

Embrapa

Suínos e Aves

2022 ANNUAL REPORT

Research and Development
Technology Transfer
Administration

embrapa.br/suinos-e-aves



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1st edition

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Cataloging in Publication (CIP)

Embrapa Suínos e Aves

Embrapa Suínos e Aves.

Annual Report 2021 / Editors Monalisa Leal Pereira, Lucas Scherer Cardoso. -
Concórdia: Embrapa Suínos e Aves, 2023.

20 p.; 29,7 cm. (Documentos / Embrapa Suínos e Aves, ISSN 0101-6245; 243).

1. Agricultural Research. 2. Embrapa Suínos e Aves. 3. Report. I. Pereira,
Monalisa Leal. II. Cardoso, Lucas Scherer. III. Título. IV. Série.

CDD. 630.72

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Innovation and significant results reached by the projects portfolio

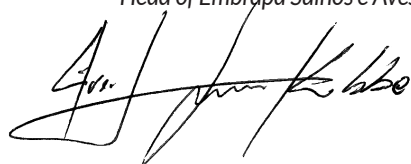
Foreword

2022 presented several challenges. Our staff worked with dedication to deliver results and build new projects and partnerships in cooperation with private and public actors linked to the pork, poultry, and eggs production chains.

Each year passes by, we reinforce our commitment to innovate and deliver impactful results to the Brazilian society. In the following pages of this report, we highlight our main actions and results achieved in 2022. I hope you enjoy the reading about our contributions!

Everton Krabbe

Head of Embrapa Suínos e Aves



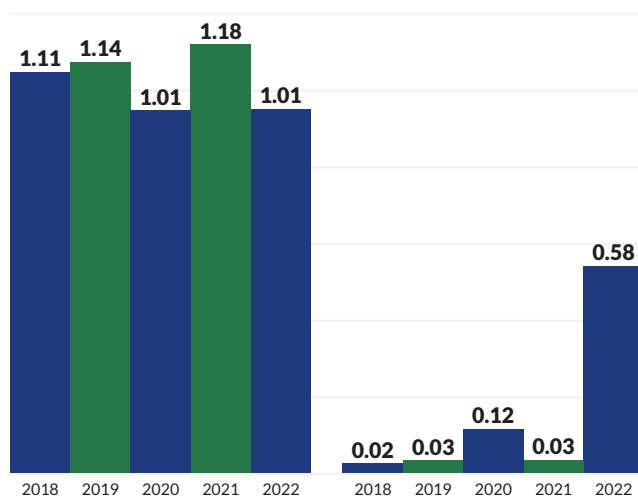
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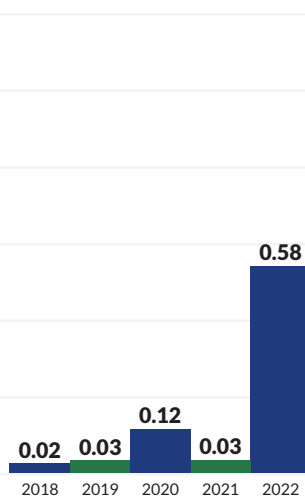
Costing, investment and staff evolution at Embrapa Suínos e Aves 2018-2022



Total costing
*In US\$ million

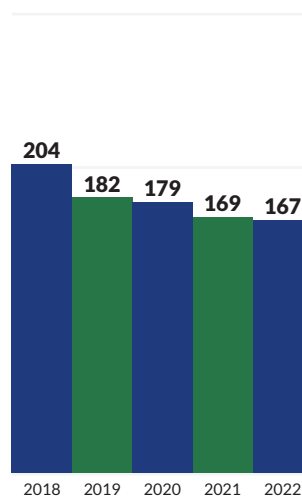


Investment
*In US\$ million



Employees

*As of December 31 of each base year



41
researchers
47
analysts
27
technicians
52
assistants

Embrapa Suínos e Aves' Indirect Revenue from 2018-2022

*From 2020, expenses executed are taken into account instead of the revenue reached throughout the year

