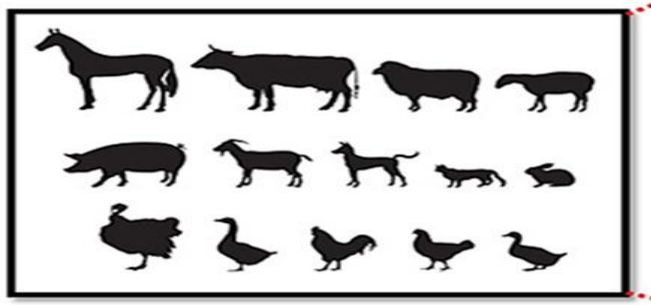
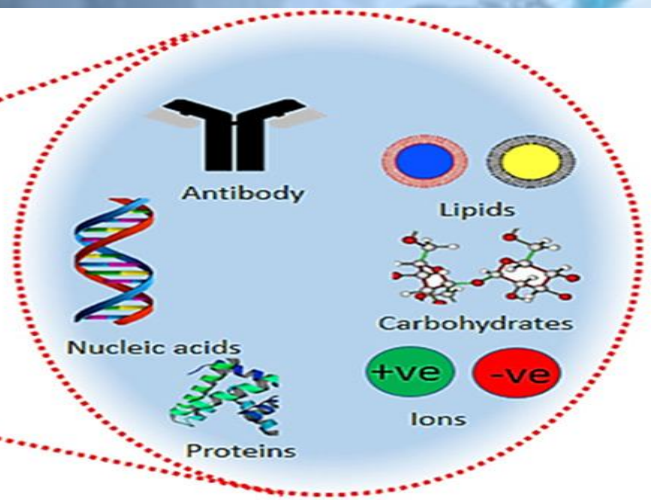
Agropecuária digital – desafios para o futuro

Prof. Dr. Iran Oliveira
NUPEA

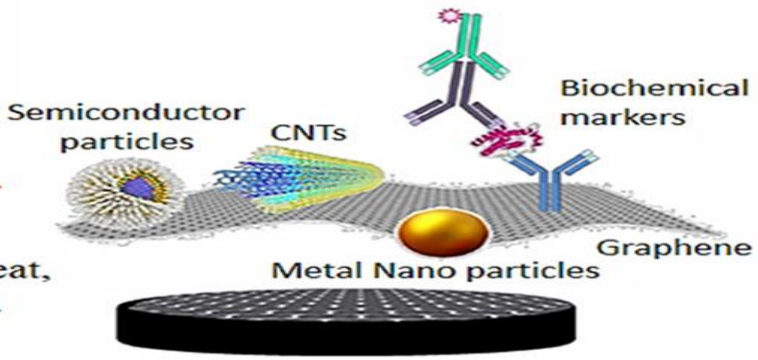




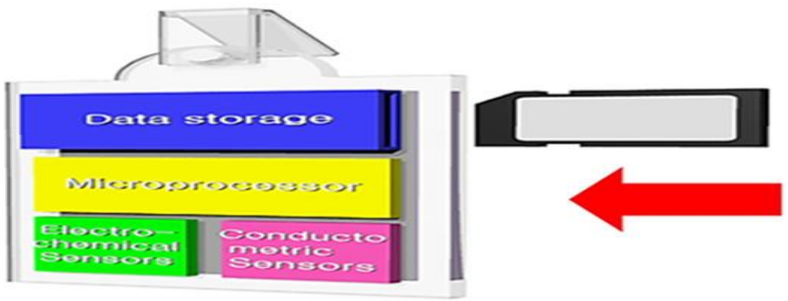


Biosample

Blood, serum, saliva, tears, sweat, urine, interstitial fluid etc.





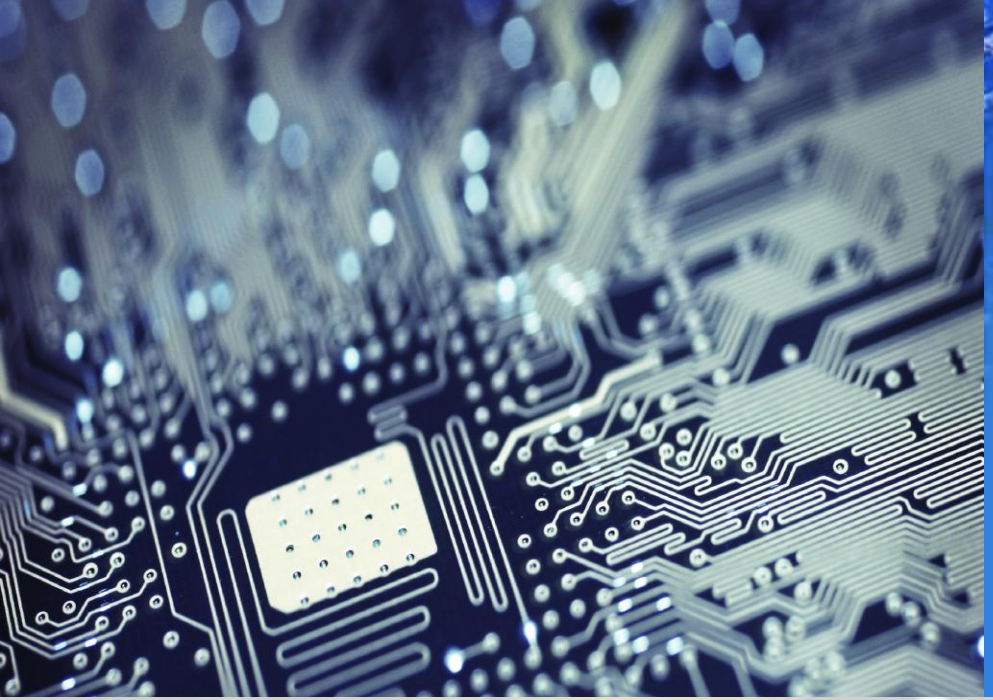


Signal Processing



Transducer

Electrochemical, Optical, Colorimetric, Mass, SPR, Magnetic etc.



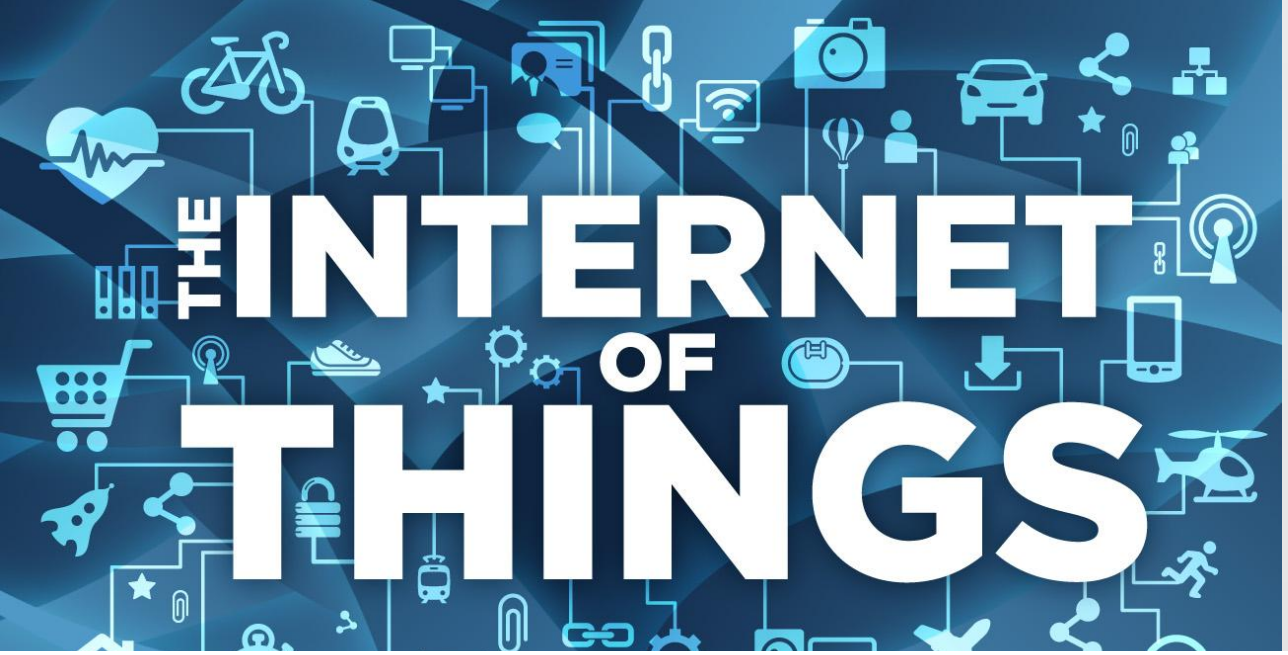
TECNOLOGIA DE INFORMAÇÃO
INTERNET DAS COISAS

