Organisme de Sélection
Prim'Holstein

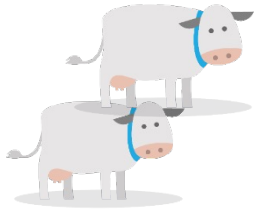
Single Step Implementation in French Genetic Evaluation

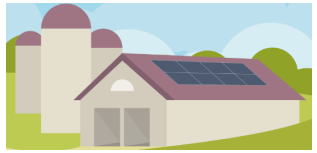
2023 European Holstein & Red Holstein Conference

Why Single Step ?

- From 2008, Genetic Evaluations are run by two kind of index model :

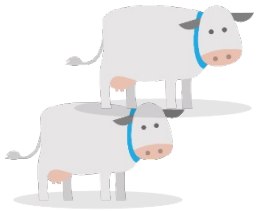
  – **Polygenic Evaluation**



Genetic Evaluation =  **Performances** +  **Environnement** + ε **Residual**

Why Single Step ?

- From 2008, Genetic Evaluation are run by two kind of index model :
  - **Polygenic Evaluation**
  - **Genomic Evaluation**

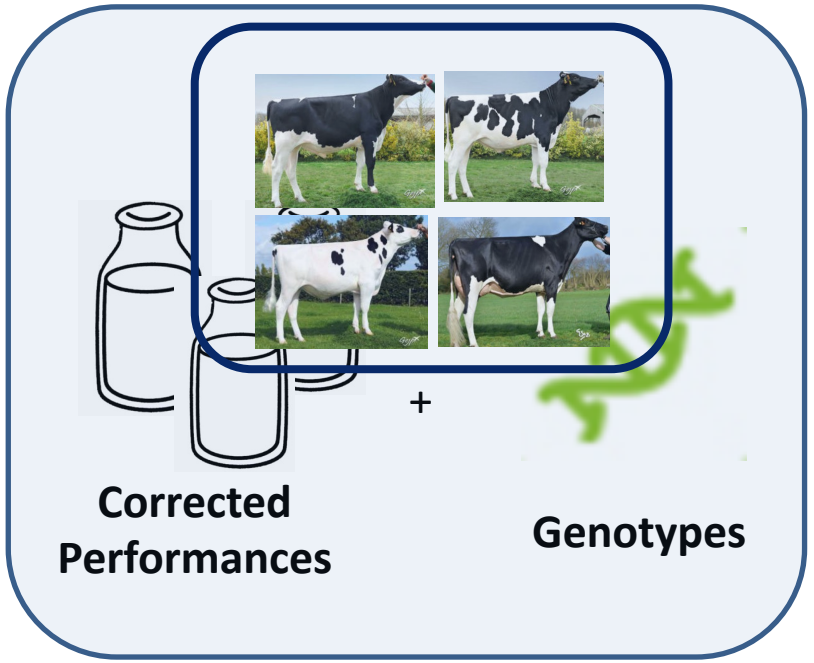


Genetic Evaluation

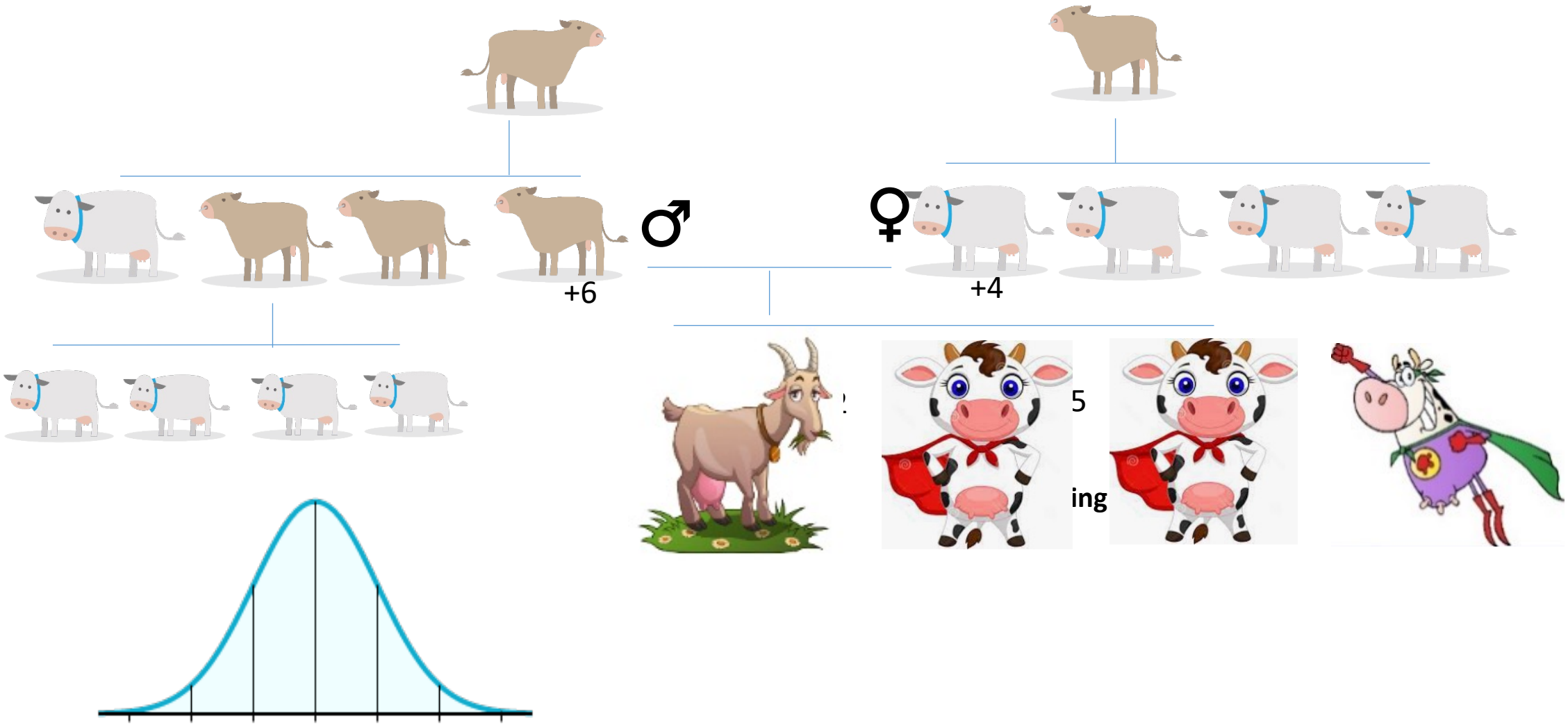
=

Genotype

Predictive Equations



Why Single Step ?



