Annual Report 2020

Embrapa

Suínos e Aves

FOREWORD

2020 presented many challenges and brought a new way of looking at the work environment and its relationships. It was, for sure, a year of many accomplishments and a time to open a novel outlook to the future as well. This document shows a little of the much we did throughout the year to tackle the demands we have gotten from the Brazilian society and contribute to developing the production chains we support.

The difficulties were numerous – e.g., restricted budget, reduced staff due to the Embrapa Remunerated Layoff Plan, and the COVID-19 pandemic. However, we went through it efficiently by counting with a qualified collaboration of our technical and support team. Public and private partners also played a pivotal role in our actions and achievements.

We made varied efforts to keep in touch with our audience. To make it, we deeply entered the virtual world. For example, we broadcasted via the Internet 52 hours of online lectures, live streams, technical events, and technical meetings in 2020.

We carried on developing research to strengthen public policies in 2020 - e.g., projects to modernize the Brazilian food safety and inspection services, control wild boar spreading, and analyze the use of winter cereals to feed pig and poultry. Moreover, we released a software that meets the nee agencies and the ecological management of rural pro encourages and demonstrated appropriate practices alternative energy.

Additionally, innovation pervaded our institution. W results by promoting a special event named InovaAvi challenge of innovative projects linked to poultry proc InovaPork carried out in 2019, this event ensured that strongly embraced an innovation program that will en

2020 was also distinguished by our contribution t pandemic. We made our structure and team available diagnoses of RT-PCR. We also delivered technical co came to the fore our solidarity spirit. And there are mu work done throughout 2020. We invite you to discove this report. They are the result of the dedication and c Suínos e Aves entire team.

Have a nice reading!

Janice Reis Ciacci Zan
Head of Embrapa Suínos e

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**US$ 1 = R$ 5.17 (July 26th, 2021)*

Innovation
MOVE US

Embrapa

Suínos e Aves

Analysis | 2020
Production Performance

13.8 million

Brazil produced 13.8 million tons of chicken meat in 2020, the third-largest production worldwide. Domestic production increased 4.53% compared to 2019. In turn, exports reached 4.2 million tons, the largest globally, and 0.40% more than in 2019.

4.4 million

Pork meat production reached 4.1 million tons in Brazil in 2020, still the fourth largest globally and 11.37% higher than in 2019. Also, compared to 2019, exports from Brazil increased by 36.53 %, reaching 1.02 million tons, also the fourth largest in the world.

53.5 billion

Brazil produced 53.5 billion units of eggs in 2020, production 9.12% higher than that obtained in 2019. Exports reached 6.25 thousand tons, 18.81% less than in 2019. Per capita consumption in Brazil achieved 251 units, 9.13% higher compared to 2019.

159.7 thousand

The Brazilian production of turkey meat reached 159.7 thousand tons in 2020, a drop of 7.31% compared to 2019. Exports achieved 42 thousand tons last year, 10.52% more than in 2019.

Scenarios
IMPACTS OF COVID-19 ON THE MEAT MARKET

The whole chain production was affected by the pandemic

he world meat market had started recovering from the consequences of the African Swine Fever in China in 201 when the covid-19 pandemic arose. Disease's first cases in Brazil emerged in early 2020, creating a scenario of uncertainty regarding public health and the economy. Nevertheless, the agricultural sector implemented measures to remain close to normality due to its importance to Brazil. Meat industries, in particular, have adopted safety protocols to protect workers' health and maintain food safety. The transport and logistics sector, crucial to keep goods production and distribution running, remained active also, preventing even more severe social and economic problems.

The negative effects on food demand unleashed by the pandemic went from closing restaurants, bars, and hotels to concentrating supply in supermarkets. Beyond that, the pandemic increased the sale of products with lower added value (such as fresh beef cuts), which does not remunerate some costs related to consumption services.

The Federal Government implemented measures to mitigate the economic crisis resulting from the pandemic, such as the emergency aid paid to low-income families and the partial relaxation of social distancing recommendations. These actions allowed a recovery, albeit limited, in consumer income and avoided a more significant drop in demand for food in Brazil.

Chicken and pork meat prices escalated sharply from the second half of 2020, reflecting the high prices of corn and soybean, animal feed's main ingredients. The average price of chicken meat reached US$ 1.23/kg in October 2020 in the São Paulo market, compared to US$ 0.94/kg in October 2019. Pork meat shows more clearly the pandemic effects, with a drop in prices in March and April and a strong recovery from June 2020, attributed to China's growth. The average price of pork carcass, for example, between January-October 2020 (US$ 1.68/kg) was 30% above that observed in the same period of 2019.

Initiatives aimed at increasing feed ingredients production in the southern region carry on being a priority, fostering higher productivity levels of specific crops and larger cultivated areas. Santa Catarina and Rio Grande do Sul have a vast agricultural area not used to cultivate off-season corn that could receive winter cereals. Wheat, triticale, and barley targeted to animal feed may take advantage of these areas, generate income, and reduce the corn deficit. Embrapa Suínos e Aves, Embrapa Trigo, Sindicarne-SC, Fecoagro-SC, Faesc, and the Santa Catarina Agriculture Department have collaborated to increase winter cereals production.

Custo Fácil
New version brings dynamic report

Released in August 2020, the Custo Fácil 3.0 application generates dynamic reports on farms, user and database statistics on Embrapa's server. Besides that, it added functionalities to edit and delete records and batch data. Moreover, the application provides reports that allow users to distinguish general expenses from family labor costs.

Custo Fácil 3.0 also offers more user-friendly and self-explanatory navigation and the possibility of setting a backup to restore information. Additionally, it shows now which position the user occupies in the farms' ranking. Another new feature is a chart with regional averages of key economic indicators (gross revenue, total cost, net income, and cash generation). The app is available for free for Android devices on the Play Store.

Operation

SUSTAINABLE PRACTICES AND REMODELING END

Embrapa also prioritized local environmental practices

2020 presented several challenges to Embrapa's operation. However, Embrapa promoted important improvements throughout the year, such as implementing sustainable practices into its daily operation and finishing the remodeling of part of its structure.

One of the sustainable practices carried on in 2020 was integrating crop production and recycling nutrients methods, as has been done in recent years. Annually, Embrapa cultivates corn in a testing area. Later, it uses corn harvested there to prepare feed for its pig and poultry herds. In 2020, the testing area also produced wheat.

One of the objectives of that sustainable practice is to demonstrate how nutrients contained in pig manure can replace mineral fertilizer. This practice also enhances environmental management as it provides proper waste disposal. Moreover, there are gains related to labor reduction and lesser costs linked to feeding inputs costs.

Another 2020 delivery was the completion of the new site for poultry metabolism testing. The facilities, which functioned before Poultry Testing Area, were renovated to catch up with research needs in the metabolism field.

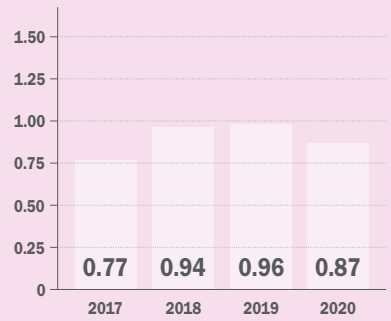
Among the improvements provided by the new facilities are wall reinforcement and the construction of an annex furnished with a heater. The metabolism facilities also gained two new evaporative air conditioning to cool down the environment according to testing requirements. All electrical and hydraulic installations also were renovated. Additionally, a cold chamber had its equipment refurbished and will be used for collecting samples conservation.

