PIGWEB Newsletter

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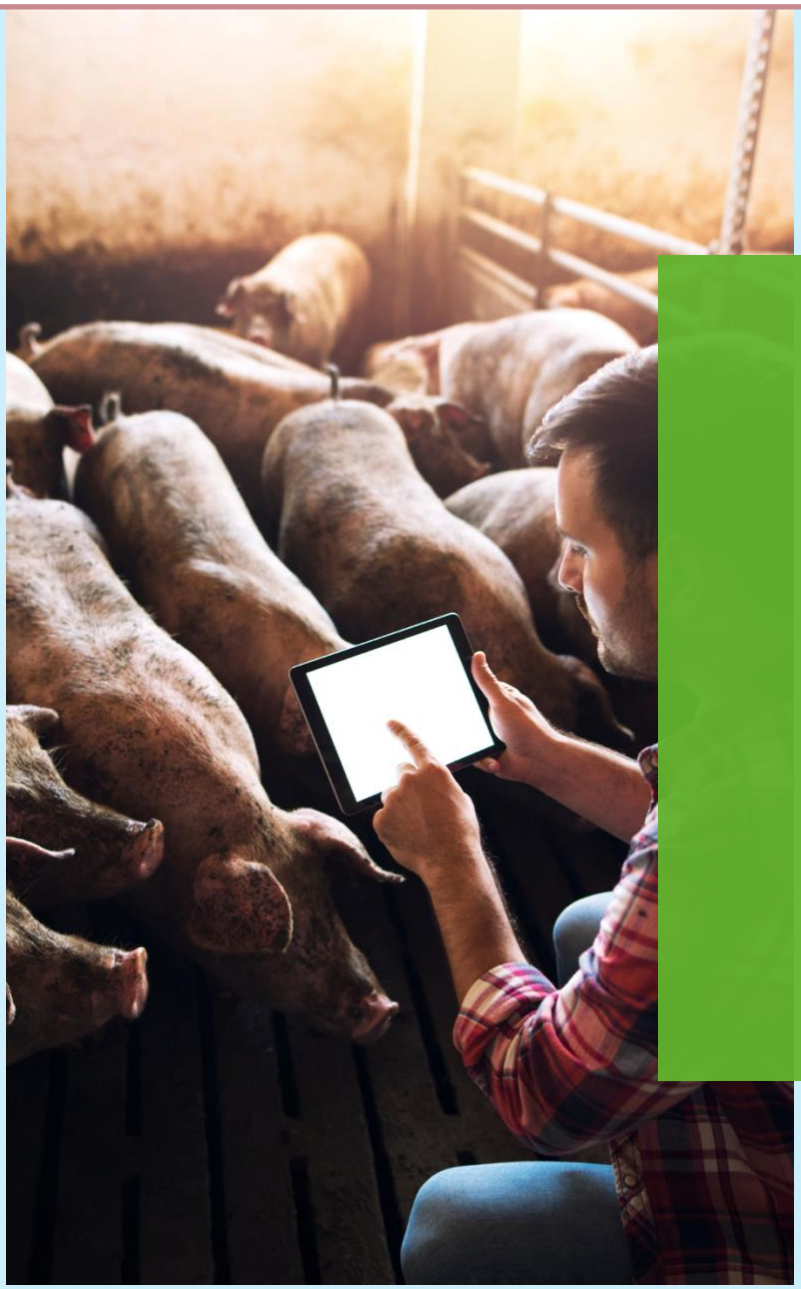

Credit: Canva

PIGWEB: A new European research initiative creating a safer and more ethical pig farming industry

Pig farming is among the most important industries in the EU. It gives work to over 2 million pig farmers, making Europe the second-largest producer of pig meat worldwide after China and the first in terms of exportations.

It also presents a significant variety in rearing methods and farm sizes across the 27 member states - from small backyard farming to extensive industrial facilities.

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EDITORIAL

Jaap van Milgen INRAE – Coordinator of the PIGWEB project

News Index

Dear stakeholder,

We are proud to present the first newsletter of the PIGWEB project, which will provide you with some first results and on-going activities of the project. PIGWEB is an infrastructure project for pig research funded under the Horizon 2020 framework program. It has a total budget of five million euro equally divided between Transnational Access (TNA), Networking Activities (NA), and Joint Research Activities (JRA).