PRODUÇÃO ANIMAL


Past
Present
Future
12
1
2
10

Zootecnia de precisão







Internet of Animal Health Things
Part 1: Large Animal

Internet of Animal Health Things (IoAHT)

Opportunities and Challenges

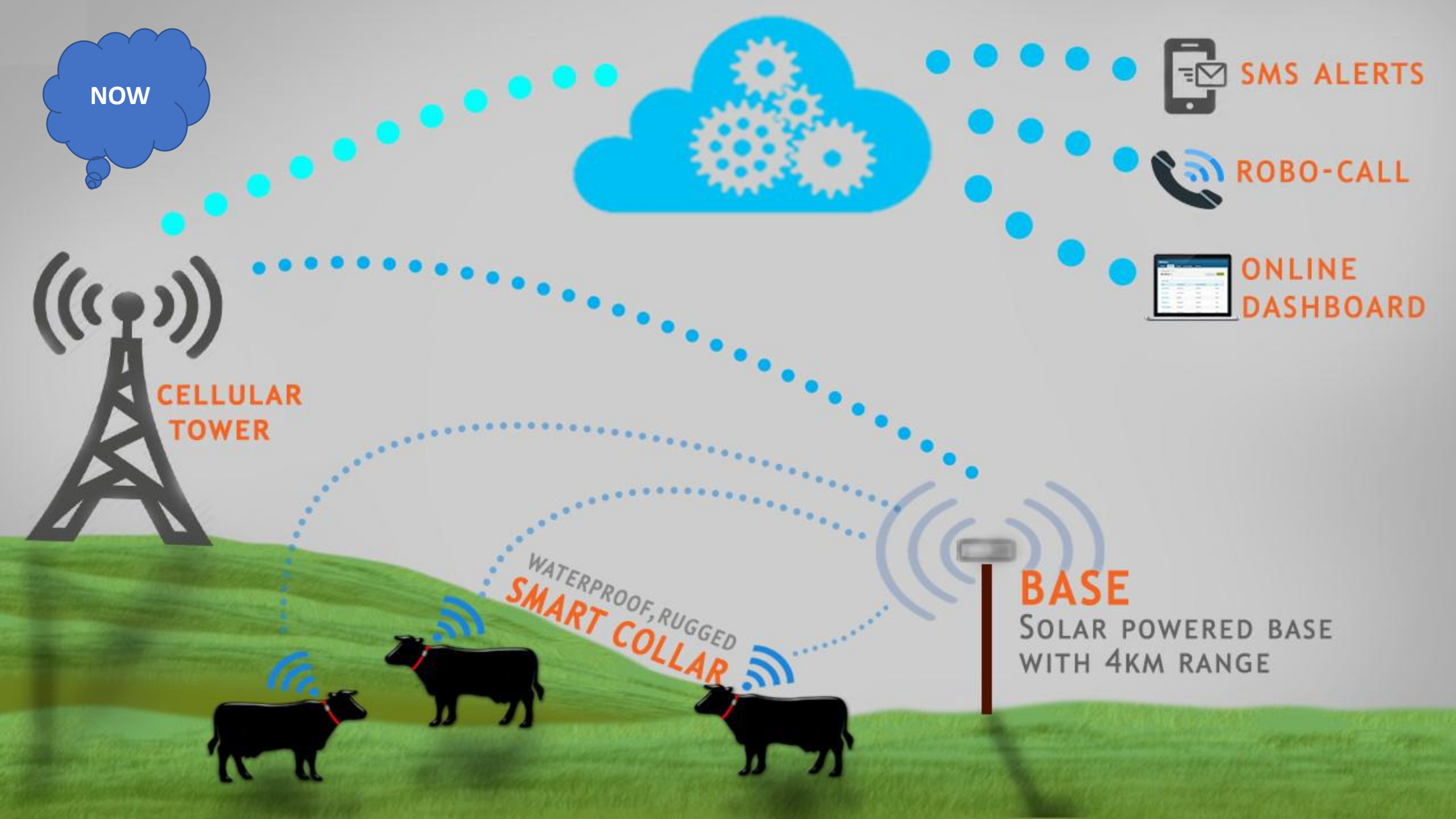
Daniel Smith, Scott Lyle, Al Berry, Nicola Manning
Centre for Digital Innovation, Zoetis

Mohamed Zaki and Andy Neely
Cambridge Service Alliance, University of Cambridge



IoAHT

UNIVERSITY OF CAMBRIDGE
Cambridge Service Alliance

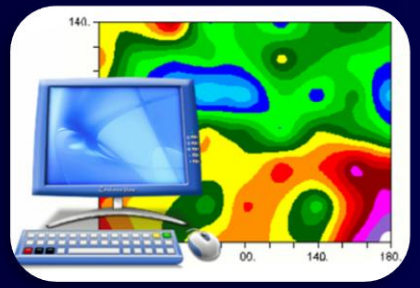

NOW
SMS ALERTS
ROBO-CALL
ONLINE DASHBOARD
CELLULAR TOWER
WATERPROOF, RUGGED
SMART COLLAR
BASE
SOLAR POWERED BASE WITH 4KM RANGE