Integration

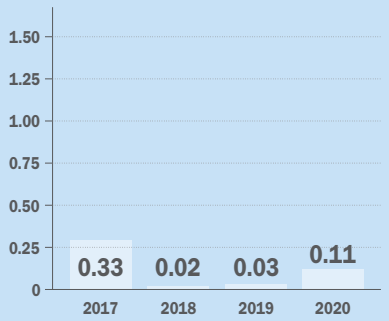
ERP integrates systems

Embrapa integrated all processes related to the Human Resour-ces Department, Financial Admi-nistration Department, and Pro-curement and Supply Depart-ment through the ERP (Enterprise Resource Planning), a mana-gement solution from SAP. This system, implemented in September 2020, aims to allow greater flexibility, efficiency, and security in administrative informa-tion between Embrapa's head-quarter and its decentralized units. In practice, it contributes to achieving organizational objec-tives and increasing Embrapa's credibility as a public research institution and developmental company. In addition, ERP-SAP adoption will provide the automa-tion and standardization of seve-ral processes linked to Embra-pa's operation departments.

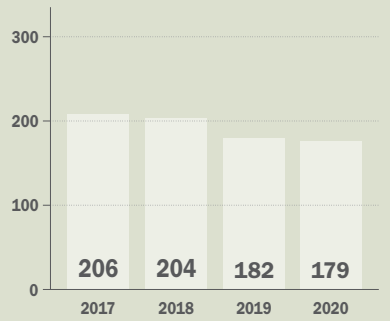
Total costing
in US$ million



Investment
in US$ million



Employees
in December 31



Innovation

Idea challenges became one

fuçar, chocar, inovar

Embrapa Suínos e Aves is consolidating its innovation program in 2021 by unifying the InovaPork and InovaAvi events. Both were the major idea challenges in Brazil in 2019 and 2020 and mobilized different people interested in innovation linked to swine and poultry productions.

Inova Program's objective is to foster technological solutions under development that can impact swine and poultry value chains. Additionally, it intends to leverage partnerships between actors in the sectors involved.It focuses on technology-based companies, including startups, with proposals for innovative technological solutions with the potential to solve problems in domestic poultry or swine production (agrotechs).

Inova Program was launched in May, opening applications for interested parties in presenting innovation proposals. The next phase should take place in August, with the selection of companies for the final stage. As in other events, the Inova Program will maintain the Innovation Trail in partnership with Chapecó@. The grand final will be held in October. The whole activities related to Inova Program will take place online.

Science

61 RESEARCH PROJECTS IN 2020

Value chains benefited from outstanding results

Embrapa Suínos e Aves research staff handled 61 research projects in 2020. Among them, 37 were under its leadership. In other 24, Embrapa Suínos e Aves research staff took part in action plans and activities in projects handled by other Embrapa's units and research institutions. Moreover, the dynamics of approving and managing projects at Embrapa have changed in the last two years. In 2020, Embrapa consolidated an agenda focused on innovation.

Embrapa also implemented approving projects throughout the year in public notices opened by calls related to priority subjects. This way of managing research resources has allowed Embrapa to get even closer to value chains needs and expectations, strengthening its commitment to agriculture and livestock innovation.

The Unit's research portfolio achieved important results in three categories: innovation support, pre-technological assets, and technological assets.

Embrapa Suínos e Aves carried out 14 actions that underpinned public policies building or accomplishment in innovation support. One of the Unit's contributions related to research initiatives to subsidize winter cereals development focused on animal feed. In 2020, Embrapa's research staff organized and participated in technical meetings and workshops to provide technical information to the Winter Grain Planting Incentive Program, elaborated by the Department of Agriculture, Livestock, and Fisheries of Santa Catarina state.

Furthermore, Embrapa Suínos e Aves backed the updating of swine and poultry sanitary inspection systems, which is another crucial action linked to public policies.

Embrapa Suínos e Aves also developed in 2020 processes and methodologies (17), prospective studies (12), training and technological updating of advisory service agents (9), internal strategic training (2), institutional arrangements (1), and software (1). Deliveries of pre-technological assets took place primarily related to databases (22), biological collections (16), and technical-scientific methodologies (2). In terms of technological assets, the deliveries were cultivars (10), agricultural processes (6), machines and equipment (4), and agricultural products and inputs (01).

Numbers of 2020

The Unit published **46 articles** in peer reviewed journals with **level A**, the highest quality possible.

The total number of **scientific papers** published in indexed journals reached **82**.

12 media articles and **36 articles** were published in scientific meetings.

The number of **edited books** reached **2**.

21 chapters were published in **technical-scientific books** last year.

11 folders/leaflets/booklets and **12 Series Documents** were edited by the technical staff.

Ongoing and approved projects in 2020

Projects under Embrapa Suínos e Aves direct coordination	Research Funding
Development and validation of biogenic amines analysis via mobile NIR spectroscopy	Type III - 90/2020 AB Spectral
Development and validation of equipment for carcasses cleaning of dead and non-slaughtered animals	Type III - 90/2020 REFRIBRASIL
Development and validation of animal meal production equipment	Type III - 90/2020 Rondon
Digital tool for making closer the public and private ATER to small-scale pig and egg production	Type III - 90/2020 ManejeBem
Technological solutions to generate biogas from residues of swine and poultry production and processing	Type III - 90/2020 Kemia
Polyvalent vaccine for pigs immunization against parvovirus, erysipelas, and leptospirosis	Type III - 90/2020 Ourofino
Electronic game for poultry producers capacitation	Type III - 00/2020 L&C ProDB
Development of territorial and environmental intelligence tools addressed to swine and poultry production	Type II - 03/2020
Technology transfer for pig production cost monitoring system implementation in Mato Grosso state	Type IV - 00/2019
Studies on antimicrobials use in pig farming studies to support the National Action Plan for Prevention and Control of Antimicrobial Resistance (PAN-BR Agro)	Type IV - 03/2019
Rapid detection and quantification of *Salmonella* sp. in the process of slaughtering chickens by metabolomics combined with artificial intelligence	Type II - 03/2019
Winter cereals project in the Santa Catarina state	Type I - 00/2019
Identification of genes and pathways involved in the manifestation of pectoral myopathies in broiler chickens	Type I - 03/2019
New technologies and sanitary practices to improve fertility and to reduce microbiological contamination in swine semen minimizing the use of antibiotics	Type II - 03/2019
Vaccine development for control of pulmonary pasteurellosis in pigs	Type III - 00/2019 Ourofino
Prediction of metabolizable energy and determination of ileal digestibility of amino acids of corn DDGS and deactivated soybean and evaluation of the effect of a protease on its nutritional value	Type III - 00/2019 Seara/Danisco
Technology transfer in ecological egg production systems southernwest Parana - Brazil	Type IV - 00/2019
Model of environmental management for areas of intensive animal production in southern Brazil	Type I - 03/2018
Development and evaluation of nanomedicine for the treatment of coccidiosis in broiler chickens	Type II - 03/2018
Improvement of bacteriophages for salmonelosis control in poultry	Type II - 03/2018
Integration of technologies for the treatment and agronomic use of piggery wastes to mitigate the global warming potential of swine production chain	Type II - 03/2018
Methodologies and processes for improving operationalization and scope of wild boar surveillance and monitoring - Wild Boars Project - Phase 2	Type II - 03/2018
Swine, poultry and caititus *in situ* conservation	Type I
Development of a new virosomal antigen delivery system and its effectiveness in the local and systemic immune response	Type I
Technologies for destination of dead animals	Type I
Review and modernization of the inspection system applied to avian's slaughterhouse with federal inspection	Type IV
Genetic and antigenic diversity of influenza A viruses and efficacy of diagnostic methods and nanotechnological vaccine for the control of influenza in swine	Type II
Swine and poultry genetic modification methodologies improvement platform	Type II
Calcium, phosphorus, and vitamin D levels in laying hen diets to improve productivity and reduce pollutant impact on the environment	Type I
Nicarbazin residues in chicken meat raised on reused litter	Type I
Evaluation of the immunological components of swine fresh and frozen colostrum	Type I
Technology transfer for production and use of biogas and fertilizers from pig and poultry manure treatment under the ABC Plan	Type IV
Cooperation, communication and technology transfer for the production of safe pork without the use of antimicrobials	Type IV
Technological platform for swine breeding programs	Type III BNDES/BRF
Biotechnological process for swine wastewater treatment - Sistrates	Type III BNDES
Greenhouse gases mitigation on swine slurry treatment and use as organic fertilizer	Type I - CNPq
Support to the poultry and pig production chains to access the drawback system benefit	Type IV - ABPA