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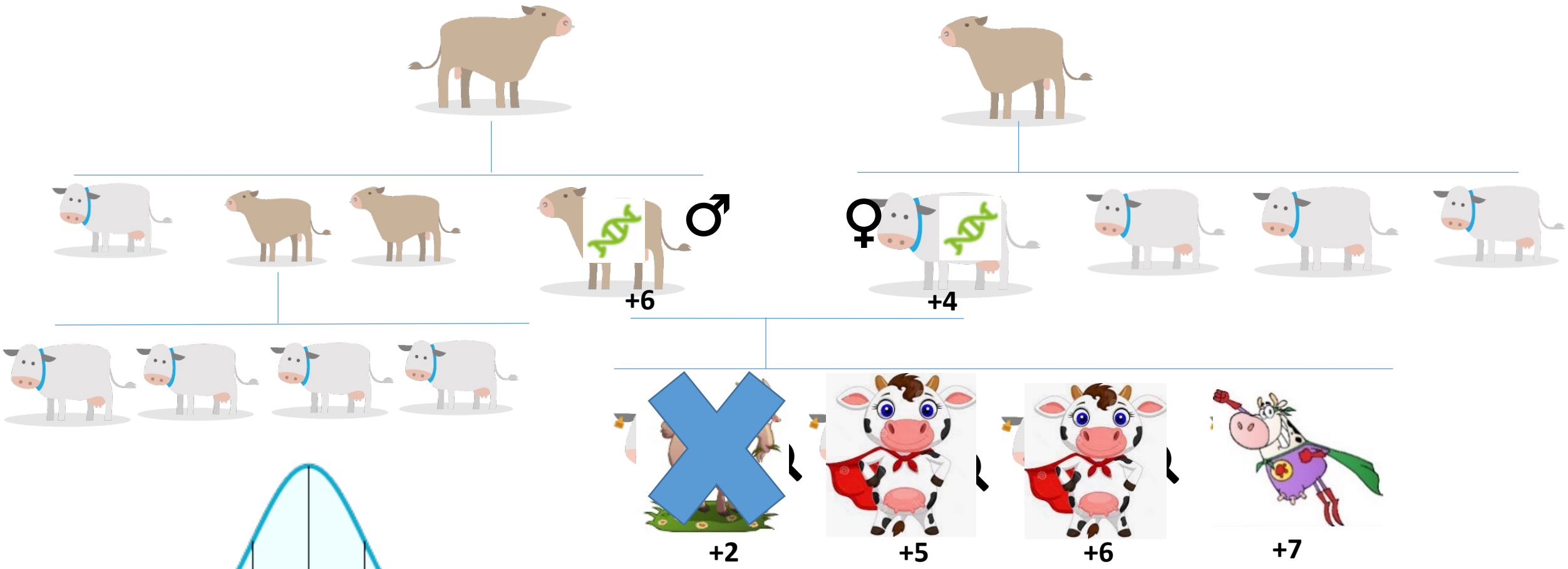
Why Single Step ?



Average Offspring level move from +5 to +6

With extra effect the base reference constitution

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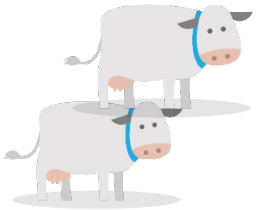
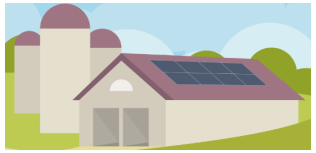
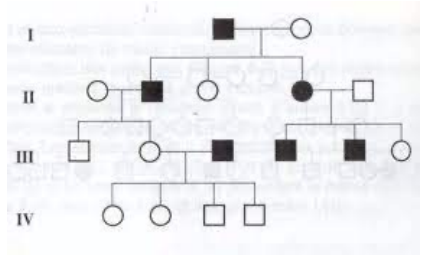
What is Single Step ?

- From April 2022, the Single Step Genetic Evaluation is implemented in Dairy Breeds



