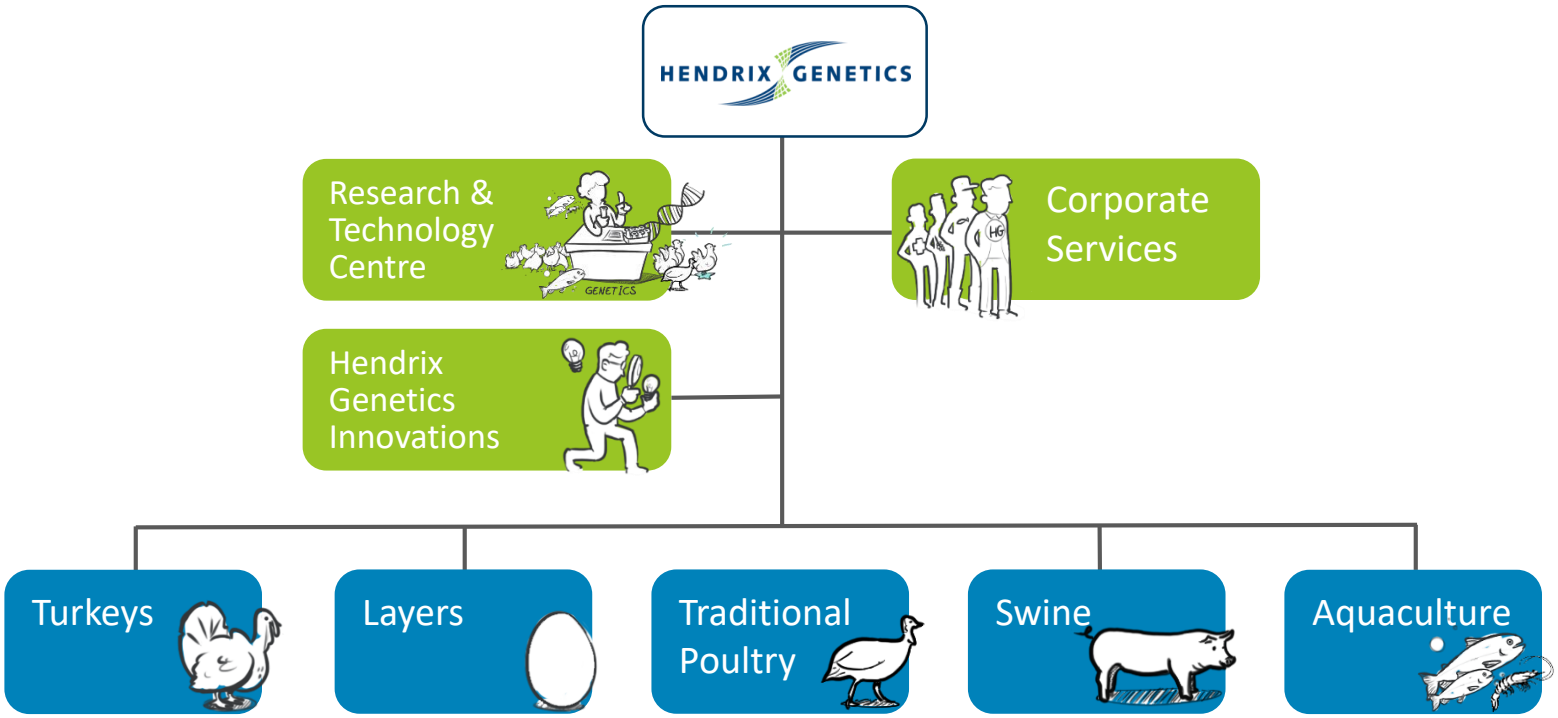
Expectations from a poultry perspective

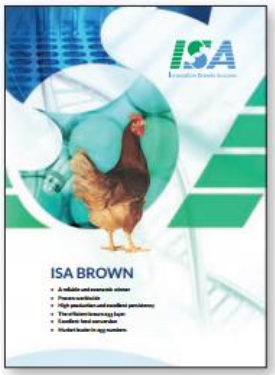
Johan van Arendonk and Katrijn Peeters

Our genetics

Organization structure

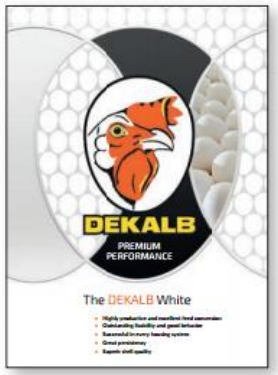


Genetic brands

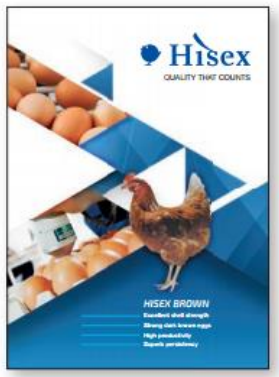


ISA Innovation breeds success

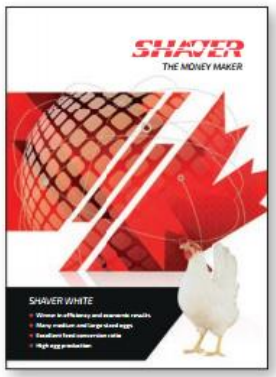
BOVANS Robust results



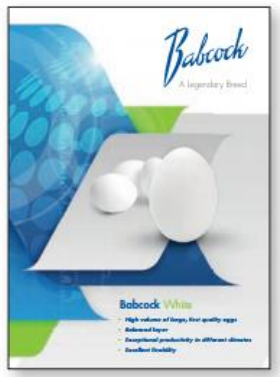
DEKALB Premium performance



HISEX Quality that counts