Projects which had other research center leadership	Research Funding
Salmonella spp. occurrence in cultivated tambaqui and its hybrids, and good practices and technologies building for its prevention and control	Type II
Nanotechnologies for biological cross contamination control in food handling processes	Type II
Embrapa's genetic resources conservation program strengthening	Type II
Cattle waste usage in biodigestion systems on smallholder properties in the region of Luziania (GO)	Type III
Implementation and Monitoring of Quality Requirements for Animal, Microbial, and Plant Genetic Resources at Embrapa	Type IV
Implementation and Monitoring of Quality Requirements in Embrapa's Multiuser Laboratories	Type IV
Polo de Inovação Tecnológica do Agronegócio no Rio de Janeiro: Estratégias para organização da rede de inovação, implantação e implementação	Type IV
Agribusiness Technological Innovation Hub in Rio de Janeiro: Strategies for organizing and implementing an innovation network	Type III
Reproductive biotechnologies for the emerging production systems in Brazil	Type II
Implementation and Monitoring of Quality Systems in the Microorganisms Network (QUALIMICRO)	Type IV
Communication strategies for the Bucket Full Network	Type IV
Institutional Collections of Microorganisms	Type I
Management and digital curatorship of Animal GRIN (Alelo Animal) Database	Type II
Ex situ conservation of animal genetics resourses	Type I
Evaluation of risk factors for specific pathogens and ripening t ime in Brazilian artisanal cheeses to ensure their safety	Type I
Modulation of the immune system to control haemoncosis in sheep	Type I
Breeding oats, rye, triticale and dual purpose wheat for agricultural systems in southern Brazil	Type III
Technological solutions to optimize the use of waste and biomass as source of agricultural inputs in organic production systems	Type I
Technological and incremental development of sheep meat products as opportunity of adding value	Type II
Development of lipossomal immunomodulatory nanosystem with active guidance to hepatocytes as a future alternative tool for R. microplus cattle tick control	Type I
Dissemination, expansion and applicability of the Biodigester Septic Tank as social technology for rural basic sanitation	Type I - Fundação Banco do Brasil
Implementation of SiExp at Embrapa	Type IV - SEG Special Project
Development of production systems and technological packages for making feasible sustainable production of microalgae biomass in biorrefineries for different Brazilian regions	Type II
Cleaning technology suitable for the processing of quality shell eggs from small scale farming	Type II

SMART
Greenhouse gases

One of the activities developed by the SMART project staff in 2020 took place in partnership with the Environmental Military Police of Santa Catarina. Together, both institutions got digital images of the Lajeado São Francisco sub-basin in Presidente Castello Branco. The survey will generate high-resolution aerial photos. They were taken by MavicMaptor drones, which allow images with seven centimeters per pixel. Another highlight of the work is that the flight height reached approximately 260 meters, with an autonomy of 60 minutes, covering an area of 450 hectares during this period. The work included a survey of 1,400 hectares.

Environmental
Meetings and training

2020 was an intense year for the project team "Development of an environmental management model for areas with intensive animal production in southern Brazil – SMART." Among the main activities carried out by the project were technical meetings and online training.

In June, the virtual course "Using a geovisualizer in environmental projects" enhanced the technical team knowledge. In December, a seminar summarized the results obtained during the year. The seminar included waste management, tracking and geoprocessing tools in environmental management, land use and occupation mapping, sizing of collective units for composting, evaluation of a fermentation process on salmonella viability, and impacts in the Presidente Castello Branco municipality.

Licensing
SOFTWARE FACILITATES FARM MANAGEMENT

SGAS will contribute to environmental licensing

Embrapa Suínos e Aves presented the Swine Environmental Management Software (SGAS) in 2020. The software is a package of web applications that facilitates the management and environmental licensing of farms that raise pigs.

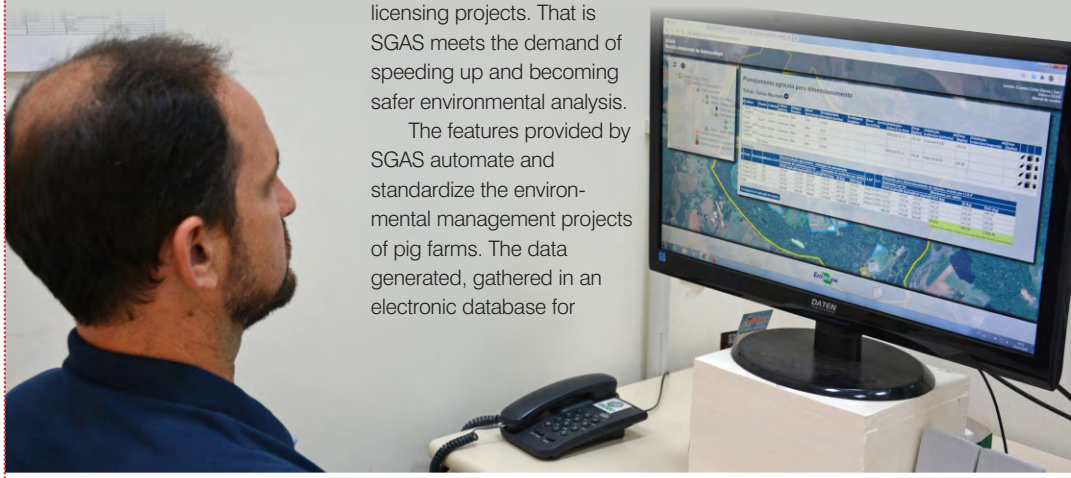
Unprecedented in Brazil, the tool encompasses several features that automate and standardize projects and analysis demanded by environmental licensing processes, previously prepared manually or using spreadsheets.

The objective is to bring reliability and traceability to environmental monitoring. Such improvement primarily helps properties and states that apply environmental licensing processes. It also benefits the national pork meat production system as a whole.

Lacks of standardization in methodologies and licensing processes often provoked divergent interpretations and insecurity among environmental agency analysts. This issue prompted delays in licensing processes and required extra efforts to design environmental licensing projects. That is SGAS meets the demand of speeding up and becoming safer environmental analysis.

The features provided by SGAS automate and standardize the environmental management projects of pig farms. The data generated, gathered in an electronic database for licensing and environmental monitoring of the farms, facilitates obtaining statistics to adopt more sustainable technologies.

The SGAS is suitable for varied audiences, such as rural producers, technical assistance professionals, rural extension and environmental licensing, agribusinesses and cooperatives mangers, environmental agency analysts, and public managers linked to waste treatment, environment, agronomy, and agricultural, sanitary, and environmental engineering.



Intensive production and environmental services
Santa Catarina as a pilot state

Embrapa Suínos e Aves's researchers and partners worked in the last three years on defining indicators to relate animal intensive production and its impacts on ecosystem services, especially those related to soil and water.

As a result of those collaborative efforts, the work "Intensive animal production and environmental services: strategies and indicators" was published in 2020. The book has 16 chapters anchored in four fundamental themes. They are the socioeconomic and environmental diagnosis of the reference basin (the Lajeado Fragosos hydrographic sub-basin), soil component analysis and indicators, water analysis components and indicators, and the modeling and valuation of ecosystem services.

The QR code allows access to the publication download

Covid-19

EMBRAPA HELPS TO TEST POPULATION

Laboratory and staff structure took part in a national effort

Since the Brazilian federal government issued the public health emergency due to the Covid-19 pandemic in March 2020, Embrapa has made its laboratory structure and staff available to take part in the national mobilization to tackle the pandemic. In the cooperation established between the ministries of Health and Agriculture, Mapa and Embrapa started using their laboratories to expand the disease diagnosis capacity in the public health system.

The Central Public Health Laboratory of Santa Catarina (Lacen) signed a partnership with Embrapa Suínos e Aves to carry out RT-PCR tests to detect covid-19. The objective was to meet the demands of 118 municipalities in Western Santa Catarina.

