



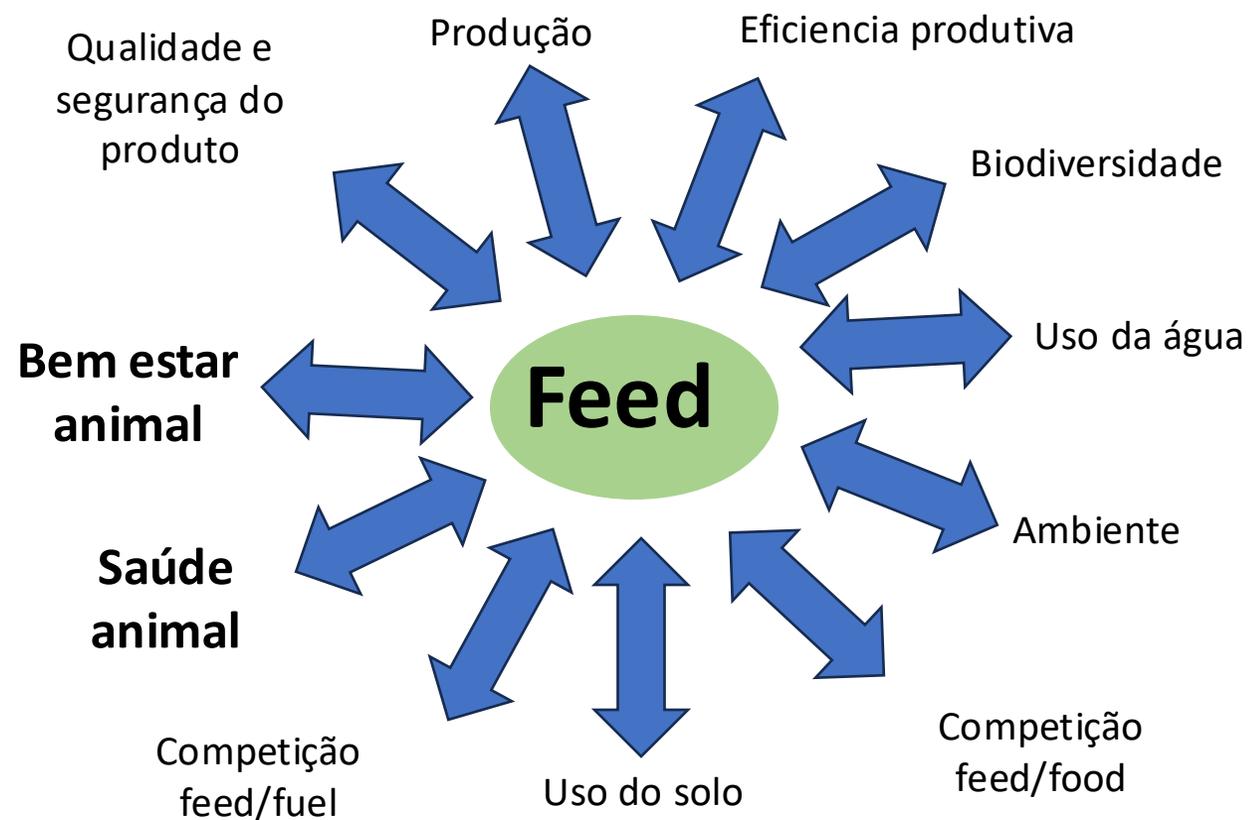
# HubRAM

UM PROJETO DE  
INVESTIGAÇÃO E INOVAÇÃO

**Dos dados à decisão: desafios e novas estratégias em alimentação animal**

Ana Sofia Santos  
[ana.santos@feedinov.com](mailto:ana.santos@feedinov.com)

## Compreensão de interações e sinergias

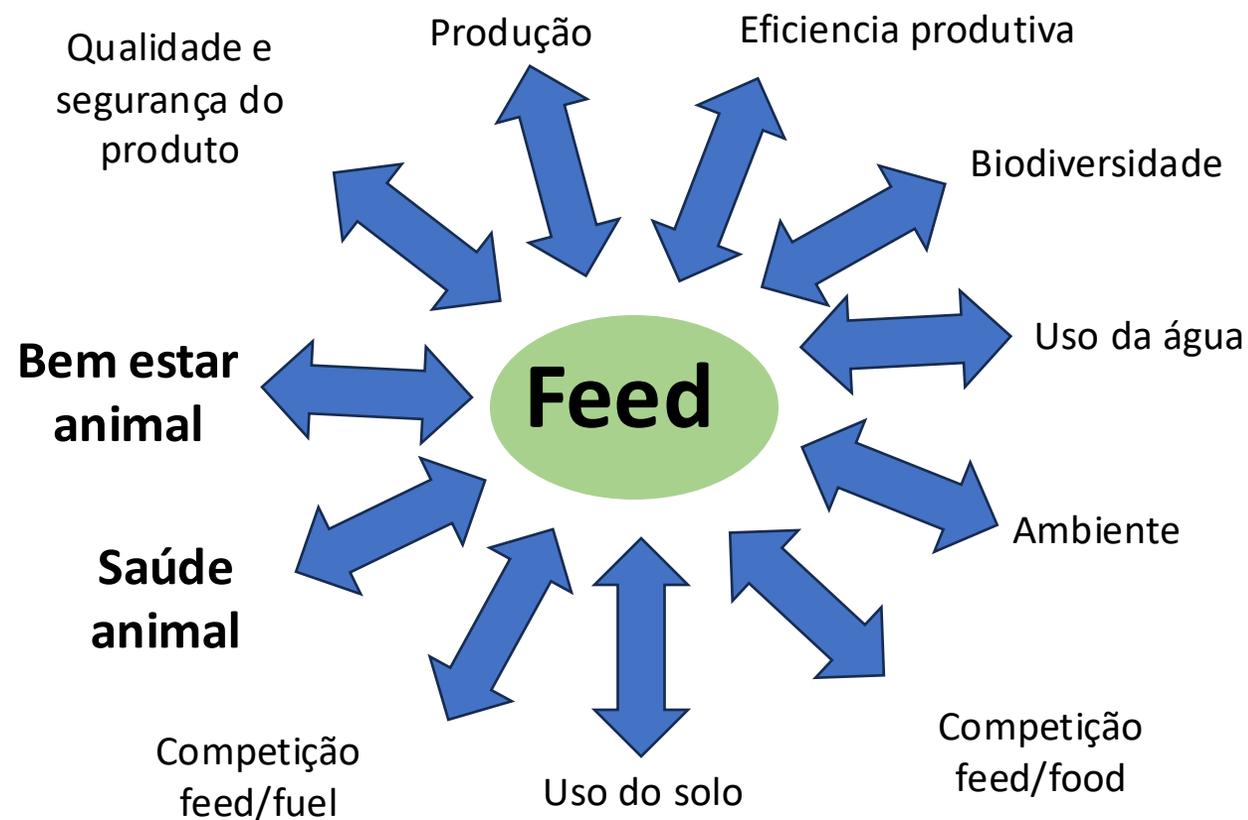
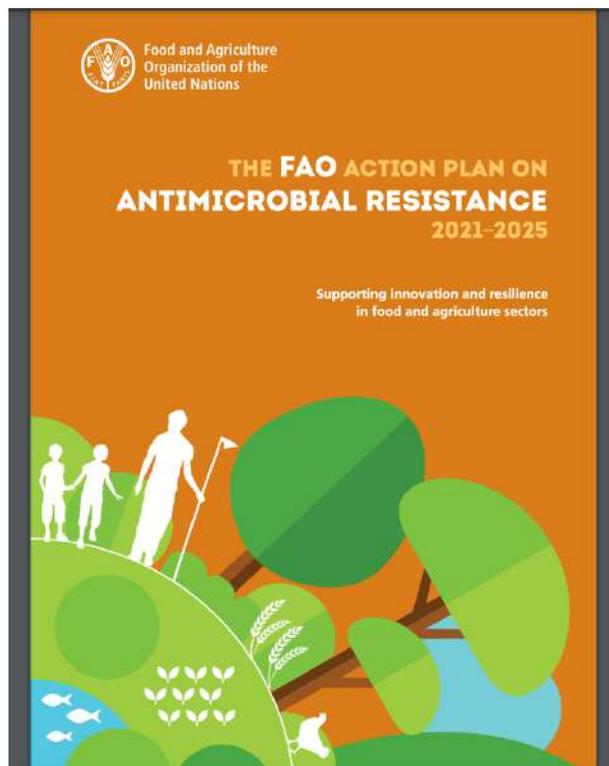




ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# INTRODUÇÃO

## Compreensão de interações e sinergias

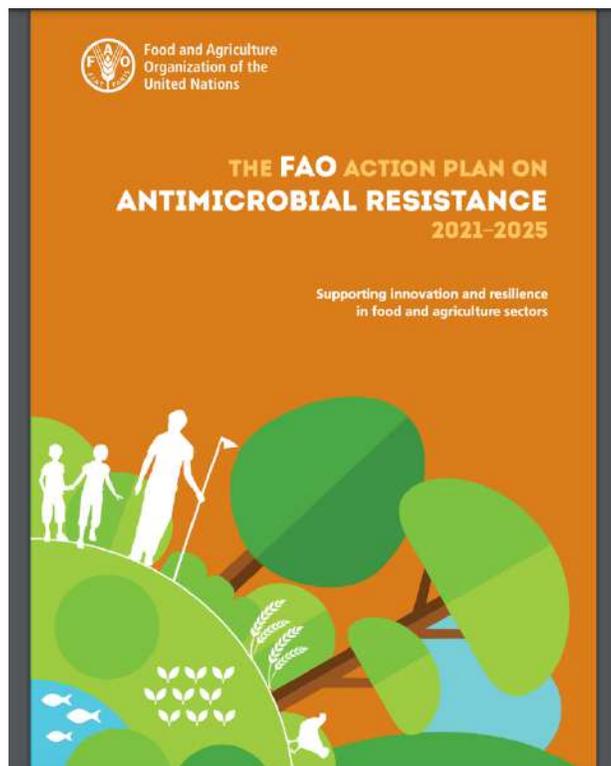




ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# INTRODUÇÃO

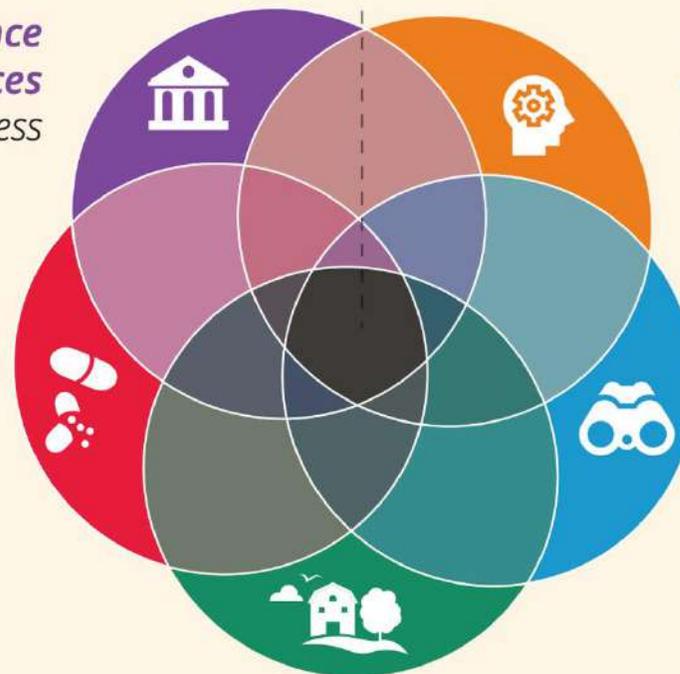
*Food and agriculture sectors,  
dependent livelihoods and economies  
are made resilient to the impacts of AMR*



*Strengthening **governance**  
and allocating **resources**  
to accelerate and sustain progress*

*Increasing stakeholder  
**awareness** and **engagement**  
to foster change*

*Promoting **responsible use**  
to keep antimicrobials working*



*Strengthening **surveillance**  
and **research** to support  
evidence-based decisions*

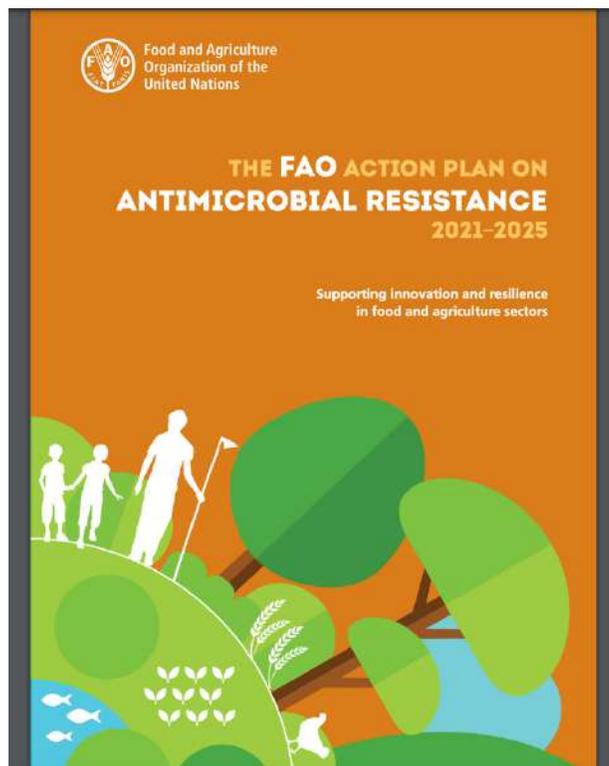
*Enabling **good practices** to prevent  
infections and control the spread  
of resistant microbes*