PIGWEB is an "open" project. Through TNA, we offer the possibility to stakeholders to carry out their research project in one of the PIGWEB installations (see later in this newsletter). Being "open" means also that we have to share and this involves sharing methods on how we measure and report on traits and harmonize these as much as possible. It also means that we have to work towards a culture of sharing data, so that these are "FAIR" (Findable, Accessible, Interoperable, and Reusable).

The JRA focus on how we can improve our research tools and methodologies, for example, by identifying research methods that are non- or minimally invasive. This includes alternatives to digestion studies and blood sampling procedures. Also, we work on issues that are complex by nature and cannot be measured by a single or a few traits (e.g., health and welfare) or traits that are simple by nature but complicated to measure (e.g., body composition). The measurement and analysis of multiple traits will tell us something about the state of the animal, more and more of which are non-invasive and can be carried out in real time. One of the JRA activities is to carry out this "integrated phenotyping" and to develop a research toolbox.

PIGWEB is an "open" project, and we want to stimulate exchanges with different stakeholders (i.e., academics, industry, policy makers, society at-large) about pig production and pig production research. Livestock production systems are often under scrutiny, and this is even more so for experimental animal research. This means that we have to engage more in an open and constructive dialogue with society. We organized a webinar on 21 March with the challenging title "Who needs experimental research if we have big data?" Most of us agree that we can reduce animal experimentation, but by how much 50, 80, … 100%?

Over the four years to come, we will be present at different meetings, and we will organize events such as a Summer school for young scientists on responsible animal experimentation, a "Science and Society" hackathon (PigHack), and a workshop to identify, with stakeholders, the future needs for pig research infrastructures in Europe.

We hope that this newsletter gives you a first glance on the PIGWEB activities to improve and share the experimental research infrastructures for a sustainable pig production in Europe.

PIGWEB:
A NEW EUROPEAN RESEARCH INITIATIVE CREATING A SAFER AND MORE ETHICAL PIG FARMING INDUSTRY

By Massimiliano Saltori (ESCI)

Credit: Canva

Pig farming is among the most important industries in the EU. It gives work to over 2 million pig farmers, making Europe the second-largest producer of pig meat worldwide after China and the first in terms of exportations.

It also presents a significant variety in rearing methods and farm sizes across the 27 member states - from small backyard farming to extensive industrial facilities.

In this context, the EU institutions play a fundamental role in protecting the products' high quality and guaranteeing an ethical treatment of the animals.

This happens thanks to specific directives, regulations, and steady cooperation between the farming industry and the research community. That's why these standards are possible today in the European market.

Scientists and stakeholders have often operated together on different pig farming projects in the past years. However, little has been done to better organize the collective efforts of research facilities, which remain fragmented and not always accessible.

And here's where the PIGWEB project comes into play.

The initiative stems from a simple question: is it possible to improve the quality and the methodology used in the pig farming industry?

Scientists and researchers working in this field want to harmonize protocols and best practices and promote the use of new high standards for the farming industry.

This will be possible through a coordinated effort between various research institutions to build a European infrastructure for pig research.

The project started in March 2021 as part of a 5-year plan, financed by the EU and 16 partners with a budget of 5.7 million euros. It also involves 16 partners from 9 countries and 28 experimental pig research infrastructures, and associated laboratories.

In addition to addressing the future challenges faced by the European farming industry, the initiative will also position Europe as the leader in relevant fields, such as animal research for food production.

PIGWEB PARTNERS MAP

ILVO

#1 PIGWEB STAKEHOLDER WEBINAR 21st MARCH 2022

WHO NEEDS EXPERIMENTAL RESEARCH IF WE HAVE BIG DATA?

That was the question we tried to focus on with the close collaboration of a high-level panel and their insightful presentations at our first PIGWEB webinar on 21 March 2022.

