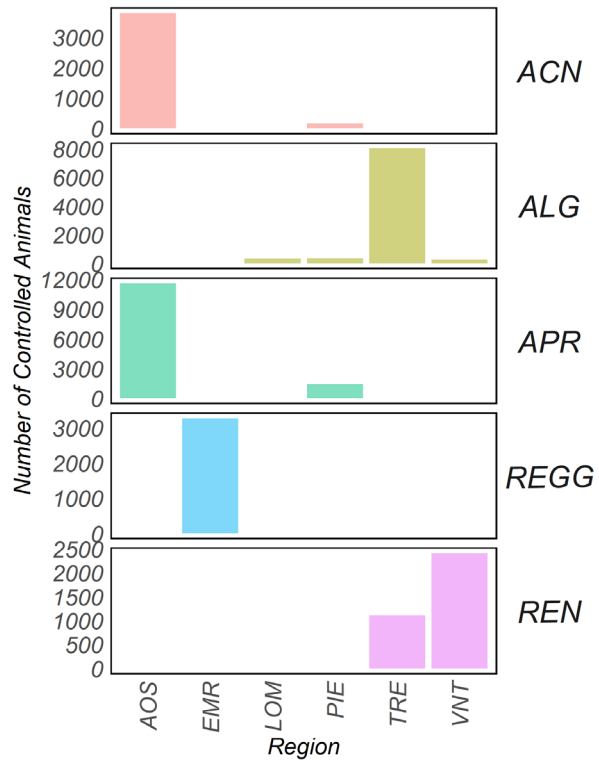


Monday 2 September 2024

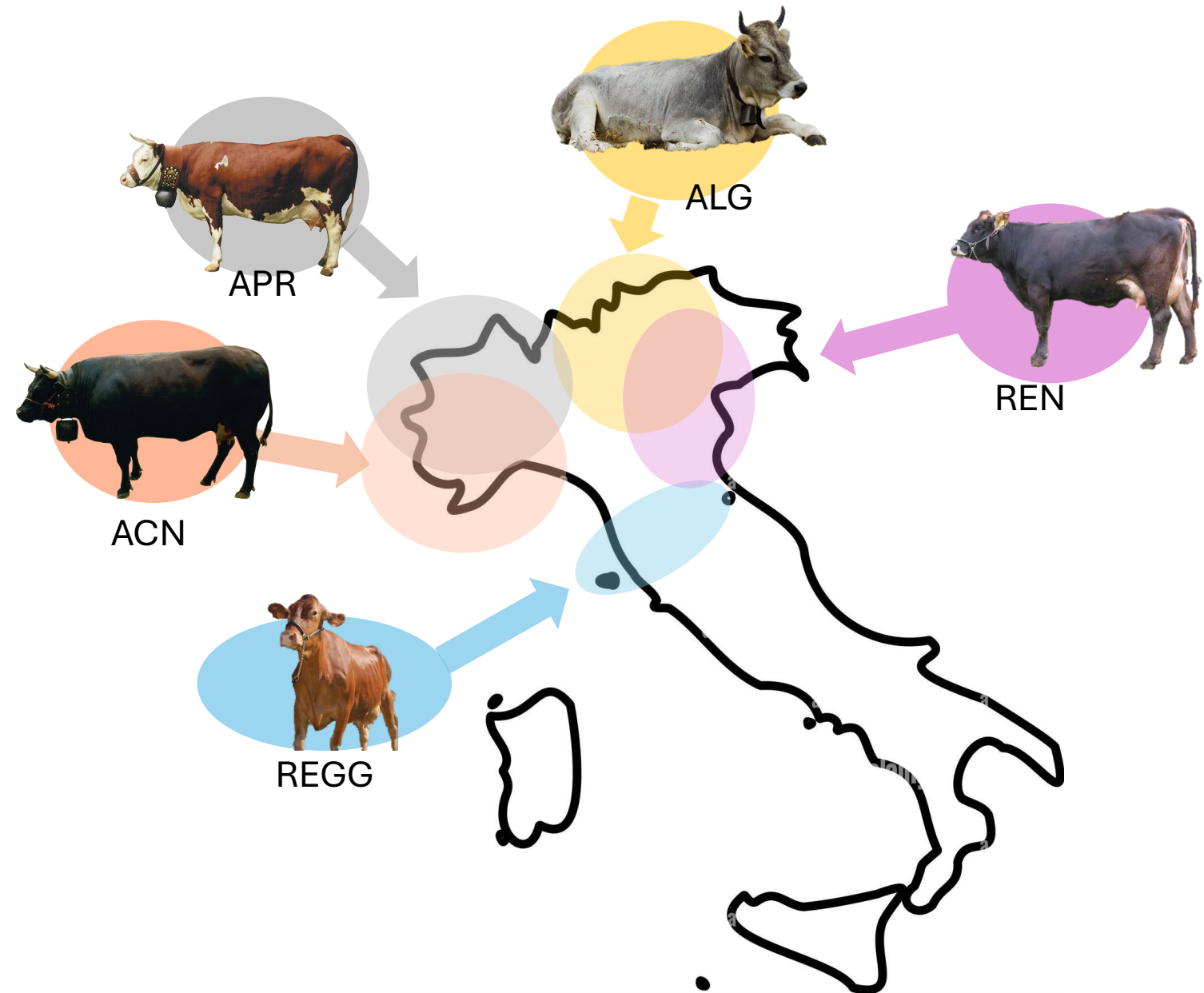
Session 31. Breeding schemes for development of small populations

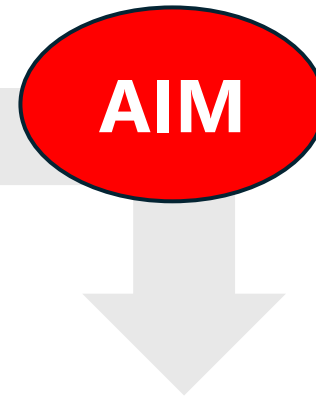
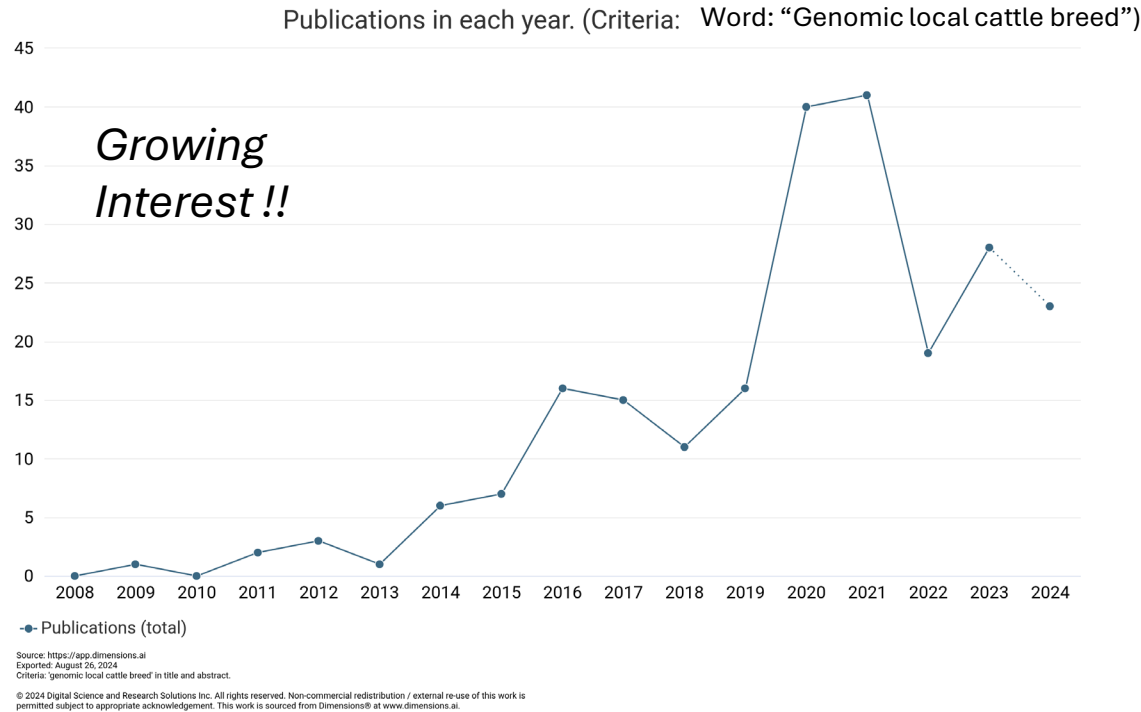
Exploring genomic selection opportunities in Italian local cattle breed