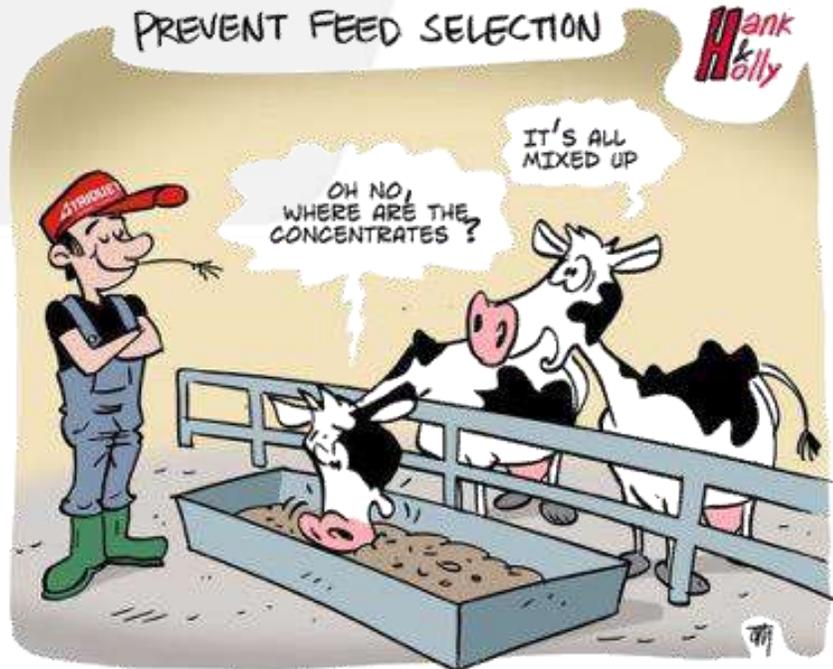
ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# INTRODUÇÃO

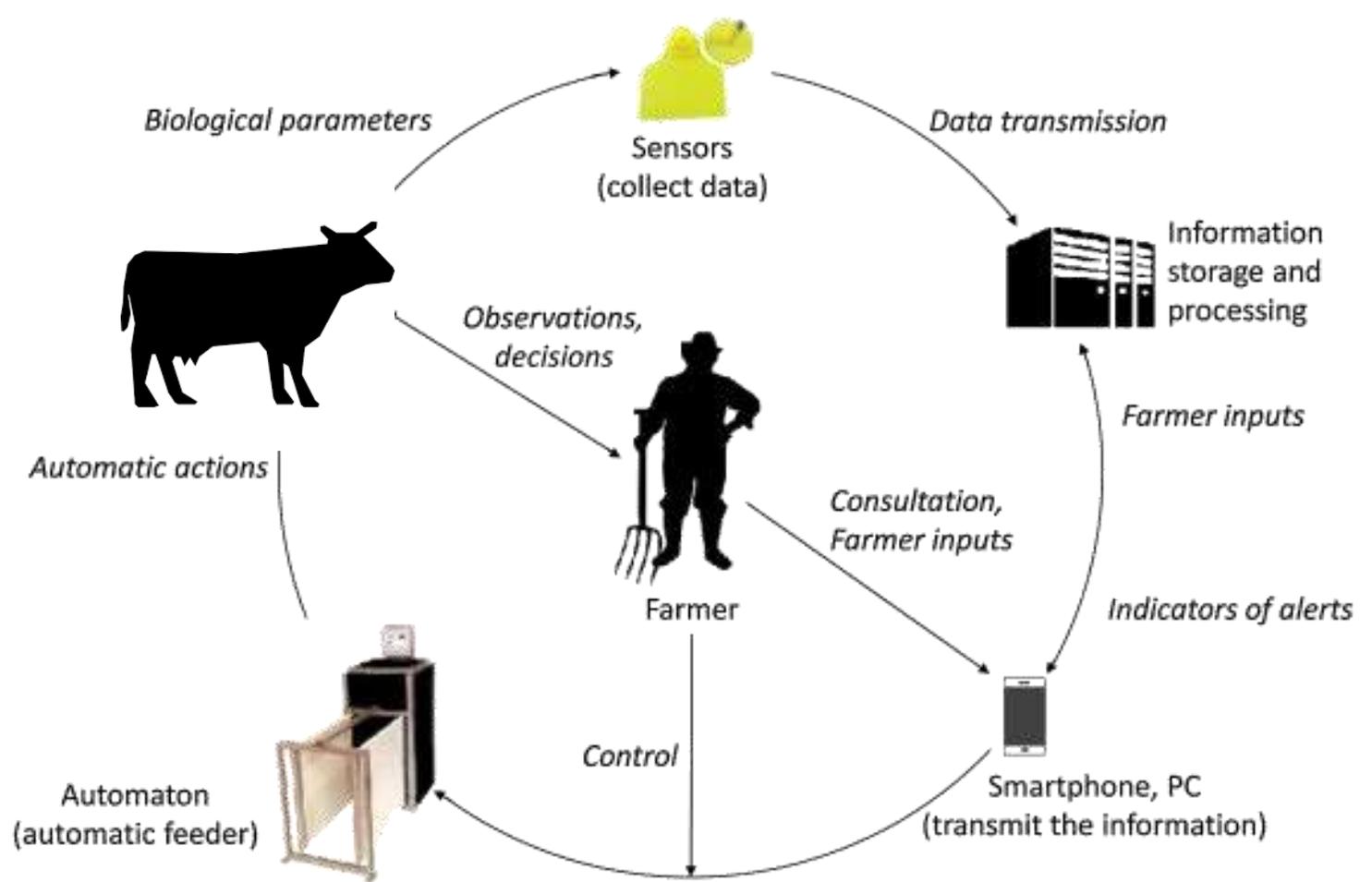
## Compreensão de interações e sinergias



# Alimentação Animal – de precisão ou não



BIG DATA



Gaillard et al. (2020)

# PRECISION FEEDING PUBLICATIONS....



ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

Google Scholar

precision animal feeding



Articles

About 3 910 results (0,10 sec)

Any time

Since 2025

Since 2024

Since 2021

Custom range...

Sort by relevance

Sort by date

Any type

Review articles

Create alert

[HTML] Linking **Animal Feed** Formulation to Milk Quantity, Quality, and **Animal Health** Through Data-Driven Decision-Making

[HTML] mdpi.com

[OA Akintan](#), [KG Gebremedhin](#), [DD Uyeh](#) - **Animals**, 2025 - mdpi.com

... high-quality **animal** products, especially dairy, underscores the need for **precision** livestock **feed** ... The nutritional composition of **animal feed** directly affects the physiological well-being of ...

☆ Save 📄 Cite Cited by 1 Related articles All 4 versions 🔗

**Precision** livestock farming: an overview on the application in extensive systems

[PDF] tandfonline.com

[G Bernabucci](#), [C Evangelista](#), [P Girotti](#)... - ... **Journal of Animal** ..., 2025 - Taylor & Francis

**Precision** Livestock Farming (PLF) represents a significant evolution in the livestock sector, promising to transform farms management improving production efficiency and sustainability, ...

☆ Save 📄 Cite Cited by 3 Related articles All 3 versions 🔗

**Precision** of dairy farming: navigating challenges and seizing opportunities for sustainable dairy production in Africa

[PDF] frontiersin.org

[E Tadele](#), [D Worku](#), [D Yigzaw](#), [T Muluneh](#)... - **Frontiers in Animal** ..., 2025 - frontiersin.org

... the integration of **precision feeding Precision** Dairy Farming, ... **Precision** Dairy Farming, such as improved **feed** efficiency and waste management, can incentivize its adoption. **Precision** ...

