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WGI Lab Results

Ten Years of Genetic Selection: Data, Results and Milestones

At the close of its tenth year of activity, the WGI Lab is excited to present this report on the current state of its database and **software development**, together with the first results of the **WGI Breeding Stock** initiative: tangible proof of the efforts breeders have made while applying scientific methods to breeding practices.

This milestone has been made possible by the WGI Software, designed in collaboration with the **University of Padua**; under the scientific supervision of **Prof. Paolo Carnier** – Professor of Genetics and Selection from the Department of Comparative Biomedicine at the University of Padua – and by the work of **Alessio Camatta**, director and technical consultant.

But above all, our most heartfelt thanks go to those of you who believed in this project from day one, who have carried it forward over the years, and to those who will take up the baton tomorrow, breeding using the same method. Huge appreciation to our extraordinary **WGI Breeders** and to all the exceptional, conscientious owners who, alongside us, have raised the banner of Genetic Respect. **Long live our dogs, long live the Czechoslovakian Wolfdog!**



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The WGI Database in Numbers

Here is a summary of the main phenotypic data in our system, gratefully gathered from your contributions:

- **44876 dogs** with a complete pedigree traceable back to the founders;
- **7810** Hip Dysplasia (HD) reports;
- **3791** heights (at withers);
- **2511** Xv proportions;
- **2521** Xf proportions;
- **1836** Xh proportions;
- **1709** metacarpus circumferences;
- **1634** skull widths;
- **1149** ear lengths.

In total, the database holds over **35,000** records, including biometric measurements and codes derived from gradings and morphological evaluations.

Health Data (Number of Cases)

- **162** tumours;
- **13** idiopathic epilepsies;
- **297** cardiac echo-Doppler results (29 pathological, predominantly Sub-Aortic Stenosis);
- **79** testicular abnormalities (63 cryptorchid, 16 descended from 60 days to within 6 months);
- **3** Renal Dysplasia;
- **5** EPIs (Exocrine Pancreatic Insufficiency);
- **3** Portosystemic Shunts;
- **5** ocular disorders;
- **1270** longevity records (incl. 38 non-natural deaths).

Traits with EBV (genetic evaluation) available on the WGI Software:

- **HEIGHT/ EBV** refers to the size of the animals, based on the wither-height phenotype.
- **XV/ EBV** indicates the genetic potential to increase or decrease the ratio between elbow height and wither height. The value refers to the genetic potential of the portion of elbow height that is independent of overall height (1–2 cm).
- **XF/ EBV** indicates the genetic potential to increase or decrease the ratio between body length and wither height. The value refers to the genetic potential of the portion of body length that is independent of overall height (2–4 cm).
- **HD - HIP DYSPLASIA / EBV** indicates the genetic potential to improve or worsen the clinical condition of HD.
- **NBA (NUMBER BORN ALIVE) / EBV** indicates the genetic potential to improve or worsen the fertility of the dams, based on the number of puppies born alive per litter. In males, the value indicates the ability to produce prolific daughters.

Descriptive trait statistics

Trait	n	Mean	SD	Min	Max
Hip dysplasia FCI score ²	7,721	1.485	0.884	1	5
Height, cm	3,828	65.4	3.4	57	75
ADHGOM, cm	2,515	35.7	1.7	28.5	41.1
ADLUNG, cm	2,506	71.6	3.3	62.4	85.6
Number of puppies born alive	8,225	5.4	2.4	1	14

n: individual records; SD: standard deviation.

² A = 1, B = 2, C = 3, D = 4, E = 5.



Heritability ($\pm$ standard error) and additive genetic standard deviation

Trait	Additive genetic SD	$h^2 \pm \text{s.e.}$
Hip dysplasia FCI score ²	0.7	55.3 ± 2.7
Height, cm	1.989	68.0 ± 3.0
ADHGOM, cm (height index)	0.532	23.8 ± 4.0
ADLUNG, cm (shape index)	1.246	33.6 ± 4.2
Number of puppies born alive ³	0.849	12.1 ± 1.9

h^2 : heritability (%); s.e. (%): standard error of the estimate.

² A = 1, B = 2, C = 3, D = 4, E = 5.

³ additional components of phenotypic variance: service sire 3.3%, bitch kennel 0.9%, environmental permanent effect of bitch 12.1% (repeatability 24.7%).

