HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – GESTERN, HEUTE, MORGEN

PROF. DR. INGA TIEMANN

PRECISION LIVESTOCK FARMING

HOCHSCHULE OSNABRÜCK

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

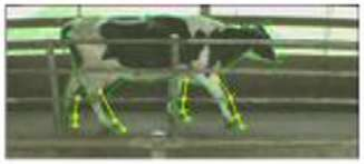
PRECISION LIVESTOCK FARMING – DEFINITION

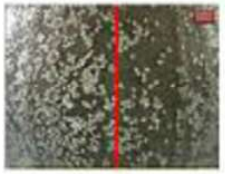
Precision livestock farming is defined as the "**management of individual animals by continuous, automated, and real-time monitoring of health, welfare, production/reproduction, and environmental impact**" (Berckmans, 2017).

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – DEFINITION





Management of livestock by continuous automated real-time monitoring of production/reproduction, health and welfare of livestock and environmental impact.

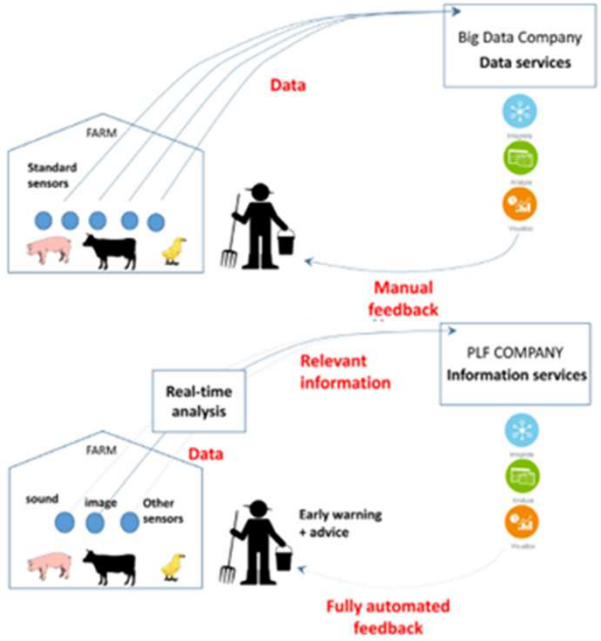


Figure 8. Scheme of a more realistic use of data versus the common idea of big data.

Figure 1. Precision livestock farming systems based on image analyses, sound analyses, or sensors (Berckmans, 2013).

(BERCKMANS, 2017)

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – GESTERN

Abb. 36. Fallnestkontrolle

(SCHOLTYSSEK, 1968)

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – HEUTE

Der Fokus liegt auf der Echtzeitüberwachung, Automatisierung und nachgelagerten Datenprozessen (inkl. KI).

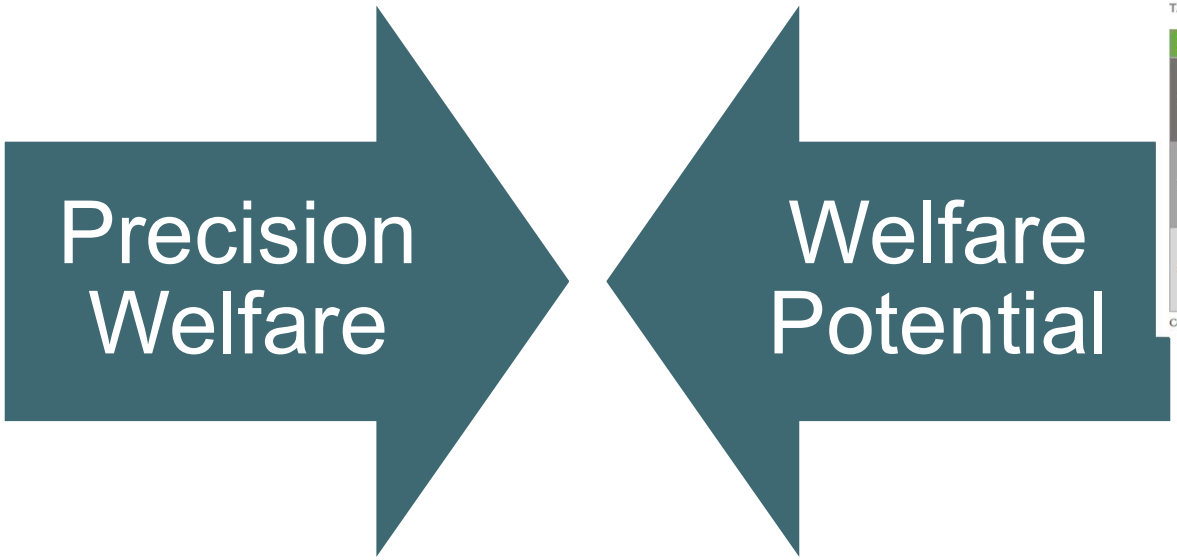


TABLE 1 How the welfare potential of a production system determines the likely welfare experienced by the animal in that system.