☆ Save 📄 Cite Cited by 1 Related articles 🔗

[HTML] **Precision** Livestock Farming applied to the dairy sector: 50 years of history with a text mining and topic analysis approach

[HTML] sciencedirect.com

[L Trapanese](#), [G Bifulco](#), [AC Macchio](#), [F Aragona](#)... - **Smart Agricultural** ..., 2025 - Elsevier

... a more technological approach that, with the aid of **precision** livestock farming (PLF), has ... various related keywords such as: "**precision** livestock farming, sensors, machine learning and ...

☆ Save 📄 Cite Related articles 🔗

Harnessing **precision** and innovation: A systematic review of **precision** livestock farming and IoT technologies in the Philippines

[PDF] sljol.info

[AN Taer](#), [EC Taer](#) - **Ceylon Journal of Science**, 2025 - cjs.sljol.info

... it will give insight into the importance of **precision animal** farming and the application of IoT ... for **precision** farming technologies, eg, better herd management, **feed** optimization, or **animal** ...

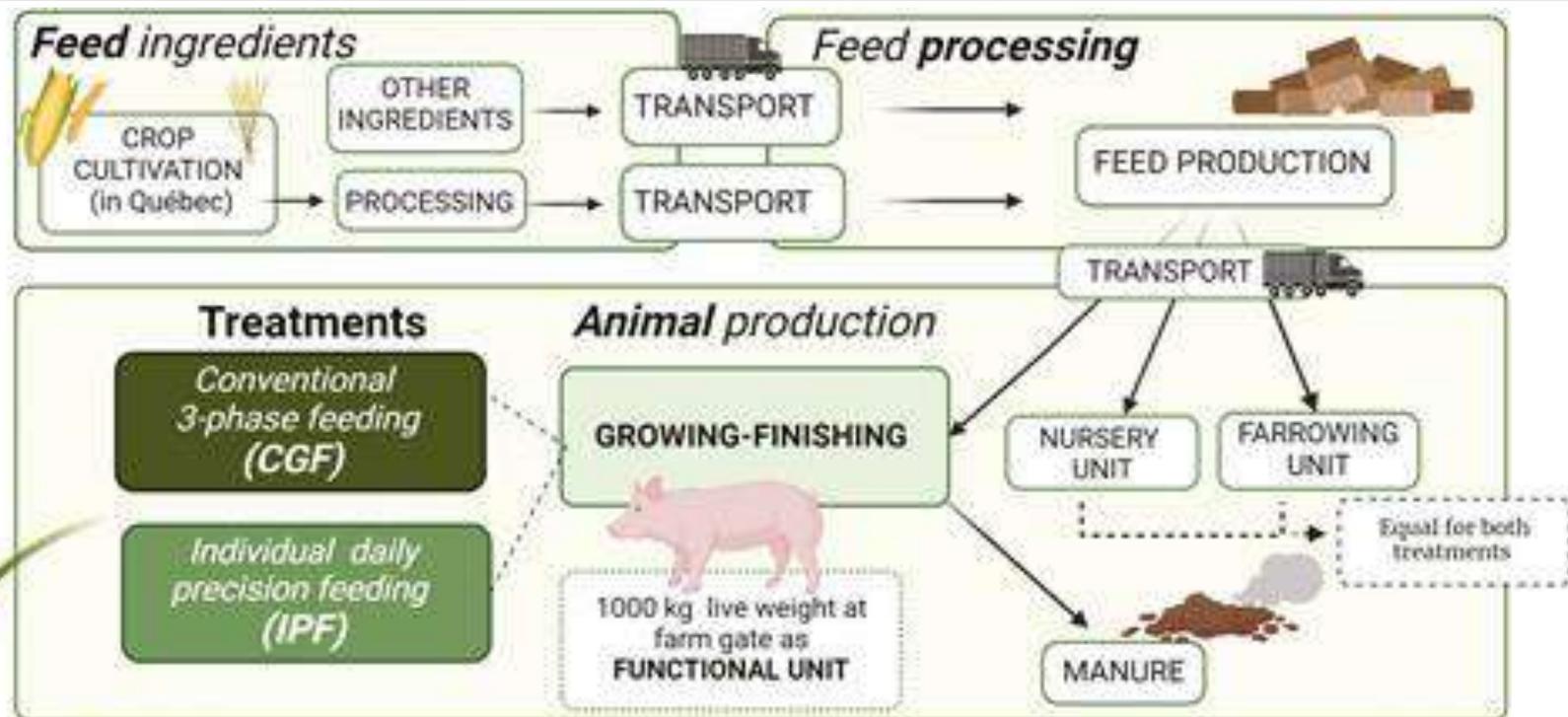
☆ Save 📄 Cite Related articles All 3 versions 🔗





ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# FERRAMENTAS - SUÍNOS



IPF – individual precision feeding

 Feed production was responsible for 60% of the CO<sub>2</sub> eq. emissions

 IPF reduced N and P excretion by 30 and 40%, respectively.

-  IPF reduced CO<sub>2</sub> eq. emissions related to global warming by 8%
-  IPF reduced SO<sub>2</sub> eq. emissions related to acidification by 16%
-  IPF reduced PO<sub>4</sub> eq. emissions related to eutrophication by 13%

Llorens et al., 2025.



Zuidhof et al., 2017

O sistema conseguiu um manejo alimentar preciso de aves relativamente ao peso objetivo (pré-programado)

Boa uniformidade intrabando : variação de PV <2% (valores anteriores entre 6,2 e 7,9%).

Os dados recolhidos pela estação permitiram novas informações:

- Comportamento alimentar
  - Quantificação de parâmetros produtivos em tempo real: PV, GMD, eficiência alimentar,...
- Em animais individuais alojados em bando

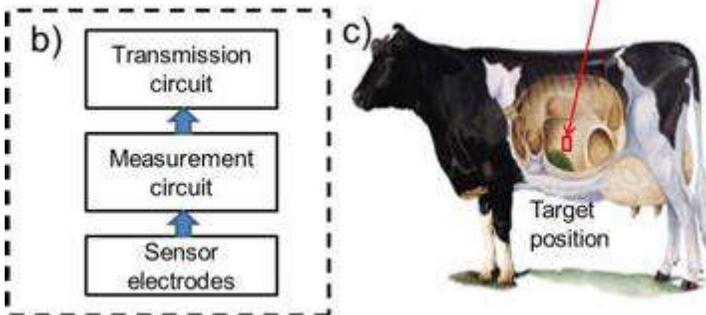
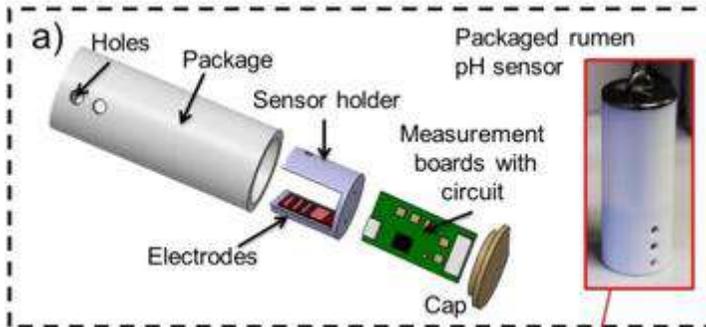
Foi possível manusear e alimentar animais individualmente, e adequar a quantidade de alimento a fornecer.