Embrapa's service capacity is up to 500 molecular RT-PCR tests every eight hours. These tests are operationalized in a high biosafety laboratory (NB3) belonging to the Animal Health and Genetics Complex. The laboratory supports the development and validation of diagnostic techniques, as well as the isolation, characterization, control, and prevention of infectious microorganisms related to swine and poultry productions. PCR and material washing rooms are also used.

The workflow for the diagnosis of covid-19 includes receiving samples sent by Lacen/Joaçaba, processing and extracting the viral RNA, RNA testing with the RT-PCR technique (which confirms the coronavirus presence or absence), and forwarding the results to Lacen. All criteria and guidelines of Lacen-SC are being met in accordance with the municipal health surveillance procedures. The team that works in the tests comprises 12 professionals from areas such as virology, immunology, genetics, bacteriology, pathology, biology, and laboratory technicians, working on a relay scale.

From May 15th to the end of December, 24,702 molecular tests of covid-19 were carried out at Embrapa Suínos e Aves. Only in December, 729 samples were processed.

Research partnership

The formula worked on avian virus

Embrapa's participation in the mobilization against the covid-19 also resulted in research outputs. The unit participated in a collaborative study with other Embrapa units and research institutions that identified detergent-based films that can inactivate the virus.

Detergent-based films added to cooking oil or water showed capable of eliminating the avian coronavirus CoV. Although this avian virus belongs to the same family as the SARS-CoV-2, further tests are needed to determine if the method is effective against the virus that provokes the Covid-19 disease. The research involved three Embrapa centers: Instrumentação, Pecuária Sudeste (both located in São Carlos-SP), and Suínos e Aves (Concórdia-SC). The study also counted on collaboration from the Laboratory of Comparative and Environmental Virology at the Oswaldo Cruz Foundation (Fiocruz), in Rio de Janeiro, the Animal Science Institute (IZ), in Nova Odessa-SP, and a doctoral student at the Chemistry Institute of São Carlos, linked to the University of São Paulo (IQSC-USP).

Challenge

Partnership and donation

The main challenge related to the Covid-19 mobilization was to acquire the needed inputs to make the diagnosis, both due to availability in the market and resources restrictions. Embrapa Suínos e Aves received donations from partner companies and cash donations in a specific account. Faped (Research and Development Support Foundation) handled donations and issued receipts to the contributions addressed to Embrapa.

The account data and the necessary inputs are included in a list widely disseminated among partners and in communication media. Accountability is also available on the unit's website. Thus, the tests used inputs and safety equipment donated or purchased with donations or kits sent by Biomanguinhos.

Reward

Project approval

For Embrapa Suínos e Aves, the partnership with governmental organs and other institutions during the pandemic helped to approve a project worth US$ 679,000 in the public call MCTI/Finep/Infraestrutura NB-3. This will allow Embrapa to continue supporting demands in animal and human health. Another project approved at FAPESP will support a postdoctoral scholarship for 12 months. It got the amount of US$ 9,500 and will run into the Finep project.

Production

Technical Instructions

The unit's actions also targeted the productive sector. Researchers prepared two technical instructions, one for poultry farmers and the other for pig farmers. Publications aimed to clarify the covid-19 disease impacts over swine and poultry value chains in Brazil.

Cultivate

Barley is part of the study

According to nutritional evaluations, the optimal levels for the inclusion of wheat and triticale in swine feed are around 35%. For barley, these levels are between 20% and 25% from the growing stage.

In the case of broilers and laying hens, 20% to 30% of wheat or triticale inclusion and up to 20% of barley in the feed from the initial stage are recommended. These are levels that allow the best combination of ingredients to optimize the balance of essential amino acids and provide the best quality of pellets (format of pelleted feed). However, it is possible to replace corn with wheat or triticale in swine diets entirely if adjustments needed are made in nutritional levels to meet animals requirements at each stage.

Great contribution

WINTER CEREALS CAN I TO FEED SWINES AND P

Results show wheat and triticale as the cereals with the greates

Research carried out by Embrapa Trigo and Embrapa Suínos e Aves indicates that winter cereals, such as wheat, oats, rye, barley, and triticale are viable options to replace corn in the formulation of swine and poultry feed and concentrates. In addition to reducing dependence on this grain in the South Region, whose production has not been sufficient to meet demand, the result expands the market for winter cereals, which occupy about 20% of the potential cultivation area.

The scarcity of corn due to the continuous increasing of animal protein production and the idleness of productive areas in winter were the main reasons of studies developed by Embrapa. They aim to assess the economic and nutritional feasibility of using winter cereals in the composition of animal feed, in addition to the characterization of cultivars best suited for feeding swine and poultry.

Areas availability in winter in the South Region, especially in Santa Catarina and Rio Grande do Sul, is estimated at more than 6 million hectares, considering spaces in fallow conditions or with cover plants. Making better use of the winter season to supply the animal protein market is the project that Embrapa is putting into practice in the region, in partnership with various actors of the private sector and public authorities.

Wheat and triticale are the best alternatives to replace corn

Embrapa's studies have primarily pointed out wheat and triticale as energy foods with the potential to replace corn and soybean meal in diets for swine and broilers. Both can replace corn as long as adjustments in amino acids and energy levels are made to supply the nutritional requirements of the animals at each growth stage. These cereals become technically and economically viable for inclusion in swine and poultry diets with nutritional value complementary to corn and soybean meal. Thus, they and can supply a significant part of the demand for grains for these two species.

Initial results show that the nutritional values of these cereals are variable, depending on the cultivar, location, and year of production. Therefore, it is essential to evaluate each batch of these raw materials before using them in animal feed production.

One of the cultivars that showed good potential for composing animal feed was the BRS Tarumã wheat, which has higher crude protein values and metabolizable energy. With a protein content close to 18%, this wheat was developed targeting animal feed, and it has been used for more than 20 years in cattle raising. Now, it also the possibility of meeting swine and poultry demands. The cultivar has an excellent energy value, very close to soybean meal, allowing lower costs regarding this production item.

Other kinds of wheat, such as the BRS Pastoreio and BRS Sanhaço, as well as the triticale cultivars BRS Saturno and Embrapa 53, had lower energy content, which increases the demand for oil in rations. The researchers point out that the use of these cereals can be economically more advantageous in phases in which animals have less energy demand, such as the farrowing phase. In the case of the BRS Tarumã wheat, due to its higher energy and protein content, its use is more productive in the growing and finishing phases, when the demand for these factors is higher.

Demand

Brazilian consumption

The average consumption per year of chicken meat achieved 45 kg in Brazil in 2020. The average consumption of pork meat reached 16 kg per year. It is necessary to produce around **30 million tons of grains** such as corn, wheat, soybeans, and other crops to meet the Brazilian demand.

45 kg of chicken meat

16 kg of pork meat

REPLACE CORN POULTRIES

st potential to replace corn

Bringing representatives of private and public sectors closer

Winter cereals' usage in the production of animal protein is nothing new. However, the mobilization that brought together specialists, entities linked to the private sector and public authorities can be considered a novelty. It aims to provide greater security in grain producers' profitability and raw material supply for the pork and poultry meat industry.

Aiming to increase the area with winter crops, the Santa Catarina state government, the largest corn importer in Brazil, launched in February 2020 the " Winter Grains Planting Incentive Program." The initiative intends to encourage farmers to invest in winter cereals with the potential to make up the ingredients matrix for swine and poultry feed. The program has the technical support of research institutions such as Embrapa and Epagri/SC, the supply of inputs and technical assistance from the cooperative sector, and the purchase of grains by the swine and poultry industry.

One of the challenges in ensuring the supply of winter cereals to the animal protein industry is the not always favorable climate responsible for many failed winter crops. The main hazard is pre-harvest rains, which can affect the grain quality and even contamination by mycotoxins, causing fungi that provoke complications in the digestive system of animals. But the meat industry, the primary consumer, has adapted to that adverse moment and makes nutritional adjustments to maintain the animals' performance.