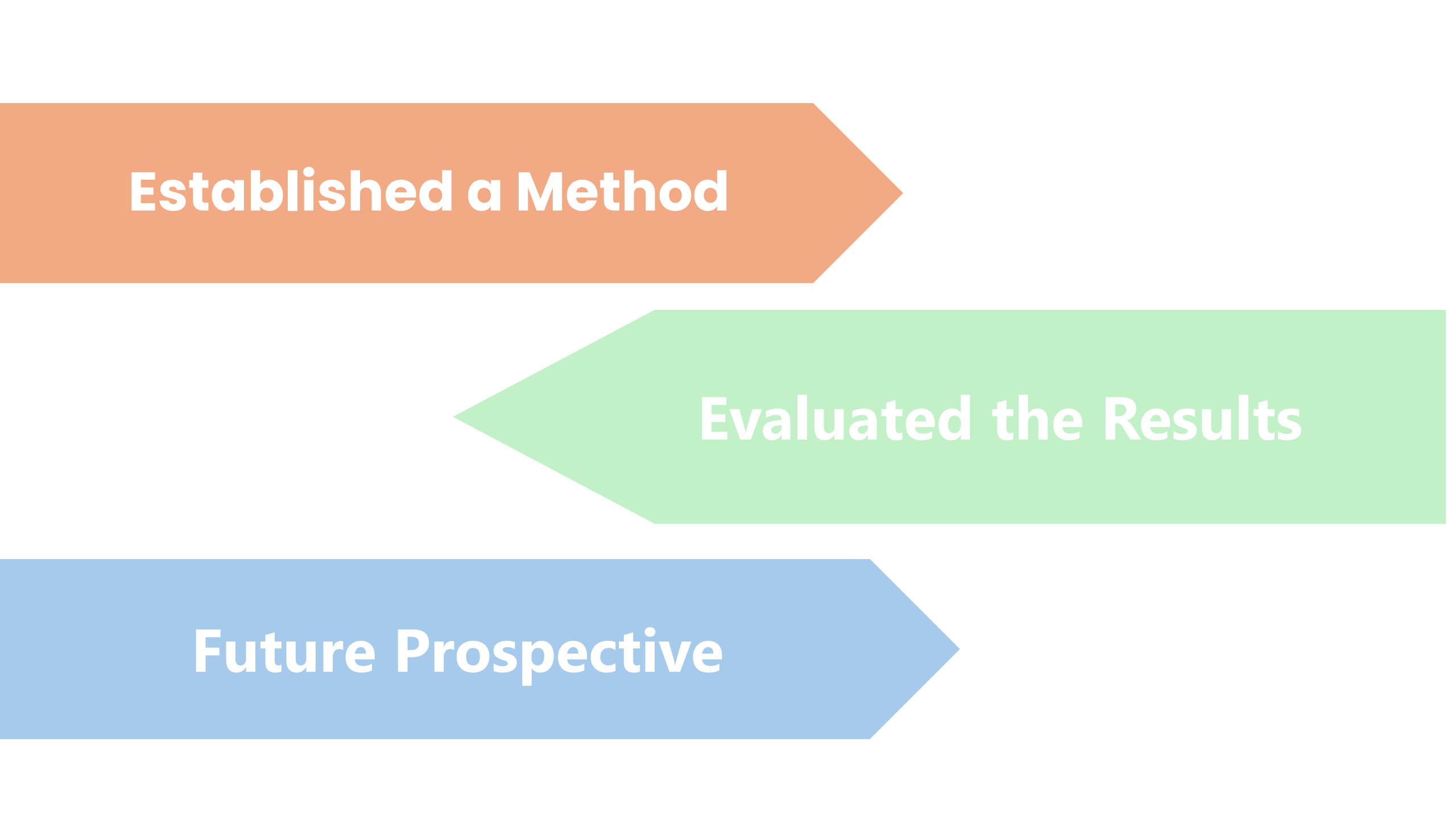


Data Obtained form
<http://bollettino.aia.it>





Integrate genotypes derived from previous population genomic studies into practical selection plans on local cattle breed

