

# Lectoraat Duurzame Pluimveehouderij in een Circulaire Bedrijfsvoering

Pluimvee en insecten



# Lectoraat door de jaren heen

- 2013-2017: Gezonde Pluimveehouderij
- 2017-2021: Precisievoeding en Duurzame Pluimveehouderij
- 2021-2025: Duurzame Pluimveehouderij in een Circulaire Bedrijfsvoering



Verbinding  
onderwijs en onderzoek



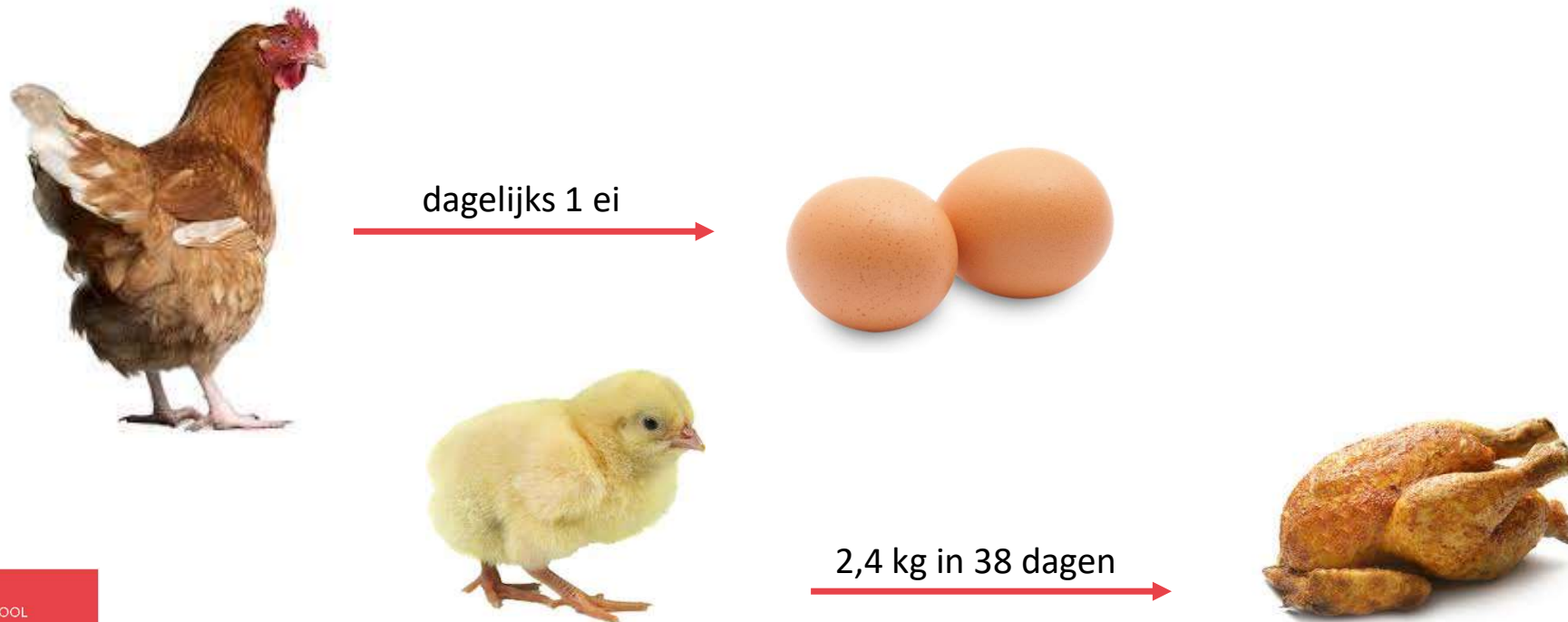
## 2014-2017: Gezonde Pluimveehouderij

- Vormgeven lectoraat
- Projecten werven
- 3-sterren beter leven stal



# 2017-2021: Precisievoeding en Duurzame Pluimveehouderij

- Voortbouwen op lectoraat Gezonde Pluimveehouderij
- Pluimvee als topsporters behandelen





# Voeren van pluimvee is “oude sport”

doi:10.1017/S004393391600074X

## Reviews

### A brief history of poultry nutrition over the last hundred years

K. ELWINGER<sup>1</sup>, C. FISHER<sup>2</sup>, H. JEROCH<sup>3</sup>, B. SAUVEUR<sup>4</sup>, H. TILLER<sup>5</sup> and C.C. WHITEHEAD<sup>6\*</sup>