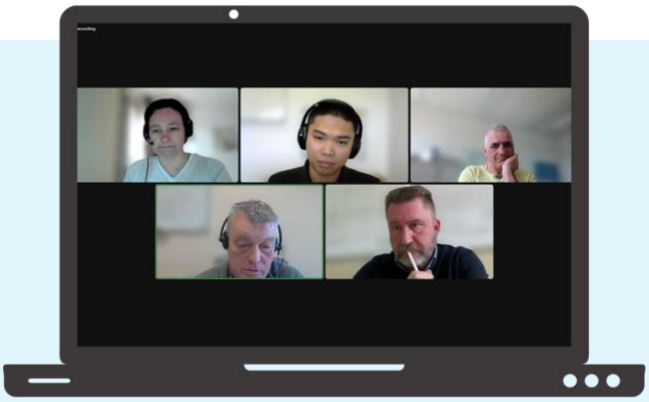
Throughout the webinar, we addressed animal experimentation and the benefits of knowledge software. We introduced testimonials from the pig industry and discuss the different ways to work towards minimizing experimental research using Big Data.

PIGWEB's project coordinator Jaap van Milgen (INRAE) started the webinar by providing information on the objectives of the PIGWEB project. He continued his speech by summarizing the European Parliament's action plan on the "Joint motion for a resolution on plans and actions to accelerate the transition to innovation without the use of animals in research, regulatory testing and education", underlining that the plan does not mention food safety or agriculture. The motion by the Parliament was adopted with 667 votes to 4, showing the **Parliament members' intention to work towards a research agenda without using animals.**

Giuseppe Bee (Agroscope), PIGWEB's WP7 Leader on "A research toolbox using non- and minimally invasive experimental methods", took the floor and his presentation focused on the animal experiments in the livestock production. He addressed the issue on how the livestock trials are performed, why models might not be always sufficient to replace in vivo trials, and how the PIGWEB project contributes to the European pig research. He expressed that *in vivo* trials are especially necessary to measure efficiency, animal health and welfare, pollution caused by livestock production and meat quality. He also pointed out that although we have Big Data, the accessibility of data is limited. **Big Data and mechanistic nutrition model can help to reduce, but never replace animal experimentations**. Giuseppe also underlined that, in case EU does not allow in vivo trials, this may put the innovation and competitiveness of the European livestock sector at risk. The outcomes of projects like PIGWEB will propose alternative experimental methods for animal experimentations. He ended his talk by mentioning the importance of **researchers engaging in an open and constructive dialogue with the general public** about the purpose of animal experimentation.

PigChamp CEO Carlos Piñeiro started his presentation by explaining the strengths and weaknesses of experimental research and Big Data. He introduced the **new approach of a living farms model**, explaining that this hybrid model has many advantages as digital technologies can collect huge amounts of data from real farms of high quality. However, for interpretation of the results expertise from veterinarians and technicians is needed.

As a last speaker, Francis-Amann Eugenio, a PhD student at INRAE PEGASE and BCF Life Sciences, provided his point of view on the topic as a young scientist. He mentioned that the **animal experimentation could be overall reduced**, where extensive research has been done on specific issues such as low protein diets. He expressed his interest on Big Data availability would allow young scientists to use **meta-analysis instead of performing animal experimentation**.



Discussion Session

Catherine Larzul (INRAE), leader of the WP3 on "Data sharing and FAIR principles" in PIGWEB started the discussion session with 2 poll questions for the participants. The first question was "Compared to today, how much do you think we can eventually reduce animal experimentation?" The most selected answer was that **animal experiments could be reduced by 0%-25%.** The second question was "What should be the relative role of the actors involved to attain this reduction?". The given choice of stakeholders included policymakers, researchers, society and industry. The attendees voted mostly for **researchers with a relative role of 75%-100%** for the reduction of the animal experimentation. The responses to both questions illustrate the discrepancy between what the European Parliament aims to achieve and what the participants of the Webinar think is feasible. Most of the participants in the Webinar are involved in (experimental) animal research and the responses to the questions can be different from opinions of other stakeholders, and illustrate the necessity to engage in an open and constructive dialogue with all stakeholders.