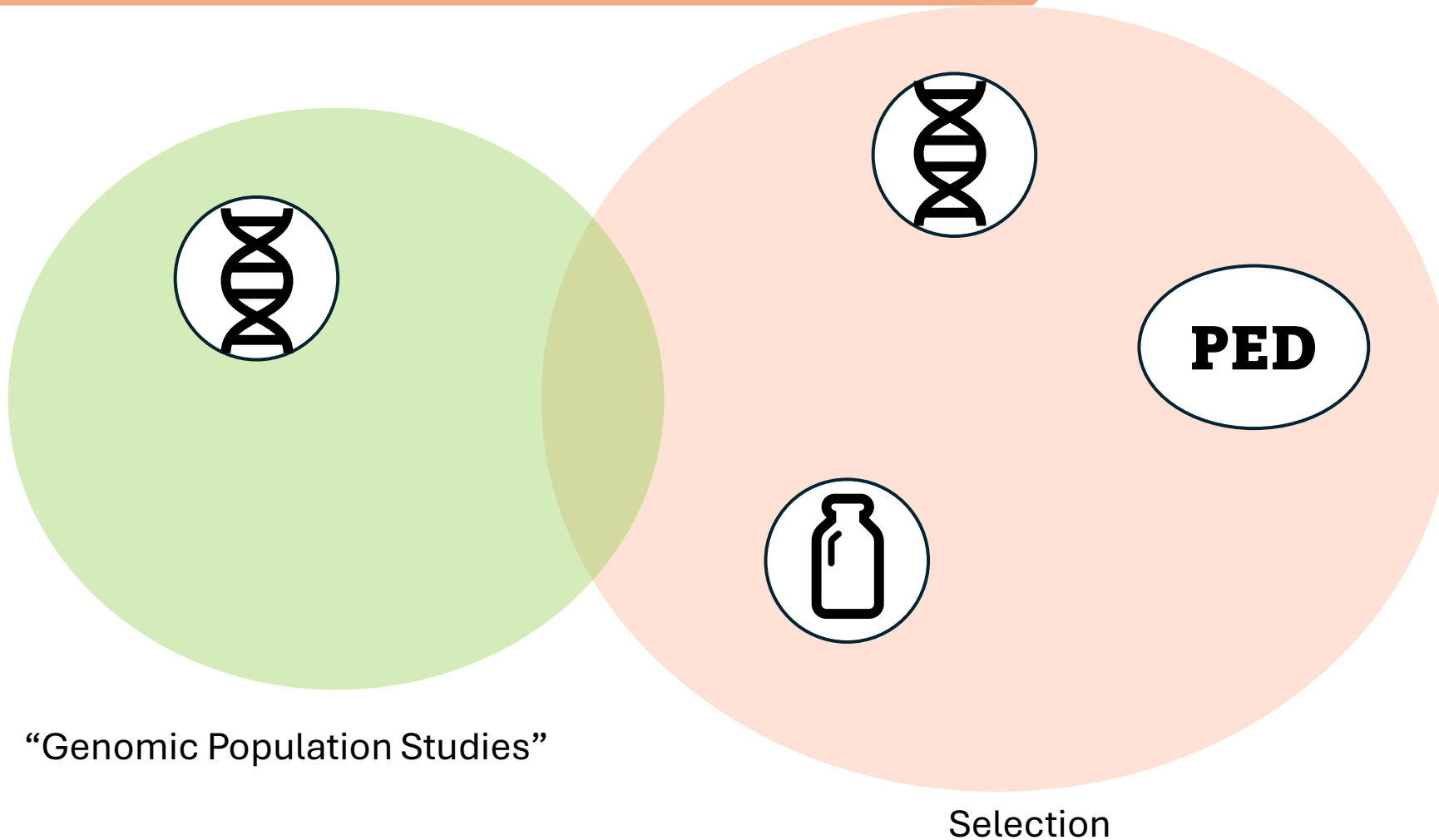


Established a Method

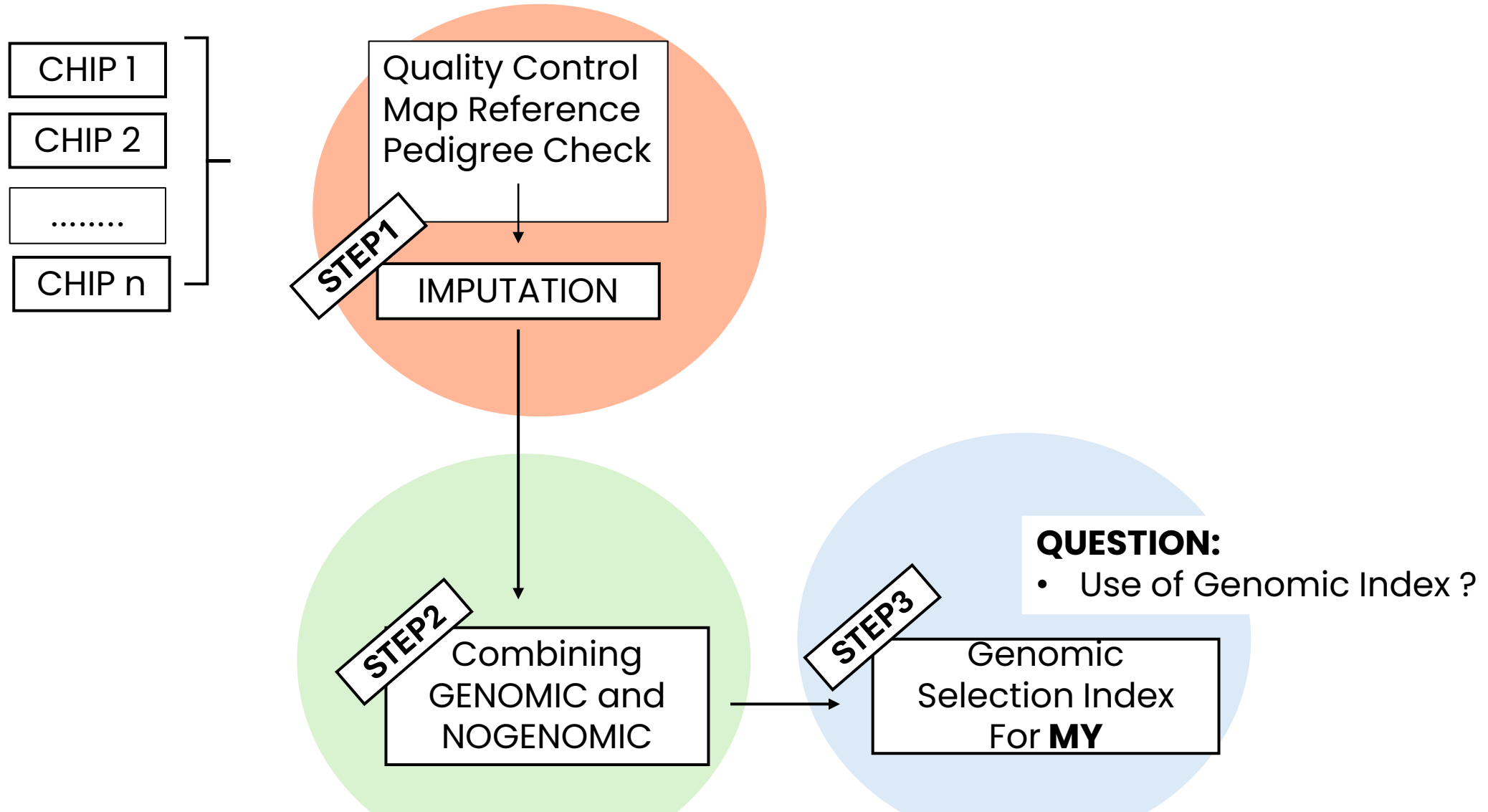
Evaluated the Results

Future Prospective

Established a Method



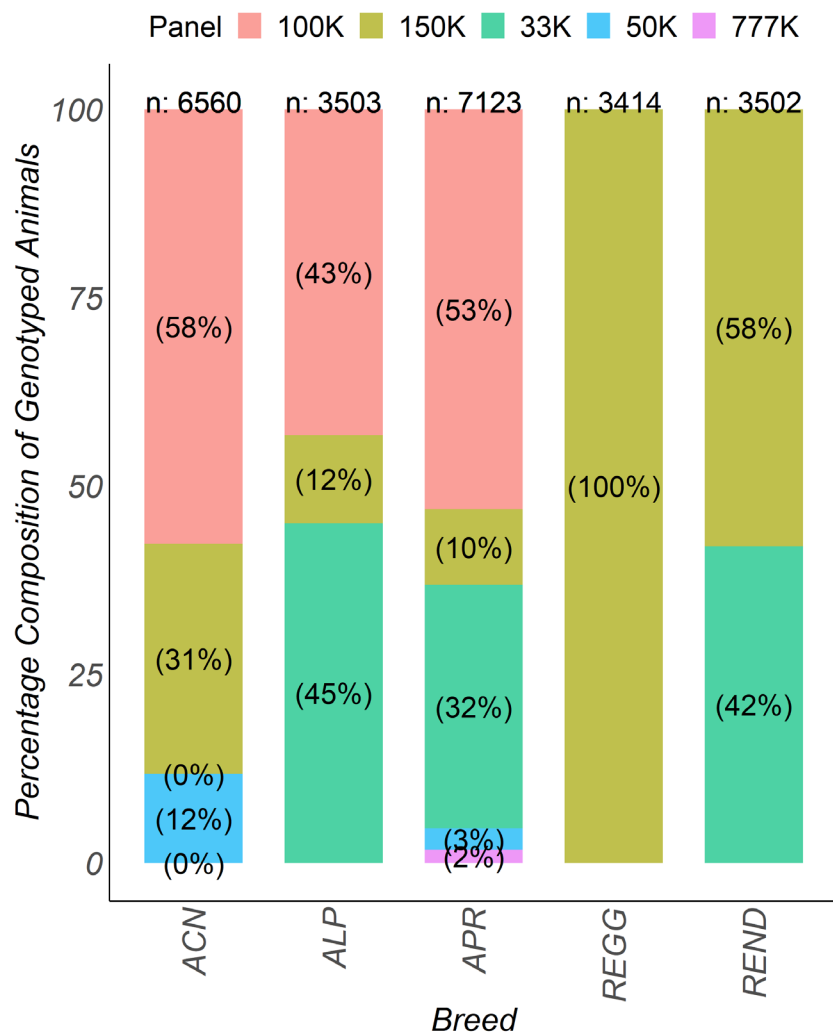
Established a Method



Established a Method

STEP 1

- A. How we decided:
1. Prediction Cross validation with different Panel
 2. Imputation error < 0.95
- B. Fimpute3 > AlphaImpute2 >> Beagle4.0



QC

120K



QC

90K



QC

90K



QC

110K



*QC

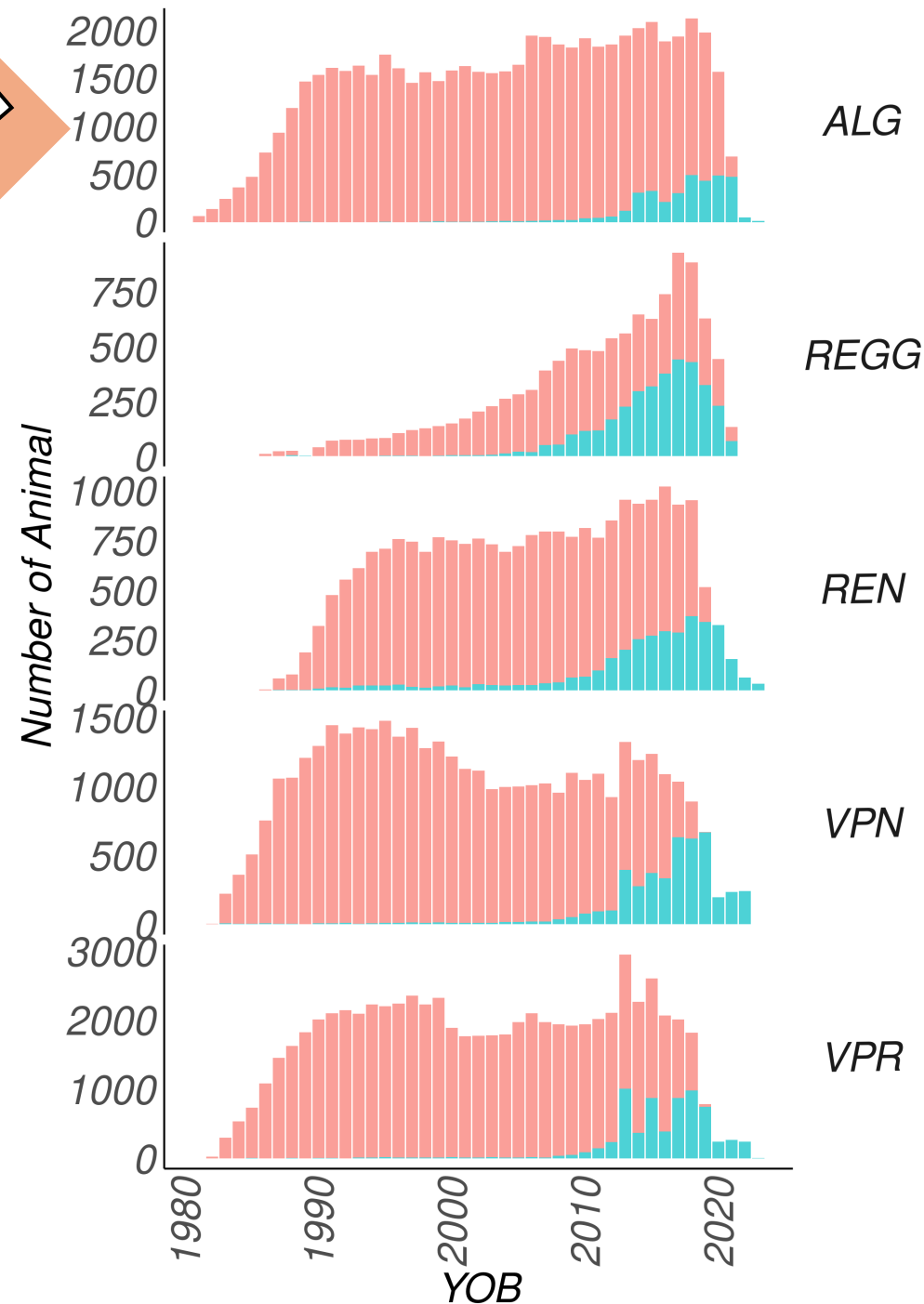
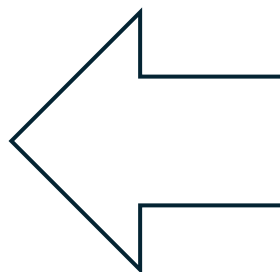
140K

*No IMPUTATION

Established a Method

STEP2

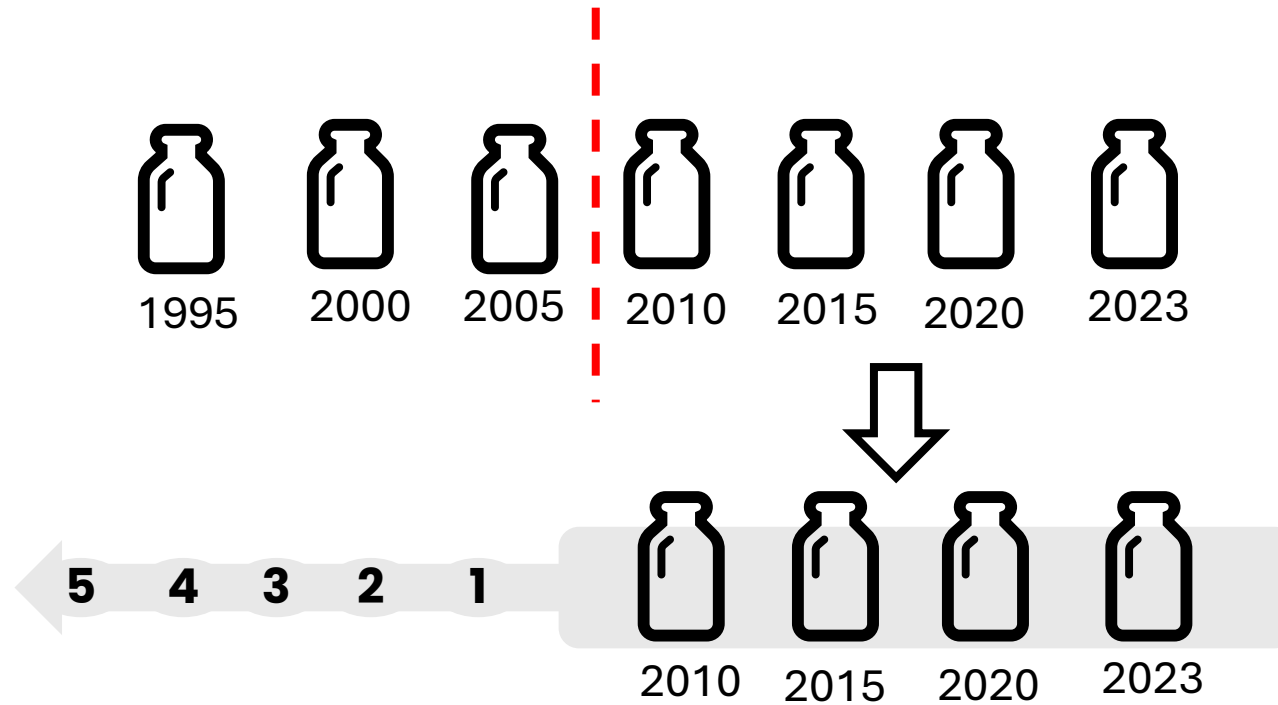
G and NOTG



Established a Method

STEP2

All Productive Data ?