The science and practice of poultry nutrition has changed greatly over the last hundred years, moving from a backyard enterprise to the modern computer-controlled production of whole diets formulated to specific nutrient compositions. This has become possible as a result of the identification of individual nutrients and their metabolic roles. Although the word ‘protein’ was first used in 1834, it was not until the 1950s that the avalanche of research on protein and amino acid requirements of poultry started. Energy content of feeds did not become a consideration until the 1940s when the concept of metabolisable energy was introduced. The term ‘vitamin’ was first proposed in 1912 to describe the essentiality of thiamine. The term was later extended to cover other essential compounds needed in small quantities. By the 1940s all the remaining 12 vitamins had been identified, and in the 1970s the importance of the vitamin D metabolites was discovered. The importance of calcium and phosphorus for both growing and laying birds was identified in the early stages of poultry keeping and requirements and dietary ratios were established. More recently, the introduction of feed phytase has allowed lowering of both phosphorus and calcium concentrations. Carbohydrase enzymes have also been developed for addition to feeds. The importance of sodium, phosphorus and chloride in maintaining electrolyte balance was identified. Trace minerals were usually supplemented in diets as inorganic salts but organic chelates or proteinates have been found in recent years to be absorbed more efficiently. Antibiotics were widely used as growth promoters but their banning, especially in Europe, has led to the search for alternative additives with growth or health benefits. Poultry nutrition is now a scientifically mature subject but changes in industrial practice can be expected to continue, though probably at a slower pace than in recent years.

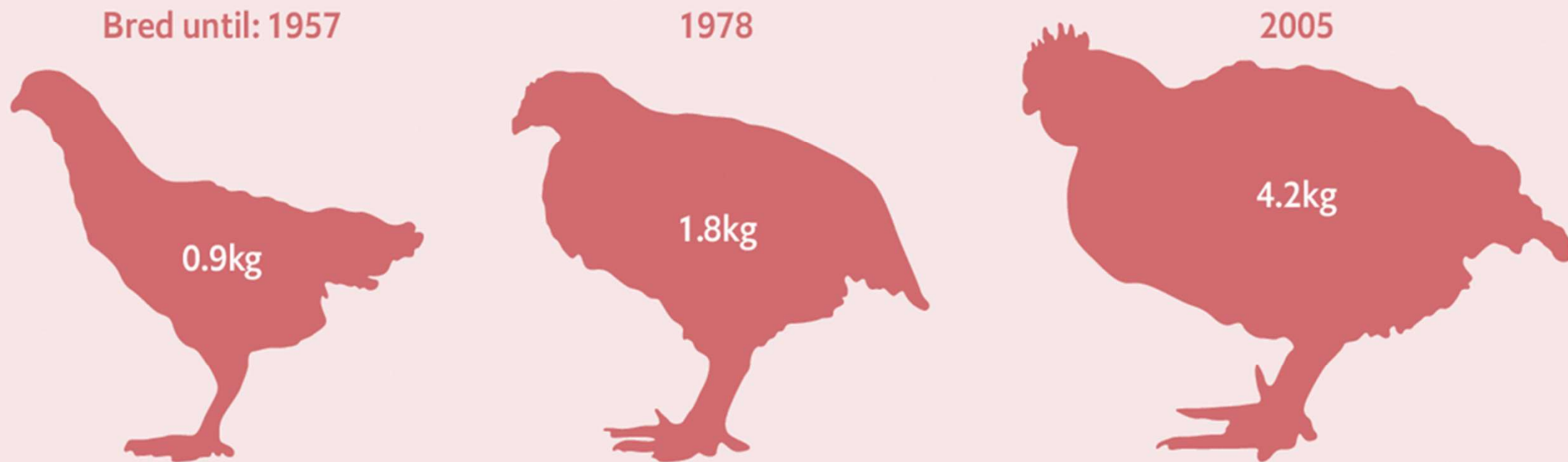
Although the word ‘protein’ was first used in 1834, it was not until the 1950s that the avalanche of research on protein and amino acid requirements of poultry started.

Energy content of feeds did not become a consideration until the 1940s when the concept of metabolisable energy was introduced.

