

Artificial Insemination (AI) success: a new trait for French dairy goats

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Outline

- The French goat breeding scheme
- Situation for AI success on farms
- Definition of the phenotype
- Estimation of genetic parameters
- GWAS analyses
- Introduction of AI success in the breeding goal



The French goat breeding scheme

2 main dairy breeds



Saanen

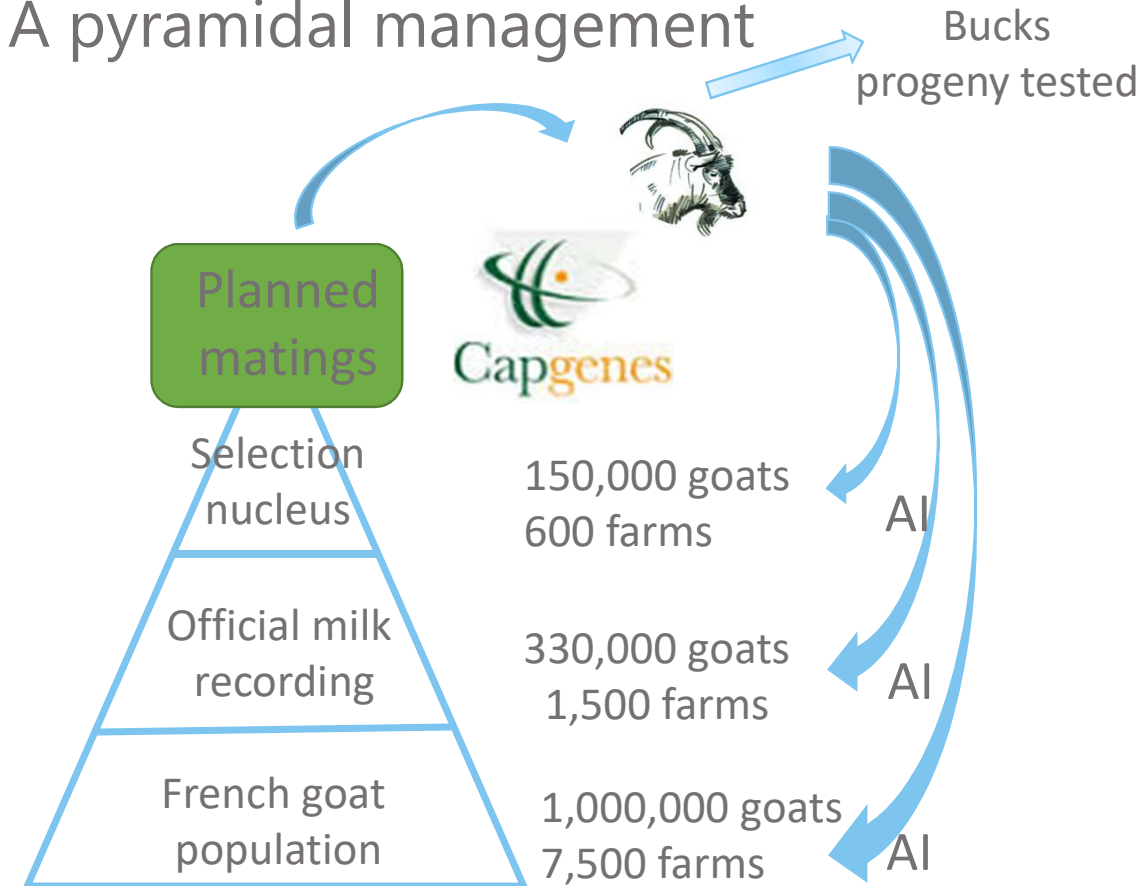
↓
Cheese production



Alpine

↓
Cheese production

A pyramidal management



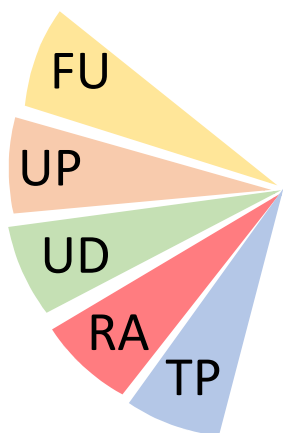
=> AI success is a key point in the French selection scheme