Winter cereals need to compete nutritionally and financially with other feed ingredients, such as corn and soybean meal, without losing quality. Wheat needs to keep quality, meet the animal protein industry demands, and not offer just occasional quantities of grains that do not meet the bakery requirements.

Suppose the producer uses wheat with characteristics of interest for animal feed, such as higher energy, protein, and less fiber. In that case, it will compete better with other commodities. Quality wheat is valued in any market, but every opportunity has to be analyzed previously.

The industry has stated that there are no technical doubts regarding the use of winter cereals to feed swine and poultry. What is under discussion is the business model to enable planting and use in feed.

In the South Region, negotiations between the animal protein industry and the productive sector have started initially with big producers and cooperatives. But they should expand their reach to small producers, especially those working close to the meat industries.

Alternative

Corn deficit increases spending

Corn production in Brazil reached 100 million tons in the 2019 harvest. Of this volume, 43 million tons are addressed to exports, and another 4.5 million tons go to ethanol production. Of the total grains destined for internal consumption, more than half target animal feed.

In 2019, the Southern Region produced 25 million tons of corn, 44% higher than the volumes achieved in the 2000s. Except for Paraná, which counts on the reinforcement of a second corn harvest, the states of Santa Catarina and Rio Grande do Sul have available (considering production minus exports) approximately half of the corn they consume. To meet the demand of the animal protein industry, which last year accounted for a production of 2.7 million tons of pork and almost 8 million tons of chicken, 21.5 million tons of corn were acquired in the Brazilian crops' market. The corn deficit in the South Region has been supplied by grains brought from the Midwest of Brazil, with logistical costs that overload production.

Wild boar I
Deputy supports project

In July 2020, the federal deputy Caroline Detoni (PSL-SC) allocated a parliamentary amendment resource of US$ 97,000 to support the Javali Project – the National Plan for Prevention, Control, and Monitoring of Wild Boars (Sus scrofa) in Brazil. The unit is part of the Technical Advisory Group and has the researcher Virgínia Silva as its representative.

The group was established in November 2017. Its purpose is to build actions to contain territorial and demographic wild boars expansion countrywide. Additionally, it intends to reduce wild boars impacts, chiefly in areas of environmental, social, and economic interest.

Wild boar II
Video guides blood collecting

As one of the Javali Project activities, Embrapa Suínos e Aves made a technical video distributed by the Ministry of Agriculture, Livestock, and Supply. The video guides managers in collecting blood from wild boars after slaughter to assist surveillance and sanitary monitoring. The 8-minute video presents which personal protective equipment is needed and blood and serum collection procedures. It also explains how to identify samples, fill the collecting form, and maintain samples until they are delivered to the nearest veterinary unit.

Biogenic amines
EVALUATION BY PORTABLE NIR IS UNPRECEDENTED

Embrapa develops a forefront methodology

Embrapa Suínos e Aves signed technical cooperation in 2020 that made it possible to assess the feasibility of analysis with mobile technology via spectral reading in the near-infrared (NIR) of biogenic amines to check out the animal meal products quality. The analysis occurs from the construction of calibration curves, using data obtained by the methodology developed via chromatography as a reference standard.

The AB analysis methodology by mobile NIR facilitates adopting such a technological novelty in animal feed industries. The project points out the NIR technology as a viable alternative to the HPLC-UV methodology, which is the predominant tool applied to determine AB in animal meals originated from bone, meat, and viscera. Embrapa's methodology can be applied when raw material arrives in industries, as well as it can realize analysis in animal feed production lines. Thus, it allows to keep an input quality control routine and ensures the quality of feed products supplied to animals.

Moreover, Embrapa's methodology application provides an in loco and quick evaluation (it takes around one minute) of the presence and content of AB in animal meal, which shows how fresh raw material is. Cost is another prominent positive factor that this methodology offers. It costs only US$ 1.93 per sample on average. Thus, it facilitates decision-making regarding the acceptance, rejection, or use of this input, ensuring the correct industrialization of feed for animal production.

Influenza A
Viral samples guarantee research

Embrapa Suínos e Aves's researchers, in association with research groups on viral diseases and prions from the ARS/USDA and the Royal Veterinary College/University of London, analyzed the genome of influenza A viruses isolated from pigs in Brazil.

Genetic data generation and analysis obtained through viral genomes sequencing are essential for risk assessment related to the emergence of viruses with pandemic potential. It is also important for disease control measures implementation as this sort of data allows the development of new inputs for swift infection diagnosis. Furthermore, they facilitate viral samples selection to develop vaccines that offer cross-protection against circulating subtypes.

As a result of this work, Embrapa identified genetic and antigenic diversity and the zoonotic potential of regionally unique viral strains. The viral samples are stored in the Institutional Collection of Embrapa Suínos e Aves (CMISEA).

These biological assets can generate immunobiological tools used in the swine chain.

They have also played a role as crucial information for developing a vaccine by Embrapa Suínos e Aves.

Myopathies

PROJECT CHANGES THE CLASSIFICATION

Embrapa validates myopathies harmlessness and guides sector

Myopathies are muscle alterations observed in broilers and represent the fourth cause of broilers' condemnation in the chicken meat industry. However, this scenario may change based on studies carried out by Embrapa Suínos e Aves in partnership with the Department of Inspection of Animal Products/Ministry of Agriculture, Livestock, and Supply (DIPOA/Mapa) and the Federal University of Rio Grande do Sul (UFRGS). Embrapa's researcher staff and partners corroborated previous studies about myopathies' harmlessness to public health. Moreover, they confirmed the possibility of keeping carcasses with initial degrees of alteration, and they also developed an alterations classification.

Suggestions made by Embrapa and its partners were accepted by the Ministry of Agriculture, which issued the Circular Letter 17/2019 that established a new standard for condemning carcasses with myopathies indication. The orientation is that carcasses, or parts of them, have to be condemned with the most severe alteration degrees. In those that present medium degree, the alterations are removed, and carcasses turn into industrialized products. In light grades, carcasses are released for fresh consumption. Although myopathies are not an infectious cause of muscle tissue disorder, the most severe degrees are alterations incompatible with human consumption due to edema and hematomas present in the affected tissue.

The new standard also determines that the classification and removal of carcasses will be delegated to slaughterhouses. Before, the Federal Inspection Service used to proceed with these chores. The change targets to improve sanitary inspection efficiency.

Pork meat

Nutritional strategies

In 2020, Embrapa presented the book "Nutritional strategies for improving the quality of pork meat," a publication that brings together knowledge acquired over 20 years of studies and scientific research on nutrition's effect on pork meat quality. Nine chapters address topics such as current pork quality standards, nutritional value and importance for health, and changing economic criteria on valuation and consumer perception. There is also a chapter that describes the main nutritional strategies for meat quality. The work brings together content from seven professionals from different areas, all of them with experience in the subject.

To present the book and debate the topic, Embrapa held a live broadcast on Facebook, in July, and brought together some of the book's authors.

The QR code allows access to the publication download

Swine and poultry microorganisms

Singular collection maintained

The storage and conservation of different microorganisms isolated and characterized during research activities on swine and poultry diseases have been carried out by Embrapa Suínos e Aves since 1977. This work consolidated the building of a singular microorganism collection related to swine and poultry production in Brazil.

The microorganisms stored and maintained at Embrapa came from the most diverse regions of the country. They have the potential to generate biological inputs production, such as vaccines used for prevention and control of the most common diseases linked to swine and poultry intensive production. They also provide antigens used in the standardization of tests for diseases diagnosis and monitoring. Thus, the microorganism collection contributes to country's zoophytosanitary security and defense.

Partnership

Courses with the Swine Academy

Embrapa Suínos e Aves and the Swine Academy established an official partnership in December 2020. The agreement sets up technical content production, whether courses or lectures. The first training available was "Salmonelas: what the field veterinarian needs to know." To find out how to carry out the training, access the website of the Swine Academy. Other courses will take place in 2021.