© World's Poultry Science Association 2016  
World's Poultry Science Journal, Vol. 72, December 2016

## Pluimveesector continue in beweging

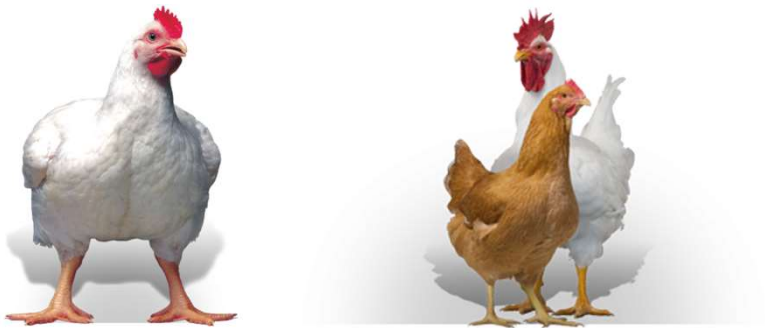
Broiler chickens, weight at 56 days old



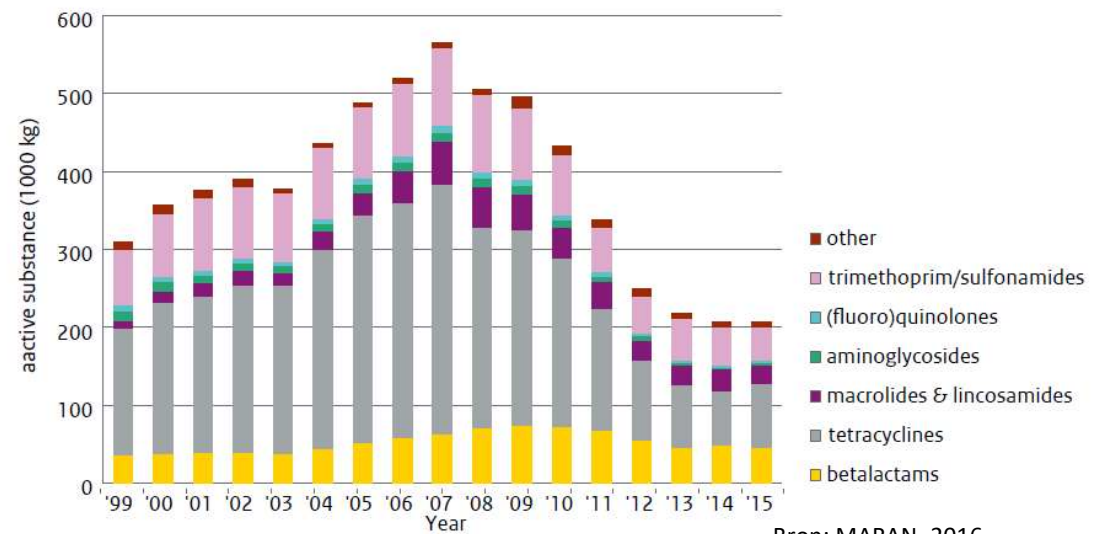
Source: "Growth, efficiency, and yield of commercial broilers from 1957, 1978, and 2005" by Zuidhof et al.