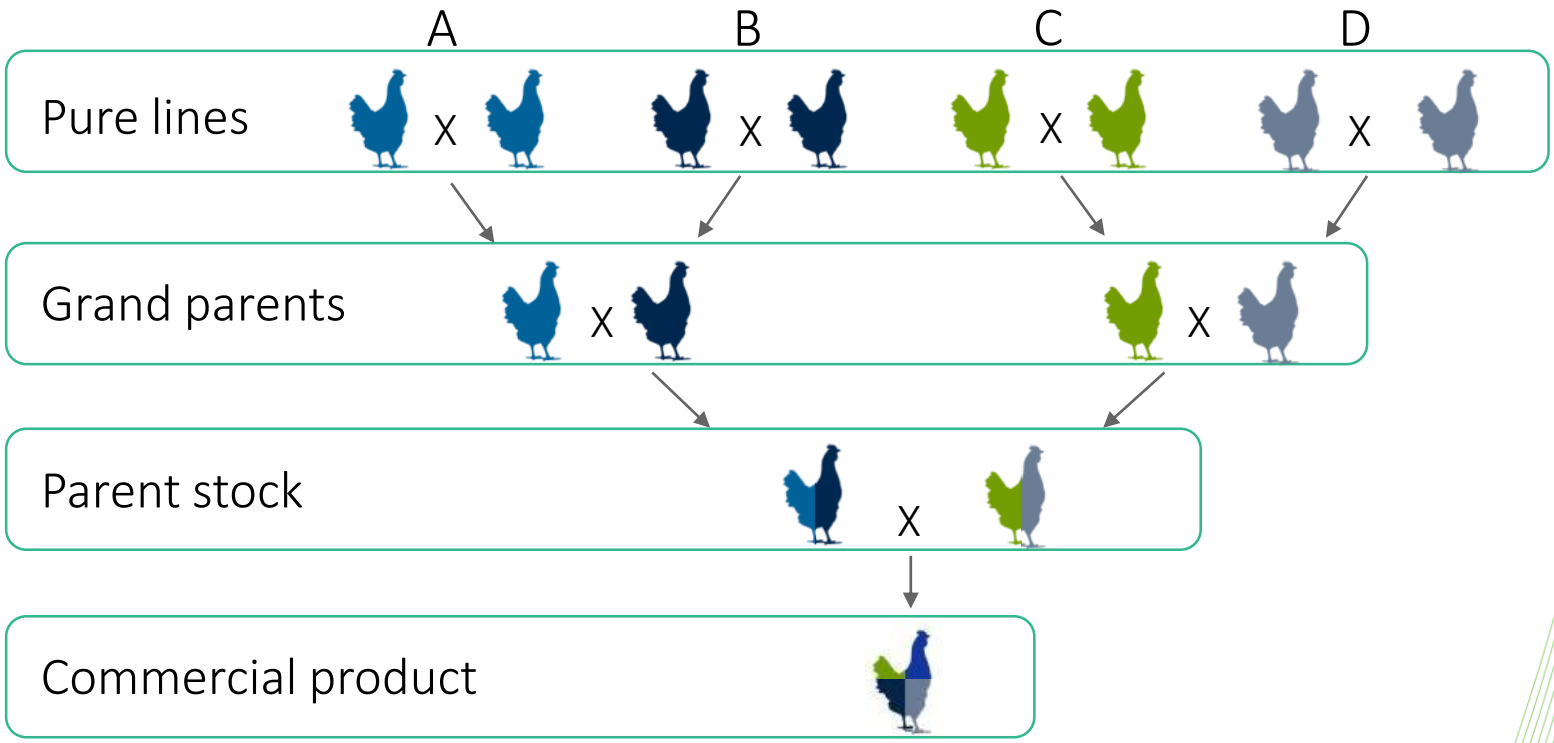


SHAVER The money maker



BABCOCK A legendary breed

Hybridization



Multiplication factors

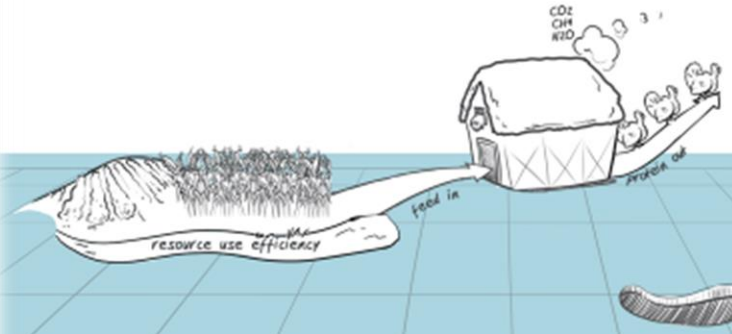
			
Pure line	1	1	1
Grand parents	85	40	15
Parent stock	7,500	1,600	300
Commercial products	750,000	128,000	22,500
Output	300,000,000 eggs	1,750,000 kg meat	2,137,500 kg pork

Based on lifetime production

Our challenges

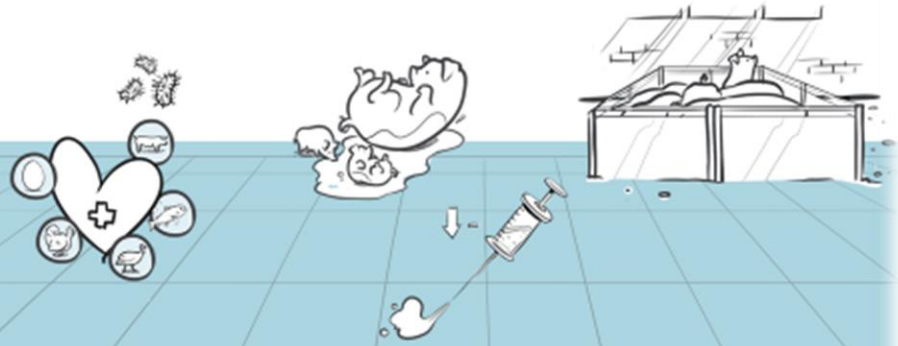
Growing world population, living in cities