Welfare potential of production system	Standard of management of system	Likely welfare experienced by animal
HIGH	HIGH	HIGH
	MEDIUM	MEDIUM
	LOW	LOW
MEDIUM	HIGH	MEDIUM
	MEDIUM	MEDIUM
	LOW	LOW
LOW	HIGH	LOW
	MEDIUM	LOW
	LOW	LOW

Colour of cells indicates the welfare potential of the system with darker colours indicating a higher potential.

MURPHY & LEGRAND, 2023

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – HEUTE – MORGEN

Open Access

Using artificial intelligence to improve poultry productivity – a review

Hassan M. Taleb, Khalid Mahrose, Amal A. Abdel-Halim, Hebatallah Kasem, Gomaa S. Ramadan, Ahmed M. Fouad, Asmaa F. Khafaga, Norhan E. Khalifa, Mahmoud Kamal, Heba M. Salem, Abdulmohsen H. Alqhtani, Ayman A. Swelum, Anna Arczewska-Włosek, Sylwester Świątkiewicz and Mohamed E. Abd El-Hack | Apr 24, 2024

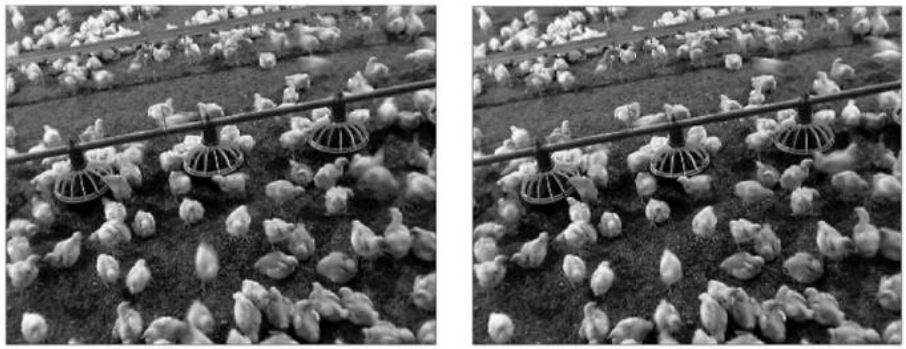
Annals of Animal Science
AHEAD OF PRINT

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – VIDEOANALYSE

Optical flow compares the patterns of light and dark in successive images



(a) Image frame at time *t*

(b) Image frame at time *t* +1

Dawkins et al. (2009) Applied Animal Behaviour Science 119: 203-209

JOURNAL OF THE ROYAL SOCIETY Interface

J. R. Soc. Interface (2012) **9**, 3436–3443
doi:10.1098/rsif.2012.0594
Published online 5 September 2012

Prediction of welfare outcomes for broiler chickens using Bayesian regression on continuous optical flow data

Stephen J. Roberts[1,*], Russell Cain[2] and Marian Stamp Dawkins[2]

[1]*Department of Engineering Science, and* [2]*Department of Zoology, University of Oxford, Oxford, UK*

Currently, assessment of broiler (meat) chicken welfare relies largely on labour-intensive or post-mortem measures of welfare. We here describe a method for continuously and robustly monitoring the welfare of living birds while husbandry changes are still possible. We detail the application of Bayesian modelling to motion data derived from the output of cameras placed in commercial broiler houses. We show that the forecasts produced by the model can be used to accurately assess certain key aspects of the future health and welfare of a flock. The difference between healthy flocks and less-healthy ones becomes predictable days or even weeks before clinical symptoms become apparent. Hock burn (damaged leg skin, usually only seen in birds of two weeks or older) can be well predicted in flocks of only 1–2 days of age, using this approach. Our model combines optical flow descriptors of bird motion with robust multivariate forecasting and provides a sparse, efficient model with sparsity-inducing priors to achieve maximum predictive power with the minimum number of key variables.