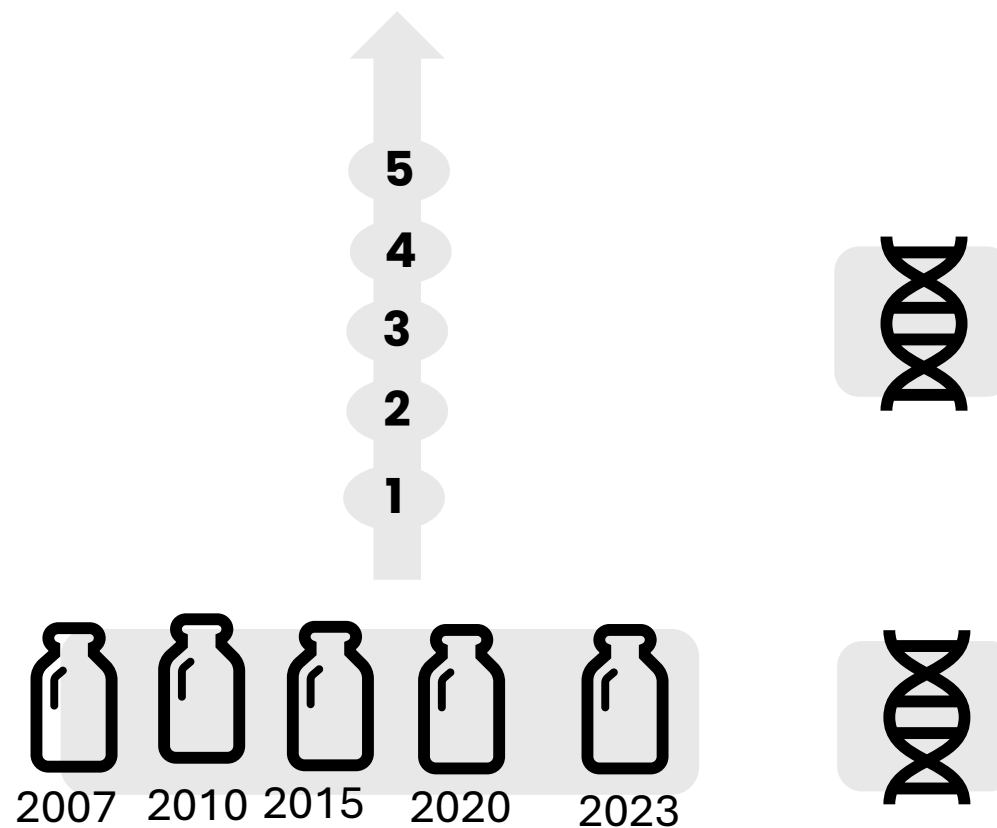
Almost not difference:

- VCE ?
except VPR=> NOT a problem
- EBV RANK
(rank=1)
- EBV ACCURACY
difference

Established a Method

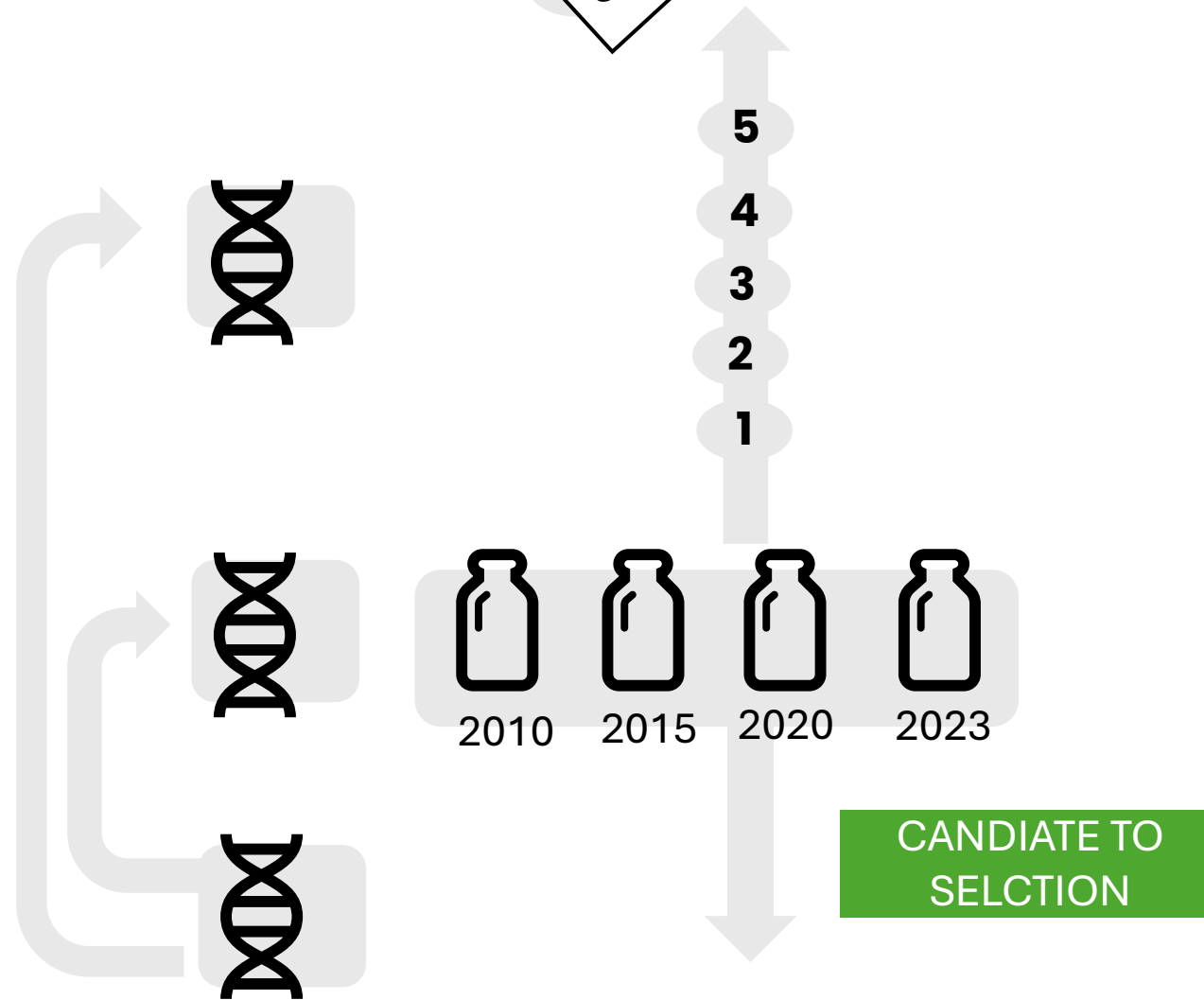
STEP2

- All Genomic Data ?



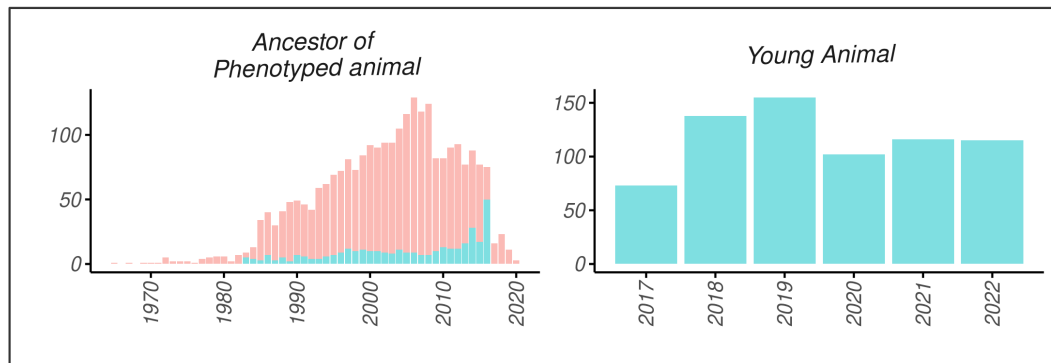
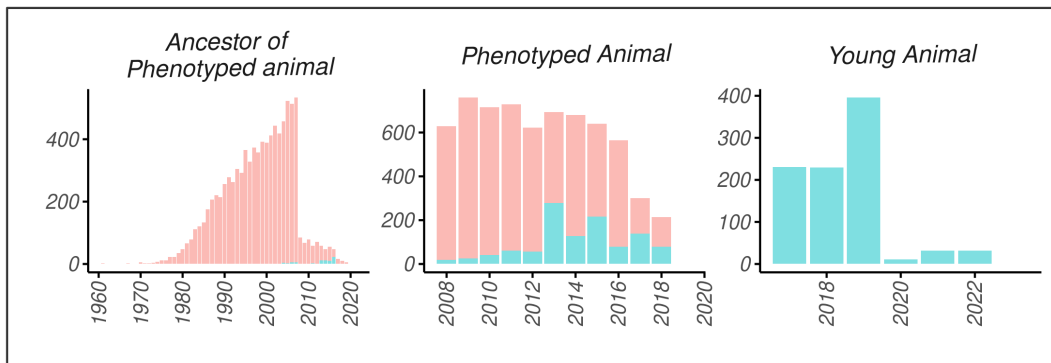
Established a Method

STEP2





ACN

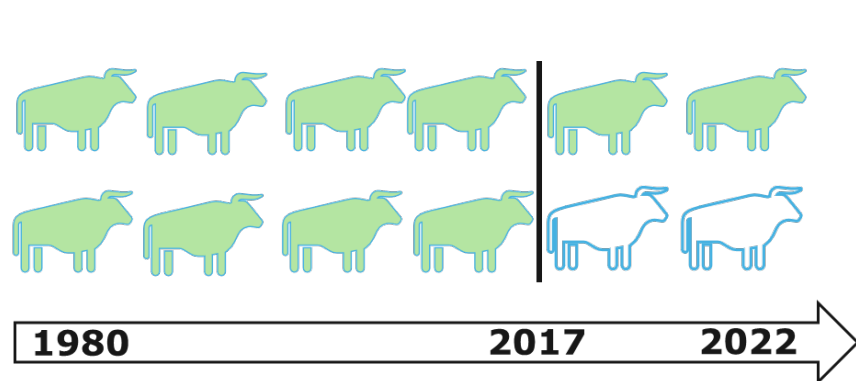


Established a Method

STEP3

Traits: Milk yields (Test-day)

L.R. Method:

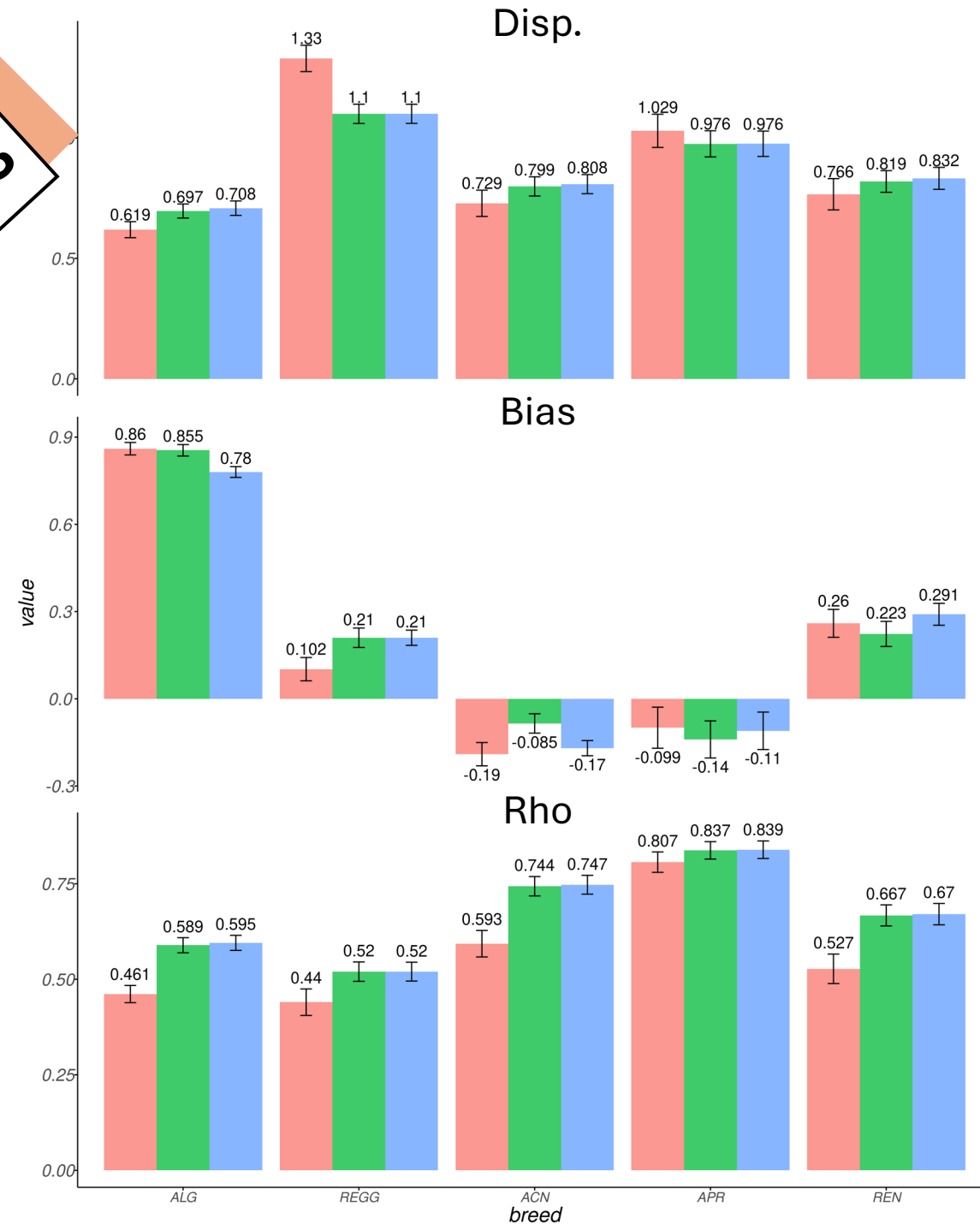


Only for
Animal
with G

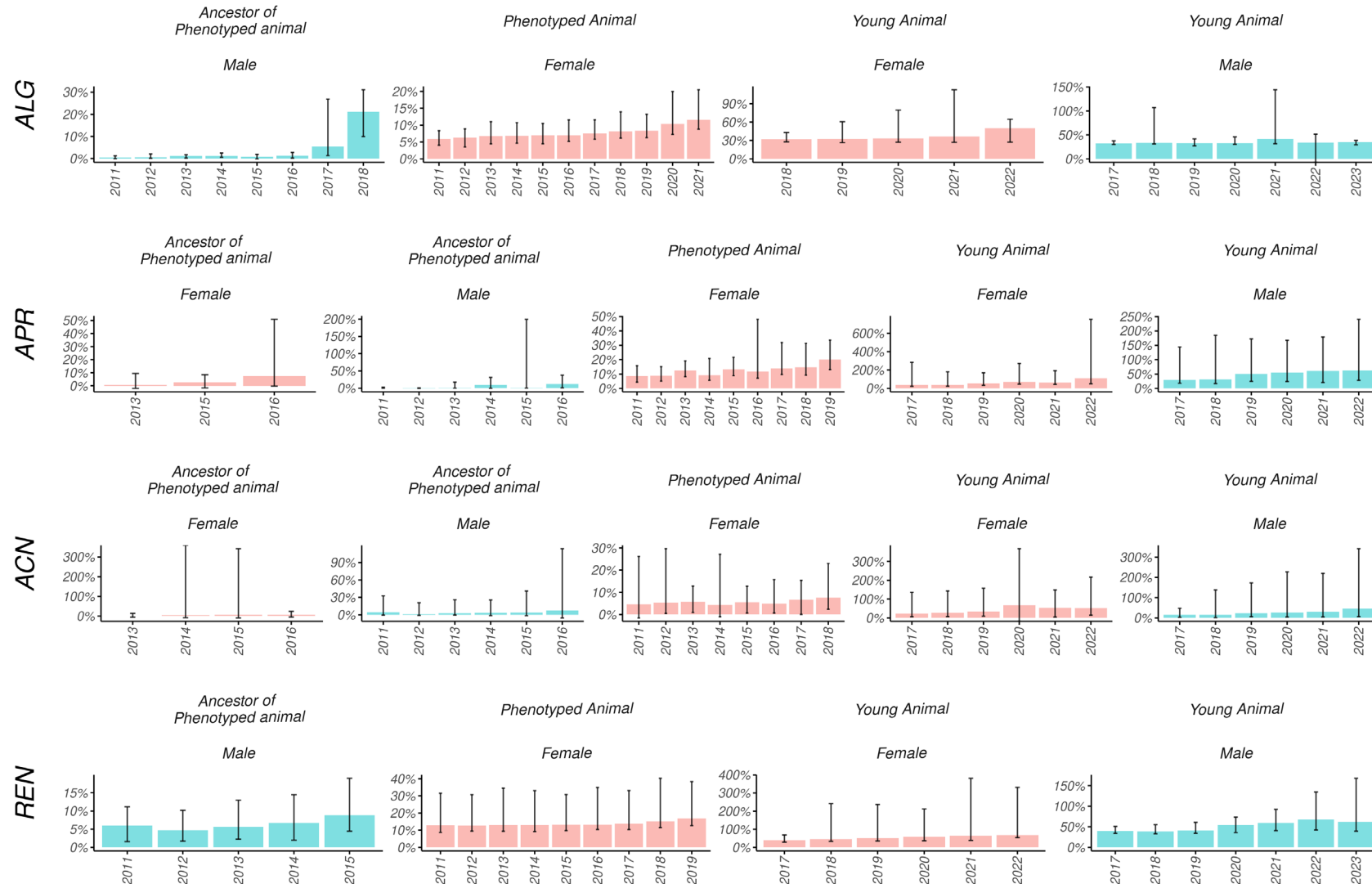
Model1: PBLUP

Model2: ssGBLUP

Model3: ssGBLUP (with exact UPG)