Traits with EBV under development (available from March 2026)

- **XB (BONE STRUCTURE INDEX) / EBV** indicates the genetic potential to increase or decrease the ratio between metacarpus circumference and wither height.
- **XHS (SKULL-STRUCTURE INDEX) / EBV** indicates the genetic potential to increase or decrease the ratio between skull width (measured at the cheekbones) and wither height.
- **XE (EAR INDEX) / EBV** indicates the genetic potential to increase or decrease the ratio between ear length and wither height.

Traits in the data-collection phase

- **XT (TAIL INDEX) / EBV** indicates the genetic potential to increase or decrease the ratio between tail length and wither height.
- **LONGEVITY / EBV** indicates the genetic potential to improve the animals' life expectancy.

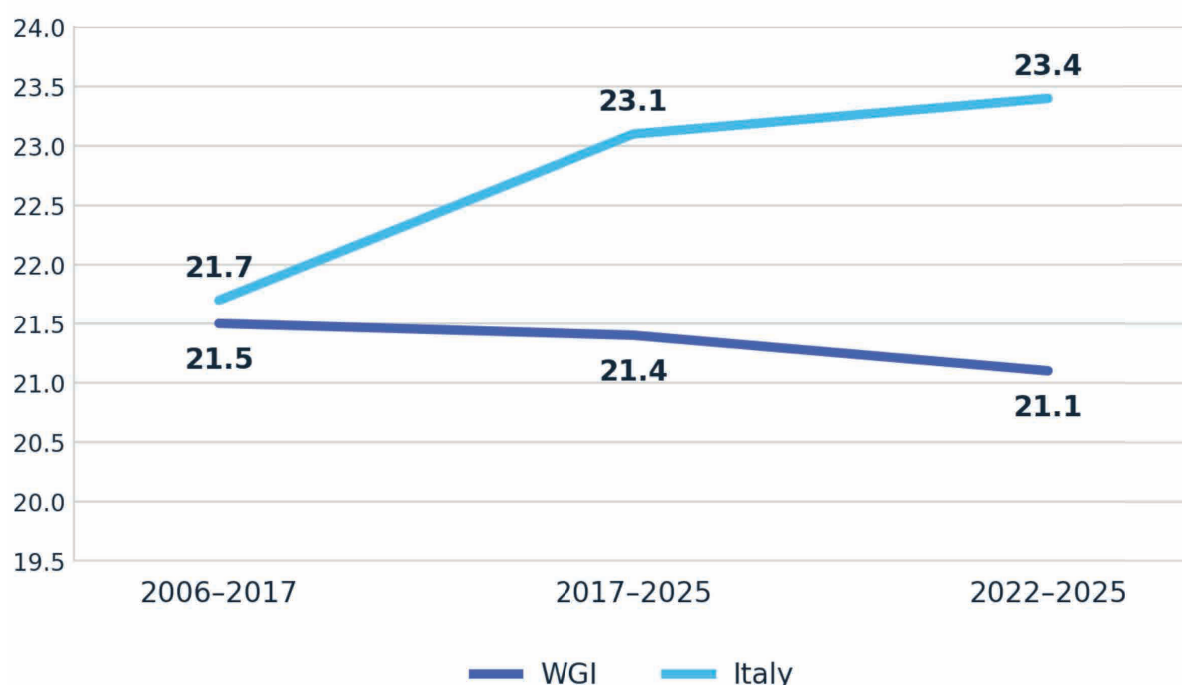
NB: for any trait that follows the genetic model ($P = G + E$), an EBV can be developed.

Preliminary Results of the Work Completed by the WGI Lab

The WGI Lab currently brings together **ten Italian breeders** who, with the dogs they have bred and own, make up the WGI Breeding Stock: with **920 dogs** born from matings planned jointly by the group, with the support of the WGI Software.

COI Management:

Average inbreeding — WGI Breeding Stock vs Italian population



Alessio Camatta | Technical Direction © WGI Software

The starting point was a group of **dogs born between 2006 and 2017**, with an average inbreeding coefficient of **21.5%**, compared with **21.7%** in the Italian population of the same period.