Genetic Evaluation =  **Performances** +  **Environnement** +  **Genotypes** + 

Pedigree

Main challenges

Calculation Model

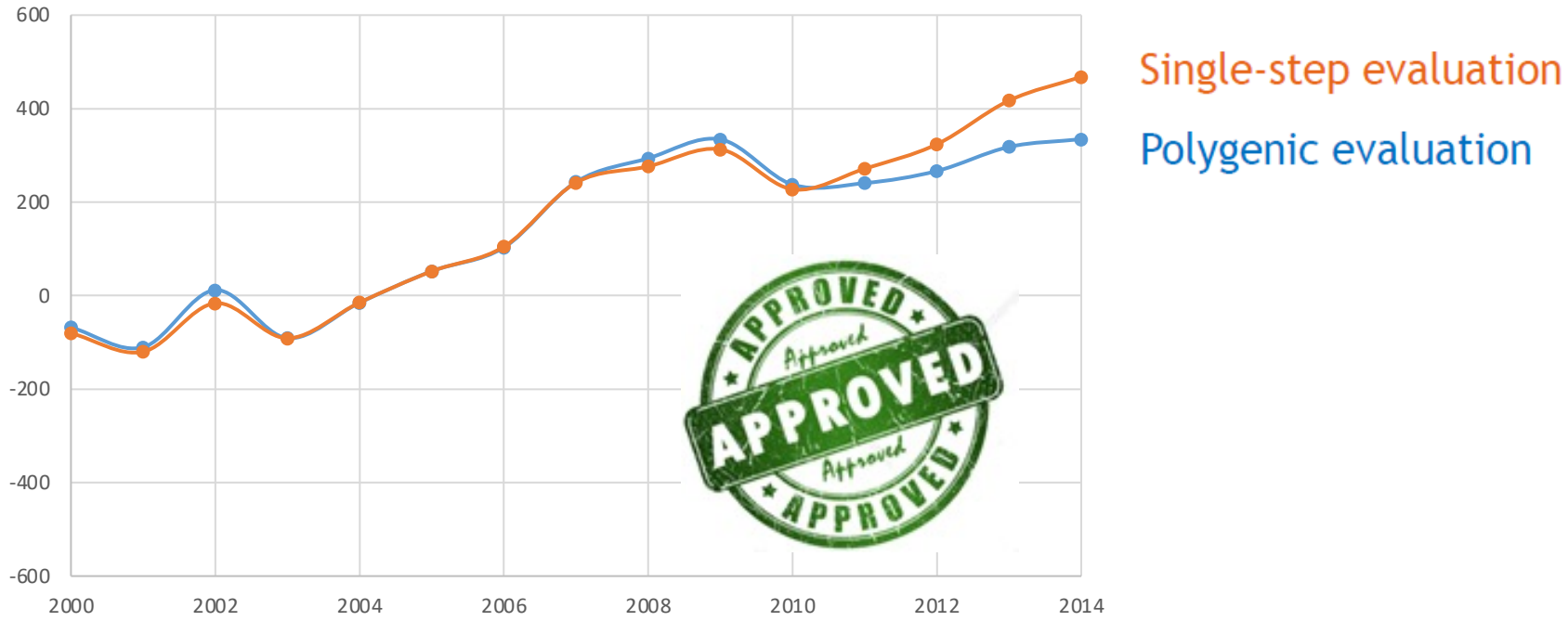
IT

What is Single Step ?

Project Consortium

What is the effect on Genetic Progress ?