The Economist

# Nieuwe disciplines binnen de pluimveesector



© Poultry Expertise Centre



Bron: MARAN, 2016

# Nieuwe disciplines binnen de pluimveesector



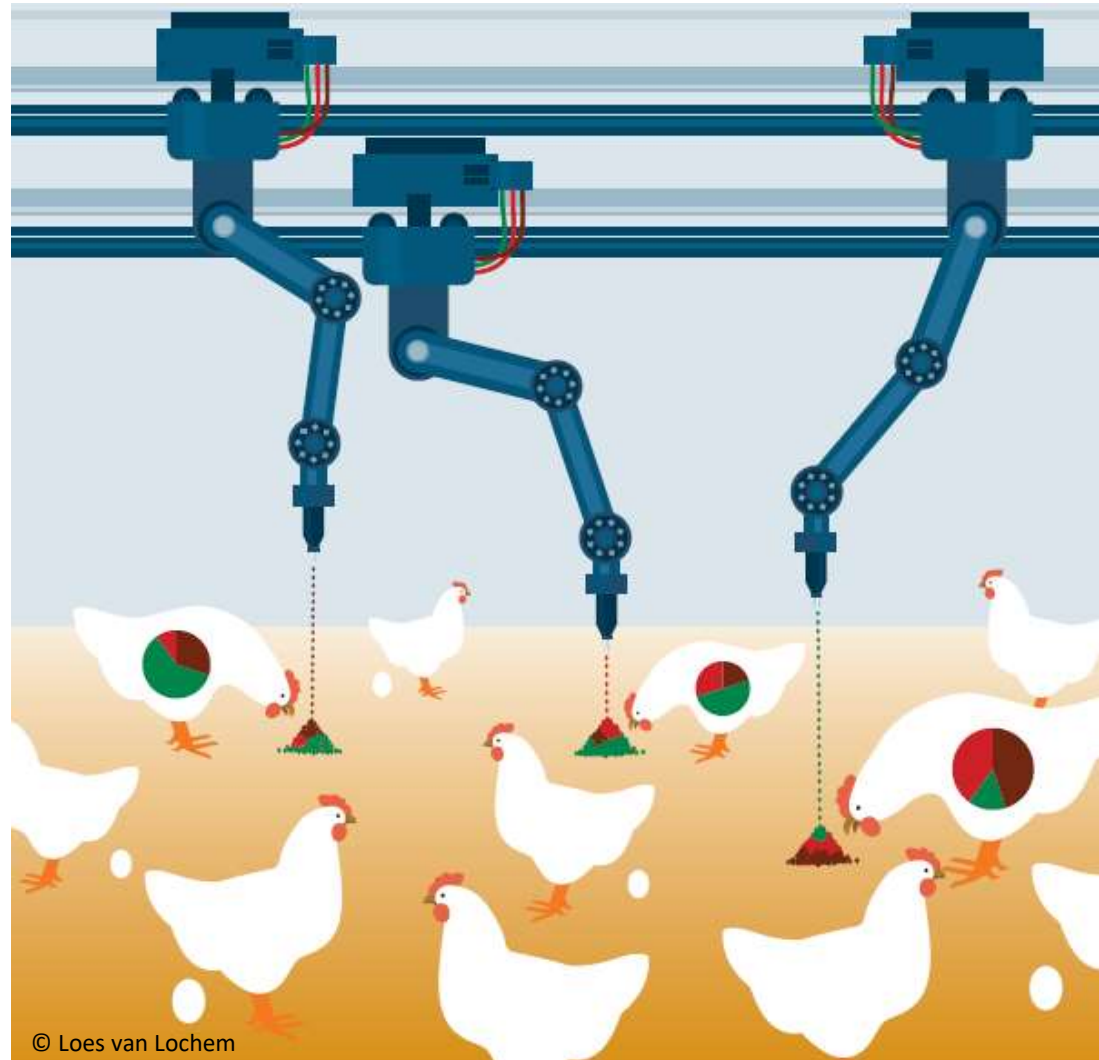
Bron: Ministerie van Landbouw, Natuur en Voedselkwaliteit





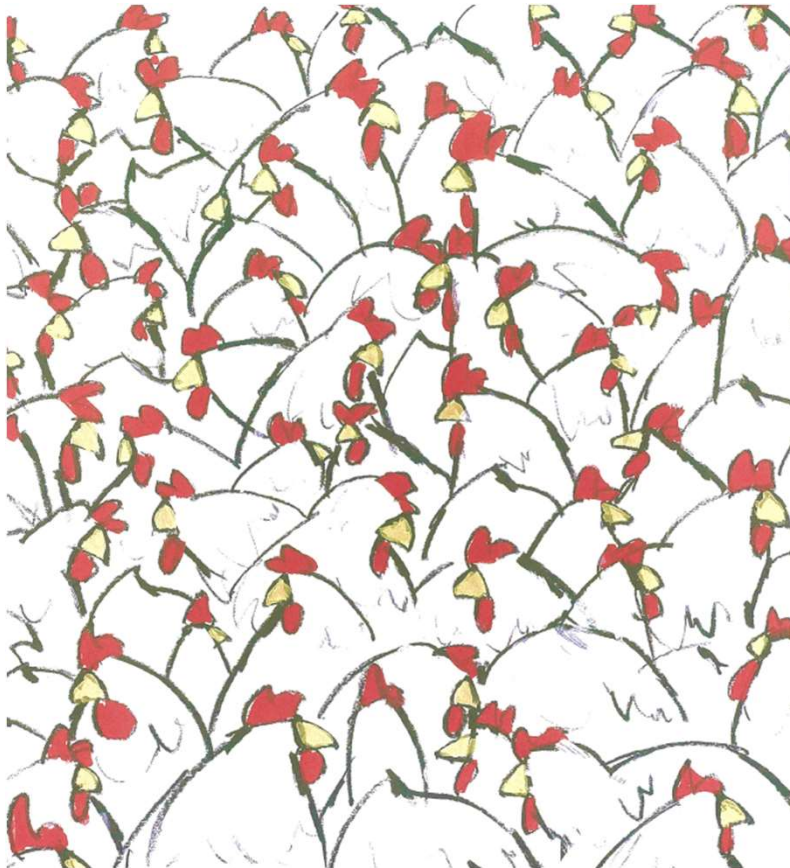
# Lectoraat Precisievoeding en Duurzame Pluimveehouderij