Alpine/Saanen

The French goat breeding scheme

17 traits and one total merit index



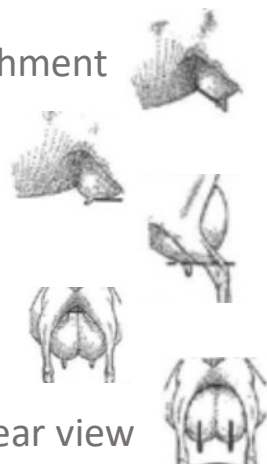
FU: Fore Udder attachment

UP: Udder Profile

UD: Udder Depth

RA: Rear Attachment

TP: Teat Placement rear view



Somatic Cell Count

13%/17%

Type traits (IMC)

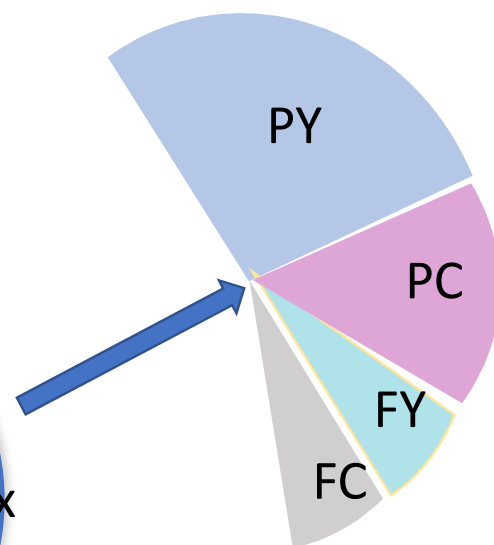
25%/28%

ICC: Total merit index

62%/55%

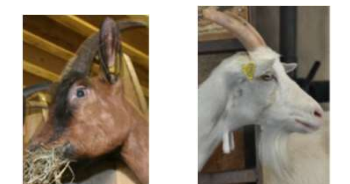
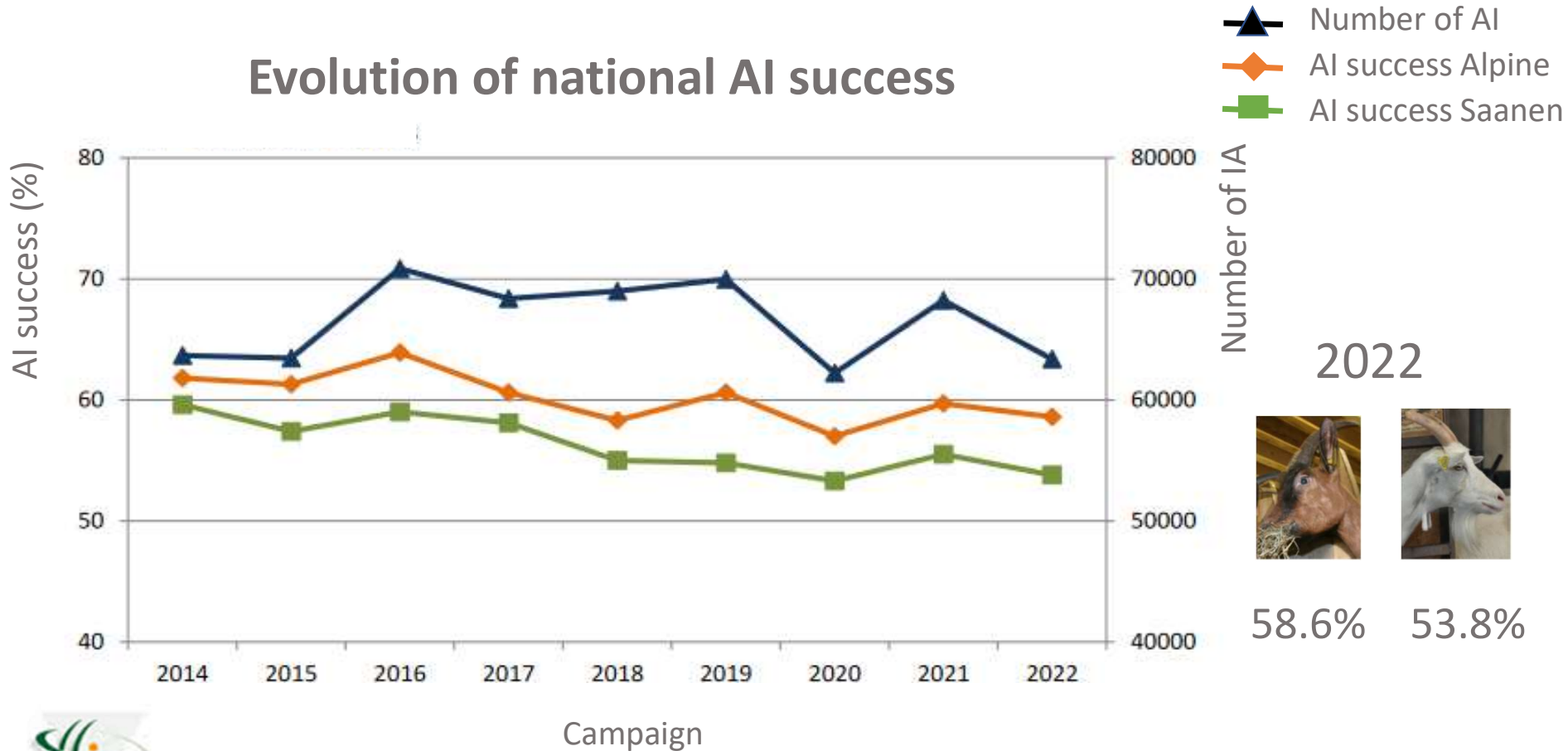
Production traits (IPC)