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| Revenue | US\$ | US\$ | US\$ | US\$ | US\$ |
| Events revenue/Technology Transfer | 34,712.18 | 55,059.87 | 33,865.55 | 18,234.87 | 46,512.39 |
| Research Support Foundations | 693,375.00 | 590,497.27 | 327,181.72 | 932,961.13 | 501,568.07 |
| Coperdia Pig and Poultry Contract Farming | 349,400.63 | 382,336.55 | 483,342.23 | 693,587.61 | 542,226.89 |
| Other partnerships (BRF, CNPq, Fapesec, Aincadesc) | 610,527.52 | 1,386,390.34 | 162,433.19 | - | 145,169.96 |
| Deputy Chamber extra budget | - | - | - | - | 105,042.02 |
| Scholarships | 13,655.46 | 15,336.13 | 30,546.22 | 65,252.10 | 85,724.79 |
| Total | 1,701,670.80 | 2,429,620.17 | 1,142,182.35 | 1,710,035.71 | 1,426,244.12 |



Investments

US\$ 574.000 in improvements in 2022

| Description | US\$ |
|--|-------------------|
| GENERAL IMPROVEMENTS | |
| Photovoltaic plant connected to the on-grid system | 236,869.75 |
| Diesel utility vehicle with box-type closed body | 39,810.92 |
| LABORATORY EQUIPMENT AND EXPERIMENTAL FIELDS | |
| Automatic isoperibol calorimeters with exhaust pump | 157,521.01 |
| Exhaust hood for the Physical-Chemical Analysis Laboratory | 9,558.82 |
| Others | 18,553.36 |
| COMPUTERS AND OFFICE EQUIPMENT | |
| Computers | 40,907.14 |
| Software licenses for graphic design | 17,723.57 |
| Others | 43,279.54 |
| AUDIO AND VIDEO EQUIPMENT | |
| Equipment for broadcasting via the Internet (capacity building and institutional events) | 4,927.06 |
| Others | 5,149.04 |
| 2022 TOTAL | 574,300.21 |

Embrapa Genetics

Market share in 2022



LEARN MORE ABOUT
THE 051 LAYING
HEN AND THE
MS115 SWINE



1.887
million
sold birds

8.6%
of the national market
of brown-egg
laying hens



289
sold boars

3.8%
of the national market
of terminal males

Partnerships strengthening



Alignment meeting with Biopark team in Toledo, Paraná

Actions turned to demands of chains



WATCH THE
EMBRAPA'S
INSTITUTIONAL
VIDEO

Embrapa focused on strengthening partnerships and ties with relevant agents of poultry and pig chains in 2022. An important initiative took place in the western of the Paraná state. Embrapa worked with local institutions to encourage research linked to development programs in that region, one of the largest pork meat producers in Brazil. Biopark and The West in Development Program (POD) are examples of this sort of partnership, which made feasible the implementation of the Embrapa Mixed Research and Innovation Unit (UMIPI).

Another 2022 highlight was the addition of two amendments from the Deputy Chamber extra budget to the Embrapa Suínos e Aves revenue. Senator Luis Carlos Heinze (PP-RS) and Federal Deputy Jerônimo Goergen (PP-RS) addressed to Embrapa financial resources to fund technology transfer actions and start the operation of a company focused on collecting dead animals on rural properties and processing them to produce fertilizers and products based on animal fat.

Research

Efforts related to research and development reinforced the building of a competitive projects portfolio based on open innovation, where partnerships with companies and institutions were fundamental. In 2022, Embrapa Suínos e Aves worked on 65 projects, which developed technological assets or benefited public policies.

Technology Transfer

Embrapa Suínos e Aves expanded its technology transfer actions in regions that cluster pig and poultry production in Brazil. In this context, the implementation of the UMIPI in the western of Paraná state and actions linked to dead animals disposal in different regions of the Rio Grande do Sul state achieved significative results.

Administration

The area made important advances in adjusting research support structures. It also optimized the financial management of contracts and agreements. In regard to Embrapa Suínos e Aves human resources, the administrative area put into practice mechanisms to encourage the dialogue between employees and capacity building actions.

Sustainability as a pivotal goal

Management goals turned into practice in 2022 increased Embrapa Suínos e Aves economic and environmental sustainability. Among the actions operationalized are the expansion of crops cultivation areas (which achieved 10.5 hectares in 2022), a project to collect rainwater, improvements related to alternative sources of water supply, and a photovoltaic plant.

The cultivation of internal areas allowed to pursue improvements such as costs reduction linked to crop acquisitions to feed Embrapa's herds. 2021/2022 harvest reached 64 tons. Moreover, internal areas cultivation also reduced costs related to mowing and cleaning.

Crops fertilization is made by applying pig manure from facilities used by Embrapa's research projects. Thus, an optimized waste management strategy yielded inputs that decreased Embrapa's research expenses. In addition, the practice met sustainability requirements, as it recycled nutrients from waste, reducing the possibility of environmental issues.