- Precisievoeding
  - Peloton vs. individueel
  - Dichter op behoefte voeren
  - Minder verspilling
- Duurzame pluimveehouderij
  - Efficiënt gebruik van grondstoffen
  - Nieuwe grondstoffen
  - Lagere emissie



© Loes van Lochem

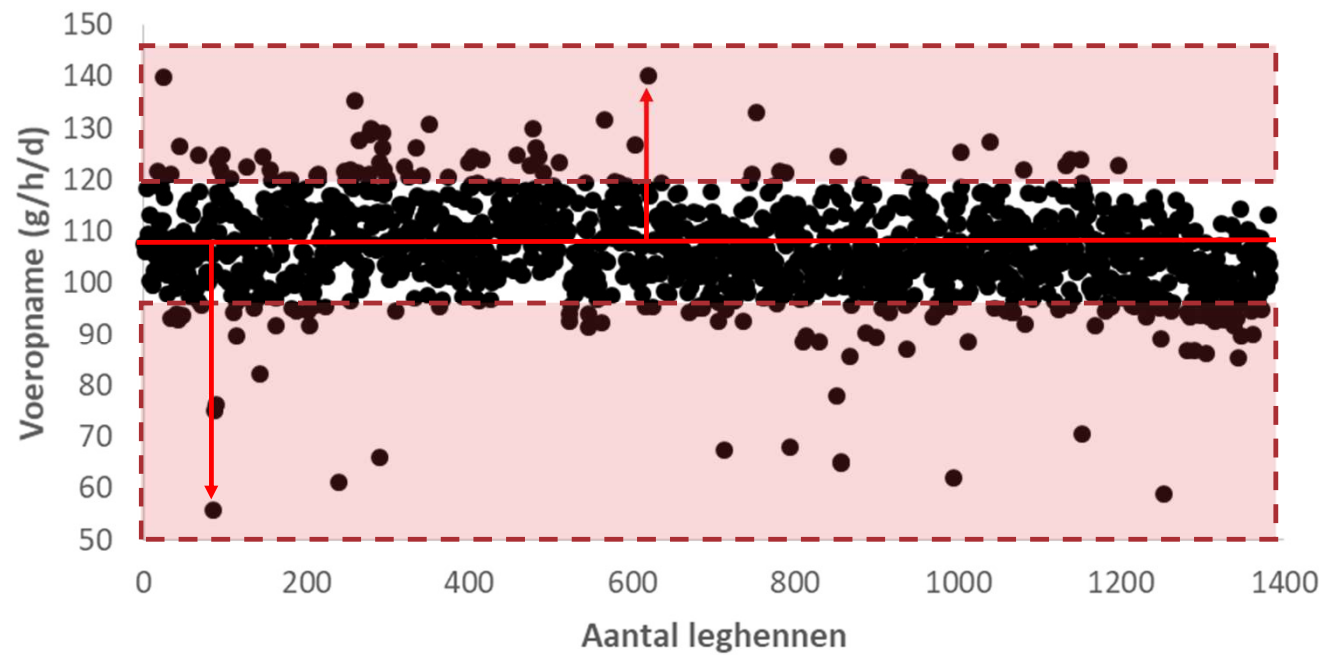
## Peloton vs. individuele topsporter



© Ellen Meuwese

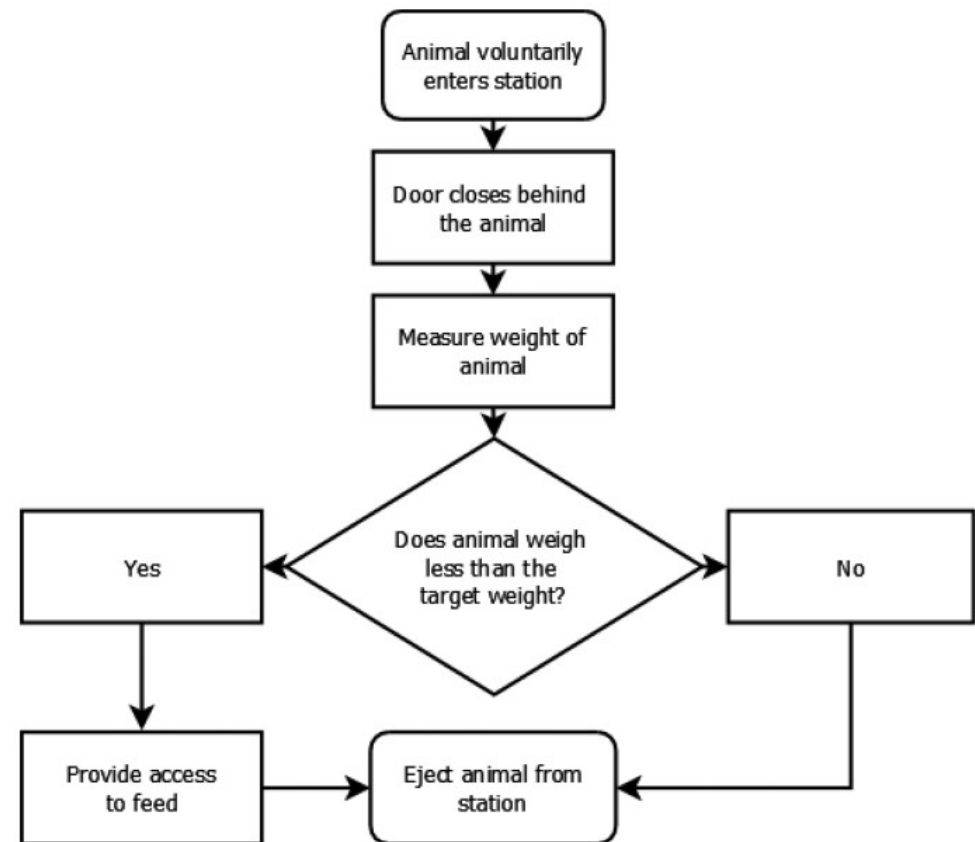


## Individuele verschillen in voeropname



Data van Hendrix Genetics

# Precisievoedingsysteem



Bron: Zuidhof et al., 2017



# Duurzaam eiwit



Sojaschroot



Zonnebloemzaadschroot



Raapzaadschroot



Zeewier



Eendenkroos



