead of the feed compounds.

"It's important that we listen and act on the experiences of the pig producers themselves. This year we decided to test mineral mixes for finished pigs in the Danish market in order to document which ones have the optimum effect," explains Tina Sørensen, Consultant at SEGES Danish Pig Research Centre.

SECRET MISSION

To test the mineral mixes, SEGES Danish Pig Research Centre sourced them from a consultant. He invited tenders based on a compound feed mixture which was identical for the participating mineral companies. The minerals were then delivered to a pig producer for collection.

"In our inspections and tests, we make a point of ensuring that the companies remain

unaware that we're testing their mixture. This is to be certain that they don't change their production to suit our purpose. We can then safely draw our conclusions on any possible differences we may find in the comparison between the analysis results and what is stated on the list of contents," says Jesper Poulsen, Senior Consultant, SEGES Danish Pig Research Centre.

There are four companies in the market whose mineral mixes have been included in this year's company tests. The mixes were tested on more than 2,700 finished pigs. The results of the tests, which were carried out between January 2020 and September 2020, will be available at svineproduktion.dk.

In addition to testing the feed on pigs, analyses of the feed have been carried out. These were subsequently compared with the declared list of contents.

IMPORTANT FOR MAINTAINING QUALITY

It was previously the responsibility of the authorities to analyse the contents of the feed:

"In the past, the food authorities were responsible for testing the quality of feed

compounds. But when they decided to cut down on the number of tests, SEGES Danish Pig Research Centre decided to intervene. Responsibility now lies with us as there is still a clear need for testing feed and maintaining a high quality," says Jesper Poulsen.

He believes that feed tests help enhance the quality of feed so that pig producers obtain the best outcome for their pigs.

"The purpose of the inspections is simply to encourage and motivate feed producers to maintain a high standard and, if possible, to develop. Perhaps they can also benefit the position of finished pig producers," says Jesper Poulsen.



“It's important that we listen and act on the experiences of the pig producers themselves. This year, we decided to test mineral mixes for finishers in the Danish market in order to document which ones have the optimum effect.”

Tina Sørensen, Consultant at SEGES Danish Pig Research Centre.





Ukrainian Viktor Shevchenko and Robert Lynge Andersen

A good start for colleagues from abroad

SEGES DANISH PIG RESEARCH CENTRE HAS TRANSLATED TRAINING MATERIAL AND FACT SHEETS IN ORDER TO DISSEMINATE ITS RESEARCH AND RECOMMENDATIONS. THIS MAKES IT EASIER FOR UKRAINIAN AND ROMANIAN COLLEAGUES AS WELL AS OTHERS FROM ABROAD TO GET OFF TO A GOOD START.

One in five employees working in Danish agriculture has a non-Danish background. According to Statistics Denmark and Jobindsats.dk, 57% of them are from Eastern Europe. At Robert Lynge Andersen's farm, the majority of his team are from Eastern Europe.

To ensure that his team get off to a good start, Robert Lynge Andersen has ensured that they complete SEGES' online course in Danish pig production, which is available in Romanian,

Ukrainian, English and Danish. The course is one of the methods that SEGES Danish Pig Research Centre has devised for foreign workers so that they can gain a better understanding of the industry.

QUARANTINE PROVIDES TIME FOR STUDY

Employees from Romania and Ukraine have to spend 48 hours in quarantine before

beginning work at Robert Lynge Andersen's farm, which means that they have plenty of time to complete the online course before beginning work.

"It's important that my team understand exactly what is required from them to work in a Danish pig unit. The fear of African Swine Fever was the reason why I made the course part of their introduction. In Eastern Europe, the way "backyard farms"

manage their pigs is very different from large enterprises."

ENHANCED INFECTION PROTECTION

Robert Lynge Andersen has made it clear to his team that bringing meat from their home country into Denmark is banned. It is also against the farm's rules to bring a sandwich into the housing unit.

"I find it reassuring that I can provide my employees with a course in their own language when they start work. Many of the things seem completely logical to us, but this is not the case for them because they have a completely different approach to livestock farming," he says.

A RANGE OF ACTIVITIES TO SUPPORT THE INDUSTRY

To ensure high standards of health, productivity and infection protection, it is important that migrant workers are given the best possible introduction to their work at Danish farms. SEGES Danish Pig Research Centre has therefore launched a range of

activities that support their introduction to the industry and the recommendations and rules that apply at Danish farms.

"As we're currently experiencing a shortage of labour, we employ migrant workers," says Dorthe Poulsgård, Team Leader, SEGES Danish Pig Research Centre.

