atf animal task force
A European Public-Private Partnership

EAAP European Federation of Animal Science

Joint session of the Animal Task Force & the EAAP Commission on Livestock Farming Systems:

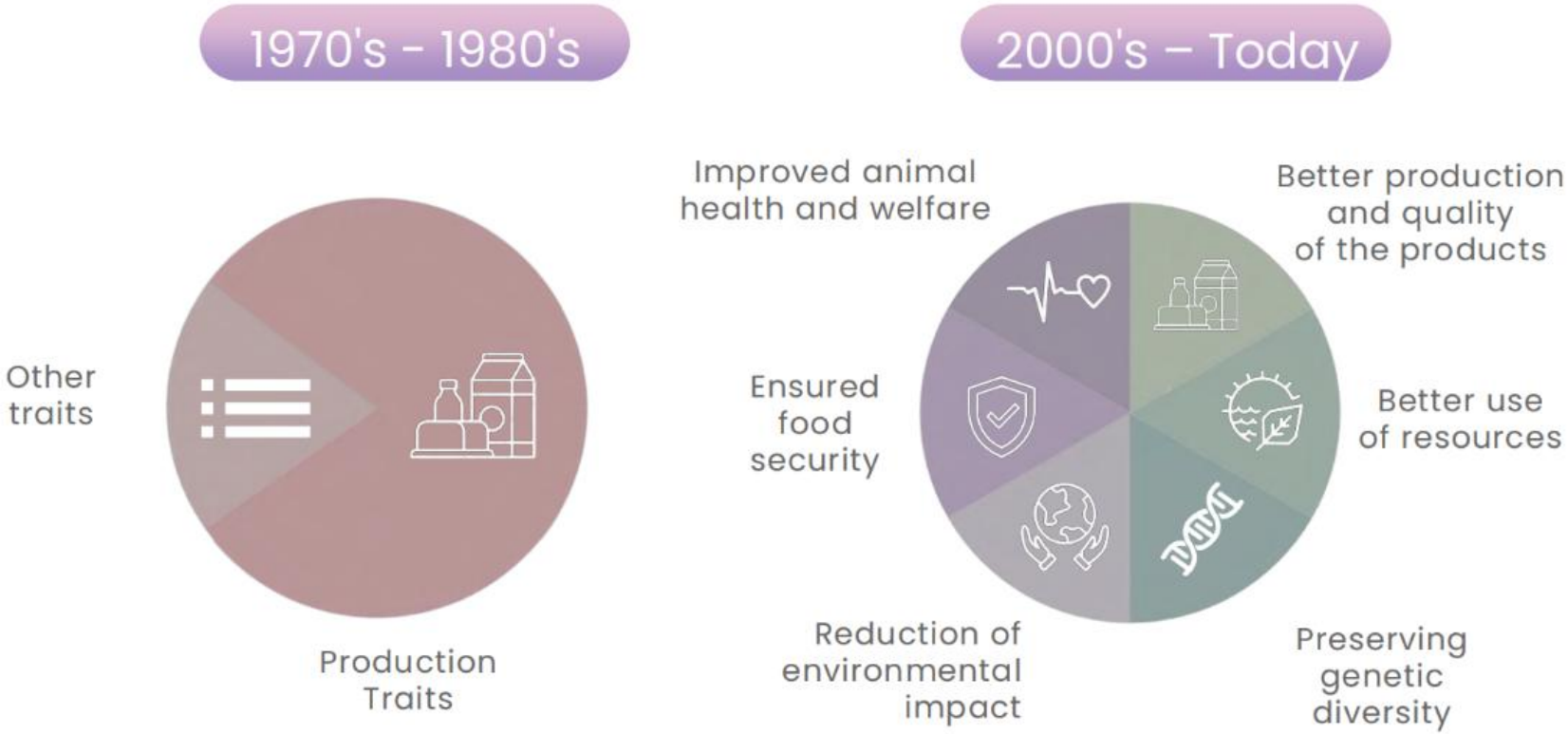
Livestock farming systems for the next generation: can we imagine the future?

How animal genetics can help to shape the future of Livestock Farming Systems ?