The 2022/2023 crop occupies 19 hectares cultivated with corn, which will recycle approximately 30% of all manure produced by Embrapa's research projects. The expected crop harvest is 180 tonnes, around 45% of Embrapa Suínos e Aves annual feed consumption. These 19 hectares represent only 11% of Embrapa's total area.

A photovoltaic plant approval is another action finished in 2022. It required several efforts to articulate and define

the project accepted by the federal government. The building of the photovoltaic plant will start before the end of 2023.

Besides energy concerns, Embrapa Suínos e Aves also has focused on improving water supply, as the region where it is located has faced drought periods increasingly. In order to minimize water shortages, the renewal of alternative sources was a priority in the last year. Among the actions put into practice were the reactivation of an artesian well, the recovering of woods near water sources, the replacement of pipes, and water treatment system improvements.

Fruit trees planting also ensured that Embrapa Suínos e Aves internal areas offered a gain related to employees quality life. Only in September 2022, 47 seedlings of fruit trees were planted.



Corn harvest in the Embrapa's internal area

Publications reinforce technological results

48 articles published in scientific journals

14 articles published in specialized magazines

32 articles published in conference proceedings

9 books edited or organized

20 technical-scientific book chapters published

14 Embrapa's Documents Series published

10 brochures, leaflets, or booklets published

20 technical reports edited



CHECK ALL
EMBRAPA
SUÍNOS E AVES
PUBLICATIONS

Embrapateca

Conhecimento, tecnologia e inovação disponíveis para você. Clique e confira!

Seleção Embrapa
Gestão ambiental da propriedade é um dos focos da Embrapa Suínos e Aves. Nos últimos anos, a Unidade validou rotas tecnológicas para o destino de animais mortos não abatidos na propriedade, bem como soluções para o tratamento de efluentes da suinocultura. O software SGAS faz parte de soluções ambientais para a gestão da granja.

Ciência agora
Conheça o que a Embrapa Suínos e Aves tem publicado em periódicos técnico-científicos nos últimos meses.

Destaques da estante
Viabilidade econômica e de produção são temas de curso voltado para o biogás

Publicação revela custo de produção para suínos em diferentes países

Cartilha detalha os requisitos básicos de biossegurança na postura

Calculadora estima demanda hídrica, potencial de biogás e disponibilidade de nutrientes

Embrapa Suínos e Aves



Embrapateca connects to audiences

The new online toll aims to improve connections between the knowledge produced by Embrapa Suínos e Aves's and its various audiences. Embrapateca distributes scientific and technical content through specific sections, such as "Embrapa's Selection", "Publications on the shelf" and "Science now".



TEC-DAM

The booklet "Technologies for Dead Animals Disposal on Farms" was updated in 2022, revising and inserting new technologies. The publication is one of Embrapa's actions on the subject.

Highlights



Legal transport

Embrapa, the Ministry of Agriculture, and Pig Producers National Association launched the "Legal Transport" spelling book. The publication and video series includes 12 chapters related to animal transport and pig welfare measures.

A photograph of a laboratory environment. In the foreground, a blue pipette is held vertically. To its right, a Bunsen burner is lit, with a bright orange flame. Below the burner, a white rack holds several test tubes. In the background, a person wearing a white lab coat is partially visible. The overall scene is brightly lit, suggesting a clean and professional research setting.

Leading-edge research and technologies for swine and poultry production

65 ongoing research projects in 2022

Embrapa Suínos e Aves research staff worked on 65 projects in 2022, 51 of which under its leadership.

In the last year by itself, Embrapa delivered 71 results, among technological assets (16), pre-technological assets (30), and innovation support (25).

Technological assets delivered were machines and/or equipment, agricultural processes, industrial processes, agricultural or industrial products/inputs, and softwares for external customers.

The main deliveries as pre-technological assets were databases, biological collections, and technical-scientific methodologies.

In regard innovation support, deliveries included support for public policies formulation or execution, institutional arrangements, capacitation and technological updating of multiplier agents, prospective studies, and socioeconomic studies or impact assessments.



Nanococcidiosis

Embrapa, in partnership with Rio Grande do Sul Federal University, leads a project that applies nanotechnology and aims to develop an alternative for coccidiosis prophylaxis and treatment in broiler chickens.



Infectious Bronchitis

Embrapa's researchers, in partnership with the Brazilian Association of Animal Protein and the Mercolab Laboratory, identified a new bronchitis variant strain in chickens in Brazil.