She believes that it is an advantage if the training in pig production is given in the

employee's own language as this minimises the number of misunderstandings.

"SEGES' online courses mean that farm owners can be confident that essential knowledge is conveyed to new employees – in their own language. The employees can also pick up any facts that have been accidentally omitted during their induction," says Dorthe Poulsgård.

TOOLS FROM SEGES DANISH PIG RESEARCH CENTRE FOR MIGRANT WORKERS IN THEIR MOTHER TONGUE

- > Online courses in Romanian, Ukrainian, English and Danish
- > Additions to employment contracts in Polish, Russian, English and Danish
- > Fact sheets for local anaesthetic procedures in Russian, Romanian, English and Danish
- > Managing pigs with hernia in Russian, Ukrainian, English and Danish

An extended health check results in higher piglet survival rate

AN EXTENDED HEALTH CHECK (OR USK, AS IT IS KNOWN IN DENMARK) ON PIGLETS THAT FAIL TO SURVIVE IS INTENDED TO REVEAL THE CAUSE OF DEATH, AND LEAD TO A SPECIFIC ACTION PLAN TO INCREASE THE SURVIVAL RATE.

Pig producer Anders Rold's sow unit team has been focusing its efforts on increasing the survival rate in the farrowing section.

When Anders Rold took over the farm last year, the piglet survival rate was not high enough – and action was required. For this reason, he decided to participate in Piglet Life 2.0 and rebuild his farrowing unit to a state-of-the-art standard.

Moreover, to get to the root cause of his piglet mortality, Anders Rold decided to arrange a piglet-USK, an extended health check.

"We wanted to see for ourselves what we were actually dealing with," he says.

An USK is a systematic post-mortem of a representative number of piglets. At the Laboratory for Pig Diseases, veterinarians examine possible causes of death among piglets. This results in a report which the pig producer and his veterinarian can use for drawing up an action plan for the farrowing unit.

"It has given us a better insight into the cause of piglet mortality at the farm. It's a valuable tool which has given us a lot to think about," says Anders Rold.

The team at Anders Rold's farm have worked hard to increase the number of weaned pigs per litter. They have managed to increase the average by 2.2 pigs per litter since he took over the farm, and in this respect the health check has been of great assistance.

"We're very pleased with the trend that we're seeing. We've still some way to go, but we're well on our way," says Anders Rold.

Resistance tests have also been conducted among the herd, which have provided Rold and his farrowing team with valuable insight.

"These have given us the confidence to be sure that the medicines we use in the unit are suitable for the challenges we face. We can also check that what we're doing already is correct," he says.

NEW VACCINE INTRODUCED

The extended health check on the farm also revealed that there was a tendency for the pigs to develop colitis caused by Clostridia. Vaccinations have now been introduced to prevent this.

"Since we introduced the vaccination, it's quite clear that the pigs have become stronger and healthier, so this has proved to be a good initiative," says Anders Rold.

Survival in the farrowing unit has increased by more than one pig per litter since Anders Rold took over the farm. He intends to use the USK service again, which can be booked through a veterinarian.

"I'm seriously considering whether I should arrange for another USK in due course. Maybe during the cold months so that other issues at the farm can be examined," says Anders Rold.

HELP FOR SELF-HELP WITH AN USK

A piglet extended health check, or an USK as it is known in Denmark, is a systematic post-mortem and analysis of a representative sample of dead piglets in a herd.

The aim is to reveal the causes of death and possible challenges in the housing unit so that improvements can be made to ensure a higher piglet survival rate.

“It has given us a better insight into the cause of piglet mortality at the farm. It's a valuable tool which has given us a lot to think about.”

Anders Rold, Pig Producer.



Measurements facilitate action

IN COLLABORATION WITH DANISH CROWN AND AARHUS UNIVERSITY, SEGES DANISH PIG RESEARCH CENTRE HAS DEVELOPED A NEW METHOD FOR CALCULATING THE CO2 FOOTPRINT PER KG DAILY GAIN OR PRODUCED FINISHED PIG. IN THE LONG TERM, SUCH A TOOL WILL MAKE IT MORE FEASIBLE TO PRODUCE A MORE SUSTAINABLE PIG. MOREOVER, IT CAN ALSO BECOME AN IMPORTANT COMPETITIVE PARAMETER WHEN COMPARED WITH OTHER FOOD PRODUCTS.