Footprint

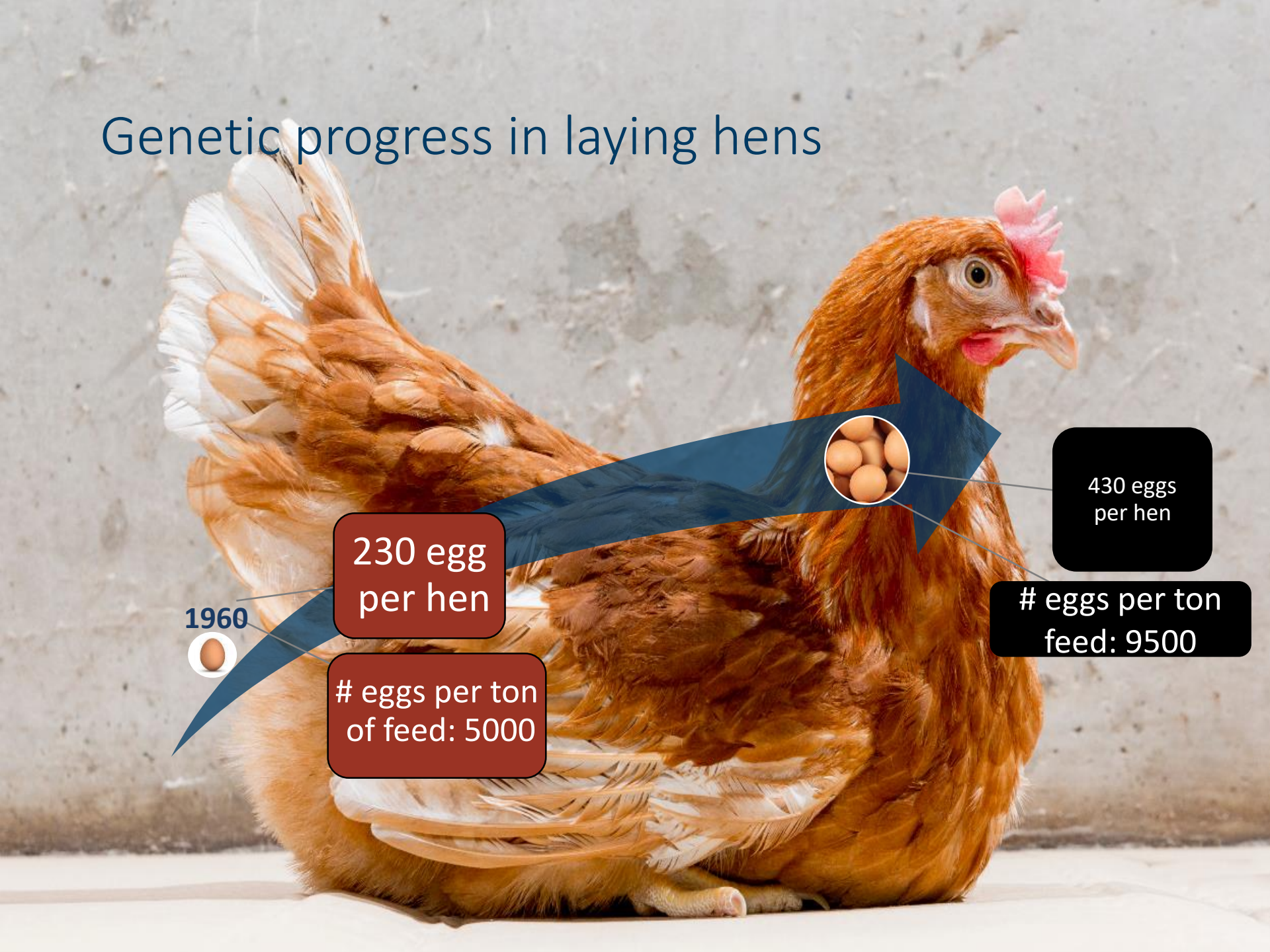


Total chain efficiency

Animal health and welfare



Genetic progress in laying hens



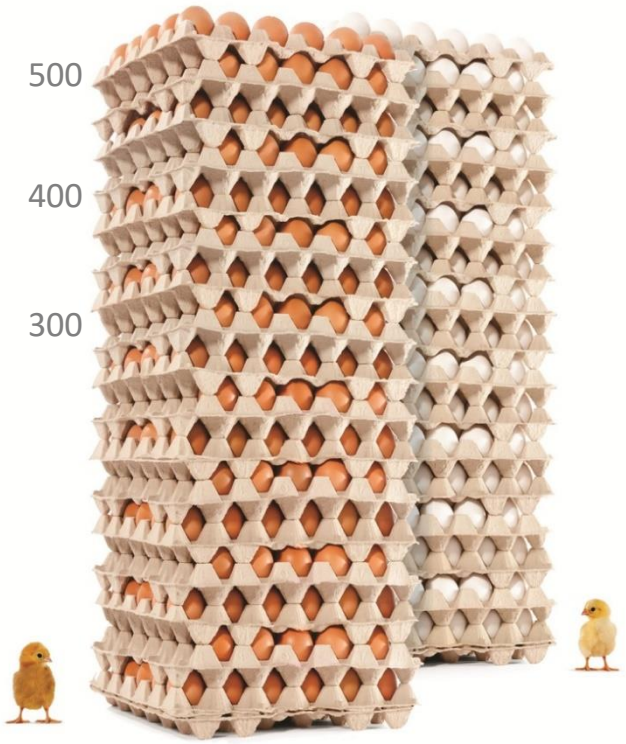
Breeding goals

Important traits in every market

- Egg production / laying persistency
- Livability
- Shell quality

Our objective:

500 high quality eggs per bird without molting



Market segmentation

- Preferred egg size (small-medium-large)
- Feed intake capacity/efficiency (robustness-efficiency)
- Behaviour (cages-cage free)
- …

Impact on data collection

Egg-innovations:

Adopting Machine Vision in our breeding program

Innovations in the field of animal breeding do not only apply to the genetic methods and models that we use in our day-to-day genetic evaluations, but can also be implemented in the most essential part of running a breeding program: the collection of your data.

Accurate data collection is at the heart of our breeding program. Whether it is the traditional way of selection or whether it is Genomic selection, you need to have data on an individual or family level in order to calculate (Genomic) breeding values that will deliver enhanced performance traits for our customers.

This need for accurate data is the reason we are so excited to announce the upcoming implementation of our egg grading robot, known as the Eggxaminator. The Eggxaminator was created in collaboration with Hendrix Genetics Innovations and one of our tech partners from the Brainport Eindhoven region (home to companies such as Philips, ASML, and VDL). The Eggxaminator is able to automatically grade and inspect eggs with the focus on ten different exterior egg quality traits.

Hendrix Genetics Innovations was created a few years ago in order to identify useful innovations that can be applied to the agricultural sector. To bring in a new perspective from an outside industries, we searched in the Brainport Eindhoven region for potential partners and their know-how to collaborate on new technologies that can be used in animal breeding.

After working together with this partner, we decided to apply Machine Vision in the grading of the eggs derived from our laying hen breeding programs. Machine Vision refers to the technologies and methods used to provide imaging-based automatic inspection and analysis. By adopting Machine Vision we are able to generate more accurate data on our exterior egg phenotypes, removing the possibility for human error and subjectivity. Each evaluation can now be completed with a high amount of measurable consistency.

When the Eggxaminator is ready, the plan is to scale up the technology for full implementation in the layers breeding program. By selecting with even more accuracy for enhanced egg quality, our customers will reap the benefits of increased shell strength, breaking strength at the end of a bird's laying cycle, and better consistency of egg shell shade.

We are so excited to announce the upcoming implementation of our egg grading robot, known as the Eggxaminator!

Egg-innovations:

The Eggxaminator

Impact on data collection

- Collecting individual phenotypes in group house systems

Impact on data collection

Field tests farms

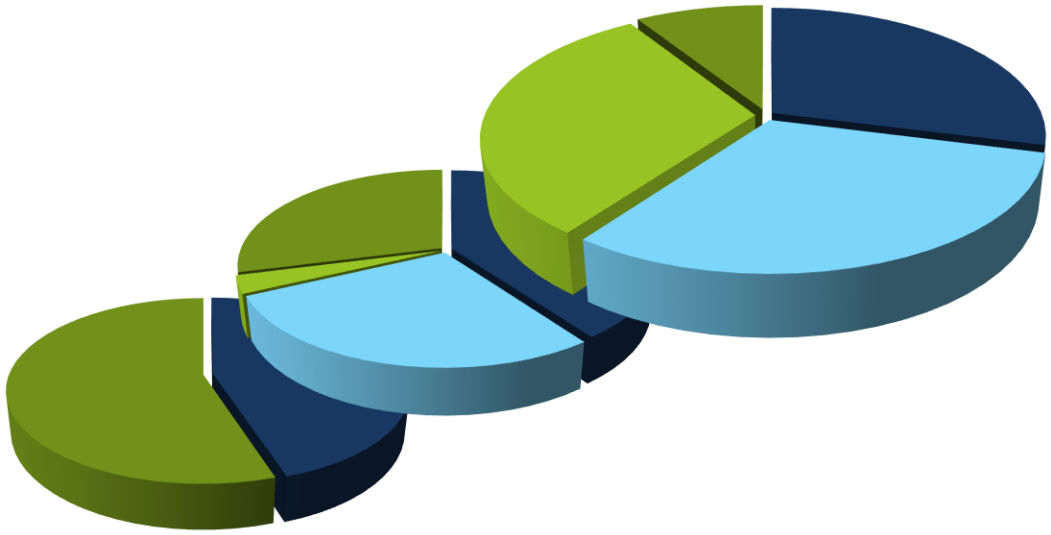
- Enriched cages, challenge tests, ≠ densities, tropical tests…
- Ensuring genetic potential is achieved under field conditions