Algen



Reststromen



Meelwormen



Black Soldier Fly



Maden

# Duurzaam eiwit



Projecten bij Aeres

# Circulaire Kip Precisievoeding bij opfokhennen

# Project “Circulaire Kip” – doel

“Upgrading low-quality protein to high-quality protein, while solving a waste problem, is the ultimate example of circular and bio-based economy”



dr.ing. T (Teun) Veldkamp



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## Doel

Toepassen van groene  
reststromen voor pluimvee,  
direct of indirect via insecten

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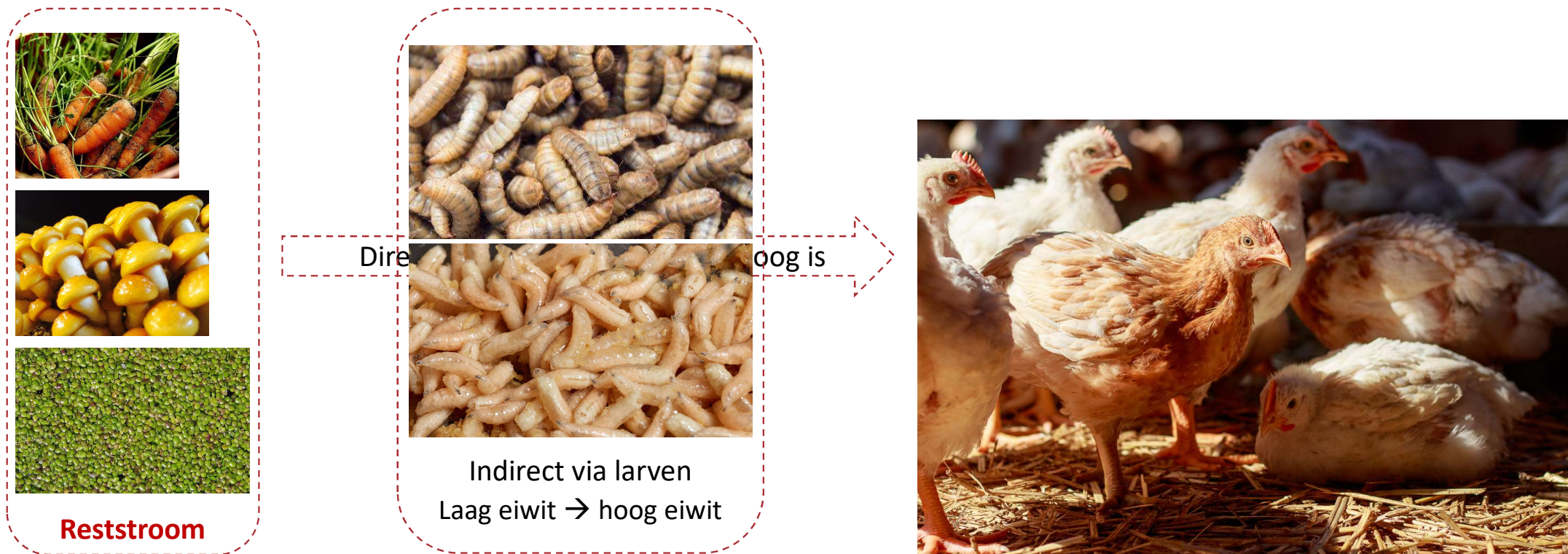