There are many good reasons for making Danish pig production even greener. The most obvious reason being that a more climate-friendly production benefits the environment. Another is that it may eventually become a fundamental requirement for pig production in Denmark: in other words, a licence to produce. Pork 4.0 is the name of the "calculating machine" as it is known by the team behind it. It is able to work out how much CO2 is

emitted per kg daily gain or per produced finished pig.

"There is a significant difference in how much CO2 is emitted per kg daily gain from farm to farm. Pork 4.0 enables data on feed composition, environmental technologies, productivity and the like to be used to calculate how many CO2 equivalents have been used to produce a finished pig or a kg of daily gain," says Chief

Consultant Finn Udesen, SEGES, who has been involved in the development of the calculating machine.

WHERE DO YOU STAND?

One of the benefits of being able to calculate the climate impact of an individual pig is that it gives finished pig producers a clearer picture of how climate-friendly their production is.

"We compile a report for the farmer which enables him/her to see how production compares with other pig producers as well as standard specifications. The vast majority are keen to improve and become more motivated when they can see where they stand compared with the others. It's easier to change and adapt production when you have something to measure yourself against," says Finn Udesen.

It is currently only possible to calculate CO2 emissions per kg daily gain or per pig for finished pigs. The long-term aim, however, is for sows to be included too, and for Danish Crown to use the carbon footprint of a pig to calculate the carbon footprint up to the time the meat reaches the store.

CARBON FOOTPRINT DECLARATION

Increasing numbers of food products carry a declaration as to how much CO2 has been expelled during the journey from farm to table. Pork 4.0 is a significant step on the journey towards being able to provide consumers with information about the carbon footprint of the pork they buy. Pork 4.0 can, therefore, become a competitive parameter for Danish pork in the global market.

"Last year, the Danish Agriculture & Food Council launched its vision for the Danish food industry to be climate neutral by 2050. As we know that our efforts to achieve more sustainable production are important to Danish farmers, we're working constantly to develop methods that can contribute

to this," says Hans Roust Thysen, Head of the Centre for Climate and Sustainability at SEGES.

"Danish agriculture contributes a very small part of the world's total greenhouse gas emissions. Over the years, Danish farmers have shown how innovative and adaptable they are. Together we can develop technologies that will benefit agricultural production throughout the world and contribute to reducing greenhouse emissions on a global level far in excess of Denmark's relatively small contribution," adds Hans Roust Thysen.



ZINC FREE 2022: Countdown underway

RESEARCH AND DEVELOPMENT CAN PAVE THE WAY FOR A ZINC-FREE FUTURE – AND FOCUS ON WEANING WITHOUT THE USE OF MEDICINAL ZINC IS ESPECIALLY IMPORTANT.

In 2017, it was decided that the use of medicinal zinc in European pig production should end by 2022. Since then, SEGES Danish Pig Research Centre has endeavoured to find alternatives with the same weaning diarrhoea prevention ability – without increasing the use of antibiotics.

"We know that we need to have an alternative ready when the use of medicinal zinc is discontinued in just under two years' time. We're therefore doing all we can to test the methods we believe can form part of the solution," says Nicolai Rosager Weber, Head of Department at SEGES Danish Pig Research Centre.

STARTING NOW

"Part of the solution" is an important point when it comes to alternatives to medicinal zinc. With the situation as it stands now, it is not certain that a solution will be found that replaces medicinal zinc on a one-to-one basis. The challenge, therefore, is to keep testing the ground.

"There are many new results from our research work, which are all freely available on our website. We have yet to find a miracle cure, however. Consequently, we're encouraging pig producers to test various solutions to find the method that works best for them. What works in one place may not

necessarily work as well in another," adds Nicolai Rosager Weber.

Experience from pig producers who have already phased out medicinal zinc shows that it can easily take up to six months to find the right method.

"Getting started now is vital. We already have some promising research results, but we're not looking at solutions that can just be implemented from day one," says Nicolai Rosager Weber.

SEGES Danish Pig Research Centre has accumulated experience from 26 farms that have succeeded in phasing out the use of medicinal zinc. It shows that 24 out of the 26 farms use the updated standards for protein allocation, have experienced teams and focus on feed uptake after weaning – all of which illustrates that a raft of measures is required to achieve success.

COLLABORATION

In addition to the trials at SEGES Danish Pig Research Centre, we are also involved in a number of other Danish and international trials, including the largescale AVANT, which is a collaboration between European research institutions.