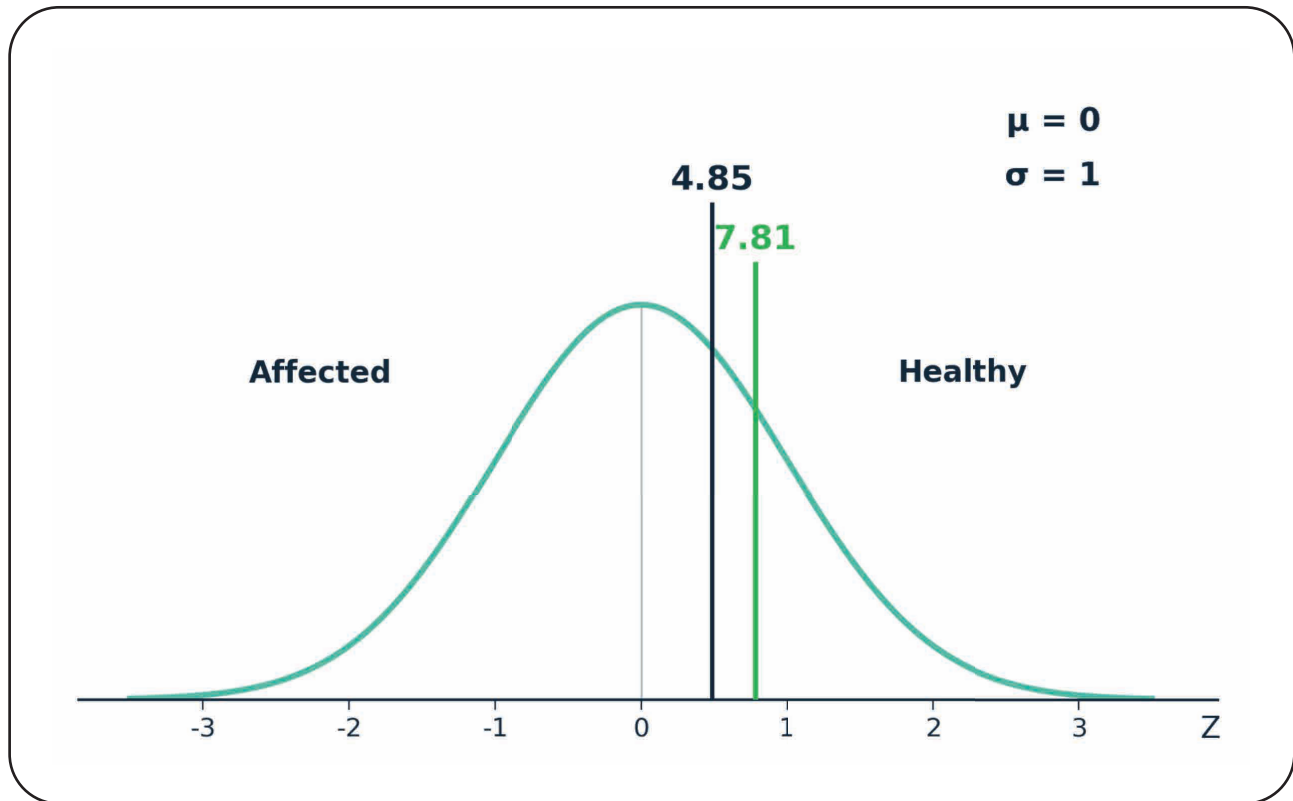
Since 2017 we have managed inbreeding operationally: the dogs born since then (2017–2025) hold at an average of **21.4%**, a sign that the increase has been curtailed. Over the same period, the average inbreeding of the Italian population rose to **23.1%**.

The most telling figure comes from the most recent period (2022–2025): the **WGI Breeding Stock** falls to **21.1%**, even below its starting level, while the Italian population rises to **23.4%**.

In the light of the scientific literature, the **2.3% improvement** we have achieved is a significant result. In the coming years, the analysis of health and longevity data will allow us to translate this figure into a concrete benefit for the dogs' health.



