# Current projects and plans at SUISAG

SABRE-TP Workshop 2021

**Res Hofer**

10.11.2021 ETH Zürich

# List of ongoing projects and pilot studies

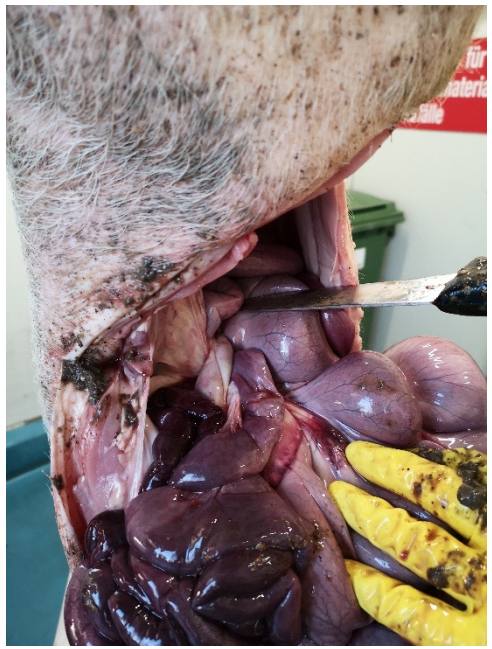
- Whole-genome sequence-based domestic pig breeding (ETH)
- Reducing losses of fattening pigs due to Haemorrhagic Intestinal Syndrome (HIS)  (ETH, VetSuisse BE)
- Mortality / medical treatment: new data/phenotypes for genetic monitoring
- Longevity indicators as traits for genetic evaluation
- Measuring aggressive behavior by video imaging and artificial intelligence
- Automated measurement of claw characteristics

# Whole-genome sequence-based domestic pig breeding (ETH)

- PhD project of Adéla Noskova
- One of the topics: low pass sequencing to replace SNP-chips?
  - 1x coverage sequence → imputation to full sequence → variant calling
  - similar cost, 20 Mio vs 80K genetic variants
  - Concordance with SNP-genotypes?
    - Overall 0.98 (BMC Genomics, 2021) → good enough for genomic relationship
    - Specific markers used in marker assisted selection (Coli resistance) → taylored imputation pipeline: 0.99 concordance, call rate below 90%
  - Not yet, but soon a good alternative for SNP-chip

# Reducing losses of fattening pigs due to Haemorrhagic Intestinal Syndrome (HIS) (ETH, UniBE)

HIS = torsion of intenstine



**Reducing osses of fattening pigs due to HIS**

| **Sub project genomics** | **Sub project environmental factors** |
|---|---|
| Post-doc ETH Zürich<br>(Arnav Mehrotra)<br>(2021-2024)<br>Main funding BLW<br>**Genomic analysis**<br>- **1000 samples of HIS cases**<br>- **500 samples of controls**<br>- **20 Mio. genetic markers/animal**<br>**→ Selection tool** | PhD thesis VetSuisse Bern<br>(2021-2023)<br>Main funding BLV<br>**Comparison of env. factors**<br>- **50 herds with HIS problems**<br>- **50 herds without HIS problems**<br>- Check-list on feeding and housing<br>- Analyses of feed and water<br>**→ Consulting tool** |

Volume 1.2 Mio CHF (50% federal government, 50% pig industry)

# Mortality / medical treatment: new data/phenotypes for genetic monitoring (Negar)

- **Introduction:** Pig survival in different production phases (pre- and post-weaning) is an economically important trait with animal welfare indications.
- **Aim:** Estimation of the mortality- / treatment-rate during the fattening period and their trend over time. Monitor difference between breeds.
- **Data:** The health data (departures and treatments) are entered by farmers in electronic treatment journal (EBJ) for the aim of this project since 2019 onwards.
- **Recording sites:** Performance test station in Sempach (MLP), PREMO sire line and end product test (finishing) farms.
- **Targeted evaluation:** 1) Estimation of the mortality- and treatment-rate across breeds and farms, 2) Estimation of the genetic components and heritability for these traits.
- **Potential outcomes:** Survival as well as antibiotic treatments during fattening period can be potentially included in our breeding goals.