Novel traits

- Robustness
- Social interactions and behaviour
- Feather cover

Impact on the breeding goal

- Balanced breeding:
  adjusting the balance to meet new demands



Balanced breeding

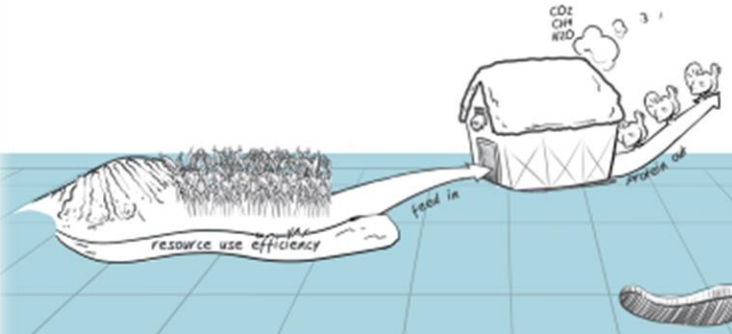
- ID 3438
- Line WB
- Sire 527
- Dam 562
- Born *09-02-**2010***

- no. of eggs produced

577 *(in 102 wks)*

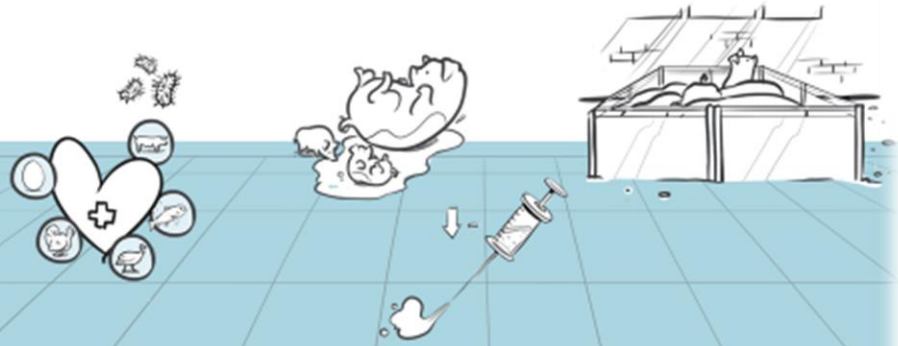
Growing world population, living in cities

Footprint



Total chain efficiency

Animal health and welfare



Our collaborations

Our strategic pillars

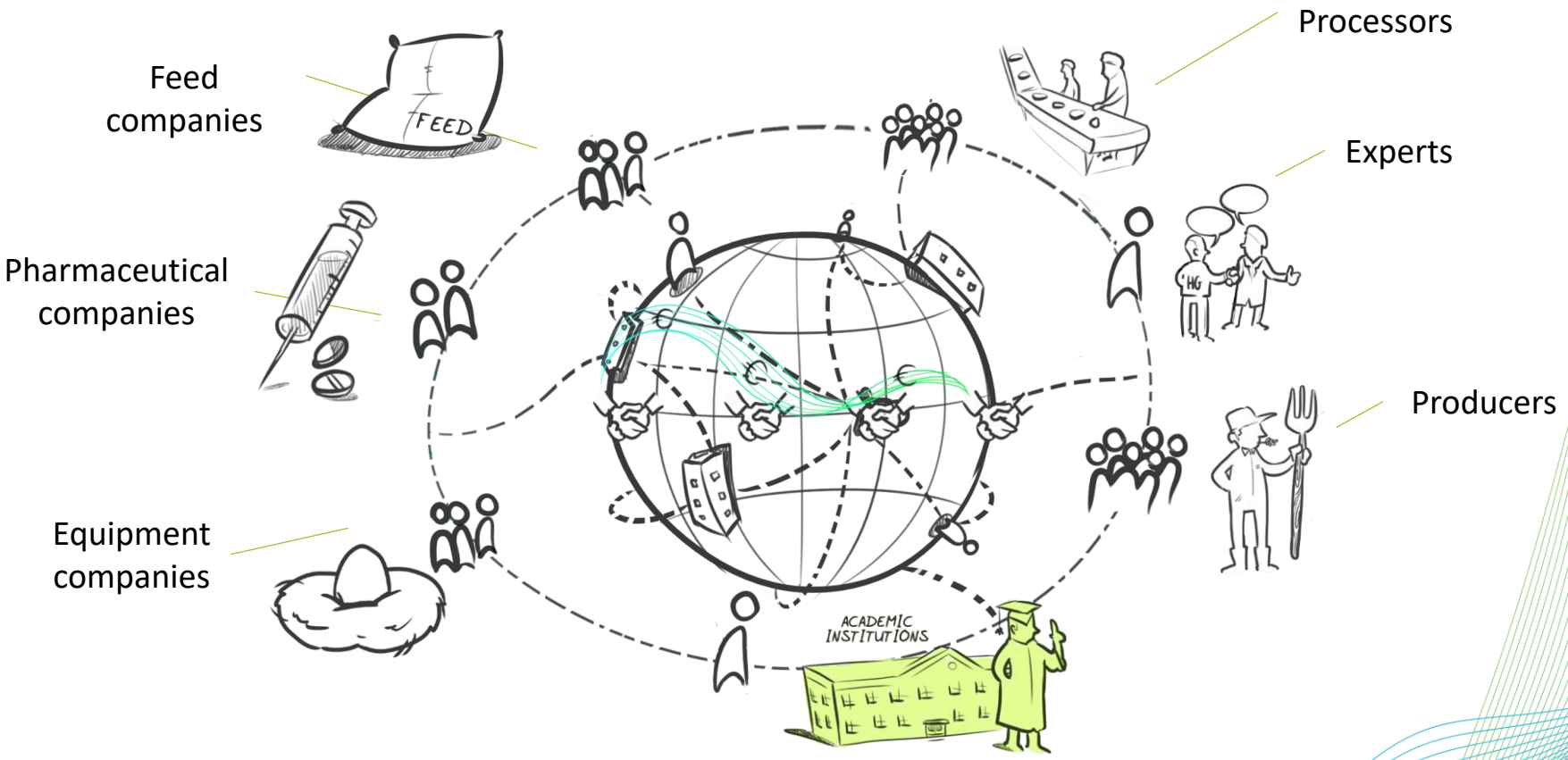
Driving **innovation** through research and development of people and technologies

Collaborating within the company and with various stakeholders in the value chain