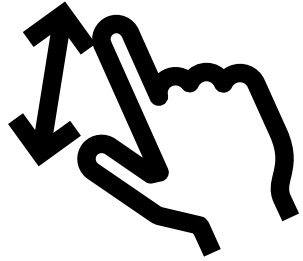


Evaluated the Results

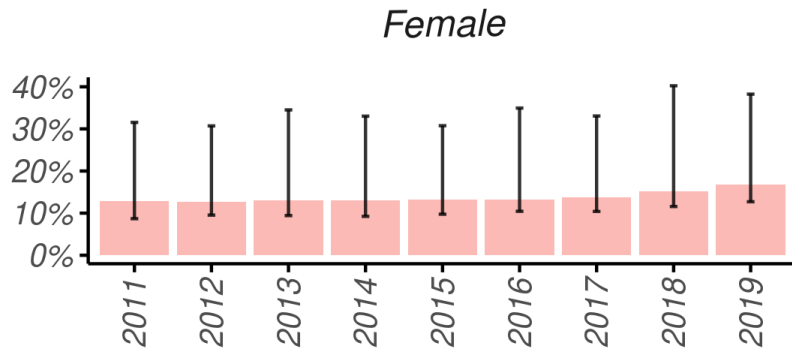


$$\text{Gain_acc} = (\text{accG} - \text{accP}) / \text{acc_P}$$

Evaluated the Results

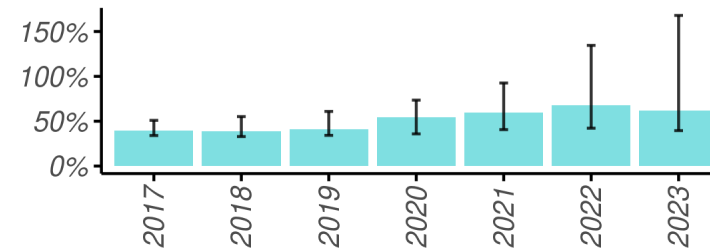


Phenotyped Animal



Young Animal

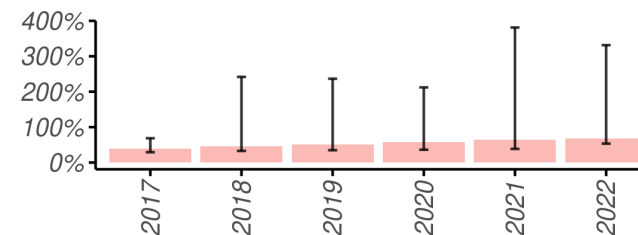
Male



$$\text{Gain_acc} = (\text{accG} - \text{accP}) / \text{acc_P}$$

Young Animal

Female



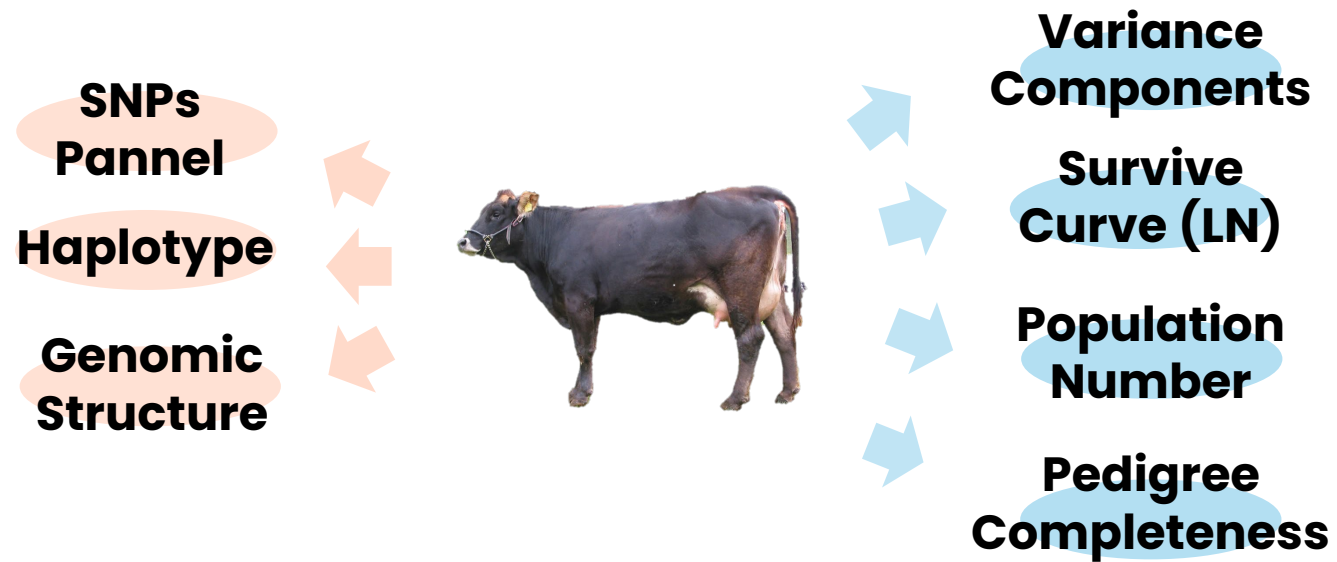
Future Prospective

Can we redesign selection scheme based on that results?

**Make
a
Simulations**

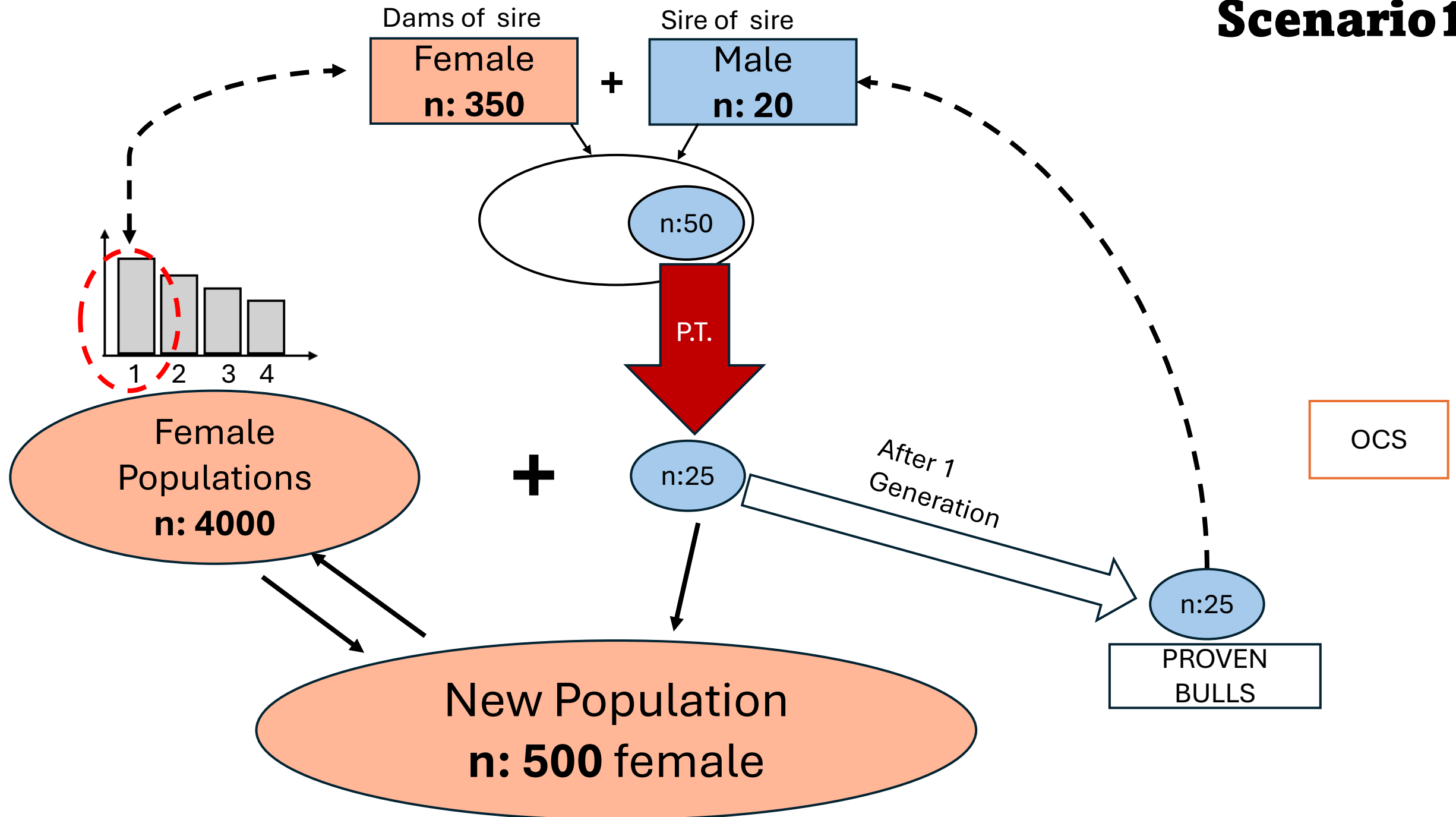
A large, light blue arrow pointing downwards, centered on the slide. The text "Make a Simulations" is written in bold black font inside the upper part of the arrow.