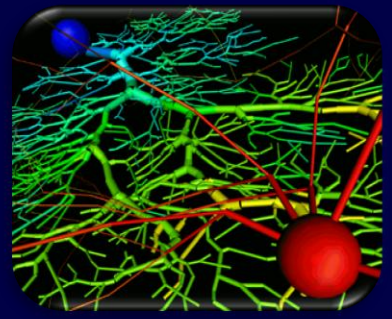


Utilização de sensores



fuzzy logic

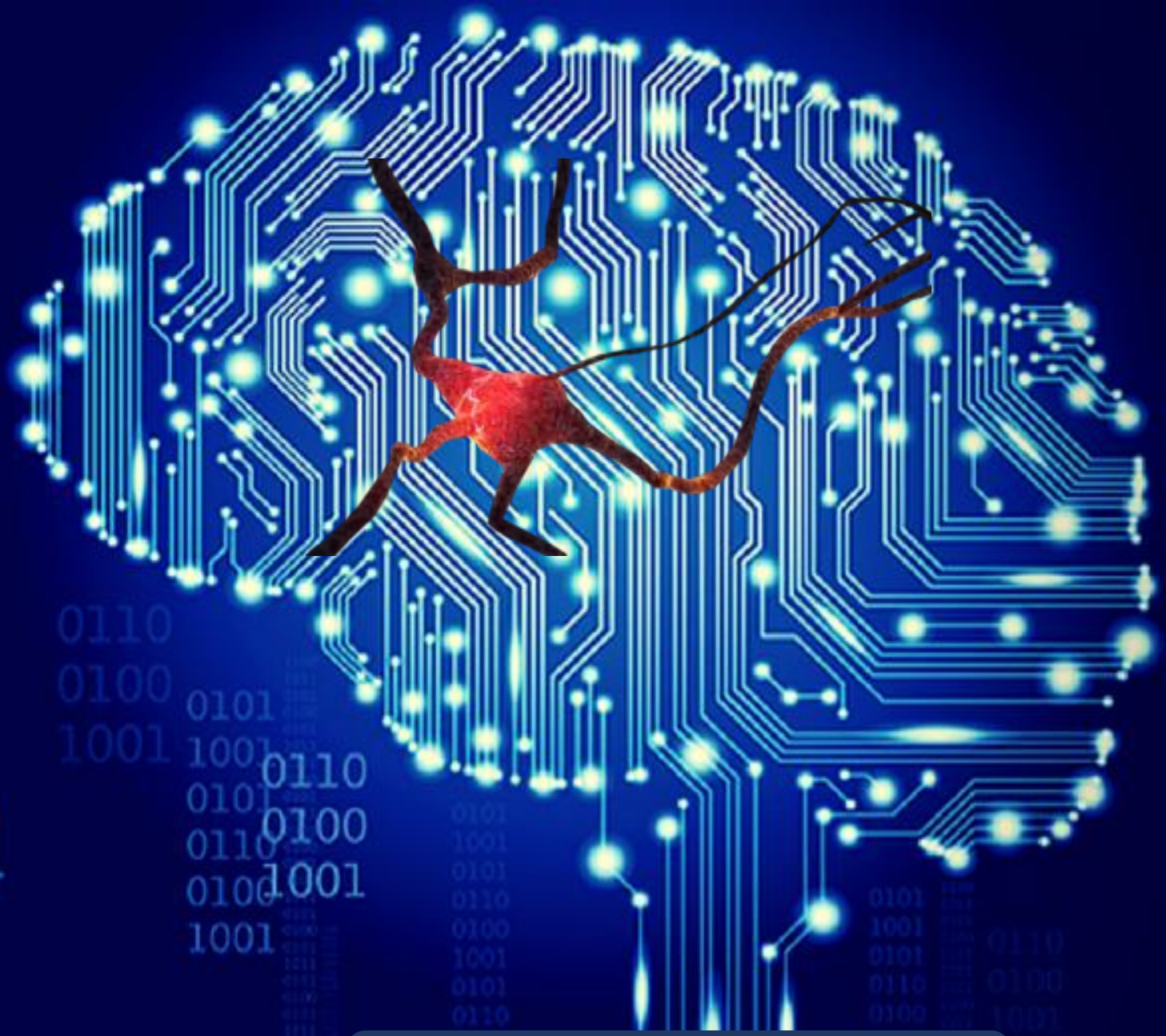




A.I.