Keywords: animal welfare; optical flow; Bayesian multivariate modelling; variational Bayes inference

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – VIDEOANALYSE

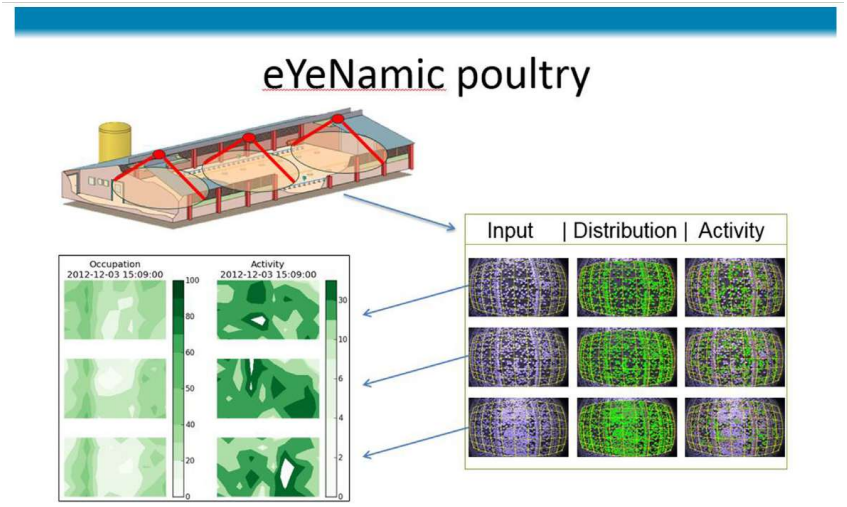


Figure 5. Three top view cameras and real-time image analysis of broiler behavior.

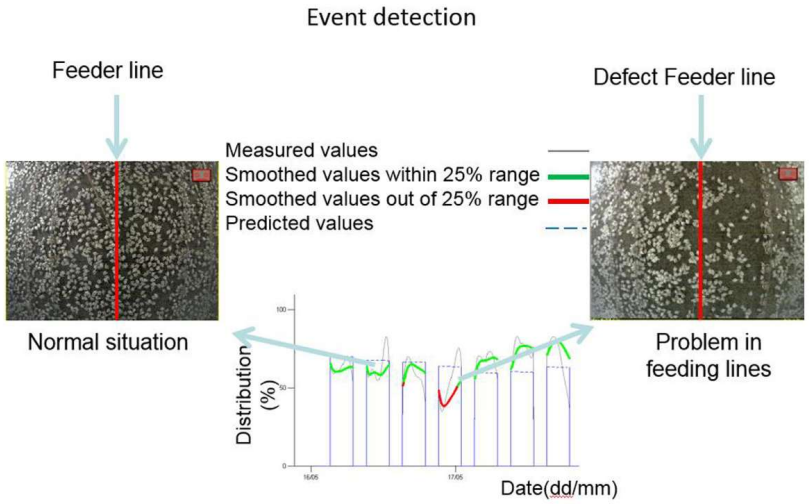


Figure 6. Image from the broilers as analyzed in real time by the eYeNamic system.

Jan. 2017, Vol. 7, No. 1

JOURNAL ARTICLE

Analysis of poultry eating and drinking behavior by software eYeNamic

De Montis, A; Pinna, A; Barra, M; Vranken, E

Journal of Agricultural Engineering; 2013; Vol. 44; pp. 166 - 172

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – VIDEOANALYSE

(GÜLTAS, 2023)