## Project “Circulaire Kip” – groene reststromen



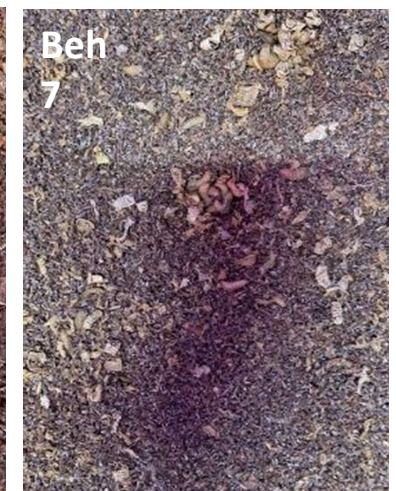
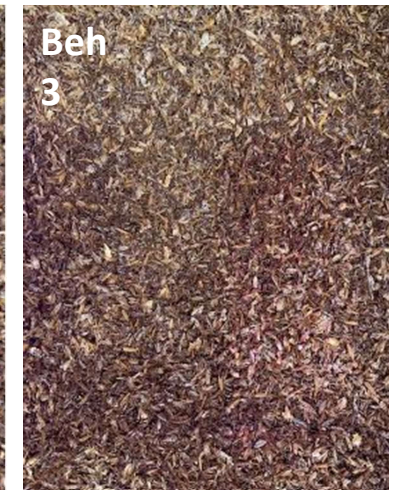


# Project “Circulaire Kip” – laag vs hoog eiwitgehalte





# Project “Circulaire Kip” – larven voeren met reststromen



| Beh |                                                 |
|-----|-------------------------------------------------|
| 1   | 25% moutkiemen + 25% moutvezel + 50% bierbostel |
| 2   | 50% moutkiemen + 50% uienschillen               |
| 3   | 50% paddenstoelen-substraat + 50% moutvezel     |
| 4   | 50% paddenstoelen-substraat + 50% uienschillen  |
| 5   | 50% bierbostel + 50% moutkiemen                 |
| 6   | 50% bierbostel + 50% uienschillen               |
| 7   | Controle                                        |

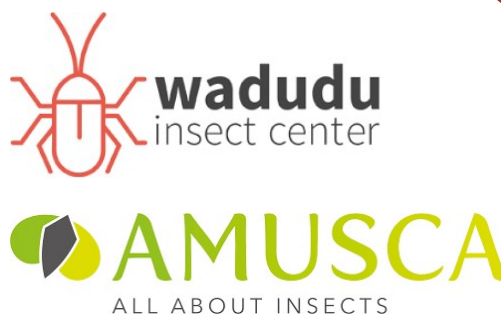
# Project “Cirulaire Kip”