"The AVANT project is focused on bringing

new technologies closer to the market. More specifically, replacements for antibiotics and zinc have to be found. It's imperative that our work makes a difference to farmers. We need to have technologies tested in practice. If it turns out that just a small part of what we're working on works well, then we'll have more control on weaning diarrhoea," says Poul Bækbo, Senior Consultant at SEGES Danish Pig Research Centre.

The AVANT project is testing seven products. When the initial tests have been performed, the three most promising will be trialled in production herds. That SEGES Danish Pig Research Centre is invited to participate in others' development projects whose purpose is to find alternatives to medicinal zinc is good news for Danish pig producers.

"From the outset, Denmark has been a pioneer in the efforts to find new methods for weaning pigs without using medicinal zinc, and this has come to the attention of the rest of the world. That we are invited to take part in other major projects is a sign that we are doing things right. It is also a great help to Danish pig producers as we know that by working with other major research institutions and companies, we can undertake expensive research projects that would otherwise have been unfeasible," adds Nicolai Rosager Weber.

ZINC FREE 2022

New results and information about our development work can be seen at [Svineproduktion.dk/Zinkfri2022](https://svineproduktion.dk/Zinkfri2022). You can also visit ZinkGuide.dk where, by answering a few questions, you can find out how close you are phasing out medicinal zinc in your herd.



Major trials on a smaller scale

THE GRØNHØJ TESTING STATION PLAYS A CRUCIAL ROLE IN SEGES DANISH PIG RESEARCH CENTRE'S RESEARCH WORK. COMPLEX FEED TRIALS AND SMALL-SCALE TESTING ARE CARRIED OUT HERE BEFORE BEING DEPLOYED IN PRODUCTION HERDS, WHICH BENEFITS BOTH DEVELOPMENT AND THE ECONOMY.



producers showed that those who had pigs with the best feed conversion rates operated with temperatures that were at a higher level than SEGES Danish Pig Research Centre's recommendations. This is also the case in Holland.

"Our recommendation is to use temperature curves which have a desired room temperature of 22 degrees when penning finished pigs and ending at a desired temperature of 18 degrees. In the trial, we compare this temperature curve to a curve that starts at 25 degrees and ends at 21 degrees," explains Torben Jensen, Chief Scientist at SEGES Danish Pig Research Centre.

TRIAL INVOLVING FEWER PIGS

If the trial had been conducted in a production herd, it would have presented the trial host with special requirements and involved many more pigs.

"In principle, we could have carried out the trial with one of our skilled trial hosts, but this would have required rigorous temperature control and the installation of expensive measuring equipment. We have advanced measuring equipment at Grønhøj, which can check the temperature in the housing unit and in the pigs' lying area. We can also measure the content of CO₂ and NH₃ in the atmosphere. We can therefore control the climate in the unit and limit the costs of the trial," says Torben Jensen.

On the surface, Grønhøj Testing Station looks like an ordinary Danish farm with a break room and office, changing room and shower, as well as housing units for pigs from 7 kg and above. An aerial view of Grønhøj gives a different impression. With no fewer than 60 silos, there are more feed components and mixes than the average pig producer could cope with.

"We can carry out complex feed trials because we have many different mixes and feed compounds. We feed with a spotmix system, which ensures that once the feed has been dispersed as required, the system is emptied. This prevents any mixing of feed compounds. We also have equipment that can measure a pig's individual feed consumption and daily gain," explains Peter Juhl Rasmussen who heads up the station.

Daily operations at Grønhøj more or less mirror those of an ordinary farm apart from the fact that employees are trained to

prepare various samples for analysis, e.g. by using biopsies or blood tests. As well as stockpersons to oversee the trials, Grønhøj also employs a team of two technicians to record the results.

A STABLE TESTING ENVIRONMENT

Conducting trials is expensive, not least because many batches are required to ensure that the results are reliable. Sometimes, up to 60 batches are involved before a result is ready. Small-scale trials can be undertaken at Grønhøj owing to the station's so-called climate rooms. These are housing units with two pens and 16 pigs in each pen separated by a feed dispenser. Measurements can be taken of CO₂ and ammonia emissions while the temperature can be more precisely controlled than in a production herd.

A stable temperature has enabled a new trial to get underway at Grønhøj. Last year, the consolidated experience of finished pig



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Torben Jensen, Chief Scientist at SEGES Danish Pig Research Centre.



CASTRATION OR ENTIRE MALES:

That is the question

BETTER CASTRATION BENCHES, TESTING IMMUNOCASTRATION UNDER DANISH CONDITIONS AND SPECIAL FEEDING STRATEGIES FOR ENTIRE MALES. THERE ARE MANY SUGGESTIONS AS TO HOW THE RISK OF BOAR TAIN AND AGGRESSIVE PIGS CAN BE REDUCED.