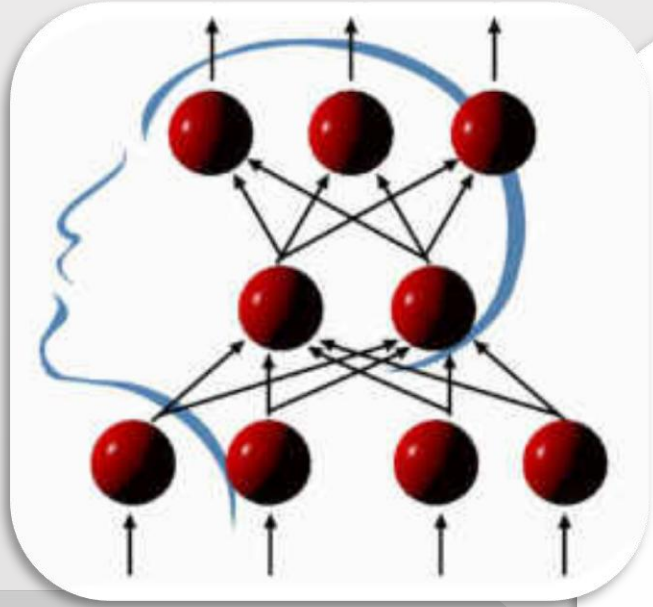
Inteligencia Artificial

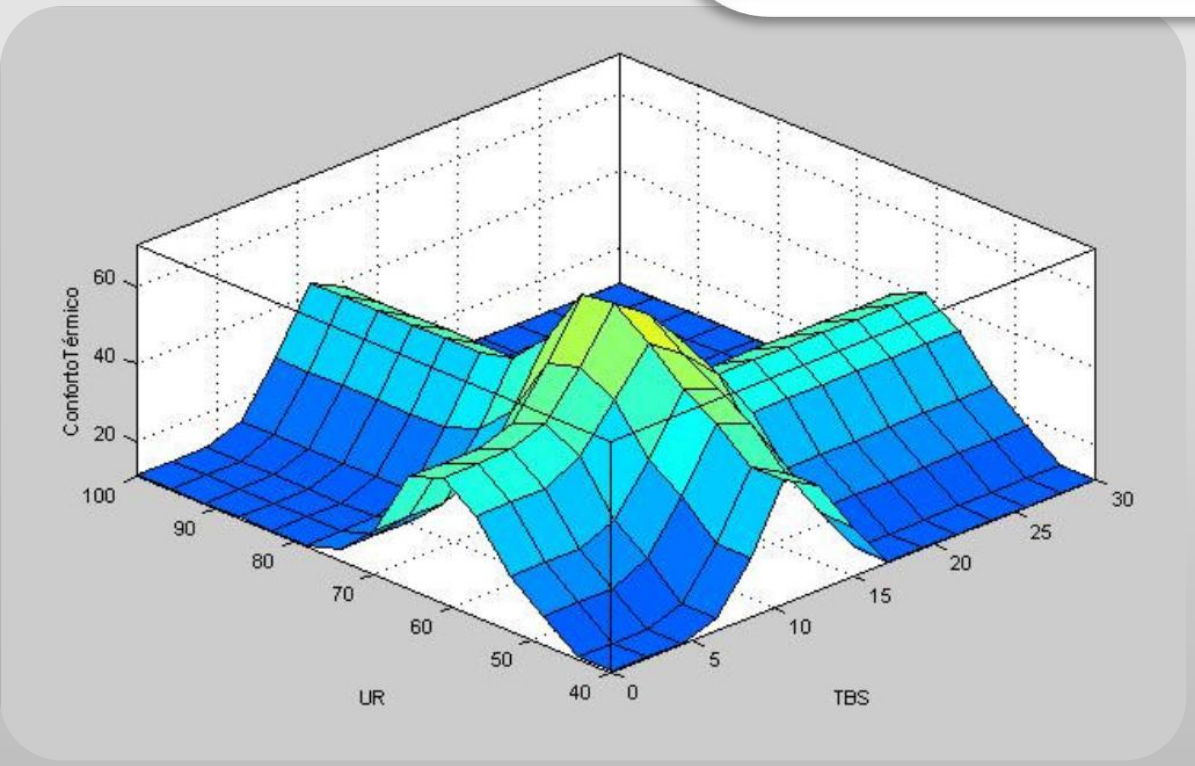
NOW



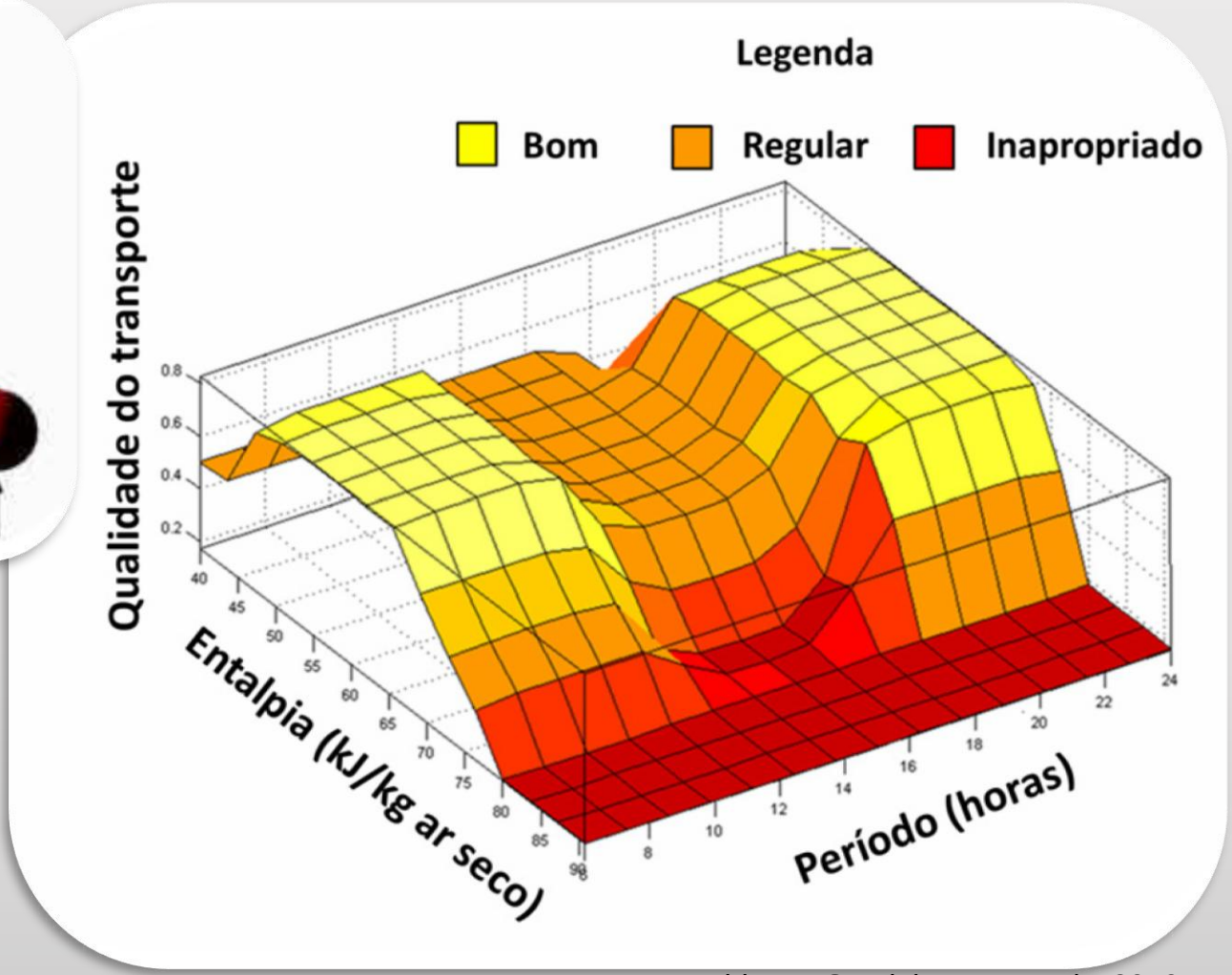
Zootecnia de Precisão

NOW



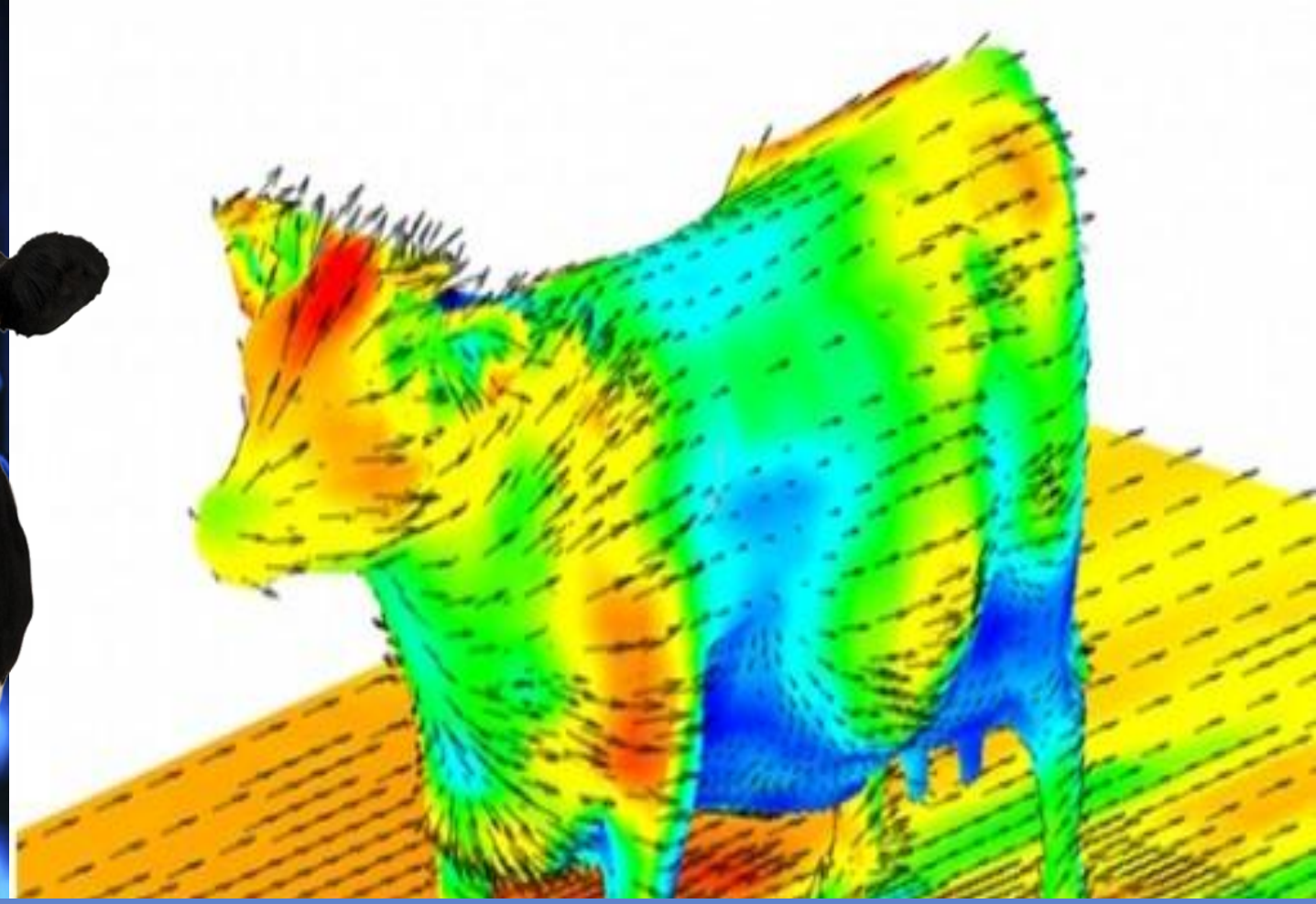


Fonte: Tolon *et al*., 2010.



Fonte: Rodrigues-Sarnighausen *et al*., 2010.

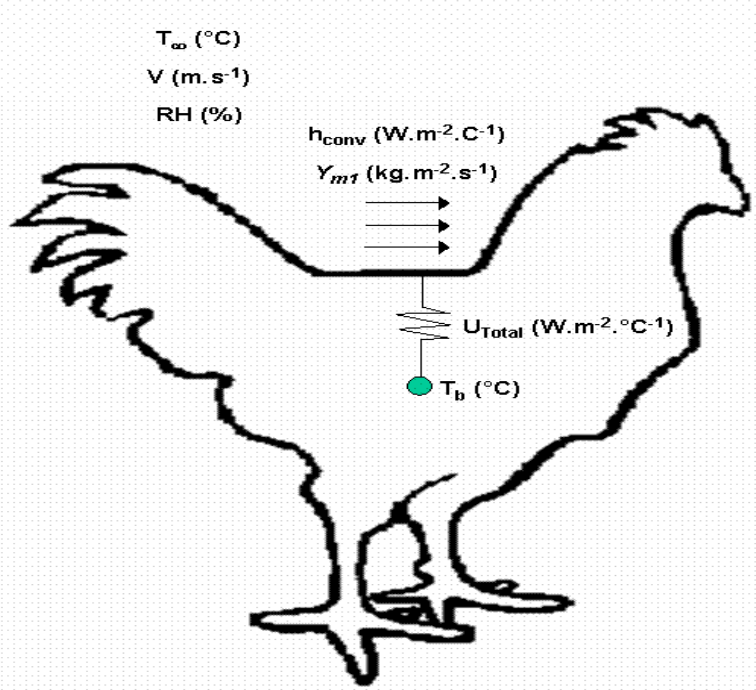




Integrar informações e expandir o uso novas tecnologias **e técnicas para**

PRODUÇÃO ANIMAL DO FUTURO

BIOSENSORES



$$dq_{a,s} = \dot{m}_a \, c_{p,a} \, dT_{bs} = h \int (T_w - T_{bs}) \, dA$$

$$\int_{T_{bs,i}}^{T_{bs,o}} \frac{1}{(T_w - T_{bs})} \times dT_{bs} = \frac{h}{\dot{m}_a \times c_{p,a}} \, \alpha \, W \int_0^L dx$$