C. Patry, E. Grindflek, N. Duivenjstein

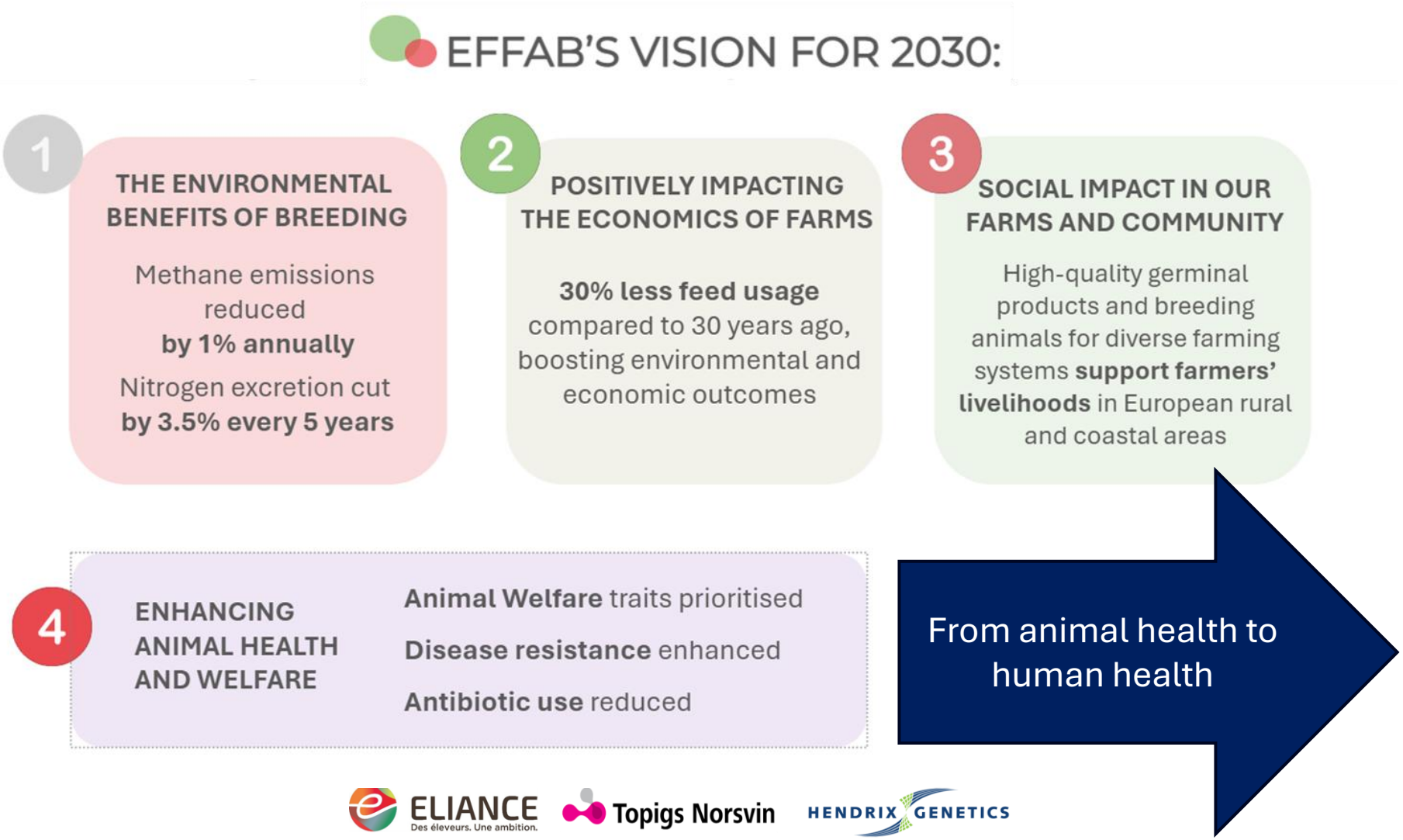
ELIANCE Des éleveurs. Une ambition. Topigs Norsvin HENDRIX GENETICS

Cattle, Pig, Poultry, … A common approach : Responsible and Balanced Breeding & a range of modern tools