PY: Protein Yield
 PC: Protein Content
 FY: Fat Yield
 FC: Fat content



Artificial Insemination success in farms

Evolution of national AI success



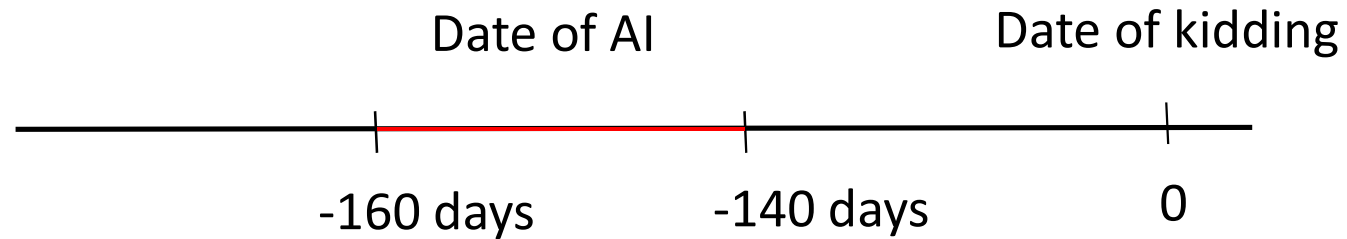
2022
58.6% 53.8%

=> A slight decline of AI success

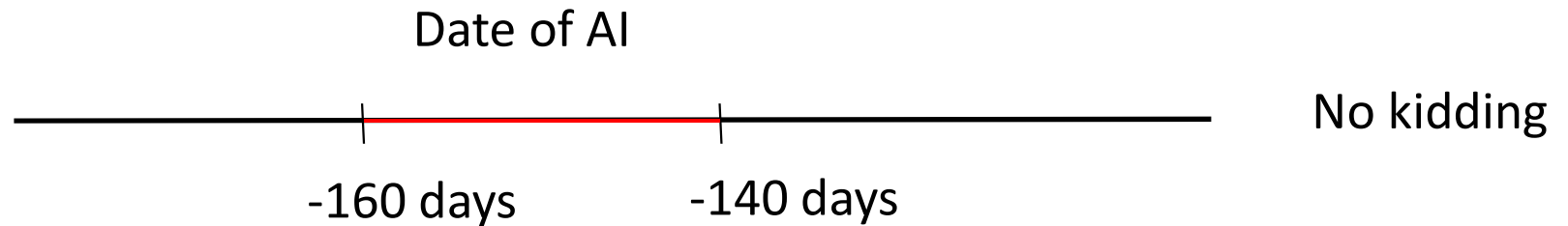


Phenotype definition

- **AI success = 1** if, for a given kidding, there is a single AI event that coincide with the date of the kidding (unknown otherwise)