It is almost two years since local anaesthetic prior to castration became a requirement for Danish pig producers. At the beginning, the process was more time-consuming, but now it has become more a matter of routine. However, the castration process could still be improved. SEGES Danish Pig Research Centre, the Centre for Outdoor Animals and an industrial designer have collaborated on the design of a new castration bench.

"The castration benches that are on the market do not take a pig's size into account. The type that we've developed, however, does just that. The bench frees up more space for the legs and protects the pig's hips and spine. This is both because the shape has changed and the pig is secured with a rubber belt instead of a metal clamp. The new type of bench also speeds up the process for the pig," says veterinarian Lotte Skade from SEGES Danish Pig Research Centre.

MORE TIME FOR THE PIGS

This is also the view of supervisor Tommy Pedersen from Brønderslev in Jutland. He and his team have been involved in testing the prototype on 1,400 pigs.

"Castration can often put increased strain on the wrist when handling the pig, but the new castration bench has helped my team to protect their wrists and fingers. The process

has also become more efficient, which means that more time can be given to attending to the piglets and the sow," says Tommy Pedersen.

Although work on developing the new castration bench has not yet been completed, Lotte Skade expects it to go on sale at the beginning of 2021.

A POSSIBLE ALTERNATIVE TO CASTRATION

Although castration is an area where efforts continue to improve both animal welfare and working procedures, it is also important to examine the alternatives. SEGES Danish Pig Research Centre has acquired significant insight through trials under Danish conditions and using DanBred genetics. The latest addition is the testing of the vaccine Improvac®, also known as immunocastration (a vaccination against boar taint at 30 kg and 4-6 weeks prior to slaughtering). The preliminary results show that the vaccine makes entire males less aggressive. It is also expected to reduce the risk of boar taint. Both occur after the entire males have been vaccinated twice.

"We have seen from the trial that immunocastrated entire males behave like non-castrated entire males until they are vaccinated a second time. The level of aggression then declines, and they behave

in the same way as castrates," says Chief Scientist Hanne Maribo, SEGES Danish Pig Research Centre, who is in charge of the trial.

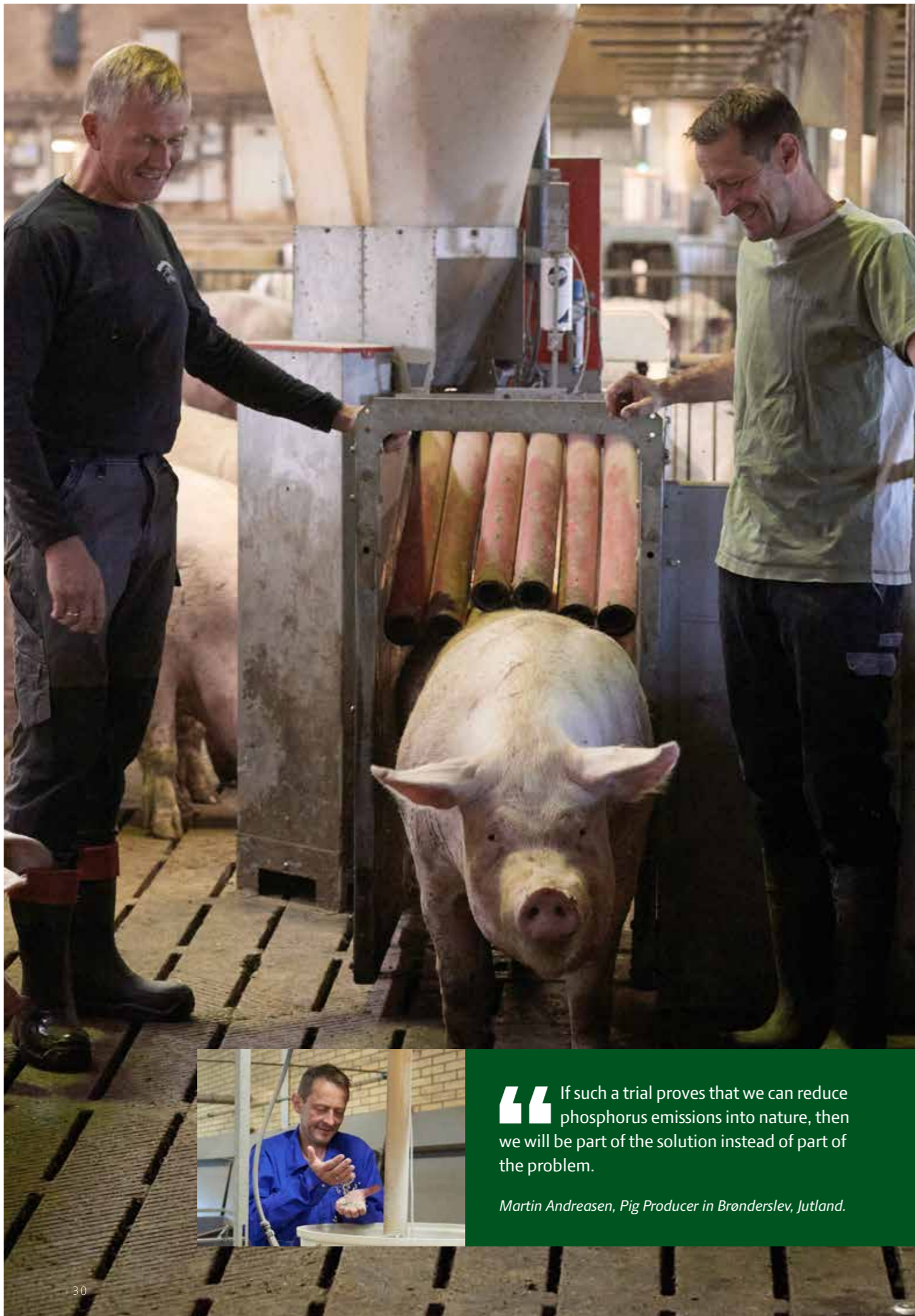
As far as boar taint is concerned, immunocastration is not a 100% safe solution. But Hanne Maribo believes that combining immunocastration with the selection of fathers with a low androstenone level as well as feeding for a low skatole level can achieve a low rejection rate of entire males due to boar taint. SEGES Danish Pig Research Centre's trials with this in recent years have produced some promising results.