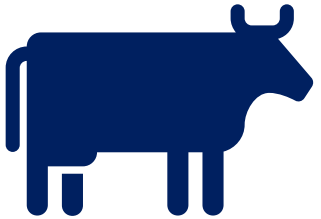
- Genomic Selection
- Precision phenotyping
- Genome editing
- Artificial Intelligence

Animal Genetics is not only adressing the 3 pillars of sustainability



How Animal Genetics relies on efficiency / diversity / circularity and helps :

- **Reducing carbon footprint (pillars 1, 2 & 3)**
- Improving animal welfare and health
- Contributing to human health



1

THE ENVIRONMENTAL BENEFITS OF BREEDING

Methane emissions reduced **by 1% annually**

Nitrogen excretion cut **by 3.5% every 5 years**

Breeding for reduced carbon footprint in cattle

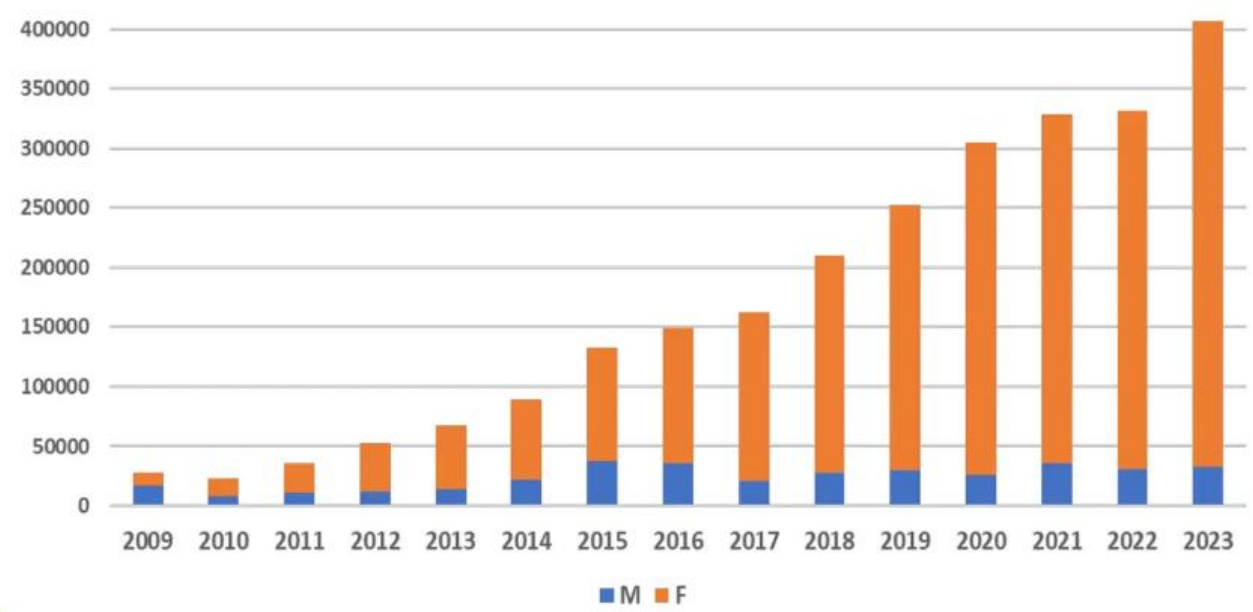
- Methane (CH_4) is a powerful greenhouse gas produced during the digestion process of ruminants.
- Reducing methane emissions is a relevant lever for climate change mitigation.
- The cattle breeding sector is proactely working on solutions
  - **Breeding for methane reduction is possible** (h^2 between 0,14 and 0,40 depending on traits, breed, lactation rank, source : METHABREED, 2024)
  - A reduced environmental footprint also consider a more efficient use of ressources

⇒Genomic selection for methane reduction

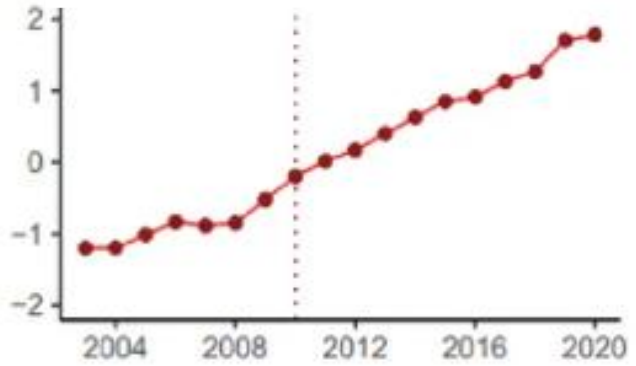
⇒Priority to be given to traits

⇒But also : genomic selection on improved reproduction, increased disease resistance and better longevity