Biogas and Biomethane

Preparations for Forum in 2021

Embrapa Suínos e Aves held online meetings in 2020 on the use of biogas and biomethane in the swine and poultry value chains. The webinars discussed the 3rd South-Brazilian Forum on Biogas and Biomethane, which will take place online in 2021. The unit developed activities related to the forum in partnership with the CIBiogás, University of Caxias do Sul-RS, and Brazilian Society of Waste Specialists of Agricultural and Agroindustrial Productions (Sbera).

Genetics Embrapa

Market share in 2020

Laying Hen 051

3.875 million sold birds

14.5% of the national market of brown-egg laying hens

MS115 Boar

458 sold boars

5.2% of the national market of terminal males

E-learning

COURSES BENEFIT 10,170 STUDENTS

Capacitation is available on the e-Campo virtual interface

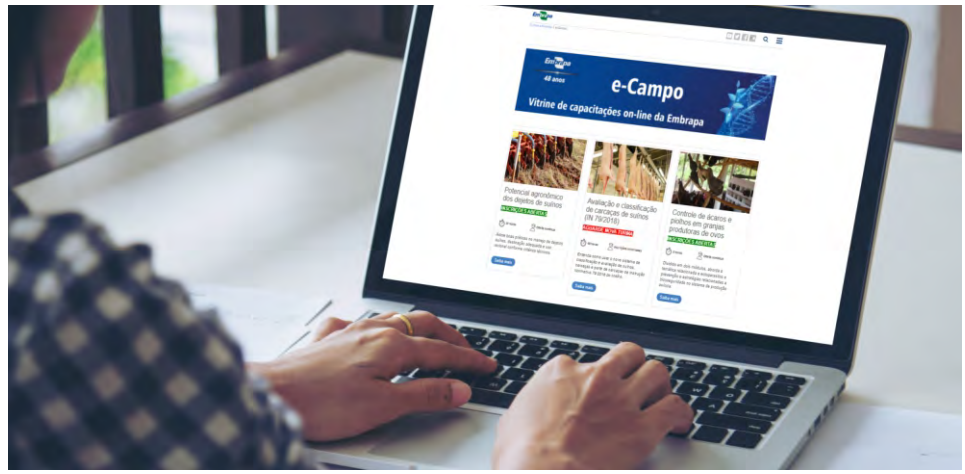
The four courses available on the e-Campo portal, a virtual interface built by Embrapa to offer online training, got 10,170 subscriptions throughout 2020.

The agronomic potential of pig manure was the greatest demand course in 2020. In total, 9,342 students followed it last year. According to technical criteria, the course teaches best practices, proper disposal, and rational use of pig manure. It is composed of 20 hours.

The course mites and lice control in egg farms, which started in November, had 687 subscriptions by the end of the year. With 8 hours and split into two modules, it addresses ectoparasites and how to prevent them. It also discusses strategies related to biosecurity in the poultry production system.

Another course that got attention in 2020 was evaluating and classifying pigs, carcasses, and parts of carcasses. The course complies with the normative IN79/2018, issued in 2019. It aims to enable professional teams to understand the objectives of risk-based inspection and the roles they need to play in this new process. Overall, 103 students, including federal agricultural auditors and veterinarians, took part in the course.

Additionally, the course about the National Poultry Health Program for the Issuance of Animal Transit Guide, a partnership between MAPA and Seapa-RJ, was offered exclusively to 38 veterinarians that work in the Rio de Janeiro state.



Capacitation

From in-person to online

With the worsening of the covid-19 pandemic, fairs and events were restricted to online activities for almost the entire year. In-person, before the pandemic, Embrapa Suínos e Aves showed its technologies and met the demands audience of Coopavel, Tecnoeste, and Cotrijal agricultural fairs. After this period, the unit started participating online in events such as Agrotins and AgroBrasília.

One of the highlights was the course on biogas production and use and digestate management, held by Embrapa Suínos e Aves with the Paraná State Agriculture Federation System (Faep), Paraná Rural Development Institute (IDR), and CIBiogas. The training had 15 weekly virtual meetings, totaling 35 hours. It improved technicians' and extensionists' knowledge on biodigestion waste management, biodigestors dimensioning and operationalization, and the use of digestate in agriculture.

Training also took place on biodigesters operationalization, Environmental Management Software for Swine Farming (SGAS), water and waste management in pig farming, and statistics.

In total, the unit held online 66 lectures, 20 courses, five fairs, three meetings, one seminar, one forum, one field day, and one business roundtable in 2020.

Innovation

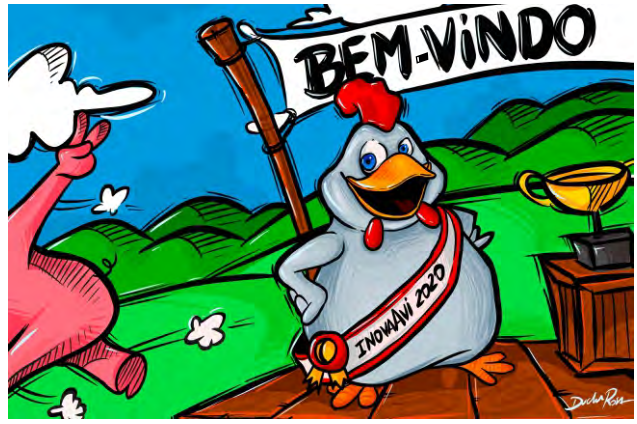
INOVAAVI SHOCKED IDEAS AND SOLUTIONS

Poultry Ideas Challenge selected three finalists

Changes and innovation marked 2020. One of them was the first challenge of ideas in poultry farming, InovaAvi – Shocking Ideas, promoted online by Embrapa Suínos e Aves.

Beyond the initial stages (registration and selection), the event also realized the following steps online. But that wasn't the only news. The teams selected to go to the final took part in the "Innovation Trail," conducted by the INCTECH team - Technological Incubator of PCT Chapecó@, in partnership with Embrapa Suínos e Aves. The objective was to foster innovation in the poultry chain, collaborating to become proposals into actual businesses and solutions. INCTECH's methodology provided an approach in five axes: Marketing, Technological, Management – Business Modeling, Management – Pitch and Management – Mentoring. In addition to those selected, the teams' "godfathers" and "godmothers," all researchers from Embrapa Suínos e Aves, participated in the process, accompanying and providing technical support.

Three lives broadcasting presented finalist proposals to the audience. The first two focused on showing the team pitches, while the last broadcasted the grand final. The events took place on Embrapa's YouTube channel. The creativity and innovation consultant Fabrício De Martino moderated the events, which also counted on Milena Pagliacci and Dudu Rosa, who produced mind maps and art.



InovaAvi

Paraná and Goiás reach the final

First place went to the team from Foz do Iguaçu-PR, formed by Mahuan Abdala and Cleber Medeiros da Silva, in partnership with Bruno Zwierewicz and Lucas Hübner. They presented the “Stac Robot – Multipurpose Autonomous Robot for Poultry,” a project developed in partnership with the Internet of Things Laboratory (LabIoT) of the State University of Western Paraná and Itaipu Technological Park (PTI).

They also took second place with the proposal “AveStac Pro – Solution for aviary management,” an idea based on hardware and software solutions aimed at producers, integrators, and technicians. And, in third place, went the team from Goiânia-GO, which presented the proposal “IndustryCare – Real-time monitoring of machines and processes.” Wagner de Barros Neto, Bruno de Sousa, Pedro Magalhães Sobrinho, and Jaderson Gonçalves make up the team, which showed a platform that integrates hardware (smart sensors and meters, interfaces, transmitters), software (big data analytics, mobile app, AI), and specialized services (IoT deployment, data science, energy efficiency projects).

The winning team got as the award qualification for the final stage of the Bridges to Innovation Program, an initiative by Embrapa and partners that aims to connect agritechs with investors to accelerate their business by accessing funding resources. For the other teams, the award was access to the Aviculture Academy courses for one year, in addition to mentoring with specialists who accompanied them in the process.

Coworking

Innovation's site

In 2020, Embrapa Suínos e Aves prepared a particular room for coworking. The room was designed with an innovative and inspiring concept to serve teams or partners who work with innovation. Beyond structured for collaborative work, the place's differential is the art applied to walls by plastic artists Simone Talin and Samantha Lucas, making the environment welcoming.