- **AI success = 0** if for an AI event, there is no kidding recorded



Genetic parameters of AI success

	Saanen breed	Alpine breed
Heritability (std)	0.052 (0.005)	0.045 (0.004)
Genetic standard deviation	0.09 (9 points)	0.11 (11 points)

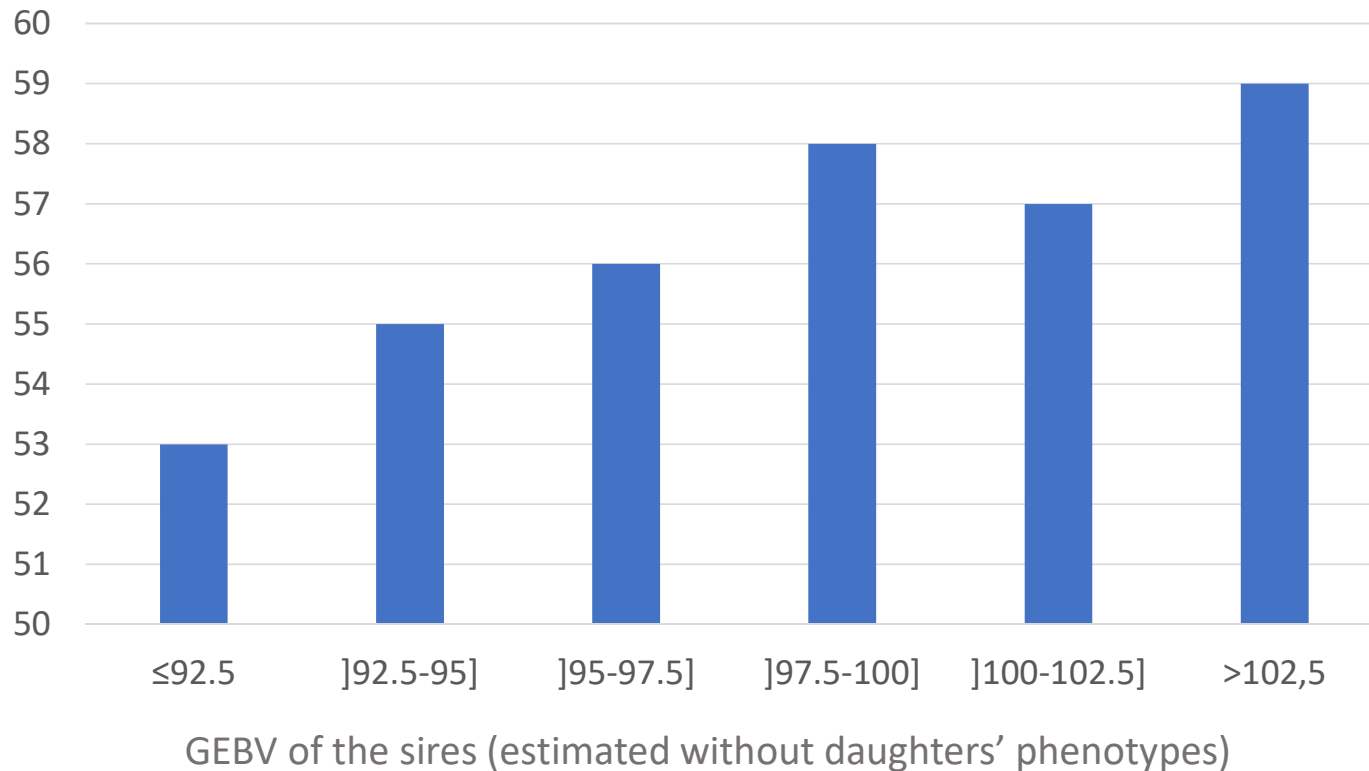
- Low heritability but significant genetic standard deviation
- In dairy cows, selected for AI success for several years, genetic standard deviation of AI success is equal to 7 points