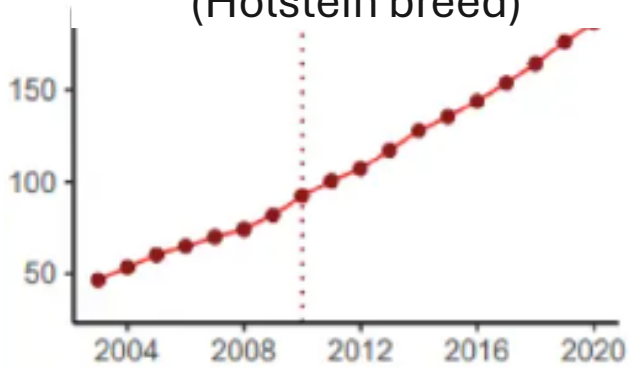
More and more females genotyped on farms



Reproduction



French Total Merit (Holstein breed)



Sources : VALOGENE, OBGENO study (2025) - France

What can we expect from balanced genomic selection ?

- Methane emissions reduced by 1% annually
- Depending on :
  - Accurate methane measurement enables effective genomic predictions
  - Dealing with large scale phenotyping (from direct measure to proxies : milk or feces analyses)
  - Balance to be define across traits in the breeding pbjective
  - Acceptance by the farmers and interactions with the dairy / beef industry (€)
  - **Diversity**

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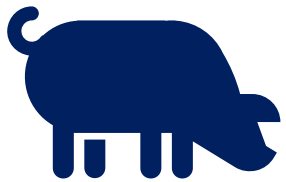

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POSITIVELY IMPACTING THE ECONOMICS OF FARMS

30% less feed usage compared to 30 years ago, boosting environmental and economic outcomes

Improved nutrient efficiency leads to reduced carbon footprint

- Cost of pork is largely feed related (50-70%)
- Climate emission from pork production is 80% related to feed

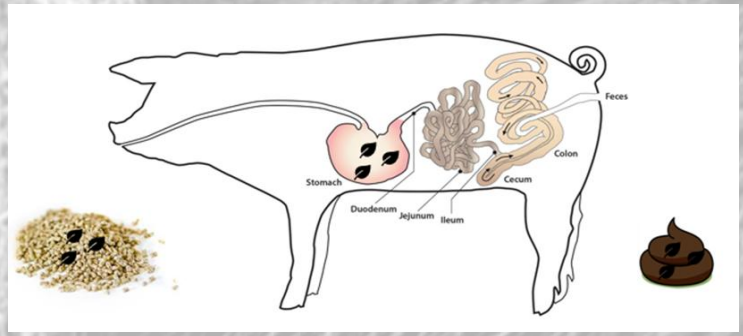
Genetic progress of Total Feed Efficiency matters:

In 5 years: Topigs Norsvin genetic reduced the feed consumption in finsher per year by 22 kg
- translates to a potential annual savings of up to 660,000 hectars

Impact for EU: with 400 mill slaughter pigs we save 1.7 million CO2 eq. extra every year (73 mill Euro in monetary units)

We can do even better with improved protein digestibility:

- Heritability: 20%
- Prediction of future gain: 1.3 kg protein saved per grower-finisher



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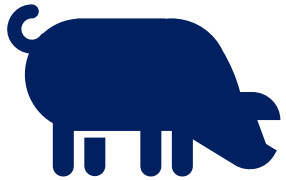


4

ENHANCING ANIMAL HEALTH AND WELFARE

Animal Welfare traits prioritised

Disease resistance enhanced

Antibiotic use reduced

Breeding for health and robustness in pigs - taking the whole animal into account