Otimizar a fermentação ruminal

Detetar problemas

Sensores

“coupling”



Zang et al., 2016

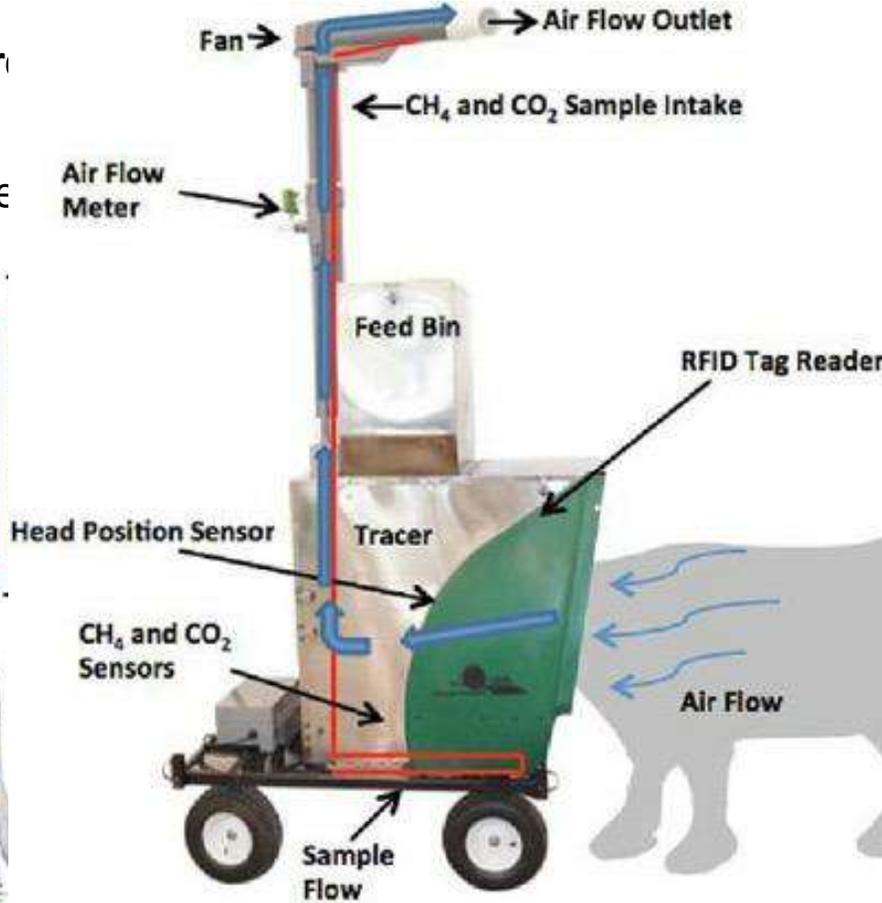
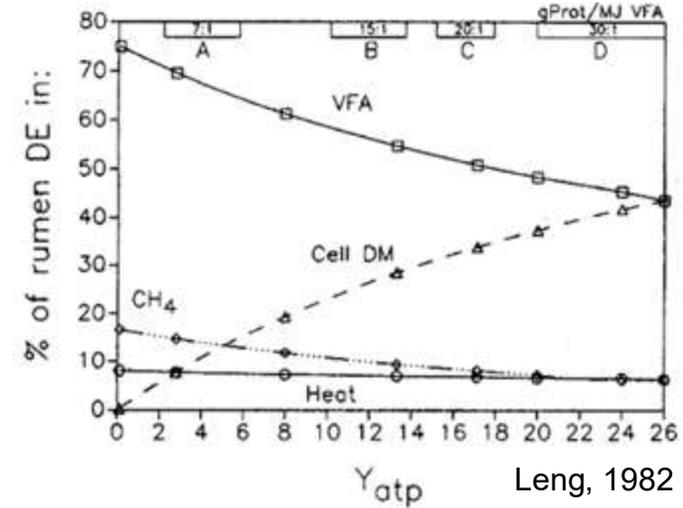
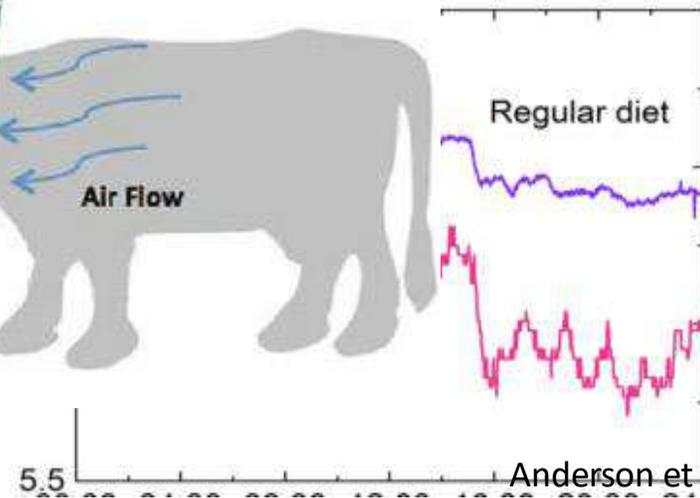


Imagem: Hirstov et al., 2015



Leng, 1982



Anderson et al., 2018

# FEED INGREDIENTS PUBLICATIONS....



ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

## Articles

About 1 820 results (0,11 sec)

Any time

Since 2025

Since 2024

Since 2021

Custom range...

Sort by relevance

Sort by date

Any type

Review articles

Create alert

Advances in the concept of **functional foods and feeds**: applications of cinnamon and turmeric as **functional enrichment ingredients**

[H Kumar](#), [R Dhalaria](#), [S Guleria](#), [R Sharma](#)... - *Critical Reviews in ...*, 2025 - Taylor & Francis

... The food and **animal feed** industries have taken notice of these health benefits and have ... products and **animal feeds** that contain cinnamon and turmeric as primary **ingredients**, which ...

☆ Save Cite Cited by 9 Related articles All 6 versions

[PDF] tandfonline.com

Environmental and Nutritional Value of Fruit and Vegetable Peels as **Animal Feed**: A Comprehensive Review

[MW Haider](#), [SM Abbas](#), [MA Saeed](#)... - *Animal Research ...*, 2025 - Wiley Online Library

... utilization of peels for **animal feed** can significantly reduce ... the dependency on conventional **feed ingredients** such as grains... , antioxidants and fats, and **functional** benefits such as flavor ...

☆ Save Cite Cited by 4 Related articles All 2 versions

[PDF] wiley.com

Full View

[HTML] Enhancing Meat Quality and Nutritional Value in Monogastric Livestock Using Sustainable Novel **Feed Ingredients**

[JAM Prates](#) - *Foods*, 2025 - mdpi.com

... , essential amino acids and **functional** compounds, enhancing **animal** health and meat ... notable for their high nutritional content and diverse applications in **animal feed** [2,17]. Spirulina is ...