# Longevity indicators as traits for genetic evaluation (Alfredo)

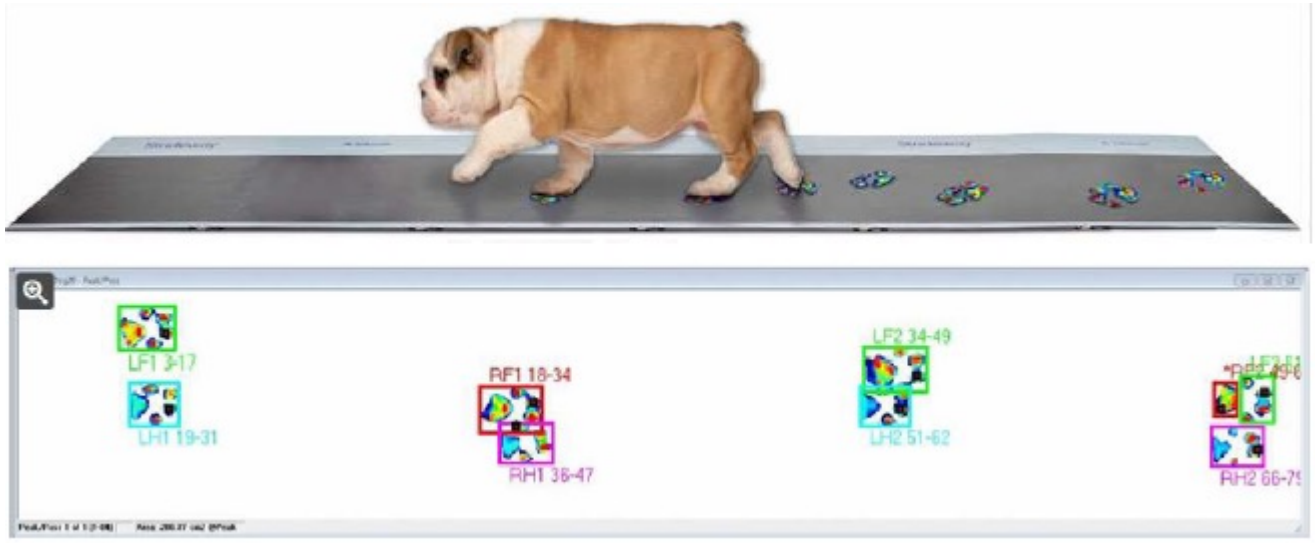
- Length of productive life only known after departure of the sow
  - Number of litters produced until departure
  - Not known for younger sows (censoring)
- Early indicators in order to get more accurate EBVs for younger animals
  - Inseminated after first litter (0/1)
  - Stayability to 2nd, 3rd, 4th litter (0/1)
- Repeatability model of survival after litter weanded (0=survived, 1=departed) sow departed after 3rd litter has observations: 0, 0, 1
  - Iversen et al (2020): low h2, but good predictive power for young animals
  - no problem of censoring: sow with 2 litters and still alive: 0, 0