Breeding for behaviour – advanced toolboxes are developed

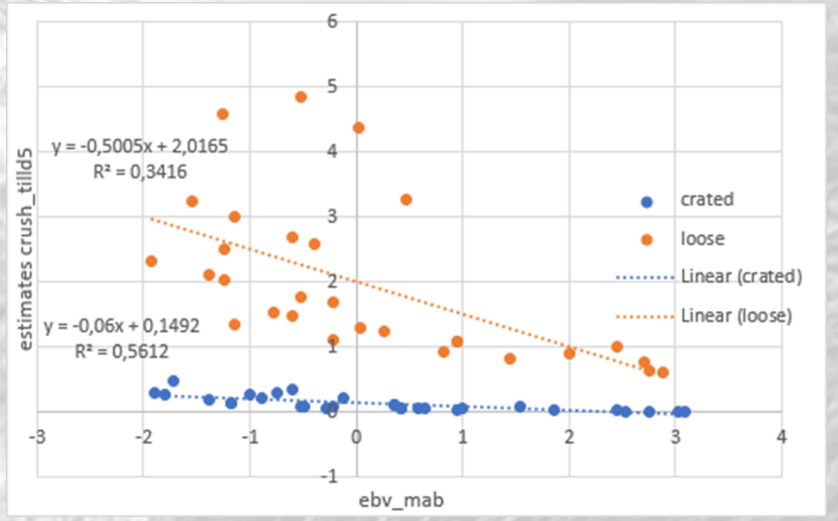
Rearing-finishing

- Damaging behaviors
- Activity
- Lameness
- Locomotion
- Disease

Sows

- Mothering ability
- Piglet survival
- Functionality
- Carefulness
- Communication

Breeding for mothering ability decrease frequency of crushing in free farrowing



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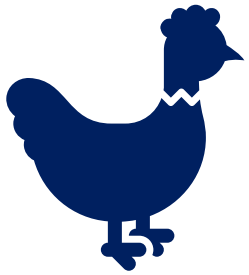

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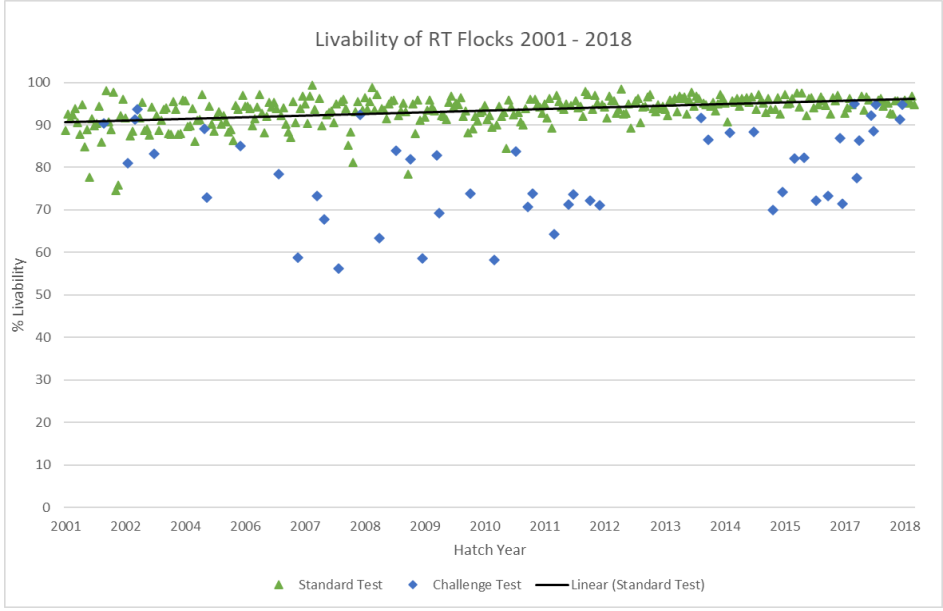
Genetic Selection Enhances Health and Welfare in Laying Hens

- Genetic selection strengthens skeletal structure, reducing keel bone fractures and **improving mobility**
- Selection for **behavioral traits** reduces injurious pecking (IP), lowering the need for beak trimming
- Group selection promotes **social compatibility** and preserves natural behaviors
- Genetic improvements enhance **immune function, stress resilience**, and adaptability to cage-free systems