To round up and end the session, Jaap van Milgen closed the webinar. Jaap pointed out that society is worried about animal production and even more so about using animals in research for production purposes. **The research community needs to be more pro-active and engage in an open and constructive debate with society** on this topic. Concerning Big Data, we have access to experimental facilities and many "old" research results are underused. New technologies provide new opportunities and many measurements are registered in real time. These non-invasive measurements can provide information about the animal's status and there is a **great potential in combining different sources of Open Data**. Jaap ended the webinar by saying that we need to give more thoughts on this important and sensitive issue and how to move forward.
Overall, the webinar reached out to 120 participants from different countries and stakeholder groups. The recording of the whole joint project session can be watched here!
We would like to thank all participants and speakers for actively joining the session and for all their inputs.

We are looking forward to continuing our PIGWEB webinars!

CLICK HERE TO WATCH THE WEBINAR

Image: Word cloud activity at the kick-off meeting on describing the PIGWEB project

PIGWEB KICK-OFF MEETING

The European project PIGWEB ("An infrastructure for experimental research for sustainable pig production") is funded under the EU Horizon 2020 programme and started its journey with the virtual Kick-off Meeting (KoM) on 3 March 2021. The project will run until February 2026.

The meeting started with the introduction and presentation of the project coordinator Jaap van Milgen (INRAE). At the meeting, the project's objectives, aim, and impact were highlighted and leaders of the seven work packages explained their roles and responsibilities, and expectations of the participants. Stakeholder mapping activity was among the interactive sessions in the meeting, where partners categorized different levels of PIGWEB stakeholders.

It is important to underline that PIGWEB and all partners fully embrace the European Green Deal and the "Farm to Fork" strategy to make Europe the world's first climate-neutral continent by 2050. PIGWEB will play a key role in identifying the levers that can be used to attain the goals of the Green Deal to produce safe, nutritious, and high-quality food with a minimum impact on nature. It will also address citizens' concerns about the welfare of farmed animals. PIGWEB contributes to all these aspects by a "Pig to Pork" approach.

We will continue our fruitful meetings with promising results together with our partners and stakeholders. We look forward to having our next annual general in-person meeting on 14-15 June 2022 in Uppsala, Sweden.

PIGWEB AT EAAP

Credit: Duru Eroglu

At EAAP 2021 in Davos, PIGWEB's project coordinator Jaap van Milgen (INRAE) presented the project and provided information about the transnational access (TNA) calls. He also invited the audience to join the PIGWEB's stakeholder platform.

The session gathered around 50 participants, which was also streamed online. Jaap van Milgen pointed out in his speech that "Sustainable pig production requires that its research is carried out in a responsible way."

In addition, at the conference, following a great introductory speech by PIGWEB's WP1 leader Sam Millet (EV ILVO), Jaap van Milgen received the EAAP Leroy Fellowship Award 2021. We would like to congratulate our project's coordinator for his outstanding scientific contribution to animal production!
You can also watch Jaap van Milgen's talk entitled "Linearity, circularity, control and robustness in biology and livestock production systems" during the EAAP plenary session "The multiple roles of livestock in sustainable development".

> "Sustainable pig production requires that its research is carried out in a responsible way

Credit: Canva

THE ATF STAKEHOLDER MEETING

By Isabella Beck *Jørgensen*

When people think about Brussels, they might think about diplomats, European politicians, fries, and strict dress codes with the colour codes of light blue, dark blue, white and grey. If you look at the picture, Jaap is doing it in his own way by not following the "classic" Brussels look. If you look even more closely, to the picture you will see a white tie hanging down from the speaking desk in front of Jaap. This is again a very unusual set up in Brussels.

Our PIGWEB Project Coordinator Jaap van Milgen is known for mastering creative communication very well and creating a dynamic *ambiance* with the audience when he is on stage. The tie is of course illustrating the logo of PIGWEB, and this is a classic example of Jaap drawing people's attention into the world of pig research in a very non-technical and efficient manner. You might also think "Hey, that presentation was not held over Zoom?".

You are right. Some of us were lucky to participate physically in the Animal Task Force (ATF) and The European Feed Manufacturers' Federation (FEFAC) Horizon 2020 Projects Stakeholder event in the beautiful Foundation Universitaire Stichting, located in the heart of Brussels. Jaap presented the aim of PIGWEB and how the project is different from other EU projects.