Focus on improving **sustainability** of the animal protein value chain

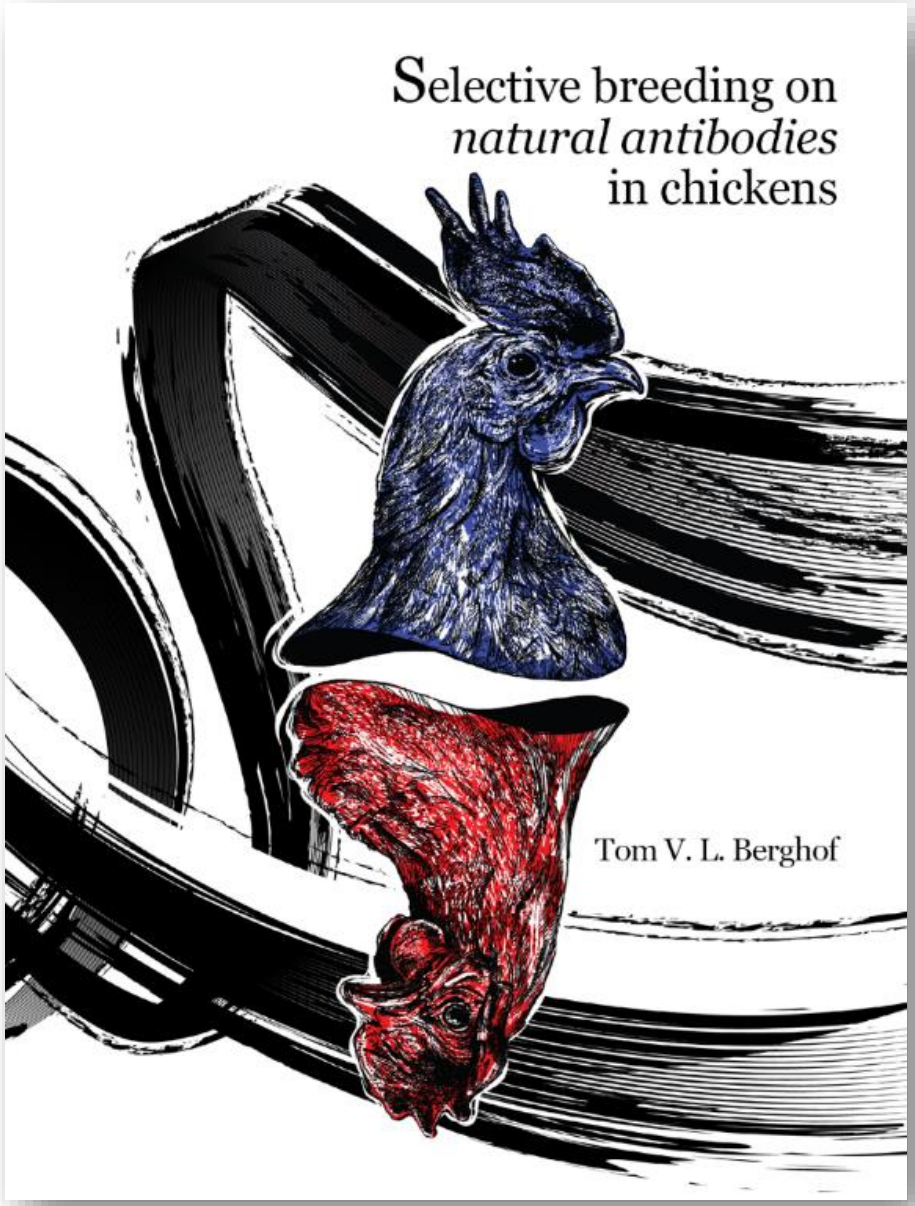
Delivering Value for all stakeholders in the value chain is our ultimate goal

Collaboration leads to solutions



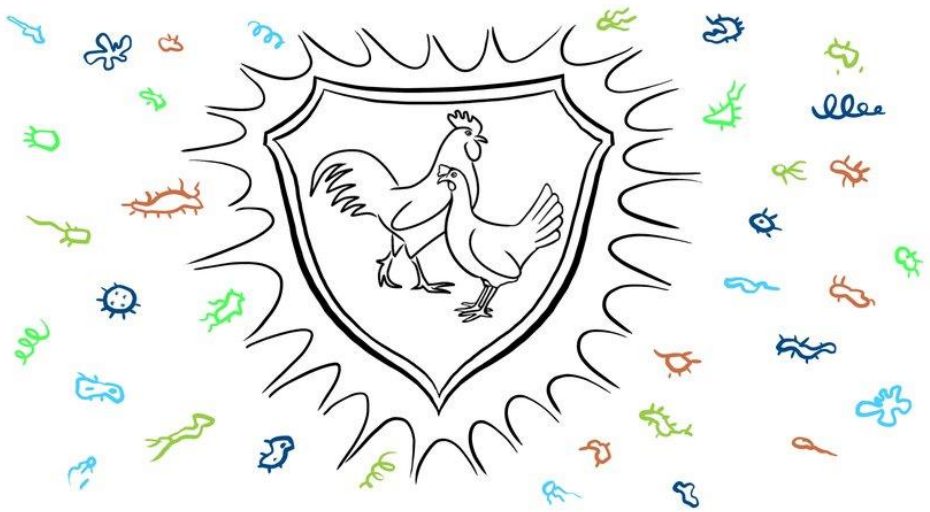
Expected contributions

- Novel phenotyping
  - How to measure behaviour and performance in large groups
  - Improving disease resistance
  - Measuring robustness/resilience
- Increased understanding of biology
  - Genetic models to capture genetic variance
  - Genetic architecture
  - Knowledge on deleterious alleles
- Novel technologies
  - Gene editing
  - Artificial Intelligence
- Tools


Selective breeding on
natural antibodies
in chickens
Tom V. L. Berghof

Selective breeding on natural antibodies

- Divergently selected for total level of KLH-binding natural antibodies at 16 weeks of age (Berghof, 2018, PhD thesis)
  - Base population and 5 generations: 8,007 individuals
  - $h^2 = 0.12$
  - Difference in *E. coli* resistance



SusTradeOff

ERA-NETSUSAN

Sustainable Trade-Offs:

Understanding trade-offs between health and efficiency to improve competitiveness and sustainability of animal production by breeding and management

INRA-GABI/GENPHYSE (FR)

WUR (NL)

Aarhus University (DK)

University of Edinburgh (UK)

Moredun Research Institute (UK)

IDELE (FR)

ITAVI (FR)

Okologisk landsforening (DK)