Livability: breeding a “social” hen



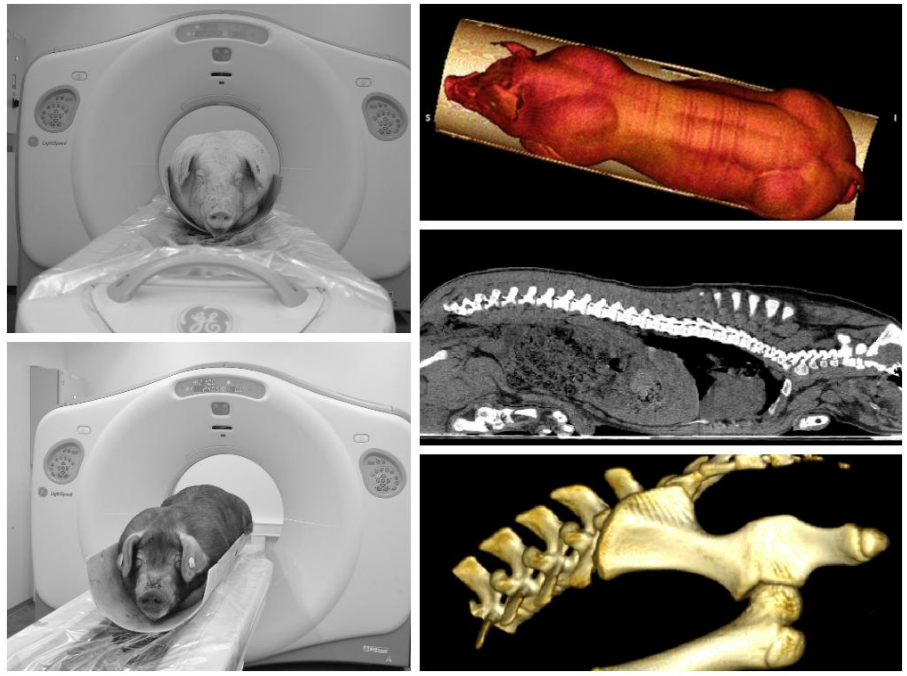
Challenging the birds via their environment

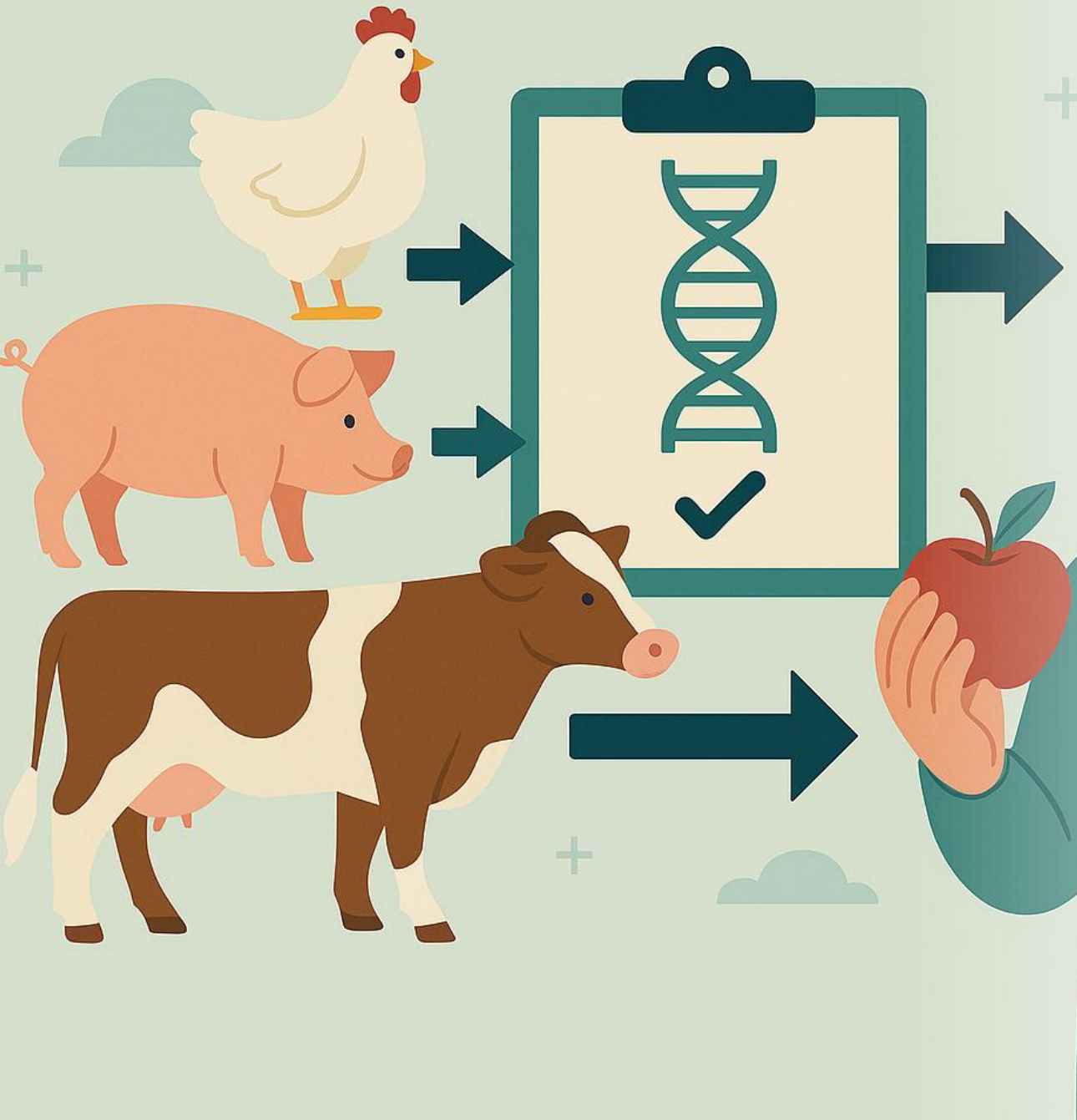
- Higher bird density per cage
- Higher light intensity
- Intact beaks