"We want to provide a policy brief on the ethical aspects of animal experimental pig research and identify the needs for future infrastructures on pig research. For the society at large, we want to open up and organize a constructive debate on experimental pig research" stated Jaap in his presentation.

JOIN THE PIGWEB STAKEHOLDER PLATFORM

By Isabella Beck *Jørgensen*

One of the most important milestones of PIGWEB is to connect people across Europe working within the pig sector. PIGWEB aims to strengthen the pig research community by providing and facilitating access to research infrastructures, reinforcing a culture of cooperation between the research community and industrial and societal stakeholders!
We have created a space on LinkedIn where people from across Europe can get in contact and stay updated on news, events, scientific publications, and career opportunities. Although PIGWEB is very active on Twitter, LinkedIn, and Facebook, it is highly important for us to create a forum where the members can share reflections and news. The Stakeholder Platform is created as a closed group on LinkedIn and participants must be verified before having full access.

For PIGWEB, stakeholder engagement is at the very core of the project. This is to ensure the produced knowledge will improve and support the pig research community and provide the most promising result can be transferred. It is also essential to receive stakeholders' views on developments of the project during the project's lifetime.
We have some very simple house rules in the Stakeholder Platform and invite everyone to join and take part of this scientific networking space and engage in fruitful debates.

Link to the Stakeholder Platform:
https://www.linkedin.com/groups/12592142/

Credit: Isabella Beck Jørgensen

Another important take home message from the Stakeholder event was stated by EFFAB's director Ana Granados Chapatte. Ana stressed *"Both national and European research levels must be more connected"*.
The event was insightful and reminded all of us how much we missed meeting in person and exchanging work related events and discussing the future of agriculture.

Thanks to ATF, for a warm and well organised event. It was a pleasure to participate, network and share knowledge.

If you would like to watch Jaap's presentation, please use the following link:
https://www.youtube.com/watch?v=dFoWPmq0mv4

PIGWEB BROCHURE IS HERE

We are happy to announce that the PIGWEB brochure is now available!

The brochure summarizes the aim and structure of PIGWEB and gives an overview of the expected results and impact. The brochure is available in English and German already.

Keep an eye on our website as more languages will be available soon!

THE PIGWEB JUNIOR COMMUNITY

BY NORALY VAN HEMERT (EFFAB)

On the 10th of January, the PIGWEB Junior Community kicked-off. This open community provides a network for post-docs, PhD students and early-career scientists working on pig production. It aims to provide an environment in which early-career scientists from all over Europe can exchange with other researchers in pig production.

The community will offer training opportunities for graduates and postgraduates. By presenting results at stakeholder meetings, members get the chance to increase the impact of their research. The members lead the community in partnership with EFFAB, and the first lively discussions are already taking place!

The expertise of early-career scientists is very much wanted and needed to advance sustainable European Pig Production. Are you an early-career scientist? Do you wish to exchange ideas, broaden your network, increase the impact of your research and be on the front row for cutting-edge research in European pig production?

Then click here join the PIGWEB Junior Community on LinkedIn

Together, we can build a flourishing community in which we can lift each other and sustainable European pig production.

Credit: PIGCHAMP

Articles

ONGOING WORK ON WP2: BEST PRACTICES FOR PROTOCOLS, USE OF STANDARDS AND ETHICS

Rebecka Westin - WP2 Leader (SLU), Anna Wallenbeck - WP2 Deputy Leader (SLU)

In WP2, the aim is to harmonize and improve protocols for basic management and standard traits and to develop standard operating procedures (SOPs) for specific experimental techniques. We also work on ethics in pig experimentation.

In the process of identifying relevant basic management and standard traits to develop improved protocols for, a two-step questionnaire has been conducted. Moreover, definitions of basic management and standard traits as well as criteria for selection of what management procedures to priorities has been agreed upon. Next step in the process is to decide on the improved protocols to be tested in partner pig research facilities. During a digital workshop in March 2022, the first version of drafted protocols was discussed. This work will continue during a physical workshop in June 2022, in connection to the PIGWEB annual meeting in Sweden.

The development of SOPs for experimental techniques is performed in specialized working groups and the work is going according to plan. One SOP, focusing on saliva sampling is almost finished.