$$T_{a,o} = T_w + (T_{a,i} - T_w) \, e^{-\frac{h}{\dot{m}_a \, c_{p,a}} \times W \, H \, L}$$

$$\dot{m}_a \, d\omega_A = k_d \times [\omega_{A,s}(T_w) - \omega_A] \times dA$$

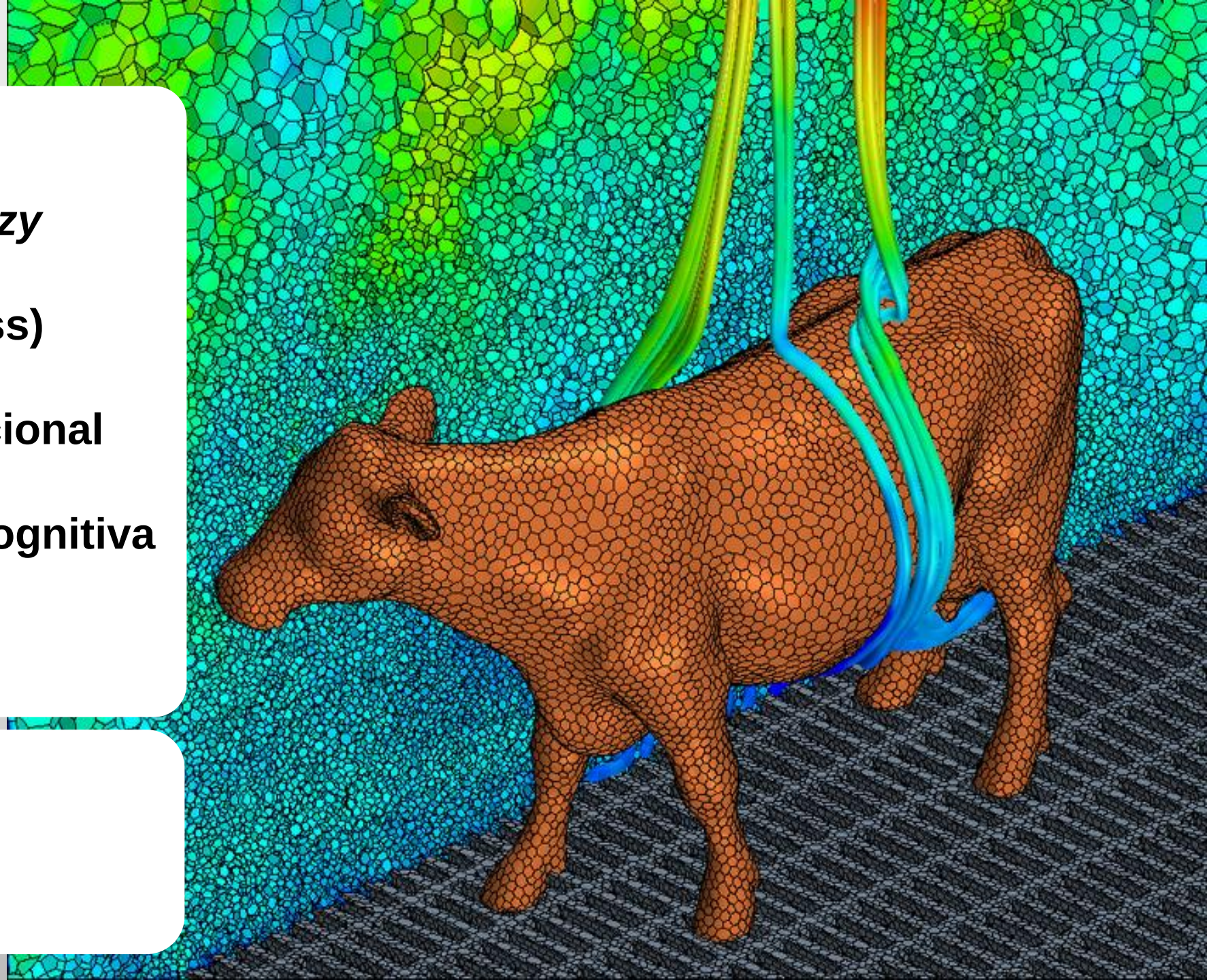
$$\int_{\omega_{a,i}}^{\omega_{a,o}} \frac{1}{\omega_{A,s}(T_w) - \omega_A} \times d\omega_A = \frac{h_m \times \rho_a}{\dot{m}_a} \times \alpha \times W \times H \times \int_0^L \times dx$$

ANIMAL RESPONDENDO...

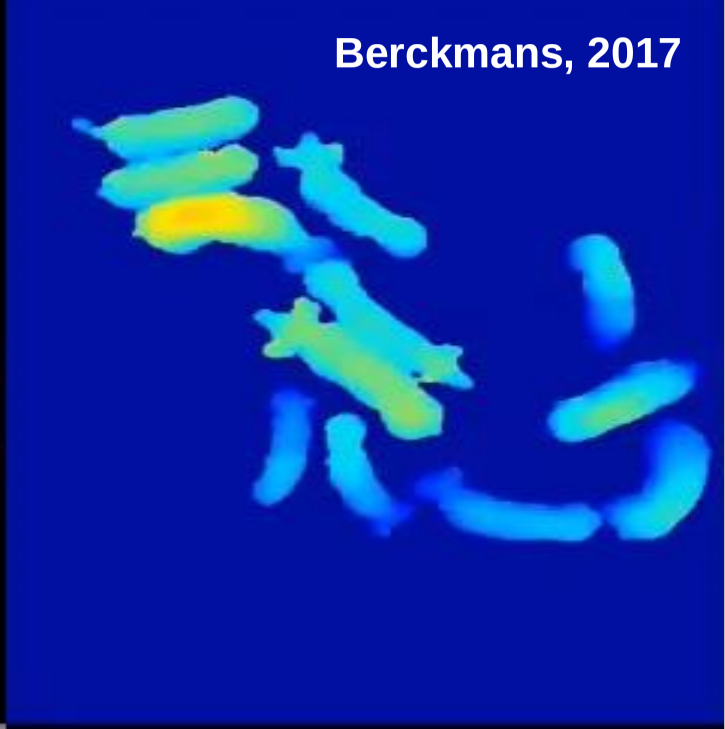
BIOSENSOR

- Geoestatística
- Modelagem *Fuzzy*
- RFID
- Redes (Wirelless)
- Redes Neurais
- Visão computacional
- Softwares
- Computação Cognitiva
- Termografia
- CFD ...

- Biomecânica
- Bioacústica
- Epigenética...