- Holstein Genetic Gain in Milk Production



Birth year of bulls with offspring in production

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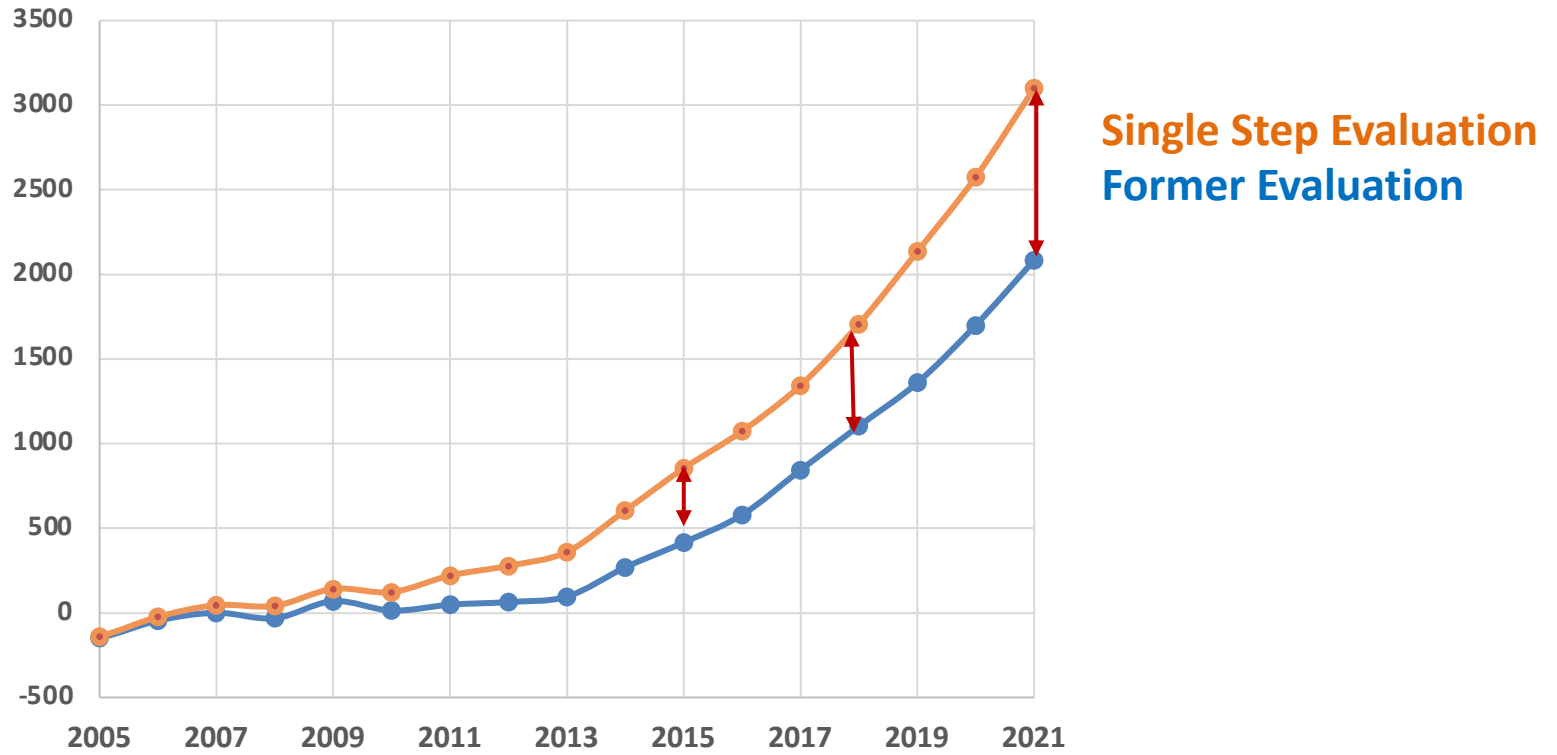
What is the effect on Genetic Progress ?

- Holstein Genetic Gain in Milk Production
  - With predictive equation adaptated to young stock evalution



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What is the effect on individual proof ?

- In General, great correlation between former and actual genetic evaluation > 0.90

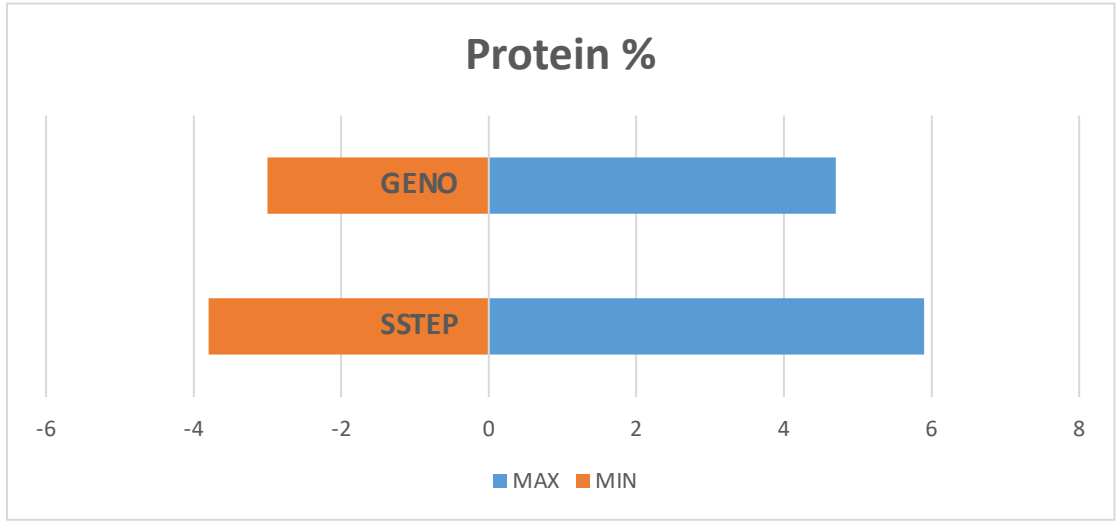
- Due to new Genetic Gain interval, younger generation are now in general higher ranked than older ones
- Greater variability in the individual traits