Bacteriophages

Embrapa has developed a bacteriophage-based biopharmaceutical to handle poultry salmonella, which causes chicken meat contamination, market restrictions, and risk to human health.



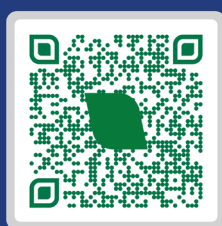
Avian influenza

Embrapa organized a special website focused on information about the Avian influenza (embrapa.br/suinos-e-aves/influenza-aviaria). It took part in efforts to avoid the emergence of the bird flu cases in Brazil.



RUP

A study made by Embrapa, Brazilian Association of Animal Protein, and Ministry of Agriculture updated the Normative Instruction 32, which defines moisture limits, protein, and Moisture/Protein Ratio (RUP) for poultry cuts.



LEARN ABOUT
ALL PROJECTS
DEVELOPED BY
EMBRAPA SUÍNOS
E AVES

Focused actions

Demands from production chains met through research

Innovation challenges

Embrapa Suínos e Aves research thematic groups (NTs) worked on a projects portfolio that met demands indicated by pig, poultry, and eggs production chains. Throughout 2022, the five Embrapa's NTs were guided by innovation challenges determined by what production chains regarded as relevant demands.

Projects and actions

In 2022, partnerships were structured with private sector were decisive for orienting Embrapa Suínos e Aves research actions. NTs worked in 65 research projects. Most of them were co-funded and implemented through technical cooperation between Embrapa and private partners. Learn research lines worked by Embrapa Suínos e Aves NTs.



NTPA Poultry Production Thematic Group

- » Prospection of microRNAs associated with broilers white striping pectoral myopathy
- » Digital tool to approach public and private advisory systems: small-scale pig and eggs productions
- » Electronic game to improves poultry producers capacity
- » Analogues of chicken cuts from tissue engineering with bacterial cellulose

NTSA Poultry Health Thematic Group

- » Federal Inspection System review and modernization for poultry slaughterhouses
- » Virus sequence analysis and viral vaccine development
- » Biosecurity of biological and GMO containment areas
- » Intestinal health
- » Nanotechnology usage for diseases prophylaxis and treatment

More poultry genetics available

With the aim of expanding poultry genetics bid in Brazil, Embrapa Suínos e Aves signed a licensing contract with West Aves Company to multiply and sell its poultry lines. Sales of three Embrapa's genetics products lines (the industrial type broiler chicken **Embrapa 021**, the industrial type laying hens - **Embrapa 011** and **031**, and the colonial/free range type broiler chicken **Embrapa 041**) are part of the agreement.



West Aves farm for poultry genetics production, in Piratini-RS

NTPS

Pig Production
Thematic Group

- » Legal transport of pigs, animal welfare data network
- » Ambience related to pig production facilities
- » Raw materials evaluation for pigs precision nutrition and winter cereals applied to pig feeding
- » Gene editing in pigs
- » Automation in pig feeding

NTSS

Pig Health
Thematic Group

- » Losses reduction in slaughtering and decontamination of raw materials in slaughterhouses
- » Agricultural practices to reduce antimicrobials usage
- » Nanovacin for Swine influenza
- » Feral swine population epidemiological surveillance
- » Poultry and swine microbiological collection

NTMA

Environment
Thematic Group

- » Sistrates: gas emissions reduction and waste treatment
- » Applications and systems: GeoFert, SGAS, and Biogas Calculator
- » Environmental Management Model for intensive pig production
- » Biomass production from microalgae and macrophytes
- » Fluid fertilizer production and granular reminalizer from poultry litter

Embrapa is a forerunner in researching cultured chicken meat

Embrapa Suínos e Aves worked in 2022 to develop boneless chicken breast fillet prototypes, which resembles sassami. This novelty will be available for nutritional and sensory analysis by the end of 2023. Also characterized as an alternative protein, the technology made by Embrapa recreates animal tissues in laboratory from animal cells, providing meat similar to natural ones. This innovation meets current consumption trends.

Why chicken meat?

Embrapa focused on chicken meat because it is considered one of the most versatile proteins consumed throughout the country. In addition, chicken meat is one of the most nutritionally complete foods, being crucial for healthy diets. Another advantage is the availability of Embrapa's poultry genetic bank.