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – VIDEOANALYSE

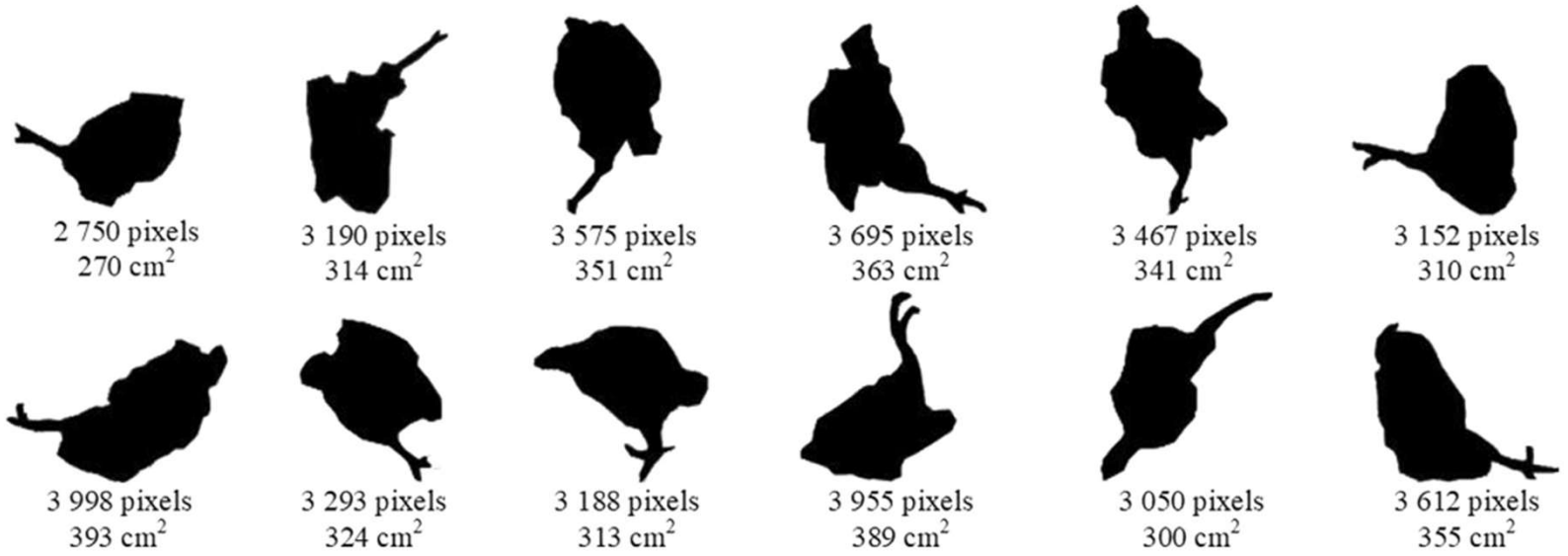


Fig. 1. Sample binary images of stretching broilers in weeks 4 and 5. The broiler pixel and actual area are provided for each scenario. Actual area is calculated from broiler pixel using a conversion factor of 10.2 pixel/cm^2. The species under this study is Ross×Ross 708 broiler.

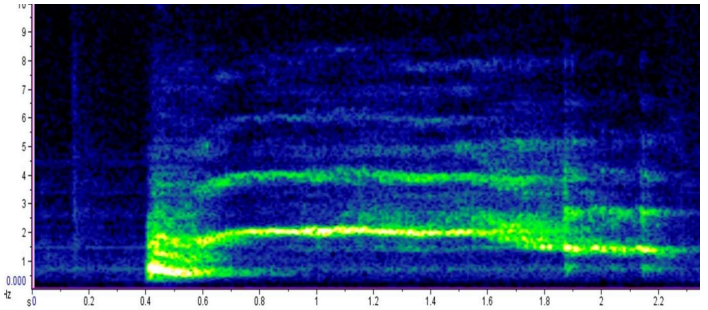
WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING - SOUNDANALYSE

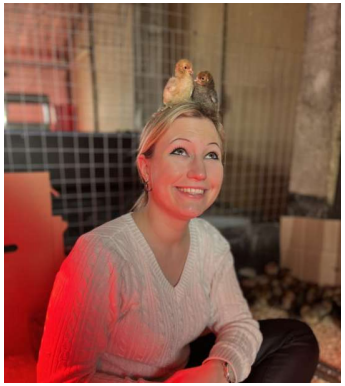
Akustik-Monitoring:

Analysetools für Tiergeräusche können Atemwegserkrankungen oder Stress erkennen.



WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES



PRECISION LIVESTOCK FARMING – AKTIVITÄT

ELEKTRONISCHES SCHLUPFLOCH
(WIEBKE ICKEN, LOHMANN TIERZUCHT)

TAURIS®
(RÜTER EPV-SYSTEME)

AUFLAUFHALTUNG (DLG MERKBLATT 347)

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – AKTIVITÄT

ELEKTRONISCHES SCHLUPFLOCH
(WIEBKE ICKEN, LOHMANN TIERZUCHT)

TAURIS®
(RÜTER EPV-SYSTEME)