Future Prospective

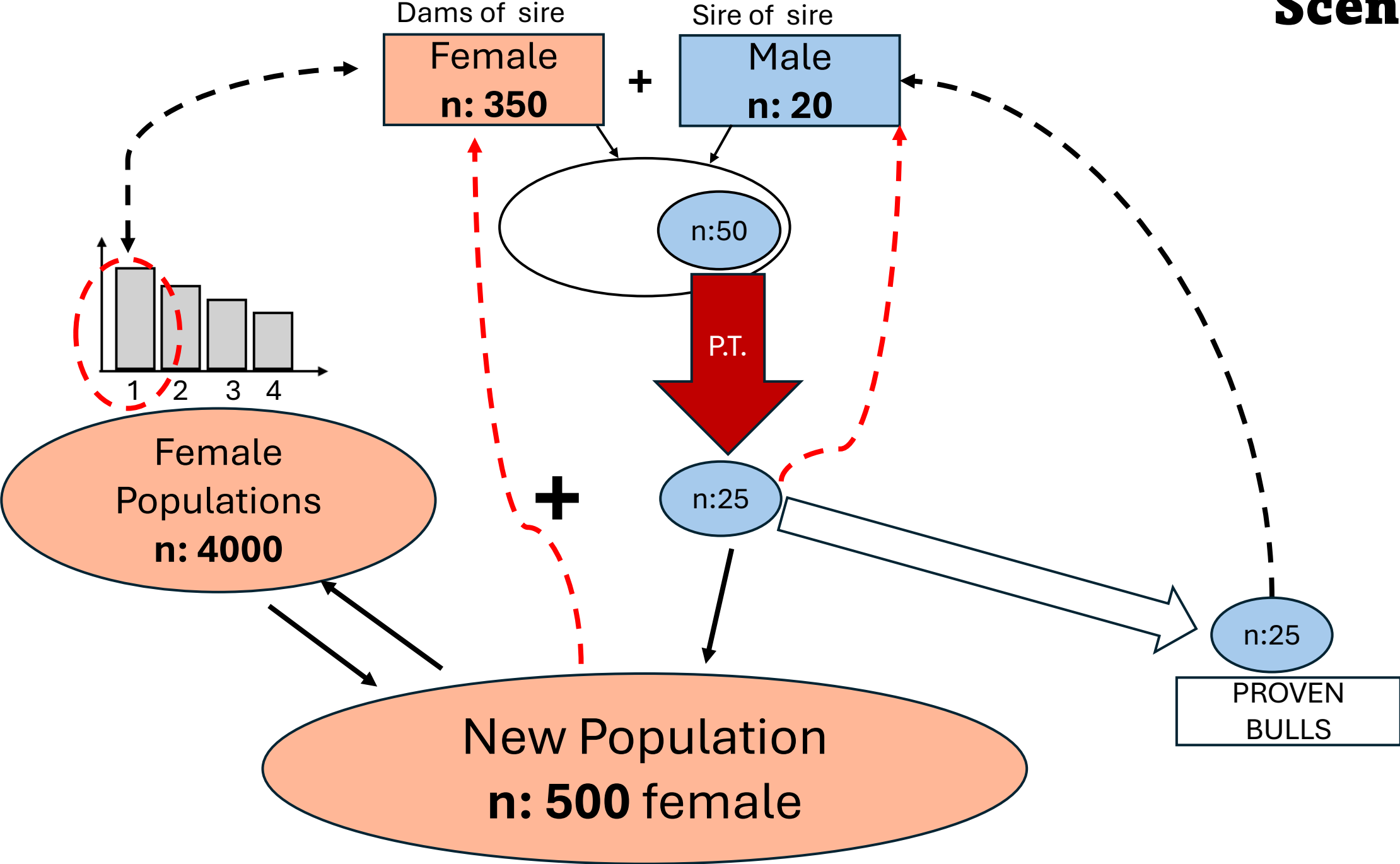


```
require(AlphaSimR)
```

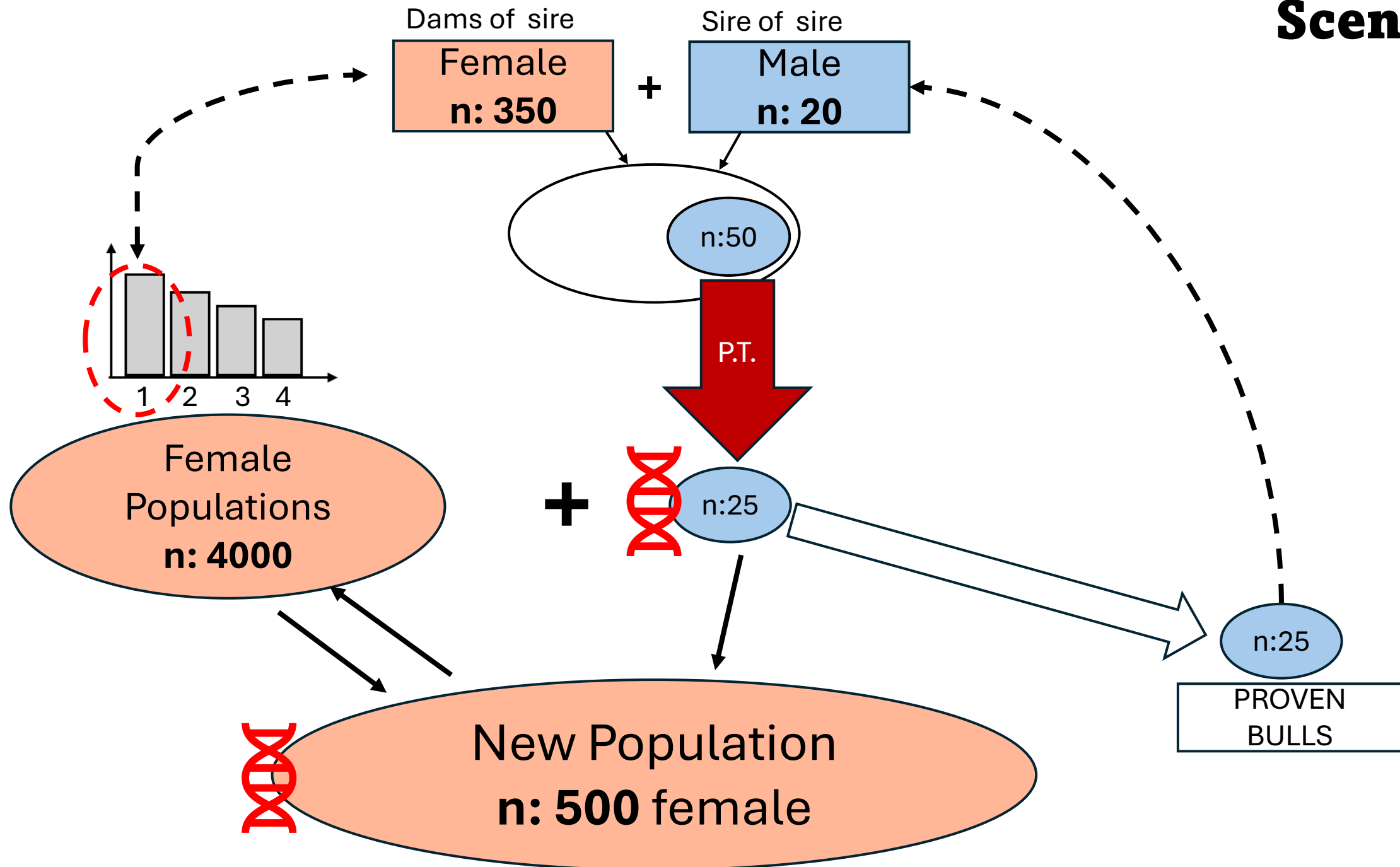
Scenario 1



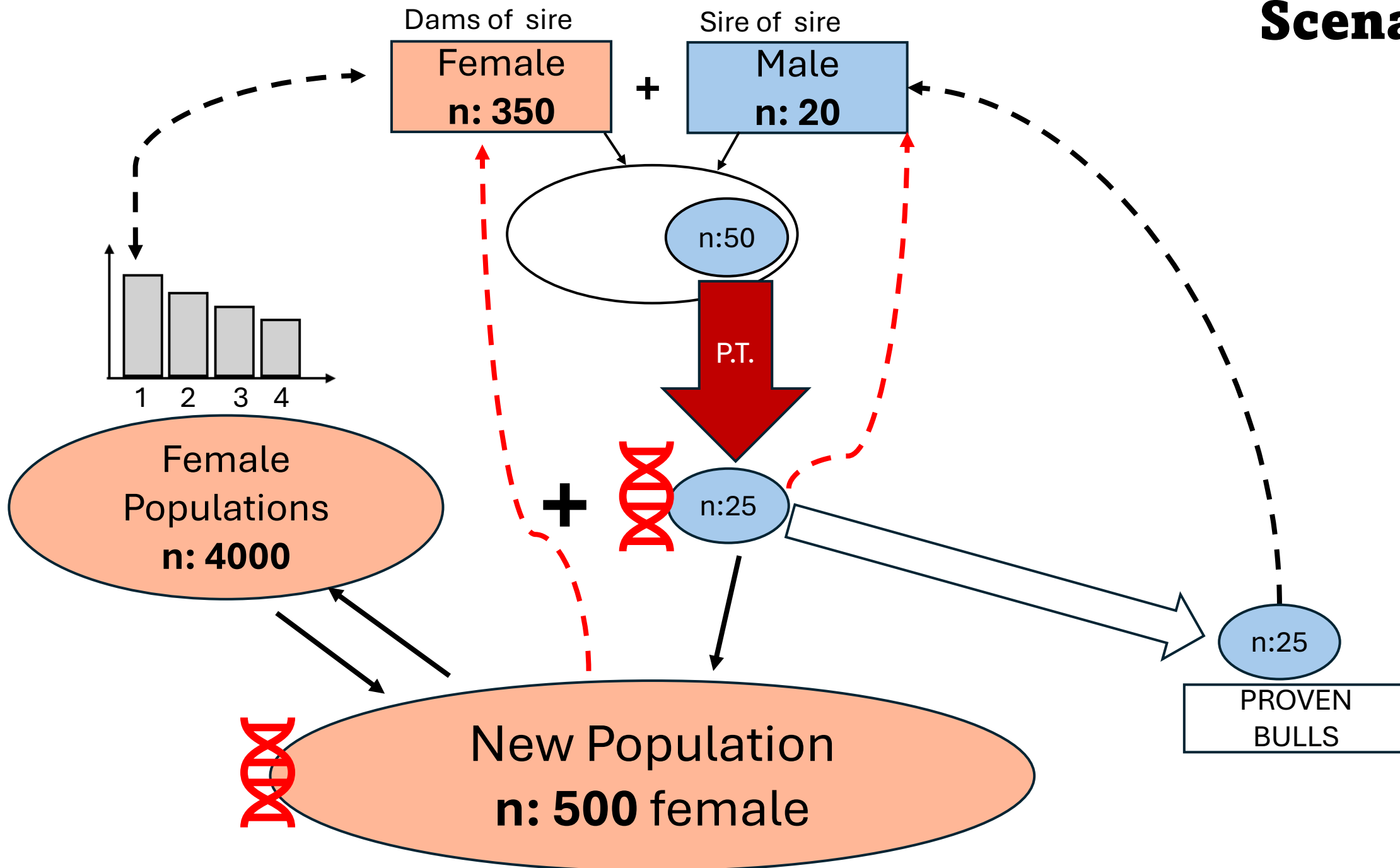
Scenario2



Scenario 1G

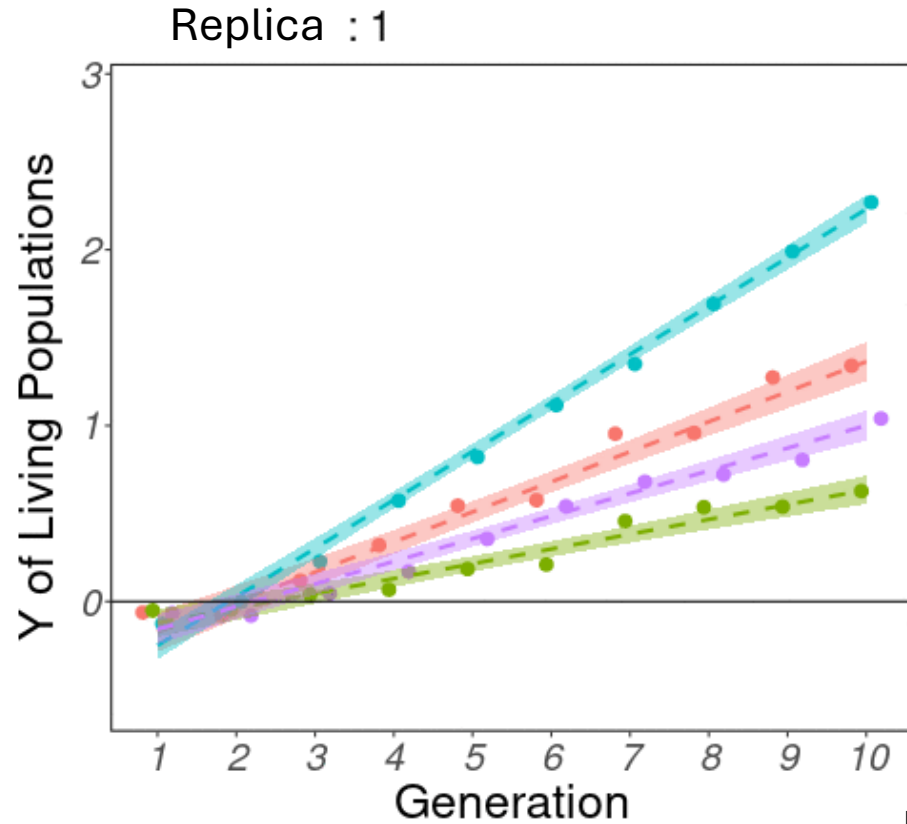


Scenario2G

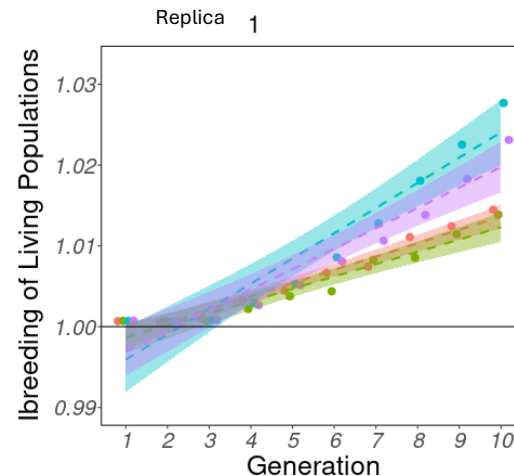


**REPLICATE
EACH
SCENARIO
x10 TIMES**

Simulation Results



S1
S2
S1G
S2G



OBS: Genomic Model always better
(S1G-S2G)