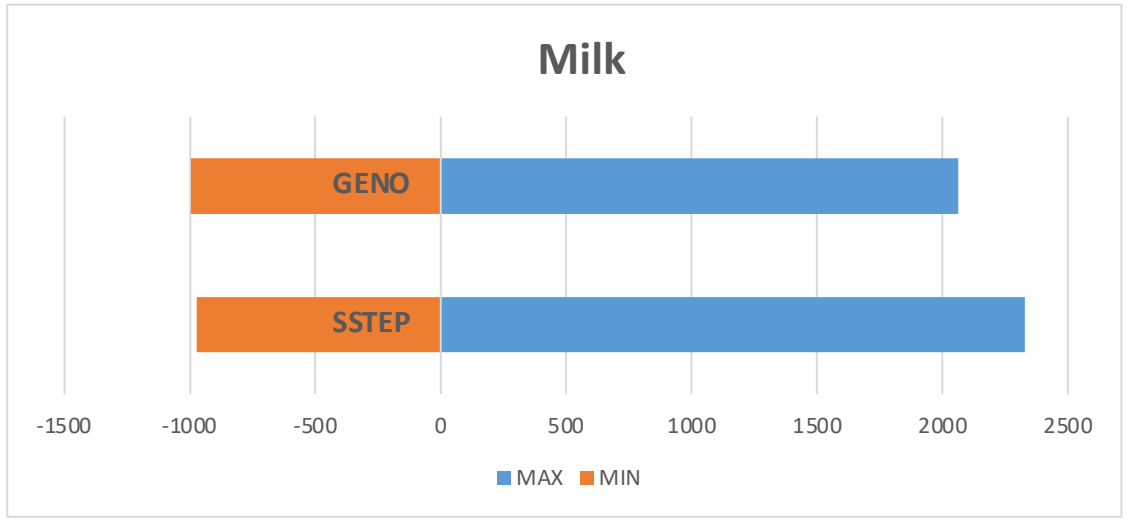
What is the added value for breeders ?

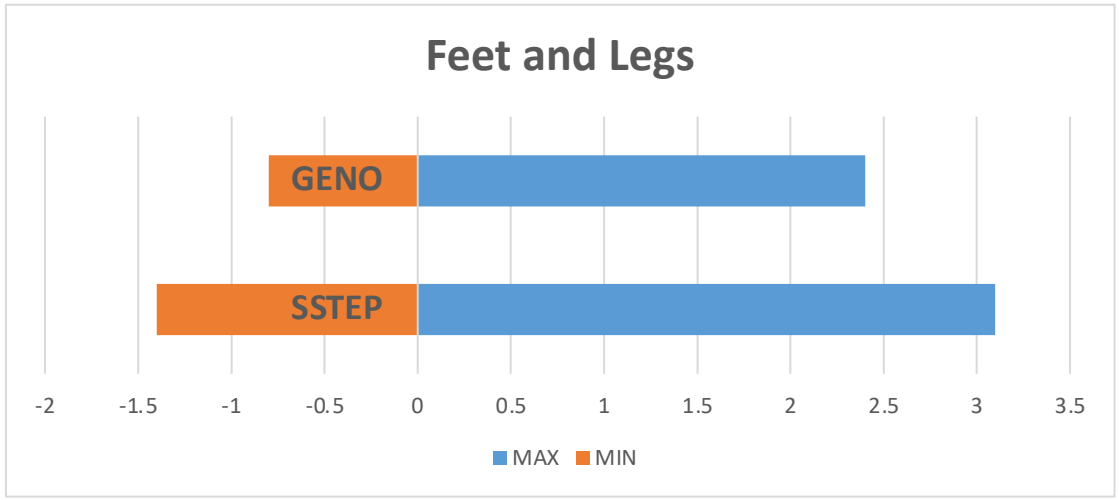
- More accurate Genetic Evaluation
- Proofs more stable when moving from full genomic to daughter proven
- Opportunity for breeder to get benefit of available genetic progress
- More variation in the individual profile gives more opportunity do relevant mating