FOTO: SENTA BECKER

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – AKTIVITÄT

UNIVERSITÄT SIEGEN

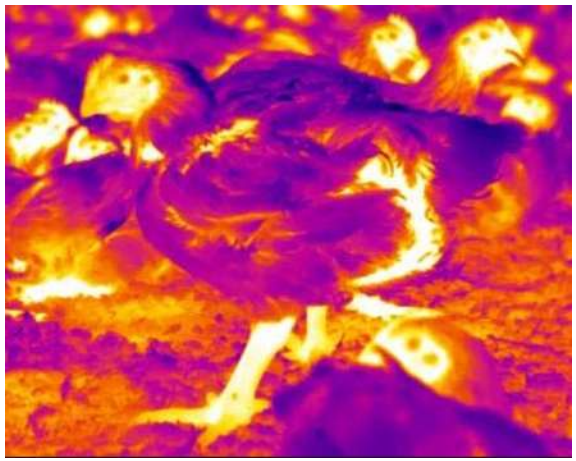
Check4Chicks

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – MORGEN

BRIAN FAIRCHILD, UNIVERSITY OF GEORGIA



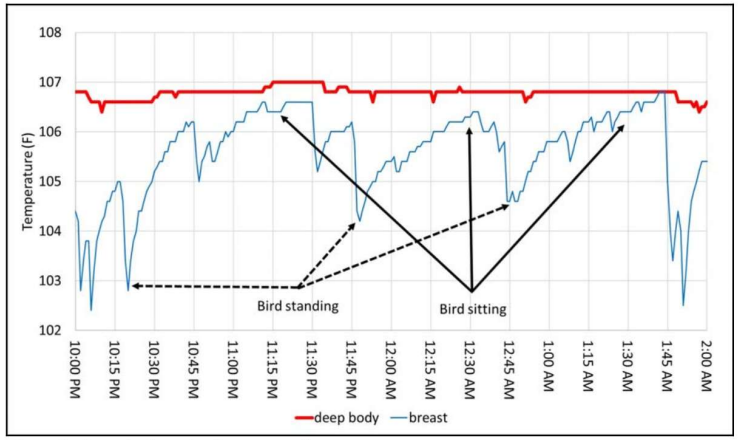
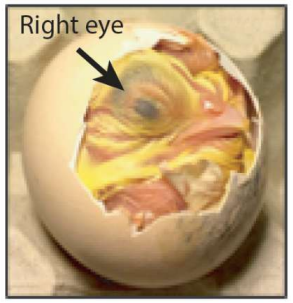


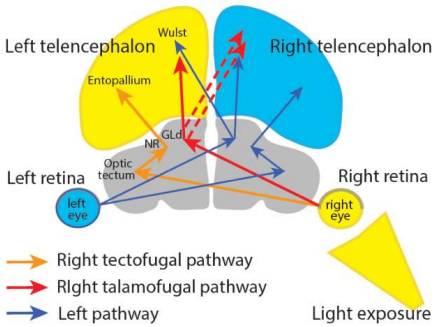
Figure 3. Deep body and subcutaneous breast temperatures.
(CZARICK & FAIRCHILD, 2017)

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – MORGEN





VERSACE ET AL. 2021

CHICK MASTER
EI-LOGGER SET
CHARLOTTE SELIGER
(COBB AVIMEX)

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – MORGEN

Project VisioChick

UNIVERSITÄT BONN
RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN
INSTITUT FÜR LANDTECHNIK VERFAHRENSTECHNIK IN DER TIERISCHEN ERZEUGUNG

igg Institut für Geodäsie und Geoinformation

Gefördert durch
Bundesministerium für Ernährung und Landwirtschaft
aufgrund eines Beschlusses des Deutschen Bundestages

Projektträger
Bundesanstalt für Landwirtschaft und Ernährung

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – ZUSAMMENFASSUNG

PLF bietet enorme Chancen für eine nachhaltige und tierbasierte Landwirtschaft, insbesondere im Geflügelbereich. Mit weiteren technologischen Fortschritten und interdisziplinärer Forschung wird es möglich sein, die Effizienz zu steigern, das Tierwohl zu optimieren und gleichzeitig Ressourcen zu schützen.

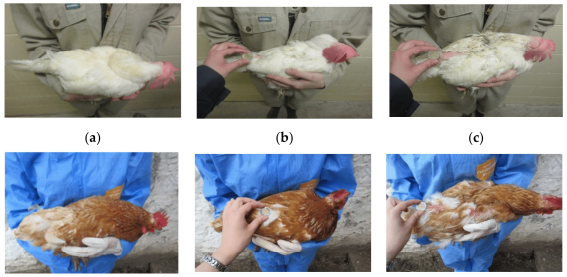
HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

PRECISION LIVESTOCK FARMING – ZUSAMMENFASSUNG

PLF bietet enorme Chancen für eine nachhaltige und tierbasierte Landwirtschaft, insbesondere im Geflügelbereich. Mit weiteren technologischen Fortschritten und interdisziplinärer Forschung wird es möglich sein, die Effizienz zu steigern, das Tierwohl zu optimieren und gleichzeitig Ressourcen zu schützen.