ANSW:. > Accuracy

OBS: Overall **NO difference between S1-S2**, (depend by scenario)

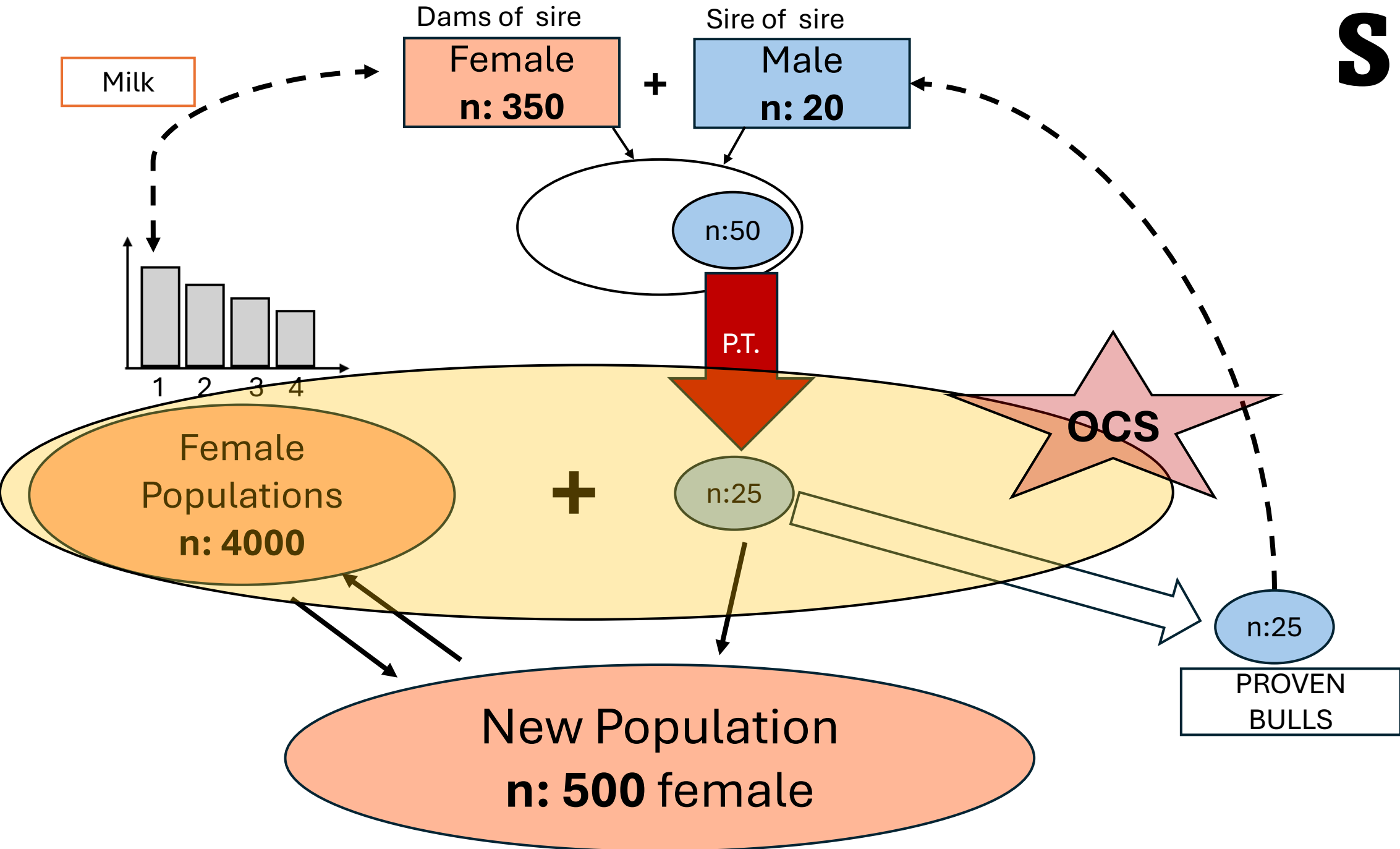
ANSW: Sometimes in S2 if we are lucky enough, we selected "correct" young animal

OBS: S2G always better

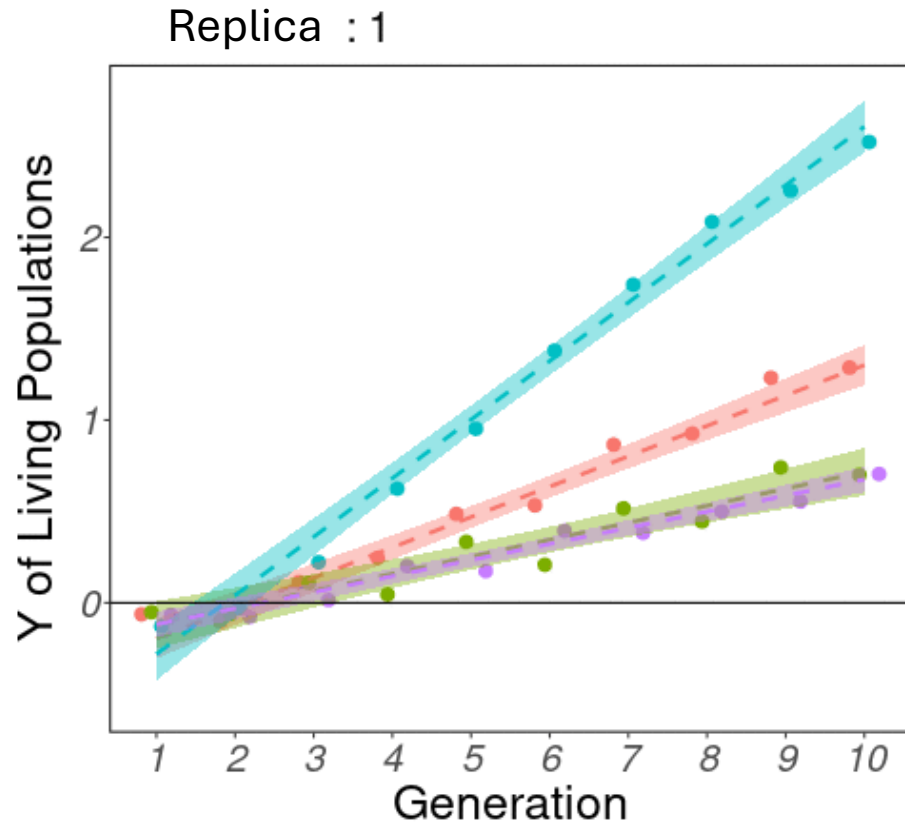
ANSW: We have larger candidate cohort with young animals and their have good accuracy

OBS: Slight increase of Inbreeding

S

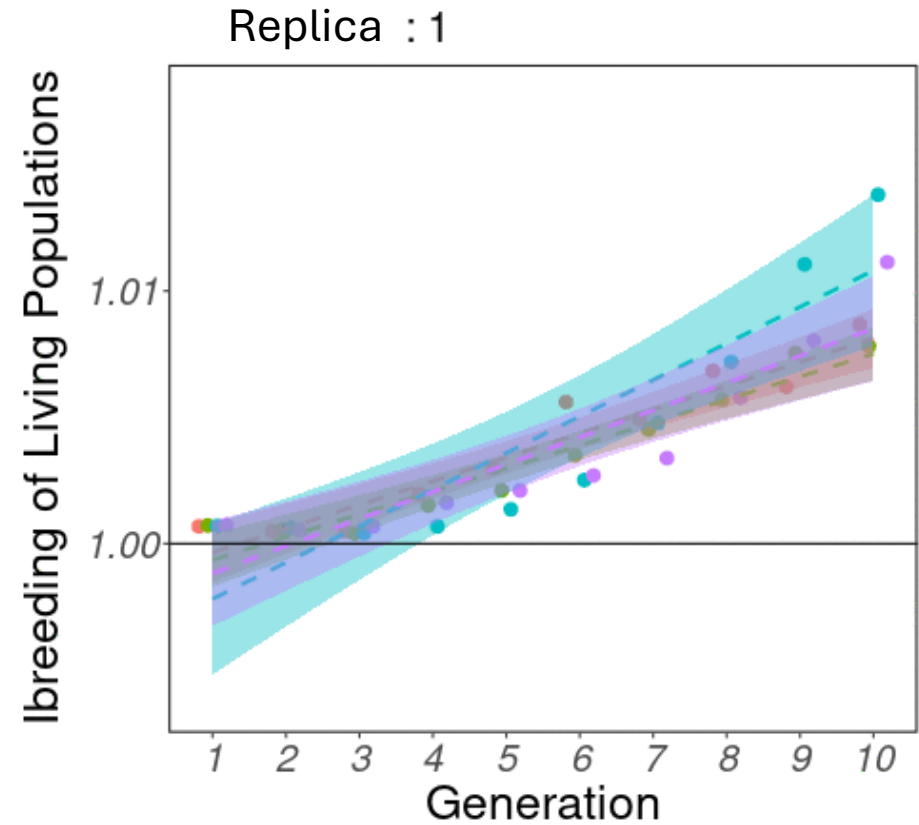


Simulation Results (OCS)



S1

S2



S1G

S2G

REMARKS

We developed a starting point of GS for Italian Local Breeds

Results were good, also opportunities to redesign selection scheme

However:

Make sense to continue to invest ?

Local breed has other type of problem, that goes behind G. progress

End & Thanks

Established a Method

STEP1



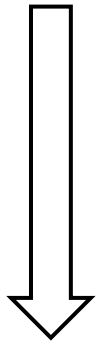
150k



33k



acc=.97



FINAL CHIP
120 K



100k



777k



150k



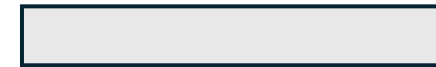
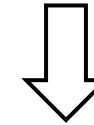
50k



33k



acc=.95



33k



90k

FINAL CHIP
90 K