All other things being equal, entire males have better productivity and meat percentage than castrates. This also benefits the climate as better feed conversion obviously requires less feed – but the risk of boar taint is a significant obstacle in terms of our largest export markets.

"Castration, as we know it today, is a safe solution for preventing boar taint. It is also a requirement from many of the countries that import Danish pork that our pigs are sows or castrates. Nevertheless, we need to look at the alternatives so that other options are available if castration is banned at some point or other markets open up to the possibility of importing meat from entire males," says Hanne Maribo.

“Castration, as we know it today, is a safe solution for preventing boar taint. It is also a requirement from many of the countries that import Danish pork that our pigs are sows or castrates.

Hanne Maribo, Chief Scientist, SEGES Danish Pig Research Centre.



MISSION ACCOMPLISHED: **Less phosphorus – better economy**

FOUR TRIALS CONDUCTED BY SEGES DANISH PIG RESEARCH CENTRE HAVE FOUND A WAY TO REDUCE THE USE OF PHOSPHORUS IN FEED FOR FINISHED PIGS – AND THE EMISSION OF PHOSPHORUS THROUGH SLURRY. THIS BENEFITS PRODUCERS BOTH ECONOMICALLY AND ENVIRONMENTALLY.

In 2017, the agricultural sector was granted permission to spread more nitrogen per hectare.

This was on the condition that producers kept below the limits for the amount of phosphorus that could be emitted. During the three-year transition period, finished pig producers were given permission to apply 39 kg of phosphorus per hectare, which should subsequently be reduced to 35 kg. This gave SEGES Danish Pig Research Centre time to study the benefit of a lower phosphorus content in pig feed. This could help ensure that pig producers can spread the maximum amount of slurry on their own land, thus saving on the purchase of nitrogen from commercial fertiliser and confining themselves to a smaller area for slurry spreading.

We have succeeded in achieving this. By using a high dose of phytase in the feed for finished pigs, producers derive both economic and environmental benefits. This has been shown in four trials where SEGES Danish Pig Research Centre has succeeded in lowering the amount of mineral phosphorus in feed. SEGES Danish Pig Research Centre's latest trial deserves a double tick.

"There are no detectable disadvantages to reducing the amount of phosphorus in feed,

which is of huge benefit to producers," says Per Tybirk, Senior Consultant at SEGES Danish Pig Research Centre.

The increased amount of phytase in feed for finished pigs means that less phosphorus is emitted on to fields. More slurry can therefore be spread per hectare compared to before the phosphorus ceiling was reached.