WIR FÜR MORGEN.

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

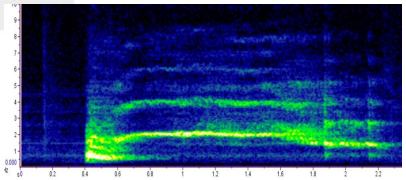


DECINA ET AL., 2019

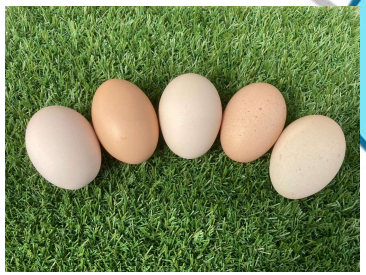
Health and much more

Detect cough early and respond sooner, from anywhere

Boehringer Ingelheim | powered by SoundTalks

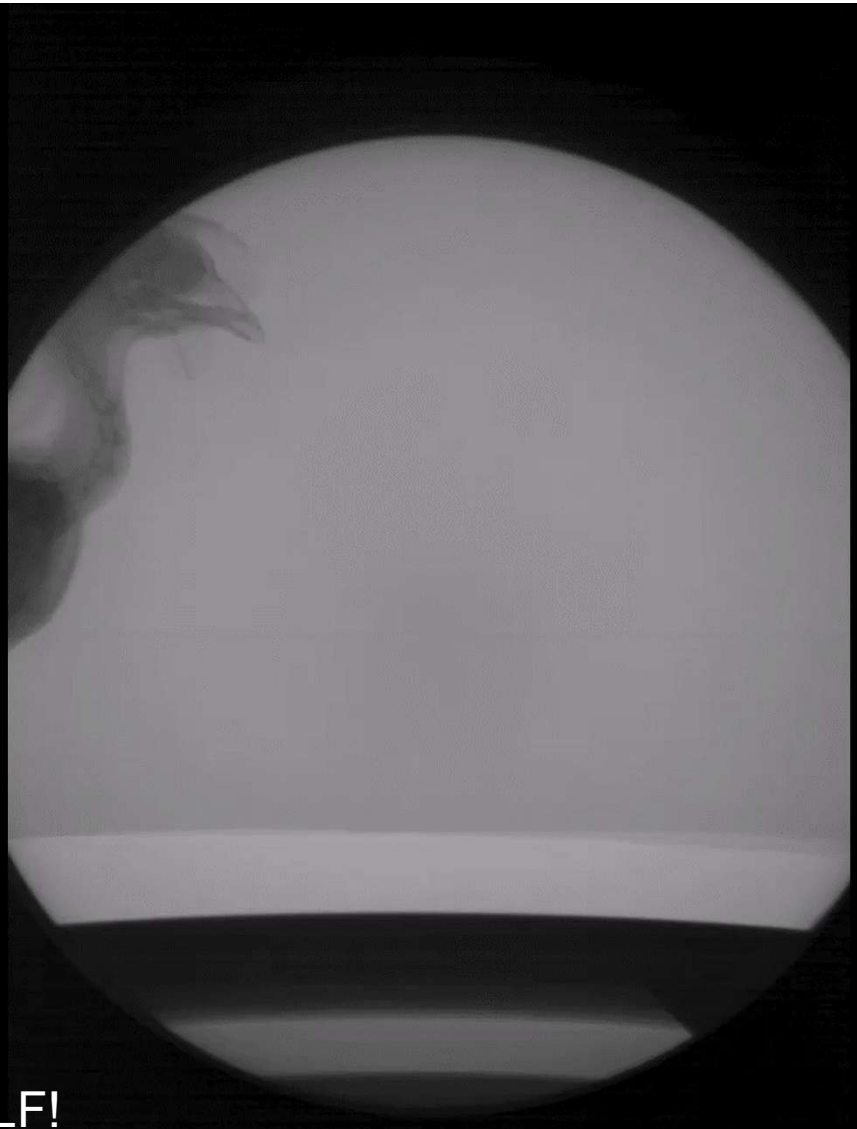


ZHOU ET AL. 2023



SENTA BECKER, HUHN³

WIR FÜR MORGEN.



Vielen Dank an das Team PLF!

i.tiemann@hs-osnabrueck.de

Frühjahrstagung
WPSA
11. & 12. März 2025
Göttingen