Participation

36 teams for just 10 spots

In the registration phase, 36 teams submitted their proposals. Ten were of them turned out selected to follow in the process and were the finalists. The proposals came from nine states, most of them from São Paulo (9), followed by Minas Gerais (8), and Santa Catarina (7). Proposals from Paraná (4), Mato Grosso (2), Rio Grande do Sul (2), Goiás (2), Pernambuco (1), and Ceará (1) also took part in the event. Sixty-seven evaluators contributed to the process.

InovaAvi was organized by Embrapa Suínos e Aves, Acate Agronegócio, Chapecó Scientific and Technological Park, Concórdia City Hall, and Faped. Fapesc, Agriness, Academia da Avicultura, and Fornari Indústria played a role as partners. As Gold sponsors, InovaAvi had Seara Alimentos and MSD Animal Health. The Silver sponsorship included Sindirações and the Brazilian Association of Animal Protein – ABPA. The Bronze sponsorships were Evonik, Cedisa, Fazenda da Toca, Boehringer Ingelheim, DSM, Adisseo, and BRDE. The event had as partners' media AviNews, Feed&Food, and O Presente Rural.

Communication

EVENTS BECOME PREFERABLY ONLINE

Pandemic required adapting communication strategy

The pandemic caused by the SARS-Cov 19 has provoked the emergence of new communication strategies. Face-to-face events occurred online and, as a result, live broadcastings via streaming channels such as YouTube, Zoom, and Google Meet, among others, became part of Embrapa's staff and audience routine.

Between April and December 2020, the unit held 29 lives, with 52 hours of online broadcasting of various events.

The first one took place on Embrapa's Facebook profile. Two researchers addressed how the Covid-19 could impact swine and poultry value chains. Then, it was time to broadcast Embrapa Suínos e Aves's anniversary ceremony, in June, with the participation of the unit's head and the launching of a nutritional strategies book related to pork meat improvement.

The unit's communication staff also organized, promoted, and coordinated online training (aimed at general or specific audiences), webinars, and events of partner institutions. Additionally, Embrapa Suínos e Aves used communication tools via the Internet to get in touch with its internal audience.

13
external events

In 2020, the Unit participated in 13 external events, including fairs, exhibitions, and symposiums. There were three face-to-face events (Coopavel, Tecnoeste, and Cotrijal, held before restrictions imposed by the pandemic) and two virtual events (Agrotins and AgroBrasília). Embrapa Suínos e Aves also organized and partnered in innovation and scientific dissemination events, such as Pint of Science, InovaAvi, and JINC, as well as technical meetings and webinars.

1,846
mentions in the press

Embrapa Suínos e Aves had 1,846 mentions in newspapers, magazines, blogs, websites, and TV stations. The number is 6% higher than that achieved in 2019.

52
hours of content broadcasting

The Unit made 29 live broadcastings on the internet, in 52 hours of content broadcasting, including courses, events, and products launching, using Embrapa's YouTube channel (youtube.com/embrapa) or partners (Pint of Science and RedBioLAC).

2,506
demands

The Citizen Assistance Service (SAC) provided answers for 2,506 demands in 2020 by email, telephone, and social media channels.

Embrapa & School

Science Field Day went online

Due to the pandemic, Science Field Day carried out only virtual activities. Embrapa Suínos e Aves organized six lectures (five for elementary school classes and one for high school students). Moreover, the 6th Science Field Day was also online, with videos produced by Embrapa and partners and made available at the address embrapa.br/suinos-e-aves/dcc.

Tecnology Transfer Revenue - 2020

Technology Transfer - US$ 14,327.07
Research Support Foundations - US$ 1,020,186.86
Copérdia Swine and Poultry Contract - US$ 445,011.80
Other Partnerships (BRF, CNPq) - US$ 193,660.86
Total TT Revenue - US$ 1,673,186.59

TT Actions - 2020

Courses	20
Folders/Booklets	11
Fields Days	1
Lectures	66

Society

SOLIDARITY CAME TO THE FORE IN 2020

Employees helped the community to cope with the pandemic

The year 2020 was marked by many solidarity actions at Embrapa Suínos e Aves. The first of such solidarity actions occurred in May. The Embrapa Suínos e Aves Employees Association (AEE) and the Embrapa Workers Union (SINPAF - Local Section), supported by their associates and affiliates, reversed amounts allocated to internal actions to purchase food, hygiene supplies, and blankets. Donations benefited the New Hope City institution, located in the district of São José, in Concordia.

In June, to celebrate Embrapa Suínos e Aves's 45 anniversary, the third edition of the Solidarity Anniversary was held. The 2020 donation action targeted impoverished families assisted by the Spiritist Society André Luiz and the institution New Hope City, focusing on distributing blankets, food, and milk.

At the end of the year, solidarity actions also included the collection of non-perishable foods and toys. Both donatives were addressed to the New Hope City institution. The institution's staff prepared special Christmas baskets for the previously subscribed impoverished families.

In addition to these actions, a group of volunteers, made up of several colleagues from the Unit, was constantly mobilized to help families in emergency and need situations. The group was formed right at the beginning of the pandemic, with the main objective of helping colleagues in the risk group.

Gradually, the group began to act more broadly and contribute to various community actions, always spontaneously.

SIPAT-SUL

Southern units mobilize

The Work Accidents Prevention Internal Week and the Life Quality at Work Week took place differently in 2020. Beyond being held virtually, they brought together the Embrapa's southern units. Throughout a whole week, all seven Embrapa's southern units got access to lectures, training, and videos on work accidents prevention and life quality at work.

Embrapa Suínos e Aves coordinated two activities. The first was a lecture with the functional nutritionist Patrícia Trainini, who addressed "Functional food today." The second was made available on the Internet the "Professor Levino's School" presentation, recorded in 2016. The presentation is a parody of a famous Brazilian TV show and counted on Embrapa Suínos e Aves employees' participation.

Internal

Videos and online meetings

Communicating and interacting with different audiences changed a lot in 2020. Meetings and face-to-face events became hard to be held as virtual and online gained space. Embrapa's internal audience also felt this change.

At Embrapa Suínos e Aves, one of the main tools used to approach employees were producing videos, campaigns, virtual meetings, and WhatsApp messages. The first took place in March when the pandemic and teleworking were decreed. The unit's heads recorded a statement, explaining the moment and what each one should do to organize his routine.

Then came motivational videos, tributes, process guidelines, and virtual meetings for sectors or the whole staff. There were 18 internal videos, all sent via WhatsApp.

2020 Training

- **28** events
- **57** participations
- **1,253** hours of training
- **US$ 1,142.60** of investiment

Investment

US$ 111,491.30 IN IMPROVEMENTS

Prioridade para laboratório de necropsia

Despite the country's economic situation and the sanitary restrictions caused by the covid-19 pandemic, Embrapa Suínos e Aves spent US$ 111,491.30 in renovating structures and acquiring new equipment, an increase of 250.6% compared to 2019 (US$ 31,801.46).

The priority was to renovate and adapt the building used for animal necropsy. This structure is part of the Animal Health and Genetics Laboratory complex. All investment resources were applied to it, a total of US$ 11,382.94.

In terms of equipment, the Unit got a new vehicle (a pickup truck with 4x4 traction, at the cost of US$ 32,301.74) for the Logistics Management Sector. Another investment was the employees' workstations updating (US$ 21,941.31) spent with desktop computers) under Information Technology Center guidance. Moreover, the Unit employed US$ 11,590.13 to buy a lawnmower robot and a tractor. Both allowed the automation of some tasks and optimized employees' time in the Infrastructure Management Sector. Additionally, the Unit also bought collars and receivers for monitoring large mammals and corral-type traps for capturing animals (an investment of US$ 17,988.39). The table below describes all investments carried out by Embrapa Suínos e Aves in 2020.