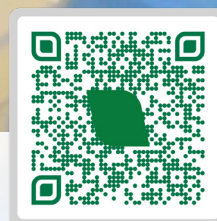
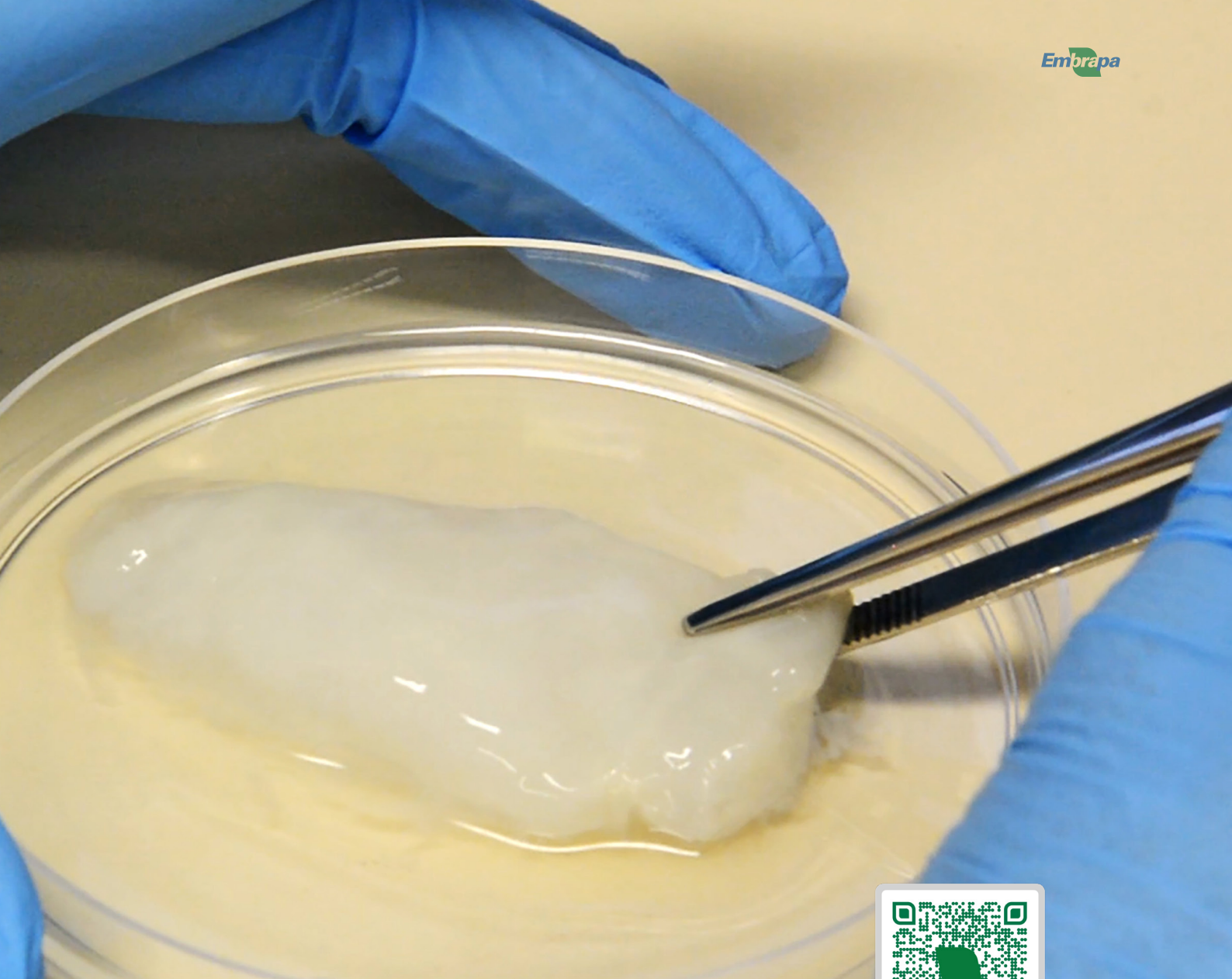


Competitive notice

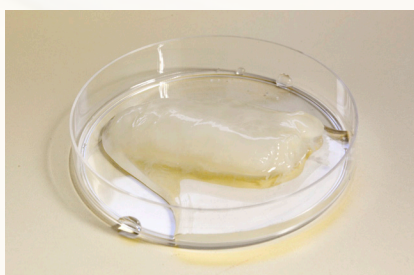
The project carried out by Embrapa Suínos e Aves got approval into the international public notice published by The Good Food Institute (GFI). Brazilian institutions or companies applied 5 out of 22 selected projects.