⇒ **Implementation of a genomic evaluation for AI success**

Blupf90 software
(Misztal, et al., 2002)

Percentage of AI success by GEBV of sires Saanen breed

Percentage of AI success of the daughters



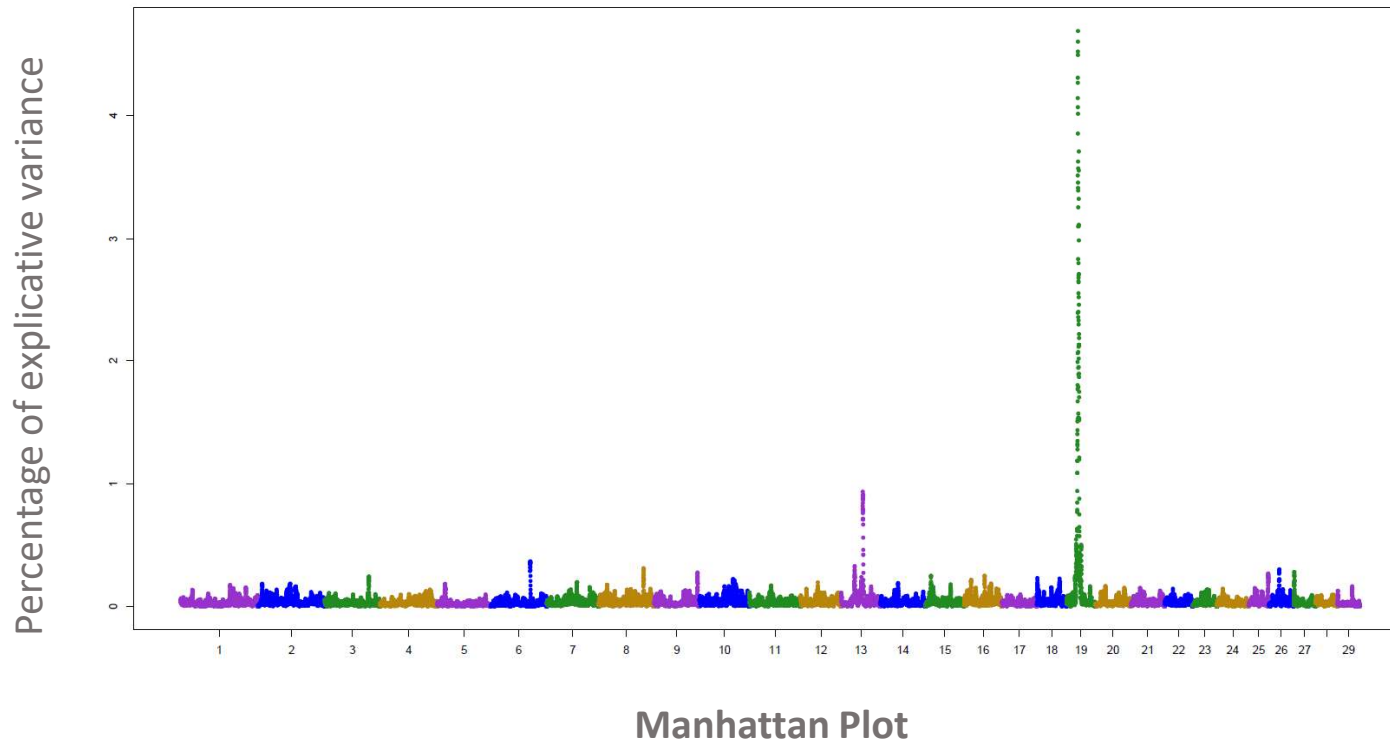
Bucks ≥ 15 daughters

=> Genetic selection for better AI success can be done



GWAS analyses