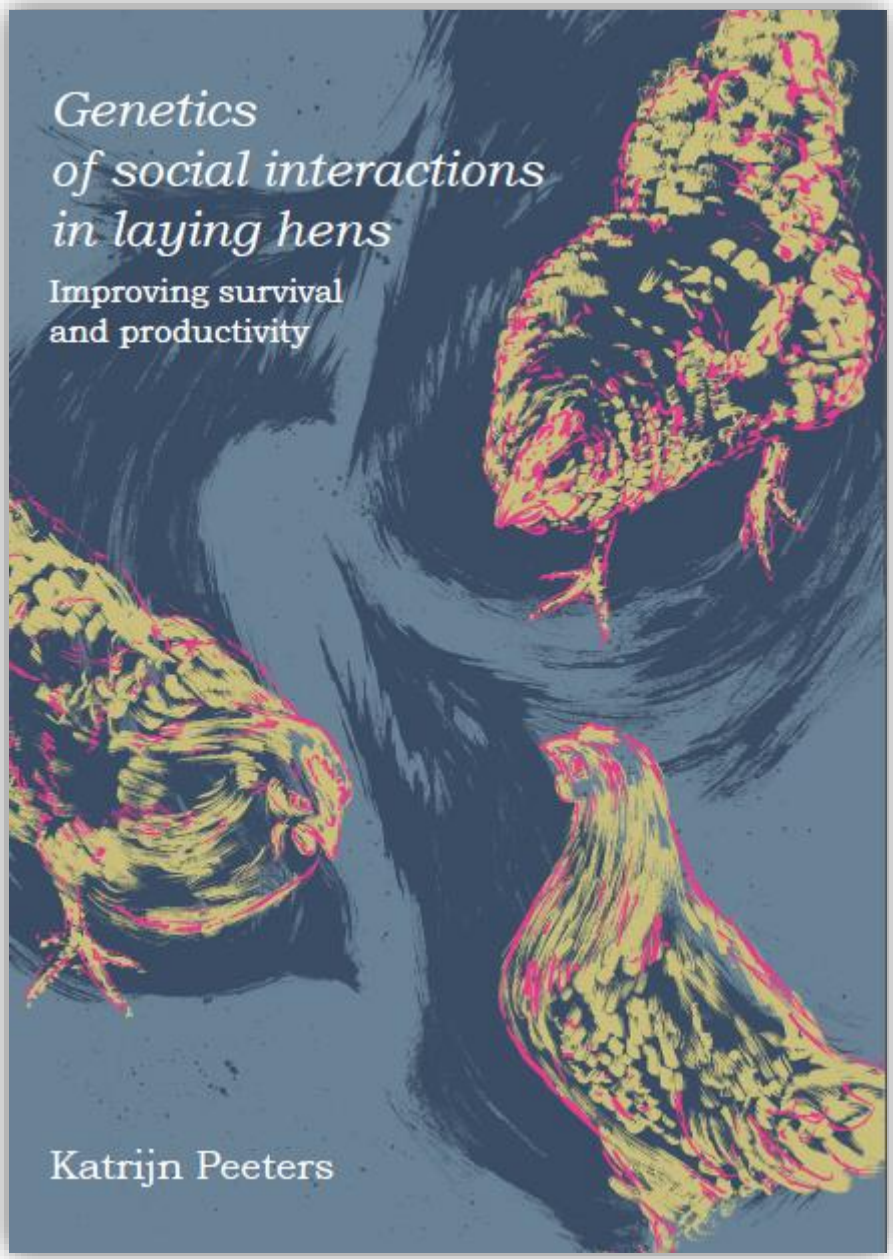
HENDRIX GENETICS

Cobb

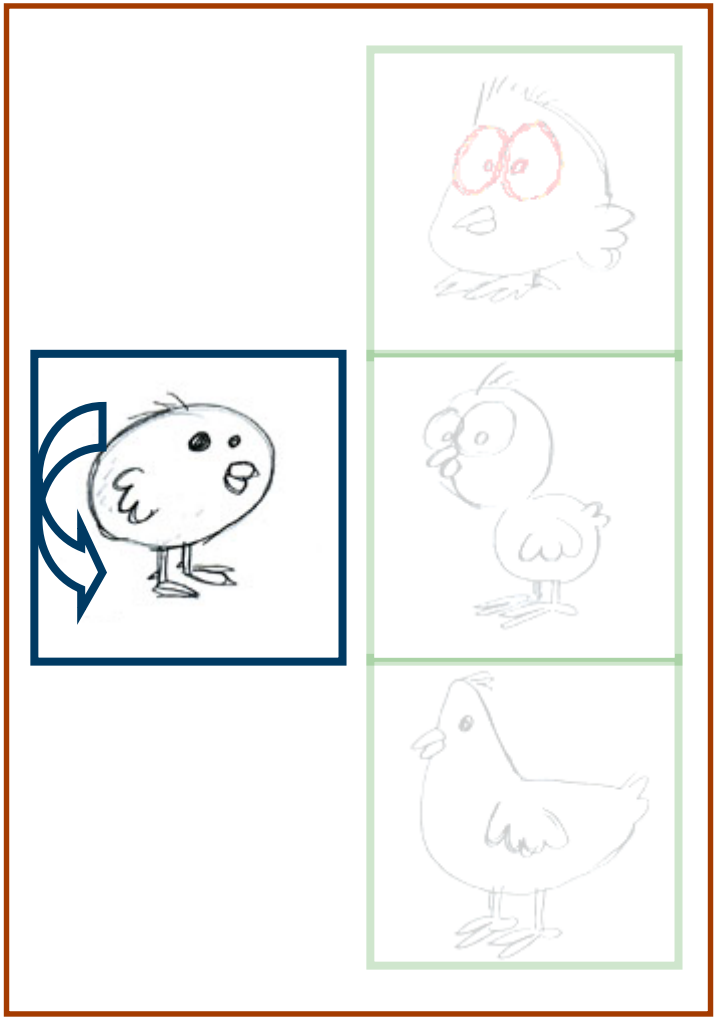
COBB-VANTRESS

Expected contributions

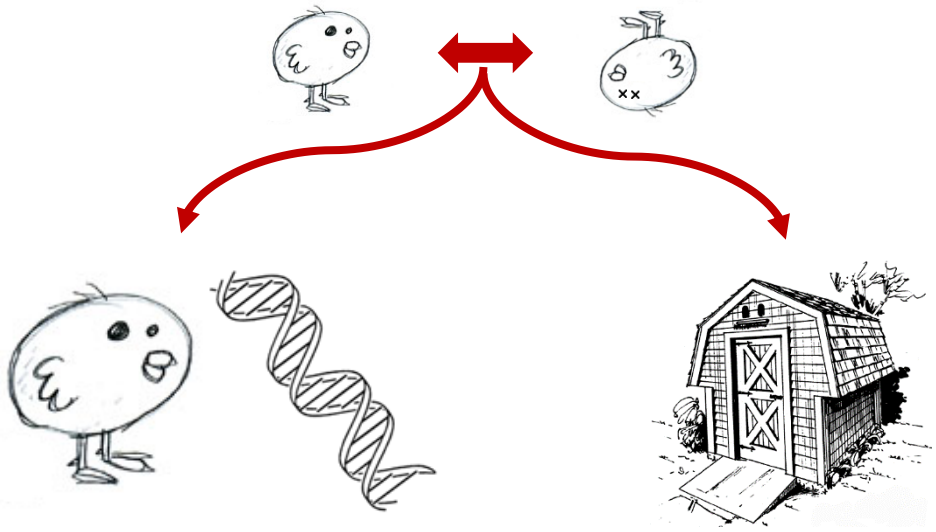
- Novel phenotyping
  - How to measure behaviour and performance in large groups
  - Improving disease resistance
  - Measuring robustness/resilience
- Increased understanding of biology
  - Genetic models to capture genetic variance
  - Genetic architecture
  - Knowledge on deleterious alleles
- Novel technologies
  - Gene editing
  - Artificial Intelligence
- Tools


Genetics
of social interactions
in laying hens
Improving survival
and productivity
Katrijn Peeters