Method

The method applied by Embrapa to build culture chicken meat uses three-dimensional structures of bacterial nanocellulose, with characteristics similar to decellularized chicken breast cuts. Subsequently, cells are placed in cellulose using the perfusion technique, similarly to that used for organ recellularization.



CHECK THE WEBSITE
DEDICATED TO THE
JOURNEY OF
CULTURED MEAT



Results

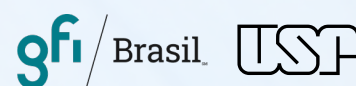
In addition to the chicken breast analogue, the project will build a biobank, which may reduce the need for repeated generation of primary cell cultures.

Alternative

Cultured meat does not propose to replace meat produced by current chicken production systems. It is an alternative with the potential to provide products for niche markets, which will coexist with traditional meat products.

Partnerships

Good Food Institute (GFI) and the University of São Paulo (USP) are partners of the cultivated chicken meat project.



Animal tissue production at Embrapa's laboratory: world trend

Information and content available to all audiences



17 technical and institutional events

» Tecnoeste, Coopavel, Cotrijal, AveSui, Famoto, TecnoFam, PorkExpo, AviSulat, Abraves, Inovameat, FSBBB, Southern Brazilian Symposiums on Pig and Poultry Production, SIAVS, IPVS, TecnoAgro and Tec Agro



2,432 mentions in the media

» 189 demands of journalists
» 37 texts sent to media
» 1 Prosa Rural (Embrapa's radio program)



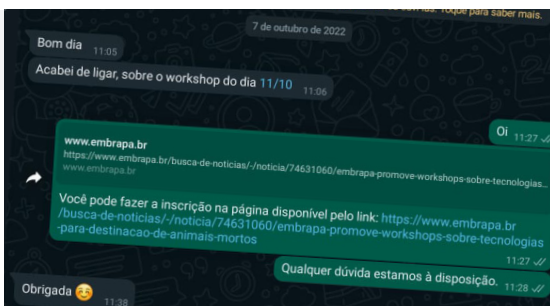
87 hours of content

» 26 live broadcastings (64 hours)
» 167 videos produced (23 hours of scientific communication, news, and interviews)



869 services

» 316 via the official customer service (SAC via Embrapa website)
» 256 by phone
» 238 by WhatsApp
» 59 by email





EaD course launched in 2022



e-Campo online education

- » 1 course launched
- » 8 training courses started
- » 7,858 subscribers



Capacitation

- » 113 events
- » 8,500 hours of training
- » US\$ 15,000 in investments



“You are what moves us” series

- » 7 episodes streamed live on YouTube
- » 4.5 thousand views on the Embrapa channel
- » Animal Health



Workshop “Technologies for Dead Animals Disposal”

- » Cities of Lajeado, Santa Rosa, and Erechim
- » More than 500 participants
- » Support: ACSURS, SIPS/RS, SFA-RS/Mapa, DDA/Governo RS, Emater/RS, and Fundesa



Awards

- » A3P Monitoring Seal from the Ministry of the Environment
- » Recognition for contribution related to covid-19 tests operationalization



Apps

- » DiagSui - version 3.1
- » Easy Cost



Science Field Day

- » In person, with live transmission
- » 5 knowledge stations
- » 800 students from Santa Catarina and Rio Grande do Sul states



Scientific Initiation Journey (Jinc)

- » 71 works enrolled and 65 approved
- » 45 poster presentations
- » 20 oral presentations



IMA team training



YOUR FUTURE **INSPIRES**
OUR **SCIENCE**



Production Performance 2022



14.5 million
tons of meat

#2nd in production | ▲1.36% (2022»2021)
#1st in exports | ▲4.59% (2022»2021)



4.9 million
tons of meat

#4th in production | ▲5.99% (2022»2021)
#4th in exports | ▼1.49% (2022»2021)



52 billion
units

production | ▼5.28% (2022»2021)
exports | ▼16.49% (2022»2021)



162 thousand
tons of meat

production | ▲3.32% (2022»2021)
exports | ▲25.53% (2022»2021)

*Sources: ABPA, USDA



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POULTRY AND PIG
INTELLIGENCE
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STATISTICS

The logo for Embrapa, featuring the word "Embrapa" in a bold, blue, sans-serif font. A green leaf-like shape is integrated into the letter 'a'.

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