Pluimveehouders



Gielen-Dielissen, Leenders, Agro-Giethoorn

Insectenkwekers



has  
university  
of applied sciences



TU/e Technische Universiteit  
Eindhoven  
University of Technology

**Kennisinstituten**



**“Reststroom producenten”**



**Voerfabriek**



**Nutriëntanalyse**

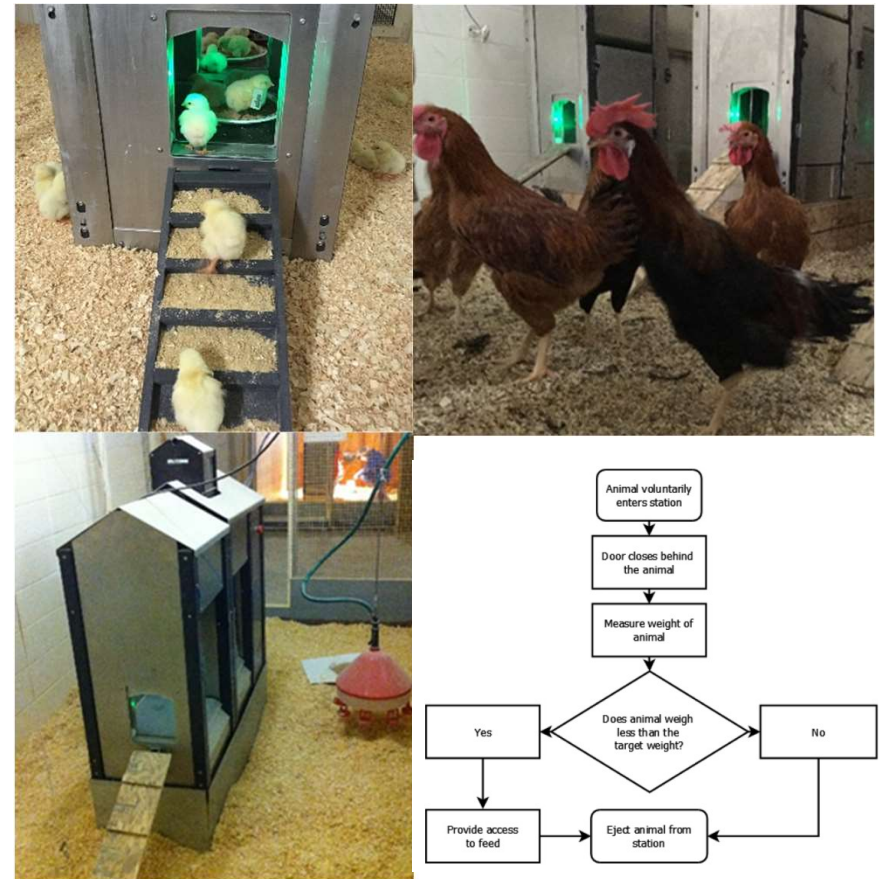




# Project “Precisievoeding bij opfokhennen”

## Doel

Ontwikkelen van een op maat gemaakte voerstrategie die de groei, ontwikkeling, productieprestaties, welzijn en gedrag van individuele hennen optimaal ondersteunt



## Project “Precisievoeding bij opfokhennen”

- Kennis over de variatie in nutriëntenbehoefte tussen individuele hennen
- Effect op groei, ontwikkeling, gedrag en welzijn
- Efficiëntie in nutriëntgebruik → minder uitscheiding via mest
- Relatie lichaamsgewicht, lichaamsontwikkeling en legprestaties (start leg, eigewicht)
- Voeropnamegedrag
- Vertaalslag naar de praktijk

## Project “Precisievoeding bij opfokhennen”



Precision ZX





## 2021-2025: Duurzame Pluimveehouderij in een Circulaire Bedrijfsvoering

- Voortbouwen op Precisievoeding en Duurzame Pluimveehouderij
- Pluimvee-breed projecten initiëren
- “oude” pluimveestal herinrichten → precisievoeding op Aeres Farms
- Insectenonderzoek
- Insectenweekunits

# Pluimvee en insecten bij Aeres

Pluimveefaciliteit Aeres Farms



Pluimveefaciliteit Aeres Barneveld



# Pluimvee en insecten bij Aeres

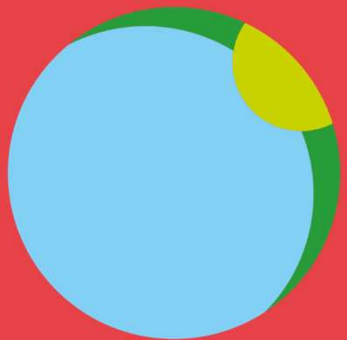
Grootschalige  
insectenkweek bij  
Aeres Farms





# Dank u voor uw aandacht

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**AERES**  
HOGESCHOOL  
DRONTEN