Genetic Improvement of HD



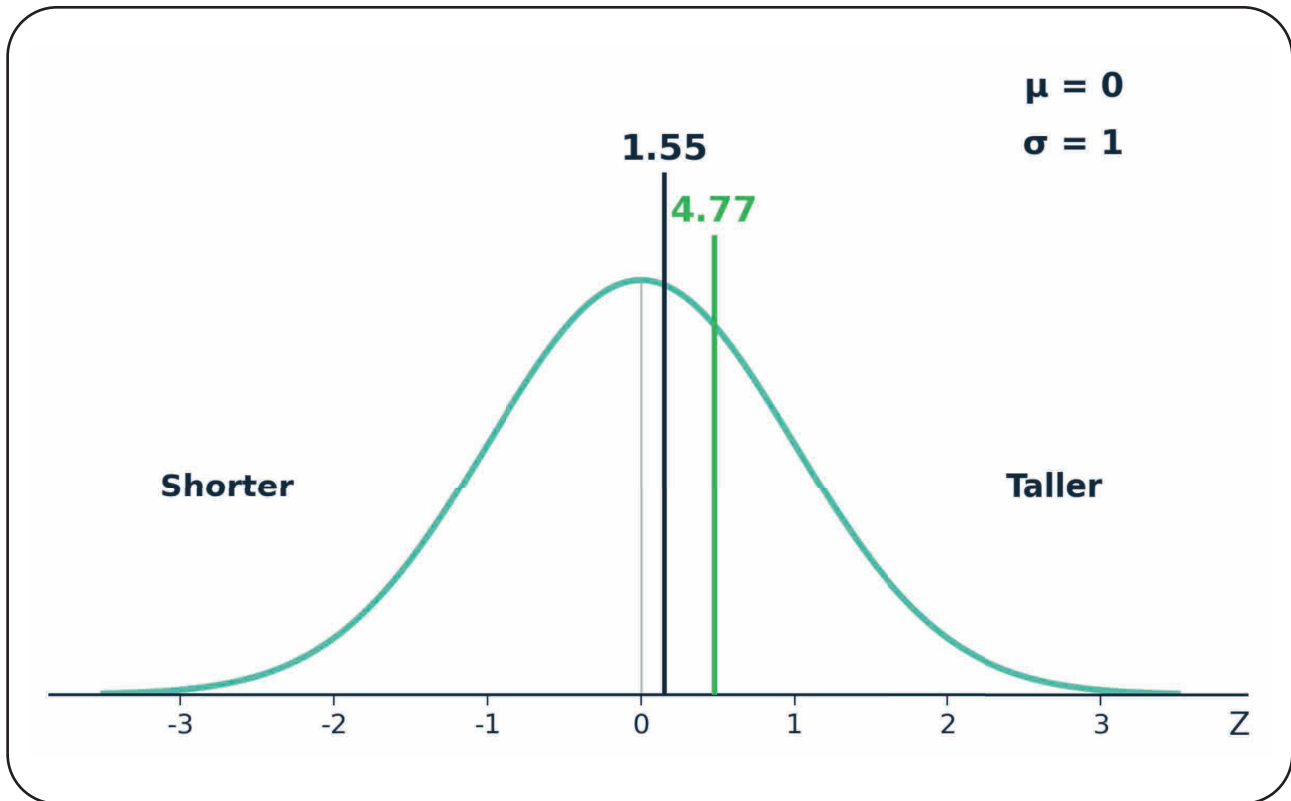
The population's genetic indices for HD are shown below, using the Gaussian curve, where the mean corresponds to zero.

The starting population of the WGI Breeding Stock had an average genetic value of **+4.85**. The population born from 2017 onwards, selected using the specific EBVs (genotype estimates), has an average of **+7.81**.

The goal for the next 10 years is to reach a value of **+10** (equal to +1 Standard Deviation), which at the phenotypic level corresponds to 93% of healthy animals (HD A and HD B). The current share of healthy animals is 88%.