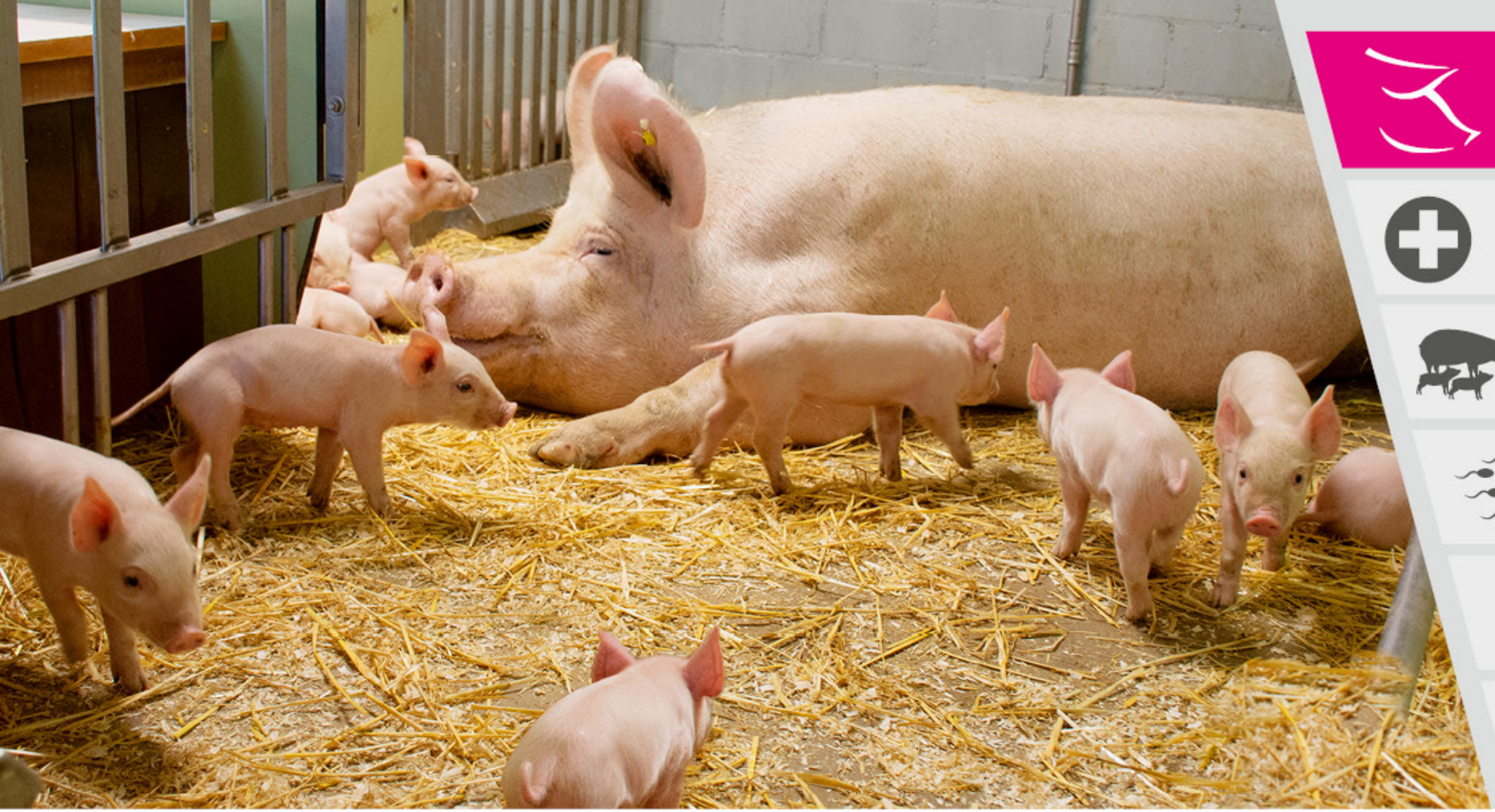
# Measuring aggressive behavior by video imaging and artificial intelligence (Alfredo)

- **Introduction**: Rising concern regarding aggressive behavior in sows, especially in Landrace breed.
- **Aim:** Improve Switzerland's high standards of pig welfare by reducing sow aggressive behavior, improving farmer safety and pig welfare.
- **Issues:** In commercial environment behavior phenotypes are very difficult and costly to measure.
- **Targeted recording site:** Sire candidates in test station in Sempach (MLP).
- **Approach:**
  - Develop a validation study associating the behavioral phenotypes of breeding farms sows and the boars from MLP (SRUC).
  - Identify behavioral phenotypes through a pattern recognition routines using video images and machine learning algorithms, enabling an automatic phenotyping procedure (Fraunhofer).
- **Expected Outcome:**
  - Have a validated phenotyping system for aggression related traits.
  - Have an automatic phenotyping system which facilitates the collection of desired traits.
  - Incorporate traits to our breeding goals to improve sows temperament, labor security and animal welfare by reducing damaging behavior

# Automated measurement of claw characteristics (Adrian Albrecht)

- Claw dimension (size of inner claw in relation to outer claw) scored by technician is the only claw trait in our current genetic evaluation.
- New claw traits by automated measurements?
- Pilot study with Strideway® system at testing station: relate pressure distribution to claw characteristics, gait, ??





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# Thanks for your attention!