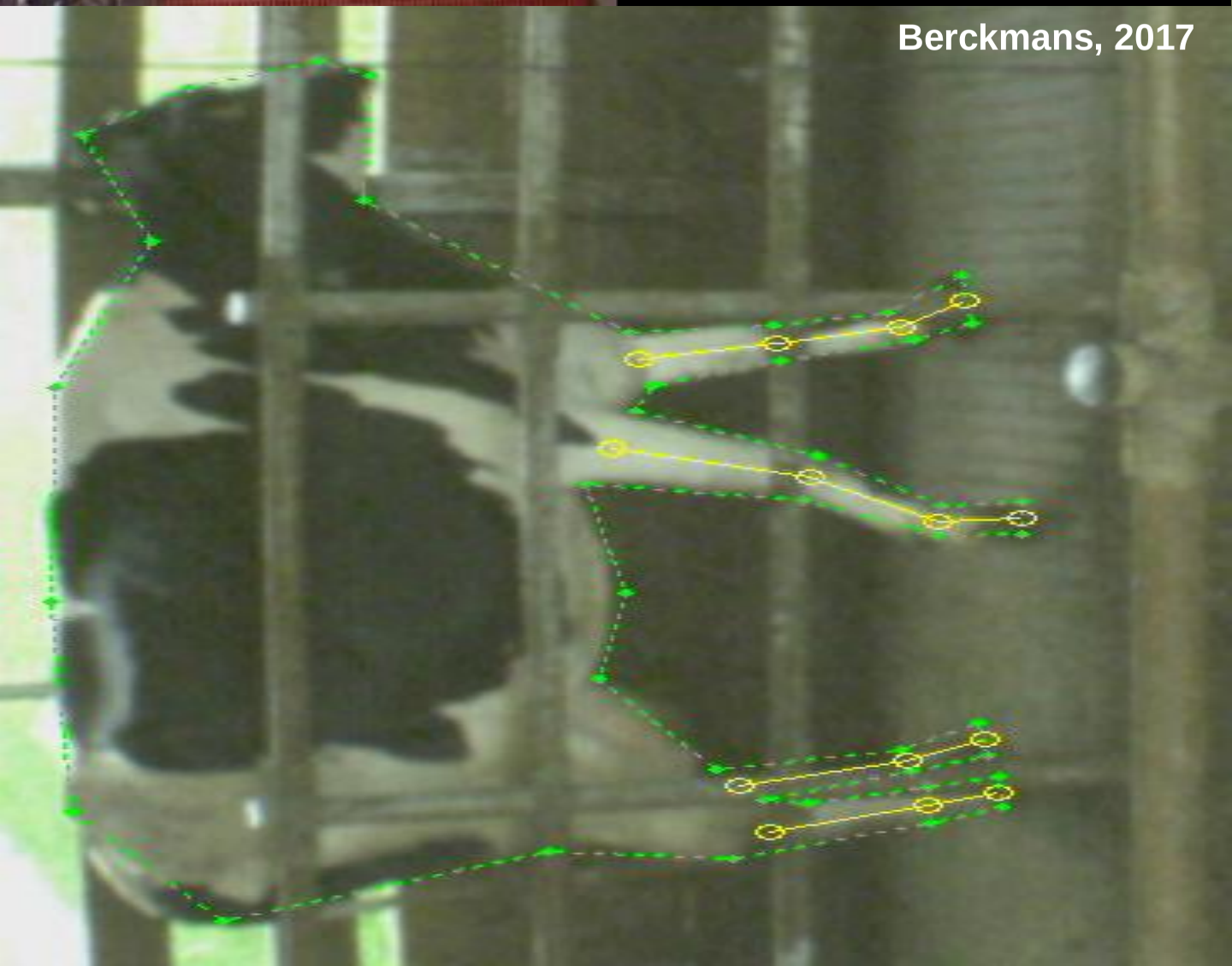


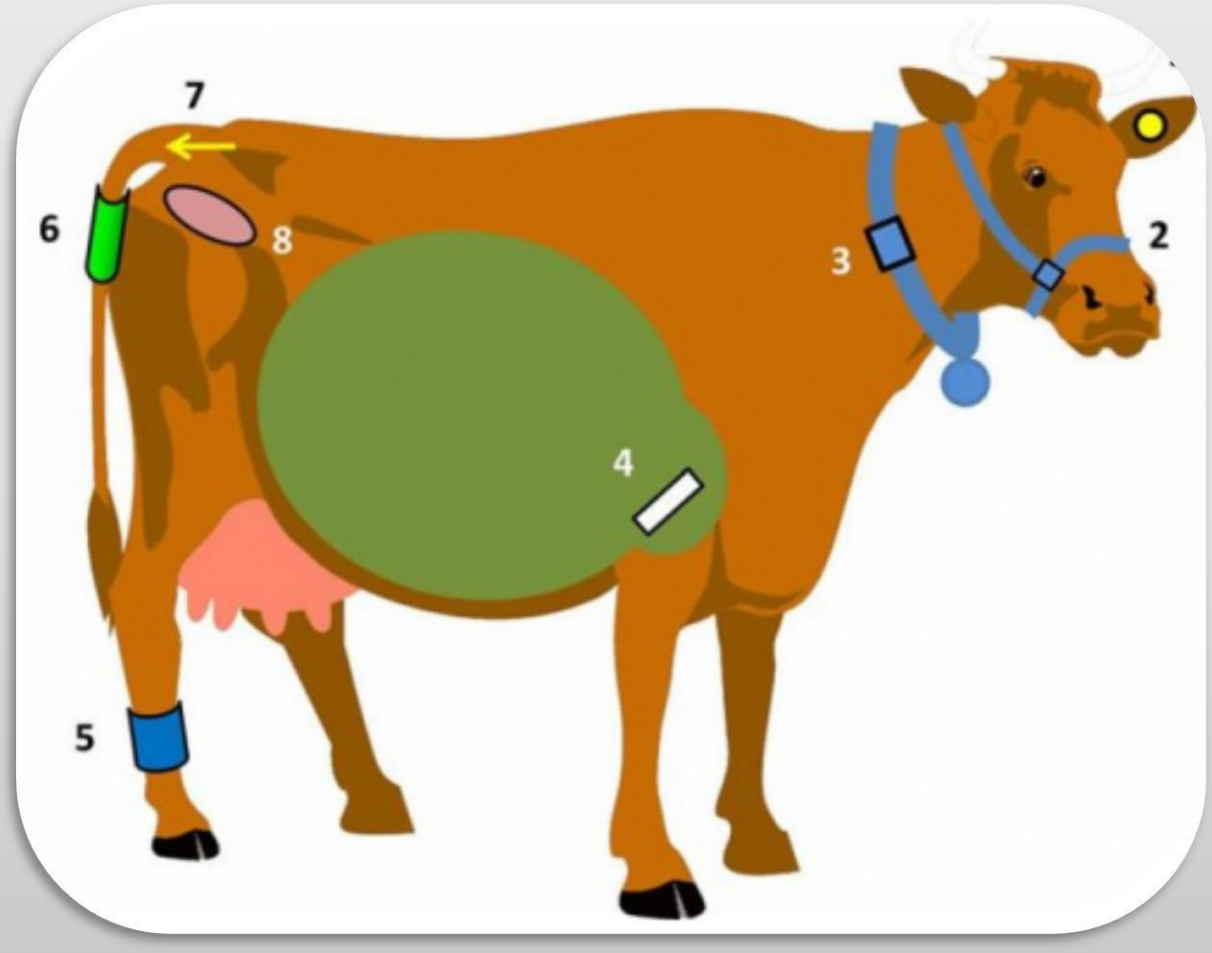



Berckmans, 2017






Berckmans, 2017



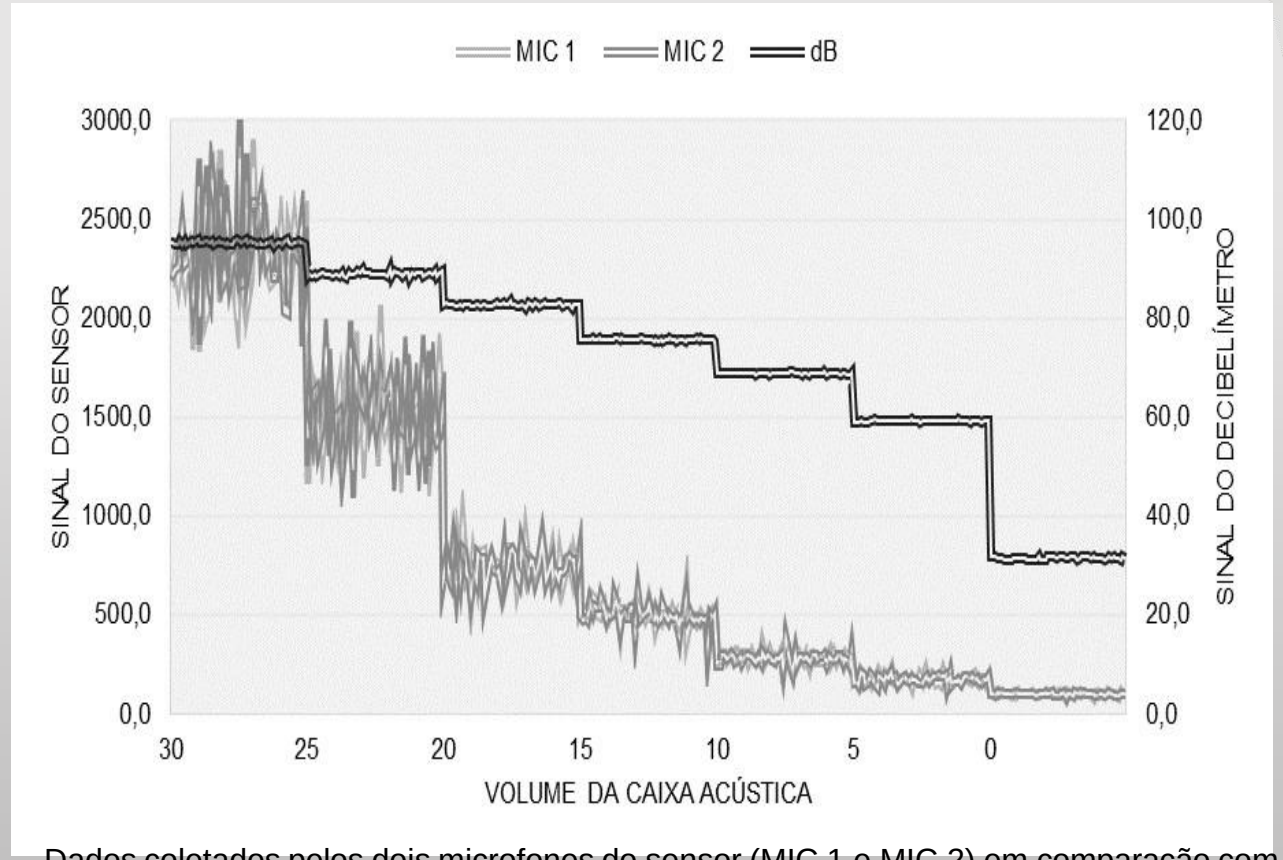


https://businesswales.gov.wales/farmingconnect/posts/precision-dairy-farming-review-current-available-technologies-0

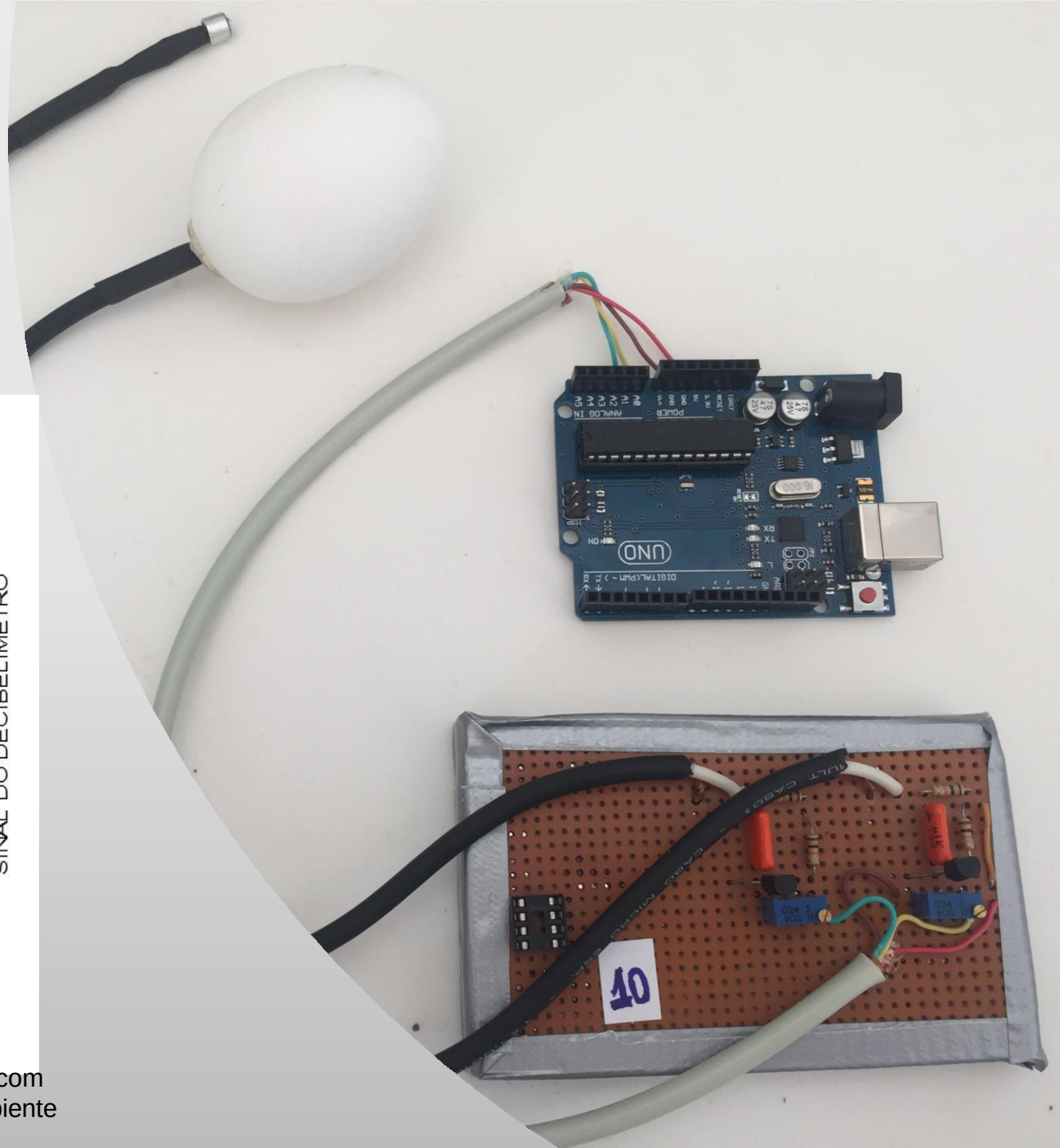

FUTURO!
Os animais irão falar!


FUTURO!
Gudrun Makelberge, 2016

O medidor de Nível de Pressão Sonora para o ovo



Dados coletados pelos dois microfones do sensor (MIC 1 e MIC 2) em comparação com