Genetic Improvement of Height



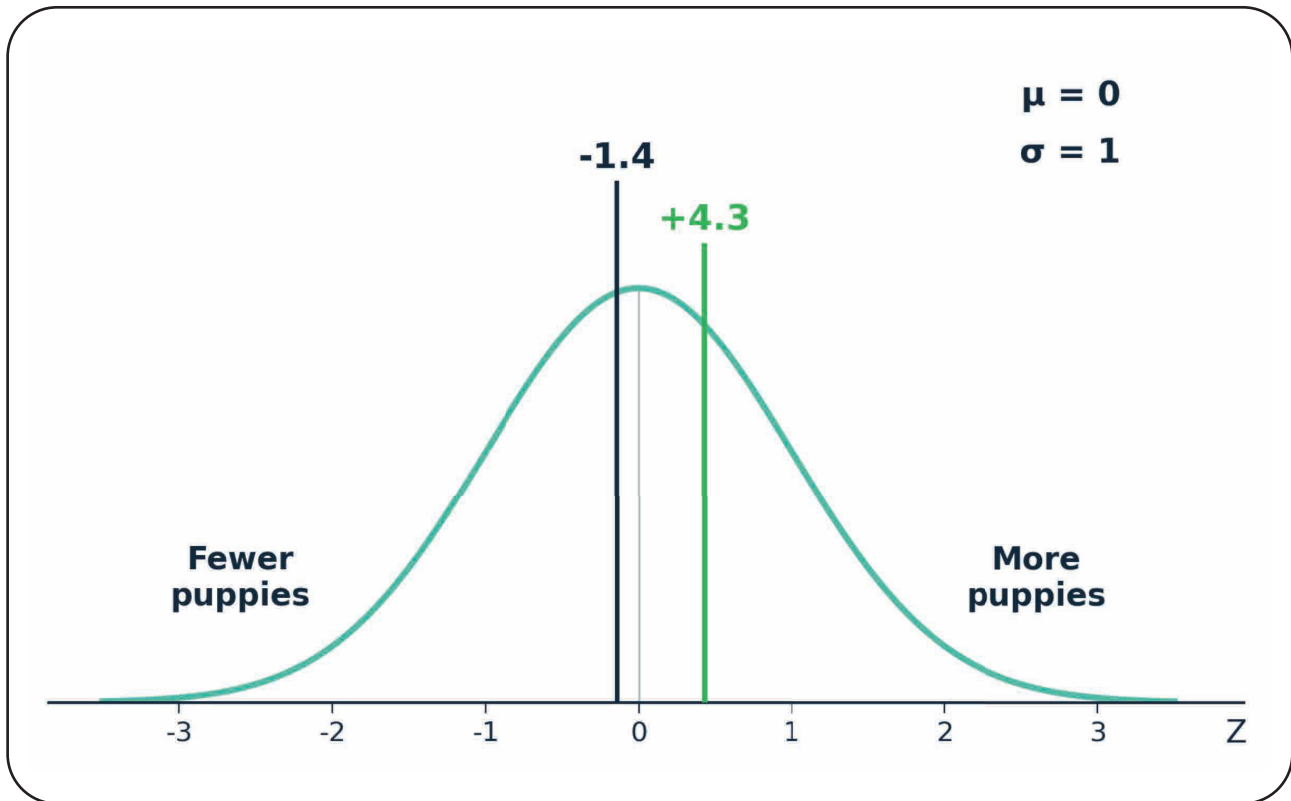
The population's genetic indices for HEIGHT are shown on the Gaussian curve, where the mean corresponds to zero (68 cm for males and 63 cm for females).

The starting population of the WGI Breeding Stock had an average genetic value of **+1.55**. The population born from 2017 onwards, selected using the specific EBVs (genotype estimates), has an average of **+4.77**.

The goal for the next 10 years is to reach a value of **+7** points, bearing in mind that we are not aiming for an excessive increase in size. Several scientific findings have in fact shown that a larger size is associated with a tendency toward more health problems and a decline in longevity prospects.



Genetic Improvement of Litter Size (puppies born alive per litter)



The population's genetic indices for LITTER SIZE are shown on the Gaussian curve, where the mean corresponds to zero (5.2 puppies per litter).

The starting population of the WGI Breeding Stock had a negative average genetic value of **-1.4**. The population born from 2017 onwards, selected using the specific EBVs (genotype estimates), has an average of **+4.3**.

The goal for the next 10 years is to reach a value of **+7**, bearing in mind that litter size is governed by a polygenic complex that serves as a health indicator, and that more puppies per litter means more genetic combinations and, therefore, an advantage in managing Genetic Variability.

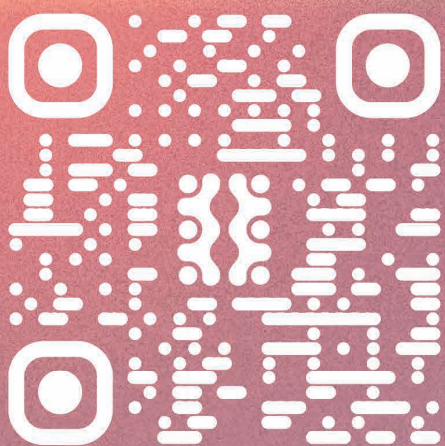
Genetic Improvement of Shape Proportions (Xv and Xf)

Work on these two traits only began operationally three years ago, once we had reached acceptable numbers – and therefore acceptable accuracy coefficients. It is therefore not yet possible to draw meaningful conclusions.



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