WIN-WIN

This is of enormous benefit to Lasse Eriksen and his farm on Djursland, north-east of Aarhus. He can spread slurry from more pigs per hectare, save money on feed and get more out of the fertiliser spread on his fields.

"This has really made a difference. We have changed our content of digestible phosphorus from 2.70 to 2.35 g per feed unit. This means around DKK 2.2 saved per pig. At the same time – and based on the same area – we can have 5-10 pigs more per hectare in the housing unit," says Lasse Eriksen.

In addition to having more pigs per hectare without hitting the phosphorus ceiling, there is another benefit.

"Instead of giving away the good slurry, I can now spread it on my fields. I hit the ceiling for nitrogen before hitting the current phosphorus ceiling, which is a win-win situation," says Lasse Eriksen.

And even though the feed mix has changed, the pig producer cannot see any difference in the pigs' daily gain.

"I was worried that the pigs would have more leg problems, etc. if we cut down on the amount of phosphorus in the feed. But there's been nothing like that, which is great," says Lasse Eriksen.

One of the other farmers involved in the trial is also pleased with the results. He welcomes the fact that SEGES Danish Pig Research Centre has solved one of agriculture's major challenges in terms of emissions.

"Phosphorus emissions are a hot potato politically. If such a trial proves that we can reduce phosphorus emissions into nature, then we will be part of the solution instead of part of the problem," says pig producer Martin Andreasen from Brønderslev in Jutland:

"It is of great benefit to us pig producers to be at the forefront of solving problems instead of a decision being forced on us by politicians. That would mean we'd have no influence on the outcome."

Based on the trials, the phosphorus standards were changed. The latest, updated standards can be found at svineproduktion.dk

“ If such a trial proves that we can reduce phosphorus emissions into nature, then we will be part of the solution instead of part of the problem.

Martin Andreasen, Pig Producer in Brønderslev, Jutland.

The sow that has more piglets than teats

MANY DANBRED SOWS GIVE BIRTH TO MORE PIGLETS THAN THEY HAVE TEATS FOR. MANY FARMS, THEREFORE, USE NURSING SOWS. HOWEVER, THE LATEST RESULTS SHOW THAT SOME SOWS CAN CARE FOR THEIR PIGLETS DESPITE NOT HAVING ENOUGH TEATS TO GO ROUND.

The national average for productivity in 2019 showed that an average of 17.5 live piglets were born per litter. The large litter size is largely the result of SEGES Danish Pig Research Centre's breeding work. However, large litters mean that the need for the sow to manage more piglets has increased.

Mette Hjort's herd was part of a trial to see whether sows could accommodate more piglets than they had teats for. This was important both for her and her colleague, Gitte Abildtrup Kallehave, who is in charge of the farrowing unit, because they are focused on their sows having a high level of self-weaning.

"When we joined the trial, we expected that some of the young sows would be able to look after one more piglet than they had teats for. But we were in some doubt about the performance of the older sows. What has surprised me most about the trial is that there have occasionally been older pigs that have been able to care for 15 piglets where previously they were unable to accommodate more than the 14 they had teats for. And what's more, they were big and beautiful pigs," says Mette Hjort.

ONE IN THREE SOWS WEANED 15 PIGS

The trial examined whether sows with 14-15 teats could manage 15 piglets without supplementary milk. The results showed that when the sow has 14-15 teats and is functioning well, there is potential for 15 piglets to reach 6.5 kg at day 21 corresponding to daily litter gain of 3.5 kg. It proved that one in three sows with 14 teats could handle 15 piglets.

"The trial has shown that it's certainly possible to challenge the sow's mothering abilities. However, this requires better management and a thorough assessment of every sow," says Vivi Aarestrup Moustsen, Chief Scientist, SEGES Danish Pig Research Centre.

AVOID MOVING THE PIGS

One of the benefits of the sow caring for her

own piglets is that this often has a beneficial effect on the piglet's daily gain. On the other hand, piglets moved to a nursing sow do not always achieve the desired weight at weaning.

"Moving to a new litter often leads to unrest, reduced well-being and lower daily gain for the piglet. If the sow is functioning well, there is potential for achieving a high level of self-weaning and also a high weaning weight by letting the sow look after her own piglets. There is often untapped potential when the piglets aren't moved to a nursing sow," explains Vivi Aarestrup Moustsen.

"It is essential to have an overview of the sow's teats and general well-being and to ensure that there is enough space in the pen for the piglets to access the full set of teats. Only then does the sow have the potential to look after more piglets than she has teats".