Saanen breed: a significant region on the chromosome 19 (25.6-26.6 Mb)
In a pleiotropic region



Percentage
of explicative variance:
4.7%

Blupf90 software
(Misztal, et al., 2002)

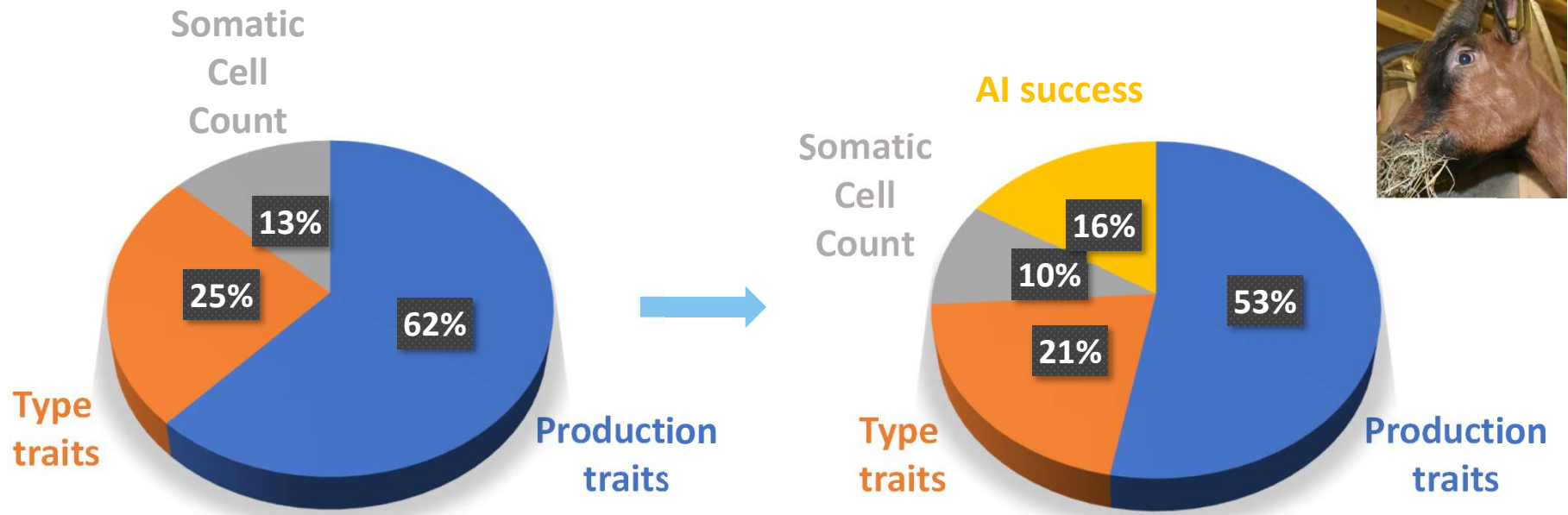
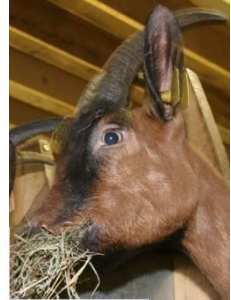


Correlation of AI success with selected traits (EBVs correlations)