In the work concerning ethics in animal experimentation, gathering of information from different countries has been done through a questionnaire and review of previous reports of the subject. Compilation is currently ongoing and will be discussed at the general PIGWEB meeting in June 2022.

Credit: PIC

WP3 PROGRESS - FAIR DATA IN PRACTICE

Catherine Larzul – WP3 Leader (INRAE)

Open science is a key feature of PIGWEB project as part of an effort to improve the full exploitation of data collected on animals, to benefit from previous research and to contribute to share best practices and reproducible results. Making the better of each animal-recorded trait requires a better management of the data produced by research infrastructures, a general use of ontologies and enriched metadata.

However, open data policies and practices are heterogeneous among animal scientists. SLU carried out a survey within the PIGWEB pig research community to find out more about experiences and attitudes towards sharing data, handing research data, and identify the challenges that researchers and their institution face concerning data, and its impact on workload and resources.

The survey was organized in such a way that it ensures a better comparison between norms and needs within the pig research community and other communities to pinpoint differences as well as similarities when working with data intensive research. A representative of each university and institute was also given the opportunity to detail their institutional policies regarding open data, because it is important to understand to which point researchers are encouraged and supported by their own institution toward open data routines.

For the institutions with an active open data policy, information is now available on metadata description and collection, platform for data sharing or training in data sharing following FAIR (Findable, Accessible, Interoperable, Reusable) principles. If a majority of survey contributors is aware of open data importance and FAIR principles to sustain data sharing, there is an underutilization of open data opportunities.

A ranking of the main obstacles and benefits for open data and identification of needs will help building an ad hoc training program for PIGWEB participants. And in the near future, a PIGWEB platform will offer an easier access to data generated within the framework of the research infrastructure activities.

VAMPIRE PIG: SAMPLING BLOOD LIKE A KISS

Catherine Ollagnier, DVM (Agroscope)

Analysis of blood parameters is crucial for many experimental studies. However, blood sampling in pigs is commonly performed by venipuncture or by catheterization with varying degree of isolation, fixation, and invasiveness. This project aims to refine or replace the blood sampling procedure by applying methods that have been developed for human medicine, or testing novel approaches. Indeed, as blood sampling is also painful and stressful for humans, new technics have been developed to refine and reduce the act.

A growing number of blood tests can now be performed with a small amount of blood, which requires efficient laboratory methods. No need to puncture the vein anymore, blood sample can be limited to a drop of blood taken from the skin. If venepuncture is needed, the patient's experience will be improved by a good visualization of the veins thanks to an infrared camera, or by replacing multiple samples by a minimally invasive sensor.

And who can sample blood without being noticed? Blood suckling parasites are well known for their minimally invasive blood sampling. So why not parasiting the parasite? Kissing bugs (*Dipetalogaster maximus*) are blood suckling parasites originating from Mexico. The bite of Dipetalogaster is essentially painless because of the very thin mouthpart apparatus and the anaesthetic effect of its saliva. Laboratory bred Dipetalogaster were already used for collecting blood samples from zoo animals and wild animals.

Animal studies will be performed at Agroscope and INRAE, where blood will be sampled with minimally invasive technics using kissing bugs, infrared camera, finger prick lancet (to obtain a drop of blood) and skin taped sensor (for continuous monitoring and analysis of blood parameter in a lab-on-chip). FBN will refine the laboratory analyses to allow evaluation of representative parameters in a drop of blood. Sensitivity, specificity, repeatability and the animal friendliness of the technic will be compared, and the most appropriate method monitoring selected blood traits will be implemented for testing in WP7.

Top: Kissing bug (Dipetalogaster Maximus). Bottom: sampling blood without being noticed.

Credit: Agroscope

PIGWEB TNA-PROGRAM

Carolien De Cuyper (EV-ILVO)

The transnational access (TNA) program of PIGWEB allows external teams (both academic and private researchers) to access the partners' infrastructures through the submission of research proposals.

A budget of about 1.5 million euro is reserved to provide free access to top-quality pig research installations across Europe in an easy and transparent way. In total, 28 experimental pig research installations are available including feed mills, barns for gestating and lactating sows, and for nursery and growing-finishing pigs, calorimeters, metabolic cages, access to different types of pig breeds and lines, abattoirs, scanners, video and sound recording systems, and laboratories for omics, lipid, mycotoxin, and NIRS analyses.