os dados de um decibelímetro comercial frente às variações de volume do som ambiente



TECNOLOGIA
Monitoramanento de toda cadeia



Vocalização da mãe influenciando o desenvolvimento embrionário do filho

NOVEMBER 2 2017 - 2:30PM

Chatting with cattle, new research to understand bovine vocalisation

Shan Goodwin

SHARE TWEET



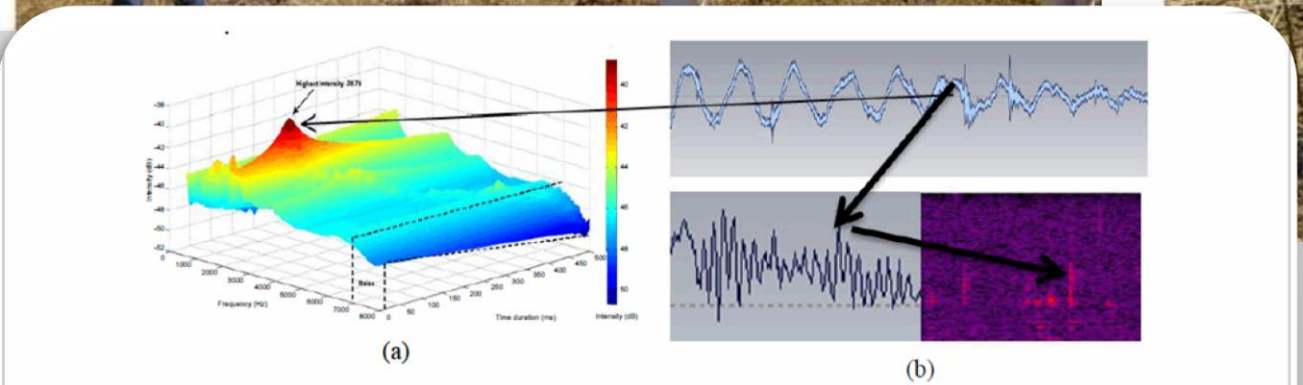


Figure 2: Acoustic parameter measured a) 3D of Intensity, Frequency, and Time duration, b) Pulse, sonogram, and oscillogram before adding salt in first day.