☆ Save Cite Cited by 4 Related articles All 5 versions

[HTML] mdpi.com

Extrusion of Oilseed-Based **Ingredients**: Unlocking New Potential for Sustainable Protein Solutions

[A Kadam](#), [MG Scanlon](#), [F Koksel](#) - *Comprehensive Reviews in ...*, 2025 - Wiley Online Library

... These protein-rich products possess unique **functional** ... as tools to enhance the **functionality** of oilseed cakes, meals, and ... , these **ingredients** are more commonly used in **animal feed**, ...

☆ Save Cite Related articles All 3 versions

[PDF] wiley.com

[HTML] Microalgae as **Functional Food Ingredients**: Nutritional Benefits, Challenges, and Regulatory Considerations for Safe Consumption

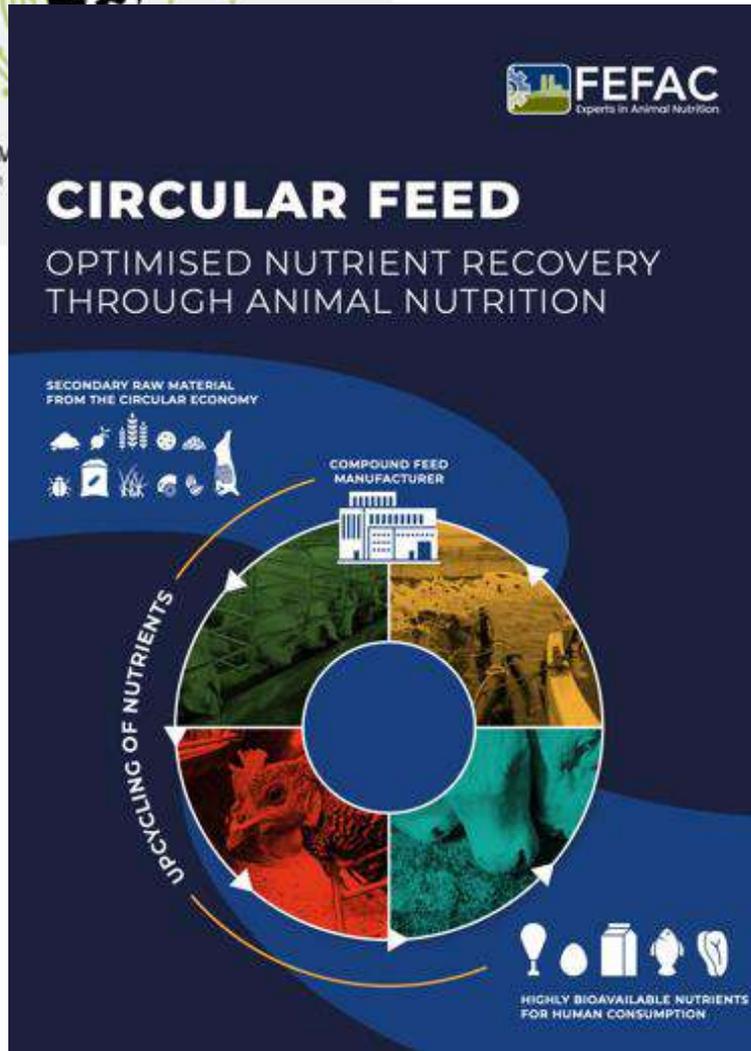
[FE Martínez-Ruiz](#), [G Andrade-Bustamante](#)... - *Biomass*, 2025 - mdpi.com

... **functional** foods, dietary supplements, food additives, **animal feed** and fodder, agricultural **ingredients**, ... care, agriculture, food, and **animal feed**. Currently, the global microalgal products ...

☆ Save Cite Related articles All 2 versions

[HTML] mdpi.com

# Outro olhar sobre matérias primas....



**FEFAC**  
Experts in Animal Nutrition

## CIRCULAR FEED

OPTIMISED NUTRIENT RECOVERY THROUGH ANIMAL NUTRITION

SECONDARY RAW MATERIAL FROM THE CIRCULAR ECONOMY

COMPOUND FEED MANUFACTURER

UPCYCLING OF NUTRIENTS

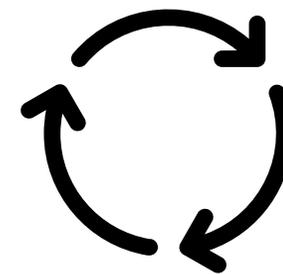
HIGHLY BIOAVAILABLE NUTRIENTS FOR HUMAN CONSUMPTION

The poster features a central circular diagram with four quadrants: top-left (green, crops), top-right (yellow, feed), bottom-left (red, chicken), and bottom-right (teal, cow). Arrows indicate a clockwise cycle. Surrounding the diagram are icons for various feed ingredients and animal products.

“ Non-food-grade ingredient recovered as a secondary raw material from the (local) circular economy with a low land-use footprint”



-  **Food/feed grade status**
-  **Land use ratio**
-  **The proximity of origin to feed mill**
-  **Nutrient digestibility**





ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°



# FeedInov



360°





ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# CO-PRODUTOS



# CO-PRODUTOS



Indústria de alimentação animal  
↓  
Utilização de subprodutos da moagem  
Atualmente



↓  
32% MP utilizadas no fabrico de AC

Avaliar os subprodutos de forma pragmática



Selecionar os que têm potencial



Trabalhá-los para serem utilizados de forma constante, mas localmente



Valorizar o produto e o setor



## FeedValue



ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# OUTRAS FONTES PROTEÍCAS



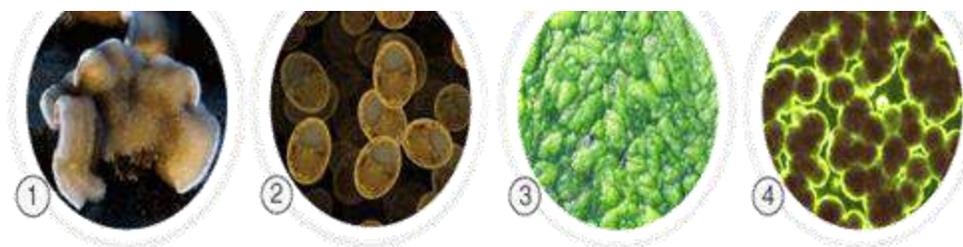
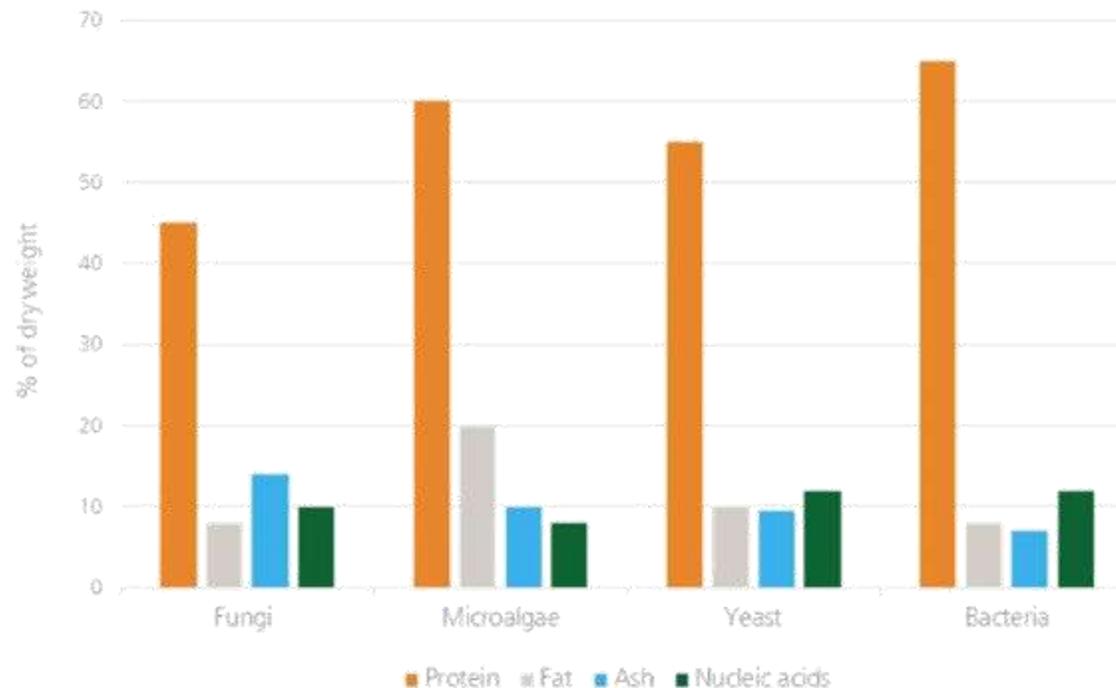
# Single Cell Proteins (SCP)