Goal: to identify the “friendly” families with good egg production and use them as parents for future generations

CT Scanning as a tool for balanced breeding in turkey and pigs

- It allows to get in-depth information on the various aspects of a body such as skin, bones, body composition, airways, and organs in order to gather multiple information (meat yield, livability, health and welfare…)

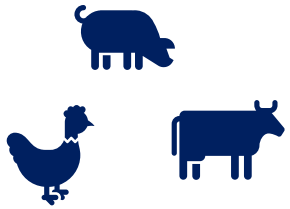




Breeding contributes to human health too

- **Healthier food products:** lean meat, milk quality, beneficial fatty acids…
- **Better disease resistance:** Reduce the spread of pathogens to humans, decrease need of antibiotics and reduce risk of antibiotic resistant bacteria
- **Higher efficiency:** Ensures a steady supply of protein-rich foods that are vital for health

Conclusion



We need to feed the world in a sustainable way. Animal genetics is part of the solution (with environmental, social & economical impacts) according to a **balanced approach.**

- **Efficiency** in animal genetics addresses the environmental footprint of livestock production (novel & conventional traits) while improving productivity and economic viability.
- Genetic and genomic **diversity** remains essential for resilience and long-term breeding, ensuring adaptability to local farming conditions and long-term sustainability.
- **Circularity** within livestock systems can be strengthened through genetic selection, supporting resource efficiency and waste reduction, but also through connections between stakeholders.

Modern beeding give us access to many tools (genetic progress, genetic diversity) but what is better for the long term ?

Discussions will continue regarding our responsibility for the future....

- **Genetic- and biodiversity**
  - High-yield breeds can replace local breeds/varieties, limiting the gene pool ?
  - Gene editing vs natural genetic selection for already existing mutations ?
  - Adding genetic variation with gene editing ?
- **Balanced breeding**
  - Will new genomic tools and new reproduction technology allow for the same level of balance?
  - With new technology, changing and distributing genetics faster, we need new and higher level of insight (faster)
- **Sustainability and climate adaption** – we need to be ahead…
  - Adapt to future feed, alignment breeding, feed industry and politicians
  - Resources using AI to catch more precise phenotyping better for climate in the long run?

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Thank you for your attention

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