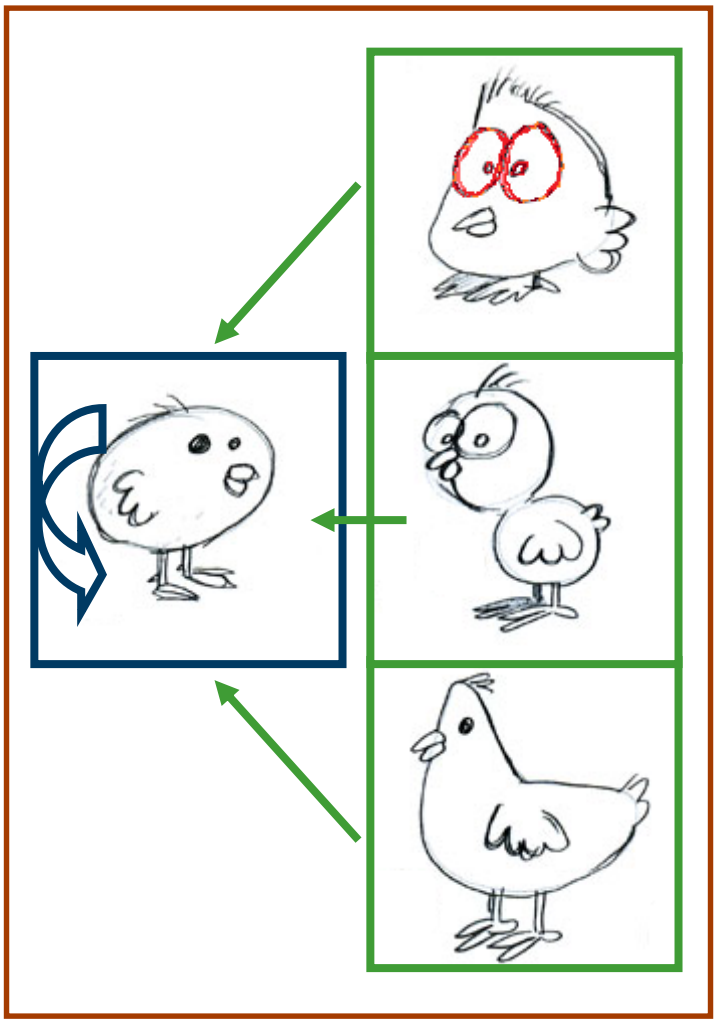
Social interaction theory (Griffing, 1967; Muir, 2005; Bijma et al., 2007)

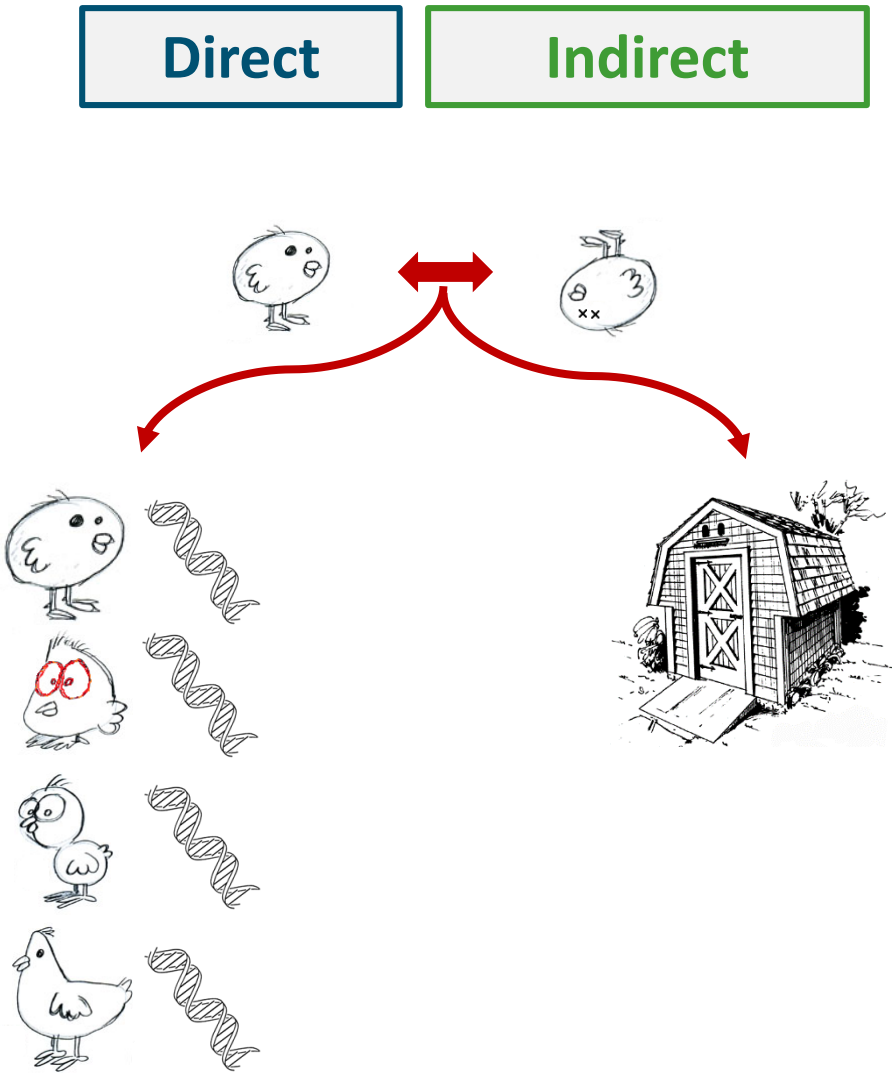


Direct

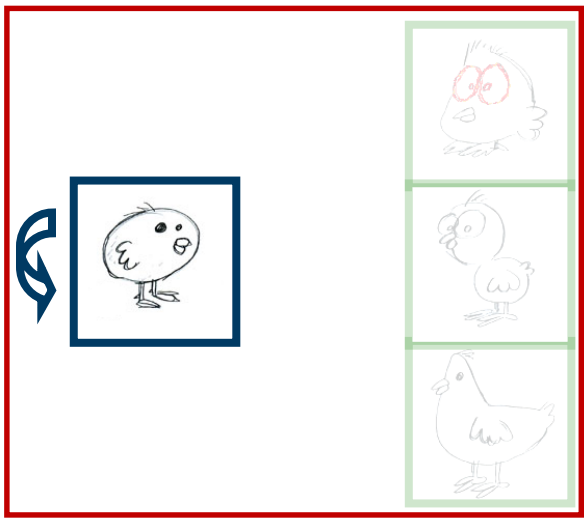


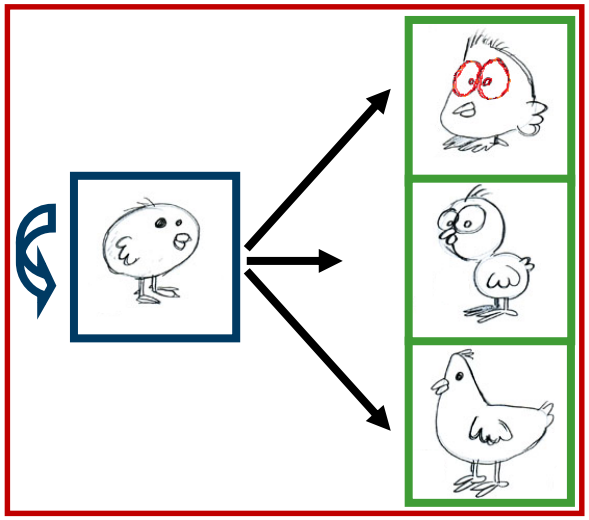
Social interaction theory (Griffing, 1967; Muir, 2005; Bijma et al., 2007)