Are you interested in more detail about the installations offered, as well as the eligibility and the procedures to be followed? Further information is available on the project website:

https://www.pigweb.eu/call-for-proposals

The first of the three TNA calls, launched in September 2021, was a great success: 20 first-stage proposals were submitted. In general, the proposals were of very high quality and addressed different research topics offered through this call, with a strong interest in performance trials. A two-stage application process is used. For the first stage, a general first-stage proposal was expected, whereas in the second stage, a detailed proposal should be submitted. First-stage proposals were reviewed based on their rationale, scientific quality, and valorization strategy.

Of the 20 first-stage proposals submitted, 11 were selected to proceed to the second stage and are invited to submit a second-stage proposal, which should be prepared in close collaboration with the TNA provider. Second-stage proposals are to be submitted by the end of March 2022. The main selection criteria for the second stage are the scientific and ethical soundness of the proposal, together with the practical and financial feasibility.

Are you triggered by the PIGWEB TNA program? Interested in for example calorimetry or the production of experimental feeds? We are pleased to announce the launch of the second call in September 2022! Looking forward to your proposals. Any questions? The TNA Management Team is available for advise on the most suitable research facilities, to assist in the submission of proposals and to answer any questions about the TNA program. You can contact the team via the contact form on the project website:

https://www.pigweb.eu/contact

FREE ACCESS TO

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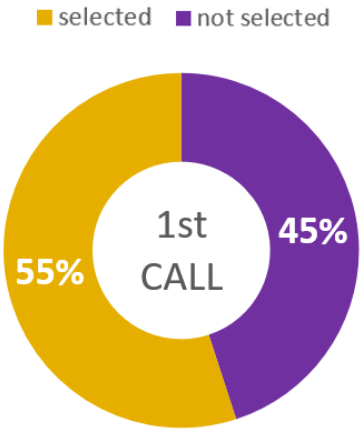
EXPERIMENTAL PIG RESEARCH INSTALLATIONS

SUCCESS RATE FIRST-STAGE PROPOSALS



SEPTEMBER 2022

LAUNCH SECOND CALL

PROXIES TO EASILY PREDICT GROWTH EFFICIENCY, BODY COMPOSITION AND HEALTH OF PIGS

Giuseppe Bee (Agroscope) and Veronika Halas (Hungarian University of Agriculture and Life Sciences - MATE)

When performing animal experimentation, traits like body weight, body weight gain and feed intake per pen are assessed routinely whereas daily feed intake of individual pigs and the associated feeding behaviour require dedicated equipment like automatic feeders. To assess behavioural interactions and health status of individual pigs or groups of pigs, non- or minimally invasive methods such as facial expression, tail position and movement, heart rate and body temperature are currently used.

When more detailed information about underlying biological mechanisms are of interest, animal scientists often need to rely on invasive methods like sampling of blood, intestinal content, and urine. These traits alone and even more so in combination, mirror animal health and welfare, growth performance, nutrient efficiency, and carcass composition. →

Image credits: Agroscope

In view of the increasing concerns towards animal experimentations of the general public and of animal scientists, non- or minimally invasive methods or proxies are required to assess the metabolic health and welfare state of pigs. Therefore, in a first step we use historical data provided by project partners to develop model algorithms using combinations of existing proxies (e.g. feeding behaviour and growth pattern) and methods (e.g. dual x-ray absorptiometry to determine body composition, thermal imaging to determine body temperature) that relate to growth performance, nutrient efficiency, carcass nutrient composition, and health and welfare status, and to identify possible trade-off among these traits.

Our activity relies on the basis that measuring a large number of traits, using non-invasive proxies and methods, in combination with sophisticated data analysis methods can be as informative (or even more informative) about the status of an animal as measuring a limited number of traits using invasive proxies and methods. In a second step, the accuracy and reliability of these algorithms, proxies and non-invasive methods will be tested in a multisite animal experiment.