HOW TO GET YOUR SOW TO LOOK AFTER MORE PIGLETS

- > Ensure there is enough space in the pen for the piglets to access the full set of teats
- > Put 15 piglets to both young and older sows which have 14-15 functional teats
- > Reduce the number of movements to ensure that the sow feeds and thrives and that the piglets have free access to the sow's teats.



“What has surprised me most about the trial is that there have occasionally been older pigs that have been able to care for 15 piglets where previously they were unable to manage more than the 14 they had teats for.”

Pig Producer Mette Hjort with Gitte Abildtrup Kallehave, who is responsible for the farrowing unit.

EXCITING RESULTS IN THE PIPELINE

2020 HAS DELIVERED A RANGE OF NEW RESULTS, WHICH WILL HELP TO ENSURE THAT DANISH PIG PRODUCTION CONTINUES TO BE WORLD CLASS IN THE FUTURE. 2021 WILL BE NO DIFFERENT.


The majority of SEGES Danish Pig Research Centre's expenditure is on innovation and breeding work. This is essential for us to compete on some of the most important criteria such as quality, animal welfare and efficiency. We must remain on the front foot and continue to work on what is important for you, your farm and your bottom line. This will continue in 2021 when additional funds will also be spent on developing and disseminating methods for implementing new knowledge in the housing units.

We share our latest results on a regular basis, and you can always obtain an overview at Svineproduktion.dk, Facebook.com/SegesSvineproduktion, seges.tv and through our podcasts.

If you wish to dig down into our results, the publications produced by our experts will give you a thorough insight into our research.

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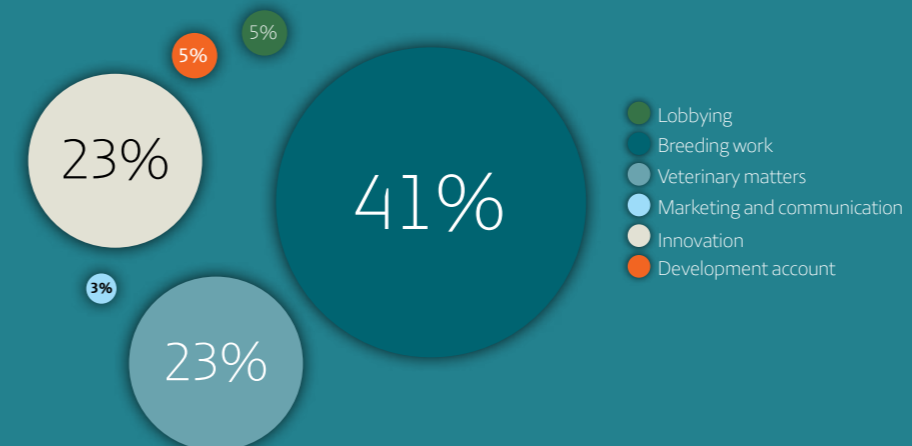
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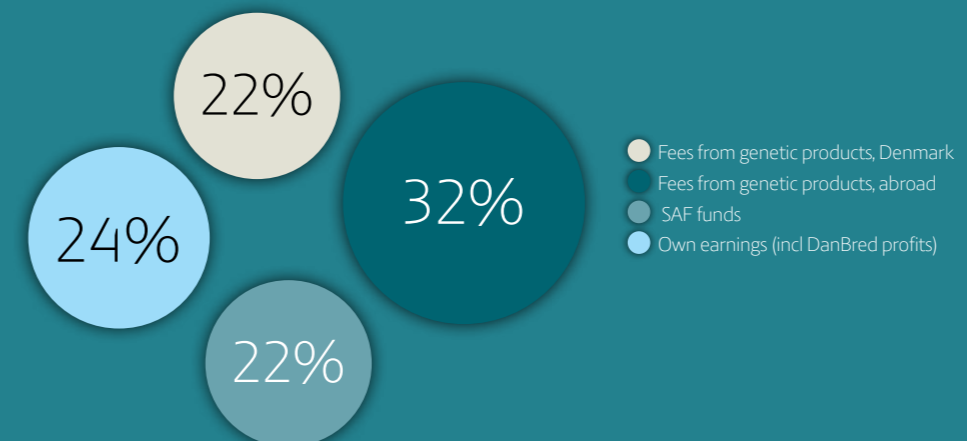
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WHERE DOES THE MONEY GO?



WHERE DOES THE MONEY COME FROM?





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