CONSTRUCTION - 2020	US$
Renovation and adaptation of the necropsy building of the Animal Health and Genetics Laboratory	11,382.94
TOTAL	**11,382.94**

EQUIPAMENT - 2020	US$
Pickup truck 4x4 traction diesel - L200	32,301.74
Desktop computers	21,941.32
Lawnmower robot and tractor	11,590.14
Collars and receivers for monitoring large mammals	11,179.88
Corral-type traps for capturing animals	6,831.72
Multimedia projectors	2,862.19
Notebook Intel Core i5	2,605.42
Wifi routers	2,385.86
Security cameras	2,308.32
Exhaust hood with articulated arm for laboratory	2,028.05
Office cabinet for laboratory	1,063.50
Sample homogenizers (3)	1,060.15
Laser printer	584.14
Laboratory microcentrifuges	579.30
Wireless access point	477.17
Gas mixture cylinder for laboratory	309.47
TOTAL	**100,108.37**

International

SWINE STUNNING SYSTEMS ON DEBATE

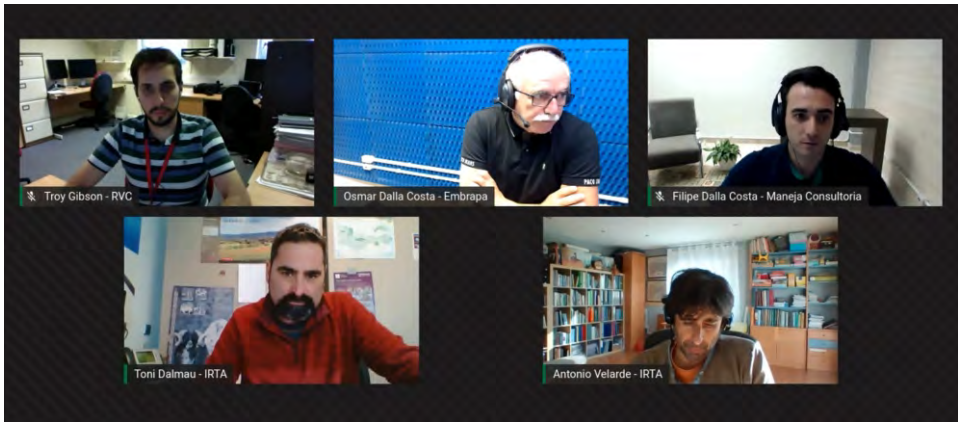
Meeting brought specialists from Brazil, England and Spain

Embrapa Suínos e Aves organized a technical meeting online to debate "Swine Stunning Systems: Electric vs CO2" last year.

The meeting brought together researchers from Brazil, England, and Spain and discussed novelties, benefits, and limitations related to stunning swine systems, such as the electric and controlled atmosphere (Co2). Specialists also identified projects and partnerships from debates based on the discussion and presentation of Brazilian and European experiences, especially to meet the needs identified by meat industries.

Embrapa's YouTube channel broadcasted the meeting, which targeted professionals from meat industries and agricultural inspectors. Subscriptions made in advance allowed interested parties to raise questions answered and debated by Brazilian and European specialists.

Researchers that took part in the meeting were Troy John Gibson, from the Royal Veterinary College (England); Antonio Velarde and Antoni Dalmau Bueno, from IRTA (Spain); and Filipe Antônio Dalla Costa, from Maneja Consultoria (Brazil). Osmar Dalla Costa, Embrapa Swine and Poutry's researcher focused on animal welfare studies, mediated the debate. Moreover, the technical meeting was organized and held by Embrapa Suínos e Aves, in partnership with the Ministry of Agriculture, Livestock and Supply, Pig Producers Brazilian Association (ABCS), Maneja Consultoria, and Industrial Electronic Flow. Additionally, the Santa Catarina Pig Producers Association (ACCS) supported the event.



InterPIG

Embrapa represents Brazil

In 2020, the Pig Production Costs Comparison Group (InterPIG) annual meeting took place online in June. Last year, the meeting happened in parallel to the annual meeting of the Agri Benchmark Network and the Agricultural Economics Research Institute of Hungary.

Embrapa Suínos e Aves has been part of InterPIG since 2008. One of Embrapa's objectives is to consolidate itself as a reference linked to Brazil's pig and broiler production costs. The 2020 meeting discussed the impacts of the African Swine Fever and the covid-19 pandemic on pig meat production and international trade.

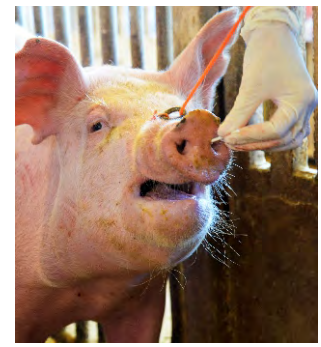
Embrapa aimed to present pig production costs in Brazil in 2019, participate in a methodological discussion to enable cost comparability between the largest producing countries, and collect data (technical coefficients and prices) on how Brazil's main competitors calculate their production costs. Furthermore, Embrapa sought to establish and consolidate an international network of specialists to exchange information and monitor pig production costs worldwide.

Influenza

International partnership

In December 2020, an online meeting organized by OFFLU took place to debate animal influenza. OFFLU is a global network of expertise on animal influenza supported by the World Organization for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), and the World Health Organization (WHO). The meeting brought together experts from reference centers that generate surveillance and research data on swine influenza, including Embrapa Suínos e Aves.

The unit has participated in this group since 2011, which enabled important partnerships, exchanges, and development of projects, such as the one on swine influenza. This approach allowed Embrapa and the National Centers for Animal Health (NCAH), linked to the Agricultural Research Service (ARS) of the United States, to formalize a cooperation agreement to develop research related to animal health. The two institutions will be involved in studies that will contribute to the diagnosis and production of effective vaccines to control the Influenza A virus in pigs.



Poultry
Award to Nutrition

Embrapa Suínos e Aves got one of the awards distributed during the XVIII Egg Congress, organized by the São Paulo State Poultry Production Association (APA) in March 2020. The work awarded was the "Study of the interaction of limestone solubility, calcium levels, and forms of vitamin D for commercial laying hens." The study was acknowledged as the best Nutrition work.

Ambiance
Conbea rewards work

The work entitled "Suitable facilities for piglets production" received an honorable mention during the Agricultural Engineering Brazilian Congress (Conbea 2020), held on November 25th. Embrapa's study achieved first place in the oral category of the Rural Constructions and Ambience topic.

A3P Award
BIOGÁSFORT™ AWARDED BY MMA

Project is among the best sustainable practices in the country

The BiogásFORT™ Project: Energict innovation for Adding Value to Production Waste through Mobility via Biomethane, by Embrapa Suínos e Aves, was recognized as one of the best sustainability practices in the country in the eighth edition of the A3P Award (Environmental Agenda in Public Administration), promoted by the Ministry of the Environment (MMA). BiogásFORT™ took third place in the "Sustainable use of natural resources" category. The award ceremony took place online in December due to the COVID-19 pandemic. It is available on the MMA YouTube channel.

All finalists went through a technical inspection process to certify actions developed in the different projects between March and September.

BiogásFORT™ was launched in October 2018 during a ceremony to commemorate the 43 years of Embrapa Suínos e Aves. Embrapa Pork and Poultry Biomethane Production Unit is the first in Santa Catarina and one of the pioneers in Brazil on this scale. The fuel originates from the pig waste generated on the Unit's farms. The waste collected passes through the Pig Waste Treatment Station – ETDS.

Embrapa's system uses a biofilter, which purifies residues and is regarded as an advantage compared to other processes available. The biofiltration process, which removes sulfur from the biogas, resulted from previous research supported by Eletrosul.

A3P Award purpose is to recognize the merit of public sector bodies and institutions' initiatives linked to the promotion and practice of A3P. In the end, the award aims to identify and recognize innovations implemented by public organs that contribute to sustainability.

Scan the QR Code with your smartphone camera. You will watch an animation on Embrapa's YouTube channel that explains the process of filtering, purifying, and pressurizing the biogas until it turns into biomethane for vehicular use at Embrapa Suínos e Aves.

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