Vocal technology could potentially assist dairy farmers monitor cow behaviour

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ABC Rural By Kim Honan

Updated 3 August 2017 at 2:56 am

First posted 3 August 2017 at 2:52 am



Fonte: Trusthel, (2017)

Animal como biosensor

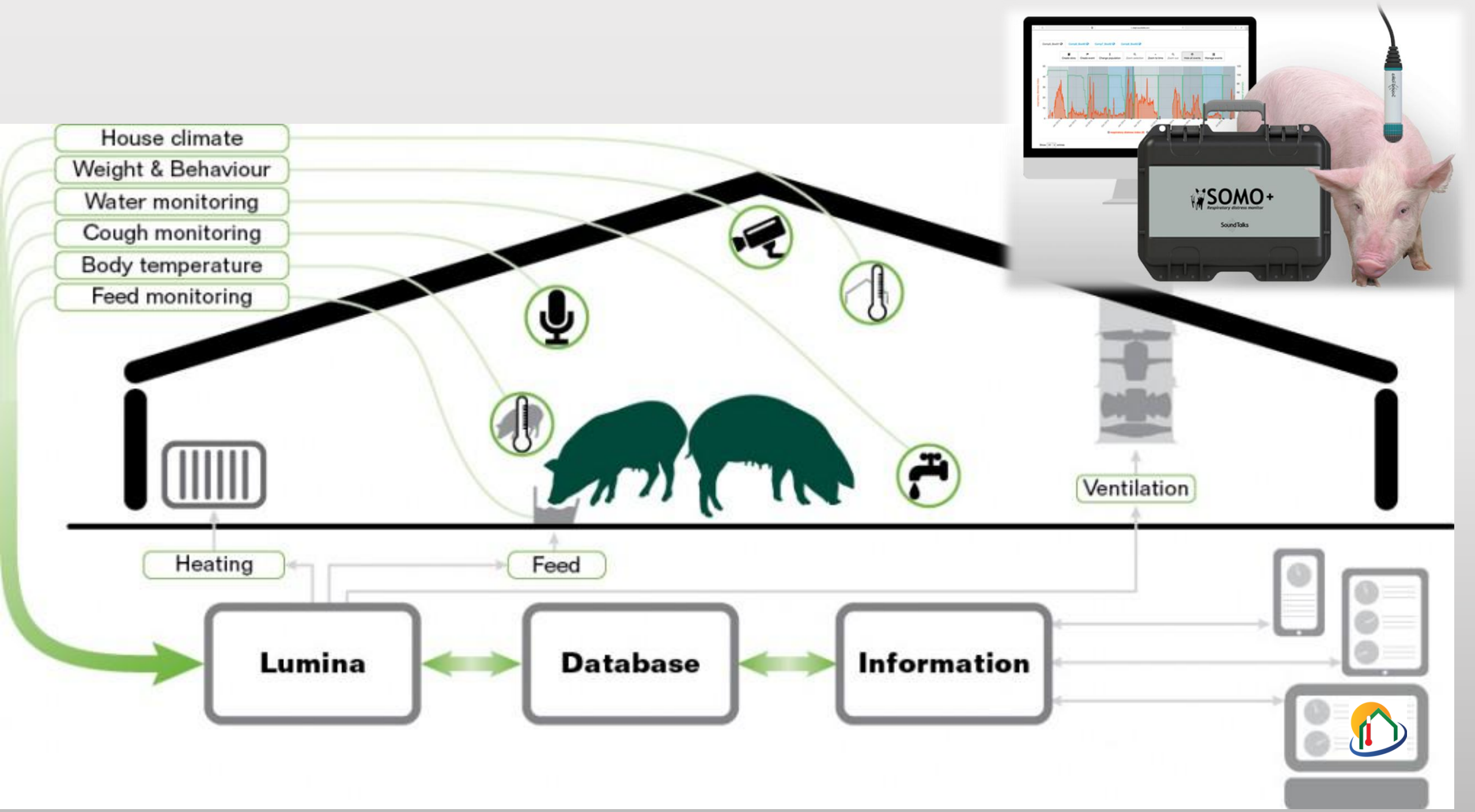
Indicadores de produção

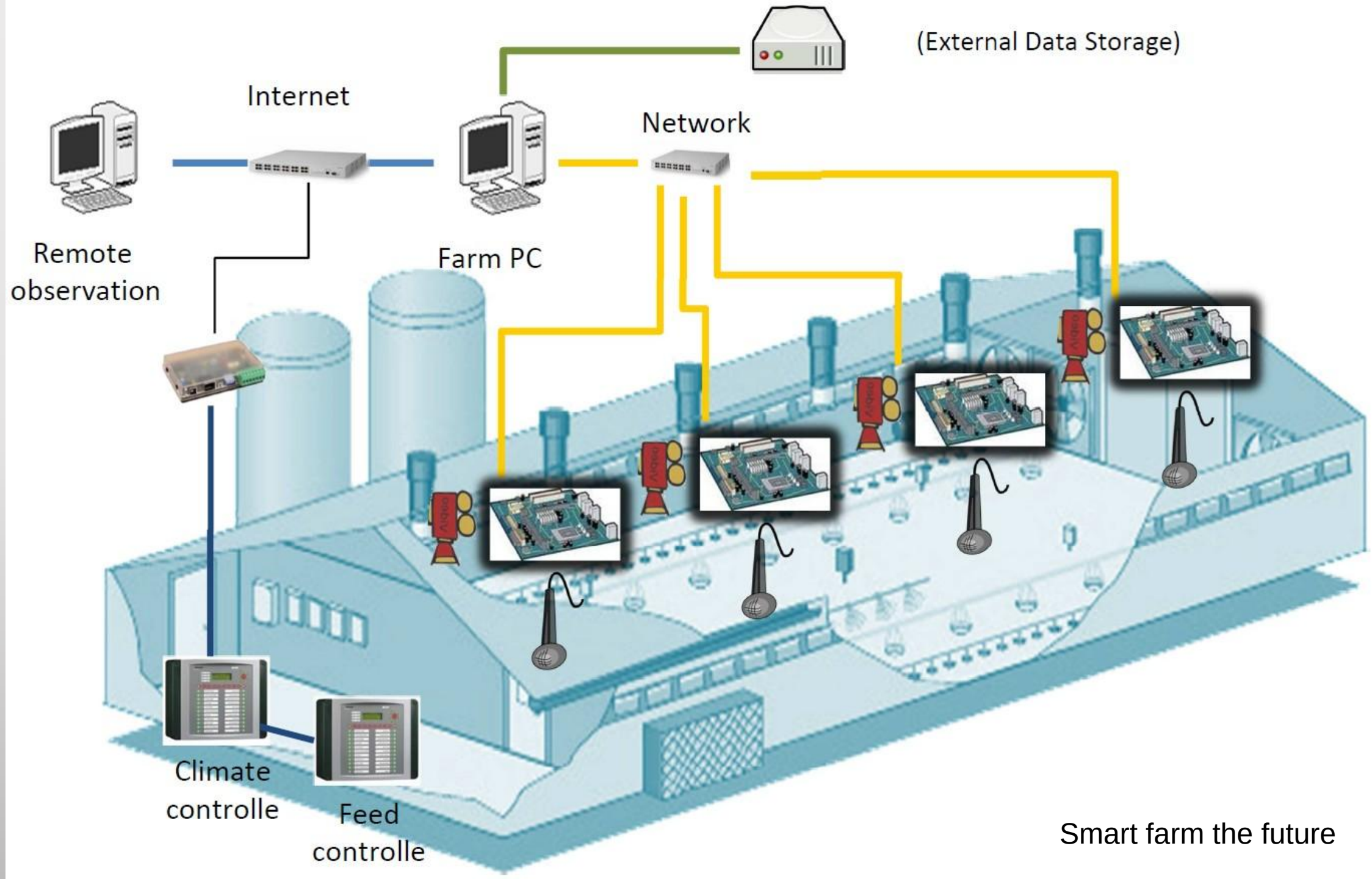
Parâmetros fisiológicos

Indicadores de BEA



Tomada de decisão na produção


House climate
Weight & Behaviour
Water monitoring
Cough monitoring
Body temperature
Feed monitoring
SOMO+
Respiratory distress monitor
SoundTalks
Ventilation
Heating
Feed
Lumina
Database
Information



Smart farm the future


A tomada de decisão
serão deles...
Acionando os
sistemas...

Produtor com Controle do sistema muito mais próximo



Obrigado!

iranoliveira@usp.br

ENGENHARIA DE BIOSSISTEMAS
USP - ESALQ