	Saanen breed	Alpine breed
Milk yield	-0.12	0.01
Protein yield	-0.09	0.06
Fat yield	-0.09	0.08
Protein content	0.08	0.14
Fat content	0.04	0.14
Somatic cell count	0.11	0.12
Udder type traits	0.08 to 0.28	-0.01 to 0.18

⇒ A slight unfavorable correlation with milk yield in the Saanen breed and with somatic cell count in both breeds

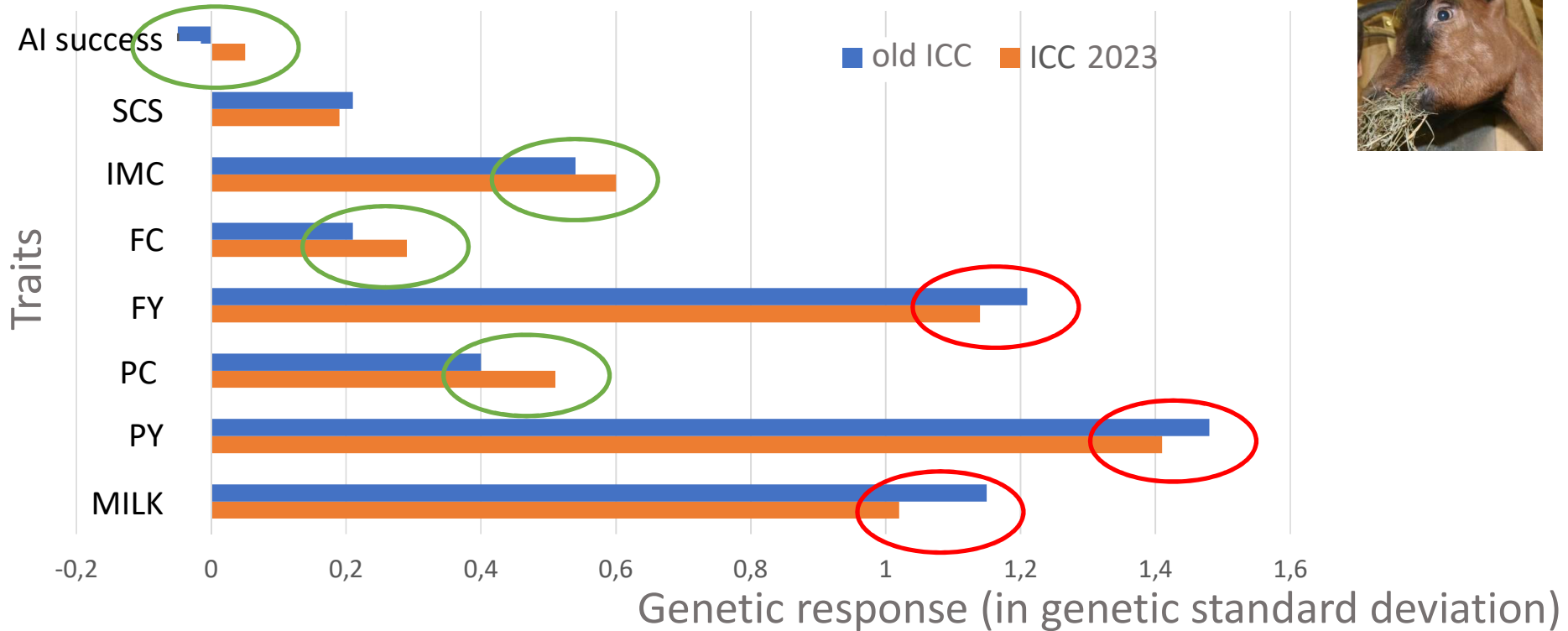
Introduction in breeding goal – Alpine breed



AI success:
16% in Alpine breed / 15% in Saanen breed

Expected genetic response – Alpine breed

Selection path: Dam -> AI sire



=> We can expect genetic progress for AI success



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La responsabilité du ministère en charge de l'agriculture ne saurait être engagée