Profiles

"The human web behind the pigs"
PIGWEB Management Team

JAAP VAN MILGEN
INRAE

Jaap van Milgen is a native from the Netherlands and he has been working in France for INRAE since 1992. His research program focused on energy and protein metabolism in pigs using both experimental and modelling methods. With his colleagues, he has co-authored the InraPorc model and software tool which is widely used in higher education for teaching nutritional principles and by the industry. From 2015 to 2020, he coordinated the Horizon 2020 Feed-a-Gene project, which aimed to adapt the feed, the animal, and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems. He is currently the chair of a consortium of the EAAP, BSAS, and INRAE that publishes the scientific journals *animal*, *animal – science proceedings*, and the newly created journal *animal – open space*. Jaap is the coordinator of the PIGWEB project.

LAURE TRANNOY
INRAE Transfert

As a lawyer, Laure TRANNOY has been managing collaborative projects for 10 years, ranging from very small to very large ones, including projects on shared instrumentation. In PIGWEB, she is in charge of the project management tasks supporting the Coordinator.

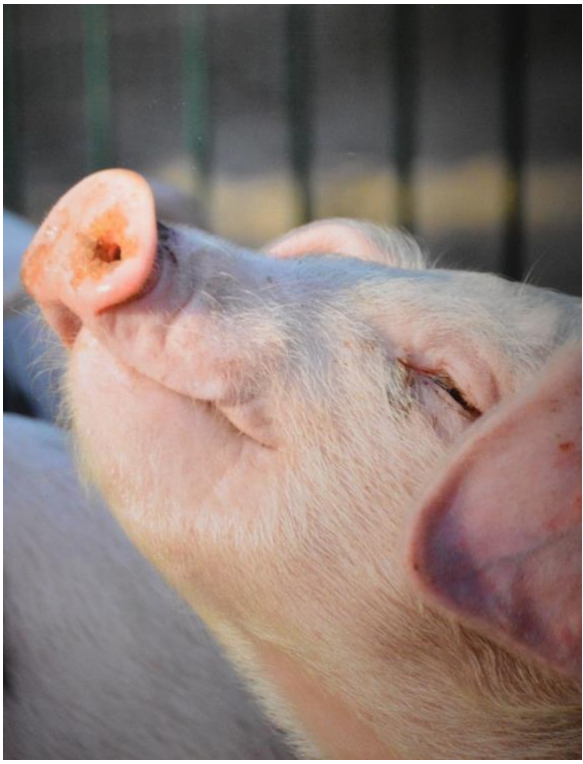
Credit: PIC

Relevant Publications

Check out these publications by PIGWEB partners

Click on the titles to access the content

- The potential of feeding patterns to assess generic welfare in growing-finishing pigs
- MEPs demand EU action plan to end the use of animals in research and testing
- Age-dependent development in protein digestibility and intestinal morphology in weaned pigs fed different protein sources
- Interaction between fat and fiber level on nutrient digestibility of pig feed
- How two concurrent pandemics put a spoke in the wheel of intensive pig production
- Machine learning algorithms can predict tail biting outbreaks in pigs using feeding behaviour records
- Dietary influences on nutrient partitioning and anatomical body composition of growing pigs
- Models of feed utilization and growth for monogastric animals



Credit: Breed4Food

Videos

KoM WP Presentations

Jaap's presentation at EAAP 2021

#1 PIGWEB Webinar March 2022

Upcoming events

*SMARTCOW Final Conference

6th April 2022
Brussels

–Belgium–

4th International Conference on Animal Health Surveillance

3rd-5th May 2022
Copenhagen

–Denmark–

13th European Symposium of Porcine Health Management

11th-13th May 2022
Budapest

–Hungary–

*DPP 2022

17th-20th May 2022
Rotterdam

–The Netherlands–

ECPLF & PDC 2022

29th Aug – 2nd Sep 2022
Vienna

–Austria–

*73rd Annual EAAP meeting

5th-9th Sep 2022
Porto

–Portugal–

*7th ISEP

12th-15th Sep 2022
Granada

–Spain–

*with PIGWEB on the agenda

PIGWEB

pigwebh2020@gmail.com

For more information about the PIGWEB project, visit our website:

www.pigweb.eu

You can also follow us on our social media accounts:

And subscribe to our mailing list!

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