**Single cell protein (SCP)**, também conhecida como bioproteína: massa de células microbianas que pode ser usada como fonte de proteína na alimentação humana ou animal.

As SCP's podem ser produzidas a partir de resíduos biodegradáveis, promovendo uma abordagem circular.

Compositional analysis Microorganism SCP Production



(Miller & Litsky 1976)

1 Fungi | 2 Yeast | 3 Algae | 3 Bacteria

# ALGAS



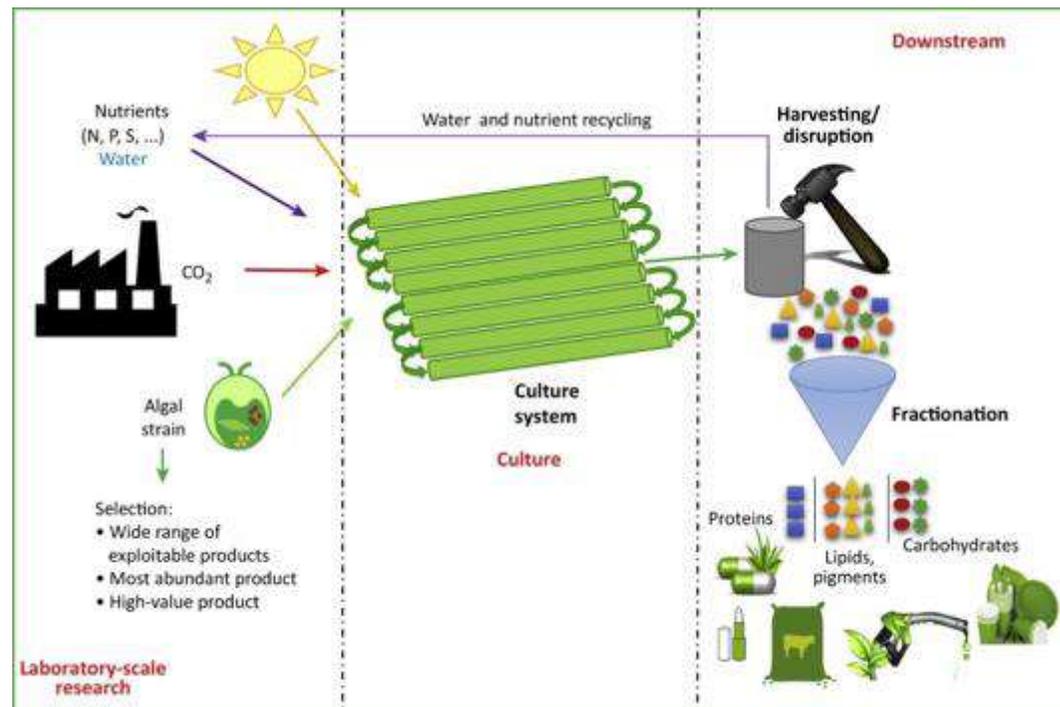
*Asparagopsis taxiformis*



*Asparagopsis armata*



**CH4: Diminuição de 50 a 98%  
Mas....**





ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

# INSETOS



## INFEED

Utilização de insetos como fonte nutricional numa alimentação animal mais sustentável e de origem local com 8 novas linhas de produtos (rações).



LÍDER DO EIXO "INFEED": 





ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

## OUTROS...

### Óleos essenciais

- Alteração padrões fermentação ruminal
- influenciar a microbiota intestinal
- aumentar o número de bactérias benéficas (*Lactobacillus* spp.)
- estimular o sistema imunológico
- reduzir o estresse oxidativo.
- ...



Fontes de fibra

Co-Produtos...

# STOPUP



## sustainable livestock systems

The Necessity for Change within European Livestock Production Systems



1 Mapping the Data Gaps



2 Establishing Current and Innovative Livestock Production Systems



3 Indicating & Measuring Impact for Livestock Systems



4 Holistic Methodology for Quantifying Impacts



5 Optimal Scenario Modelling



6 EU Livestock Systems Foresight

New Sustainable EU Livestock Production Systems



ALIMENTAÇÃO ANIMAL  
UMA VISÃO 360°

*Agenda Mobilizadora  
para a Produção  
de Leite Sustentável  
em Portugal*

## Projeto Planeta Leite



Em colaboração:



LACTOGAL



A análise do manejo de precisão pode ser classificada de acordo com 4 níveis:

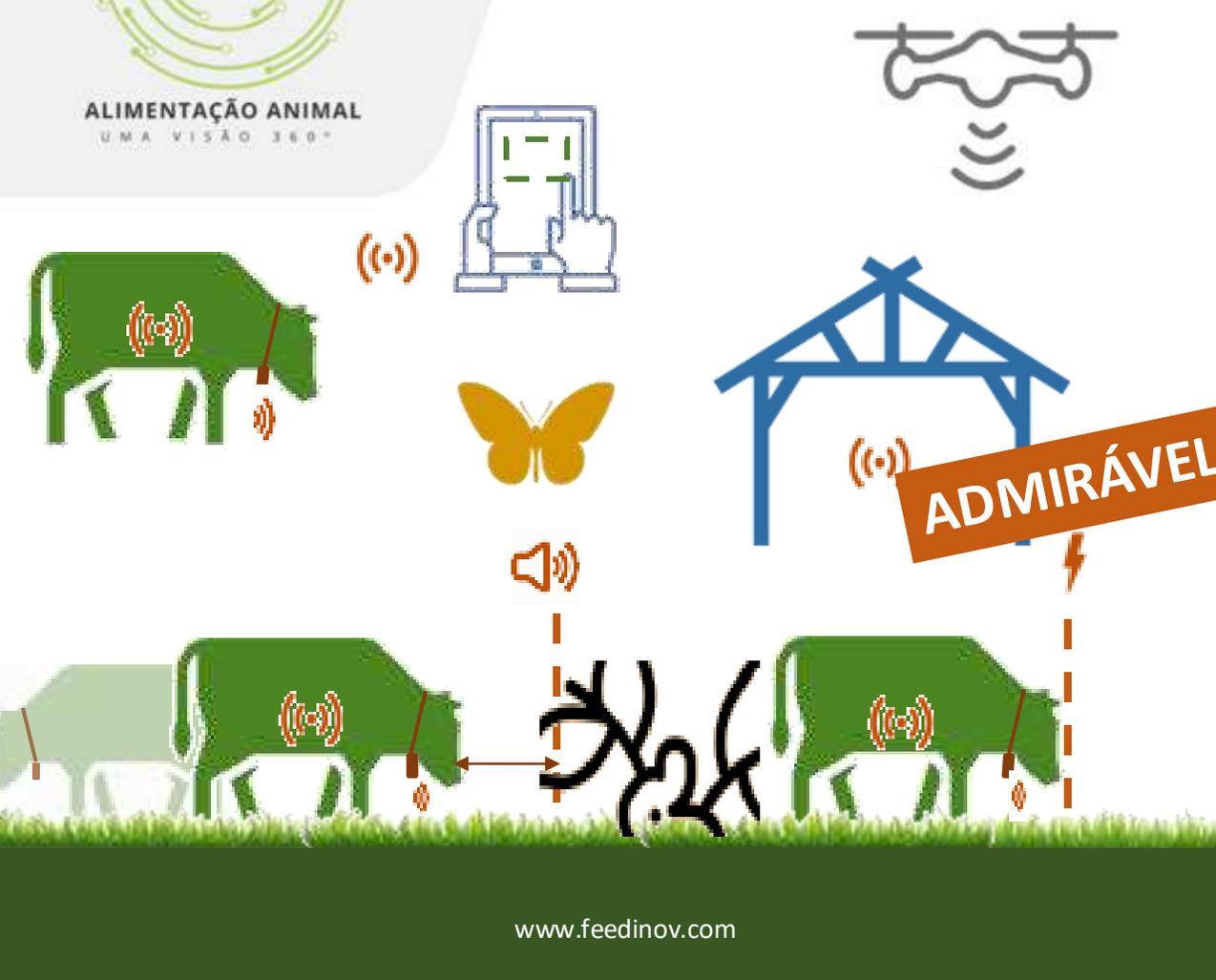
- I) Técnicas/equipamentos/ferramentas
- II) Interpretação dados
- III) Integração informação
- IV) Tomada de decisão

A analítica em produção animal encontra-se maioritariamente ainda nos níveis I e II



Avançar para a integração massal de informação e a sua integração nas tomadas de decisão é necessária

# POSSIBILIDADES...



[www.feedinov.com](http://www.feedinov.com)



Área de pastoreio

GIS – caracterização do coberto vegetal

Comportamento alimentar e de grupo

Sensor ruminal (pH, motilidade, ...)

Alimentar individualmente

Recolha, análise e integração de dados

...



**17 Associados**  
 1 Associação sectorial  
 10 Empresas  
 6 ENESIs

**Empresas:**

- ADM |
- Avenal |
- EuroCereal |
- Finançor |
- Racentro |
- Raporal |
- Sorgal |
- TNA |
- Tecnipec |
- Zoopan |

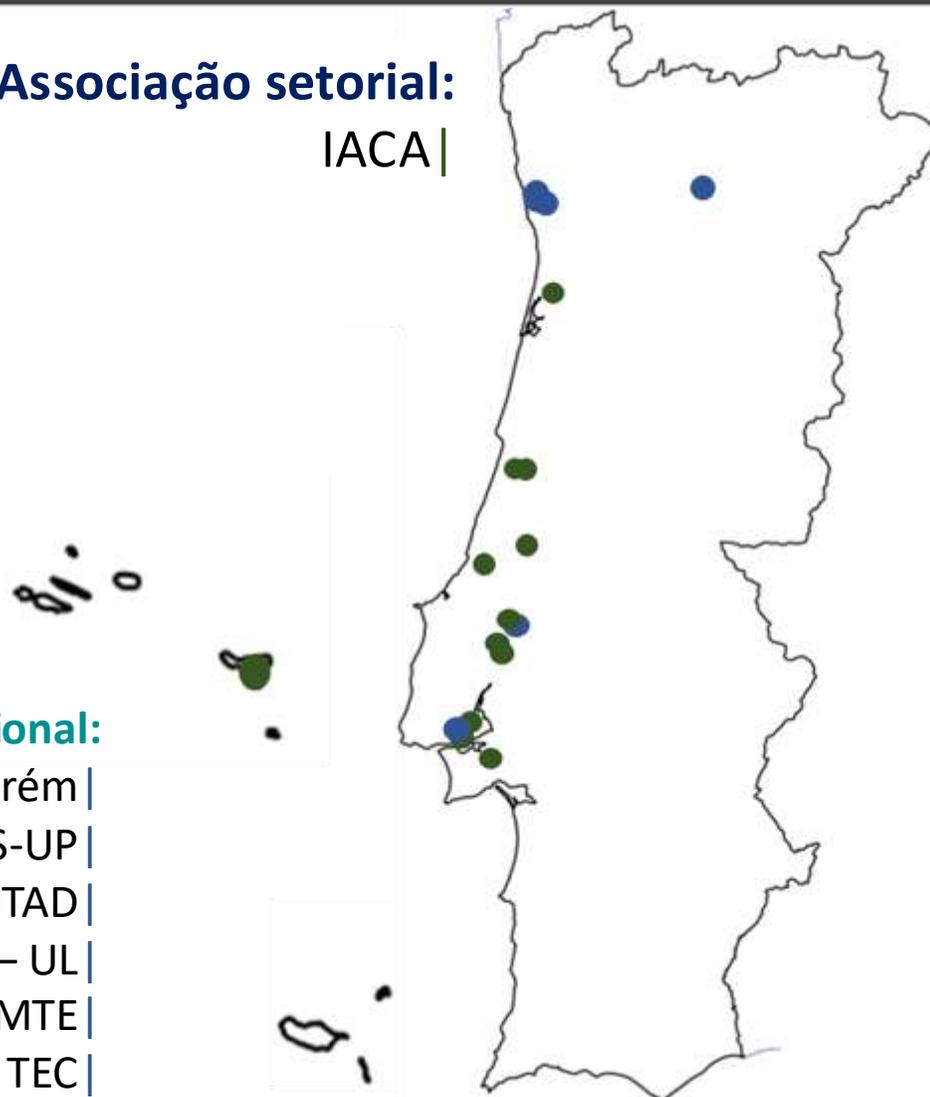
**Associação setorial:**

IACA |



**Entidades do sistema científico nacional:**

- INIAV – EZN Santarém |
- ICBAS-UP |
- UTAD |
- FMV– UL |
- REQUIMTE |
- INESC TEC |



# Obrigad@



[www.feedinov.com](http://www.feedinov.com)



[www.facebook.com/FeedInov/](https://www.facebook.com/FeedInov/)



[https://pt.linkedin.com/in/feedinov-  
colab-66b3561a9](https://pt.linkedin.com/in/feedinov-colab-66b3561a9)

# hubram