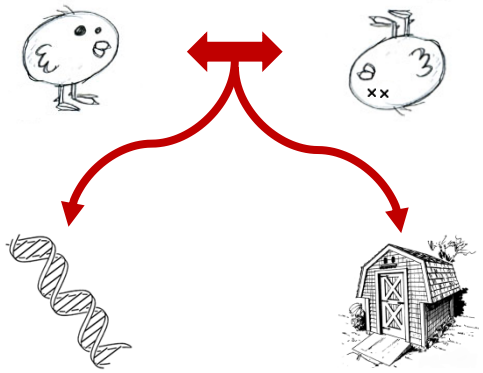




Direct ⇔ Indirect

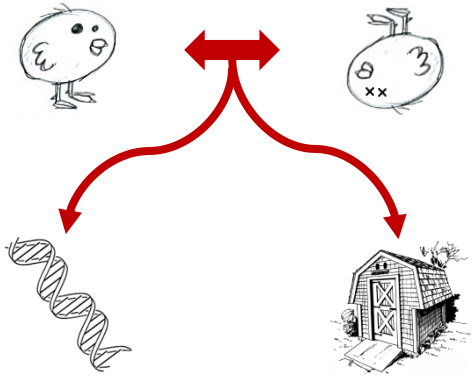






5

95



21

79

Expected contributions

- Novel phenotyping
  - How to measure behaviour and performance in large groups
  - Improving disease resistance
  - Measuring robustness/resilience
- Increased understanding of biology
  - Genetic models to capture genetic variance
  - Genetic architecture
  - Knowledge on deleterious alleles
- Novel technologies
  - Gene editing
  - Artificial Intelligence
- Tools

Our academic partners include

- INRA (France)
- Iowa State University (USA)
- Roslin Institute (UK)
- Stirling University (UK)
- USDA (USA)
- Technical University Eindhoven (NL)
- University of Barcelona (Spa)
- University of Guelph (Ca)
- University of Alberta (Ca)
- University of New England (Aus)
- Utrecht University (NL)
- Wageningen UR (NL)

Collaboration is key

- We are a proud partner of Breed4Food
- Long term collaboration
- Joining forces to increase knowledge and development of tools

WAGENINGEN
UNIVERSITY & RESEARCH

Cobb

CRV

HENDRIX GENETICS

Topigs Norsvin

News

Home / News

Seminar “Scientific developments in livestock genetics”
July 31, 2018

Application of sensor technologies in animal breeding
July 16, 2018

Multi-population genomic prediction to boost accuracy for small breeds
June 14, 2018

Efficient measuring of locomotion of farm animals
April 8, 2018

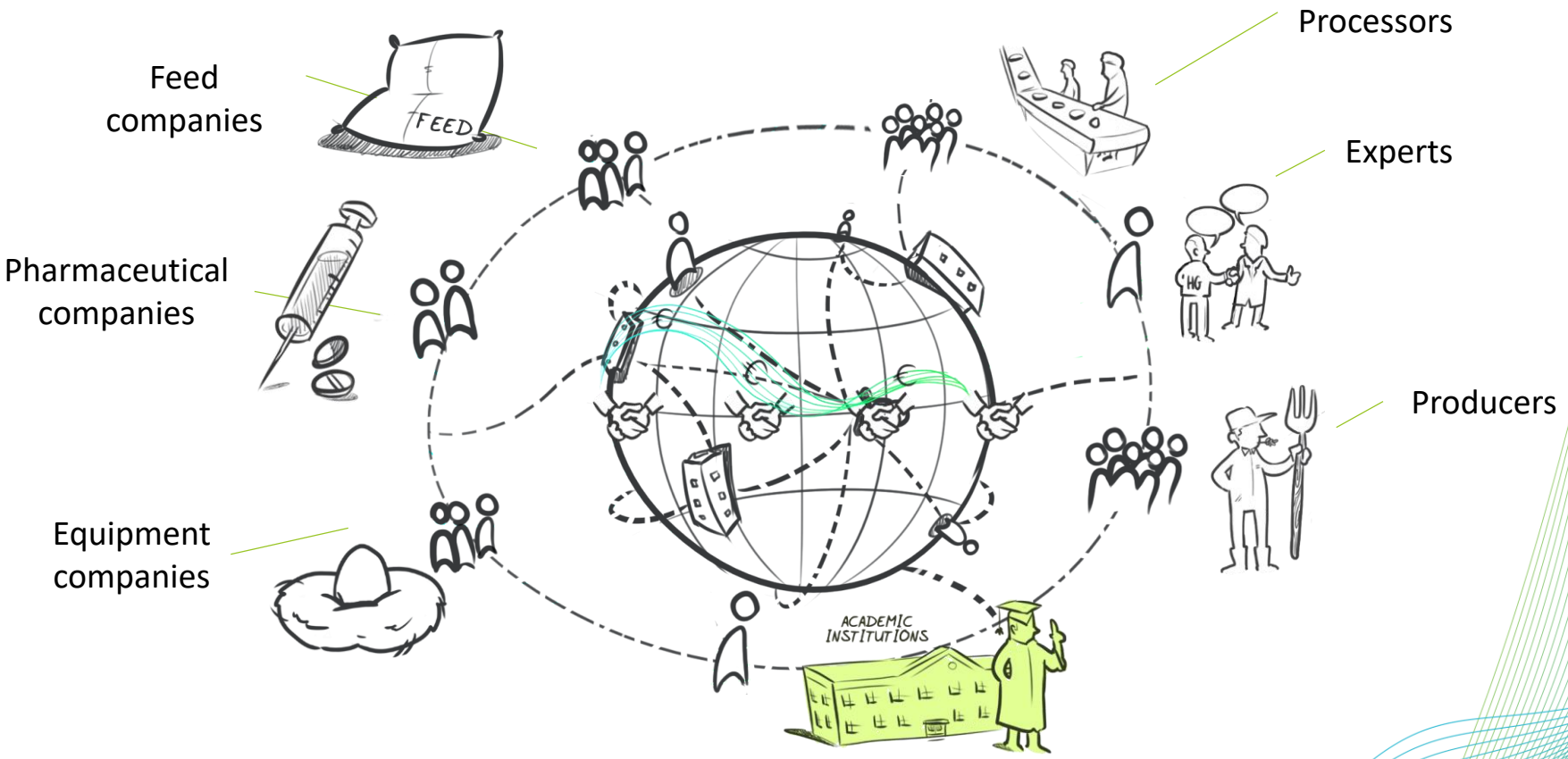
Testimonial 100 years WUR: Erwin Koenen of Breed4Food
July 27, 2018

Breed4Food seminar Scientific developments in genetic and phenotypic information
June 22, 2018

Understanding feed efficiency in pigs by using organoids
June 11, 2018

More live-born piglets expected thanks to discovery of harmful genetic mutations
February 20, 2018

Collaboration leads to solutions



Expectations and lessons learned

What we expect from collaborations

- Increased knowledge (technologies, biology, modeling)
- Tools
- Talent

What we have learned

- Important to find the right balance between scientific output and application
- Efforts needed to implement research findings are often underestimated
- Important to have long term partners
- Need to be open for new partnership