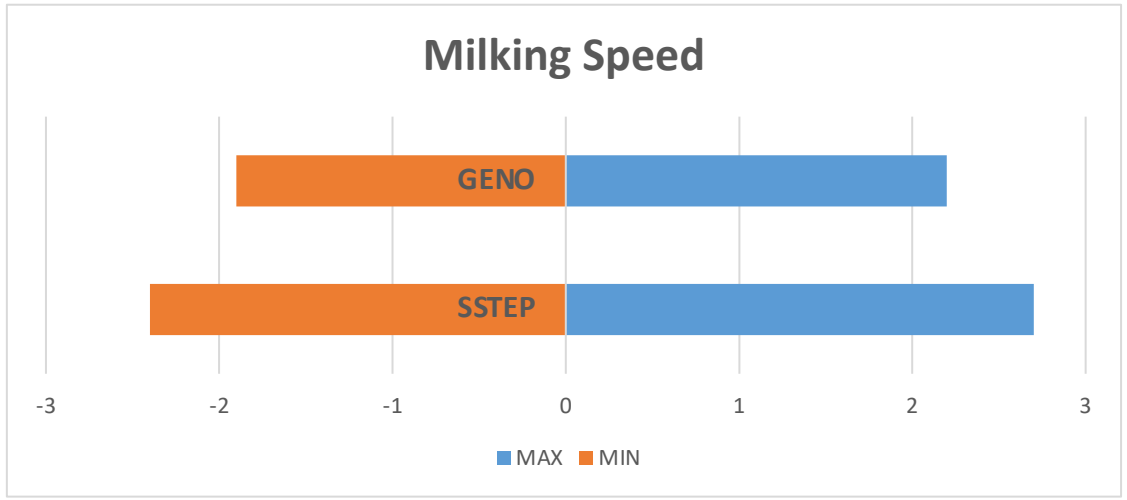
What is the added value for breeders ?

- More variability in the proofs









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What is the added value for breeders ?

Before

Total type Index	Rel. 76 / dtrs / herds / aAa 243165
Total type Index	2.3
Udder Index	2.1
Udder cleft	0.1
Udder depth	1.6
Udder balance	0.4
Fore udder attachment	1.4
Rear udder attachment	1.4
Front teat placement	1.2
Rear teat placement	0.2
Teat length	0.3
Body capacity Index	0.1
Stature	1.5
Chest width	0.1
Body depth	0.4
Thurl width	-0.4
Body condition score	0.0
Dairy form	0.6
Rump angle	1.0
Feet and legs Index	1.2
Rear legs side view	-0.4
Foot angle	0.2
Rear legs rear view	1.5
Locomotion	1.1

After

Total type Index	Rel. 73 / dtrs / herds
Total type Index	2.4
Udder Index	1.5
Udder cleft	-0.7
Udder depth	1.6
Udder balance	0.4
Fore udder attachment	0.8
Rear udder attachment	0.8
Front teat placement	0.4
Rear teat placement	-0.4
Teat length	0.1
Body capacity Index	-0.7
Stature	-0.6
Chest width	0.5
Body depth	-1.7
Thurl width	0.0
Body condition score	1.4
Dairy form	-0.7
Rump angle	-0.6
Feet and legs Index	1.3
Rear legs side view	-1.6
Foot angle	0.7
Rear legs rear view	1.3
Locomotion	1.4

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What is the prospective with Single Step model ?

- Still working progress : foreign information from Interbull evaluation

- One step ahead to get accurate evaluation for new criteria with low heritability :
  - One step means :
    - Not genotyped animals benefit from genomic information
    - And phenotypes from not genotyped animal keep contributing

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Thank You
For Your Attention