SoGen: a project for breeders

Margot Sabbagh – March 2018

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Project's objectives

**SOGEN: Genomics of the jumping horse (4-5 years old)**

**Breeders' request for early estimation of the sporting potential of their young horses**

Working group: IFCE, INRA, SHF, SF, ANAA, and other sport breeds

3 actions:
1. Analyse 1,000 horses in 3D Morpho
2. Analyse 1,000 horses in accelerometry
3. Genotype 2,000 horses

**Financial, scientific and strategic partners**

Genotyping = knowing their DNA

Objectives:
- Choose breeders more effectively
- Reasoning the couplings
- Guide horses in their use

**Phenotype** = obtain objective information

2015 / 2016

Genomics project to better characterize jumping horses

2,000 Horses

Link phenotypes and genotypes ➔ Identify markers

On the pace thanks to accelerometry and **Equimétrix™**

On morphology thanks to 3D morphometry

Thanks to "DNA chips" ➔ Analysis of 700,000 points of their chromosomes: single nucleotide polymorphisms (SNPs)
Project's objectives

2 years of data collection on volunteers
Only competitions reserved for young horses
At least 50 horses / age class / competition → able to estimate competition effect

Will: not to slow down the pace of the tests (30 horses per hour)

The IFCE agents were in charge of collecting the data

3 dimensional morphology (3D Morpho)

Technique developed by N. Crevier Denoix
4 cameras to have a 3-dimensional image
Horse without saddle and without protection on the limbs or cap
2 go back to step between cameras per horse → very quick around 2 min

Need 5 people (ifce):

- Horse identification
- Remove the saddle
- Glue some stickers
- Recording of data
- Passage of the horse in the cameras
3 dimensional morphology (3D Morpho)

Long stripping: 45 minutes per horse (1 person (ifce))
400 morphological parameters (angles, length) from 28 landmarks
Each marker is positioned in 3 dimensions

Accelerometry using EQUIMETRIX ®

Technique developed by E. Barrey
5 diagonals in a square of 60 m by 20:
Working Trot, Medium Trot, Working Canter, Medium Canter and Walk
Stabilized horse for at least 10 seconds
Very quick around 2 min

Need 4 people (ifce):
• Horse identification
• Set up the accelerometer (2 people)
• Recording of data
Accelerometry using EQUIMETRIX®

Very short stripping: less than 5 minutes per horse (1 person (ifce))
9 dimensions for each pace

DNA

Genotyping of 2000 horses characterized for gaits or morphology

Collection of DNA in the DNA library from blood samples taken during filiation checks
For the missing horses, DNA collection via hair extraction at the tail during the competitions
Some new projects

- Project on Selle Français of 3 years old
  ➔ Accelerometry during show
  Analysis of free jumping: 5 dimensions

- SoGen: a database (fine characterization related to genotyping) for the emanation of new projects

and in the end, how many horses?

- 1,500 horses for accelerometry under saddle
- Of which 750 measured pace and model
  - Of which 55 measured pace + model + jump
- 1,500 horses for 3D Morpho
- 1,000 horses for accelerometry in free jumping