Genomic breeding programs - MOET

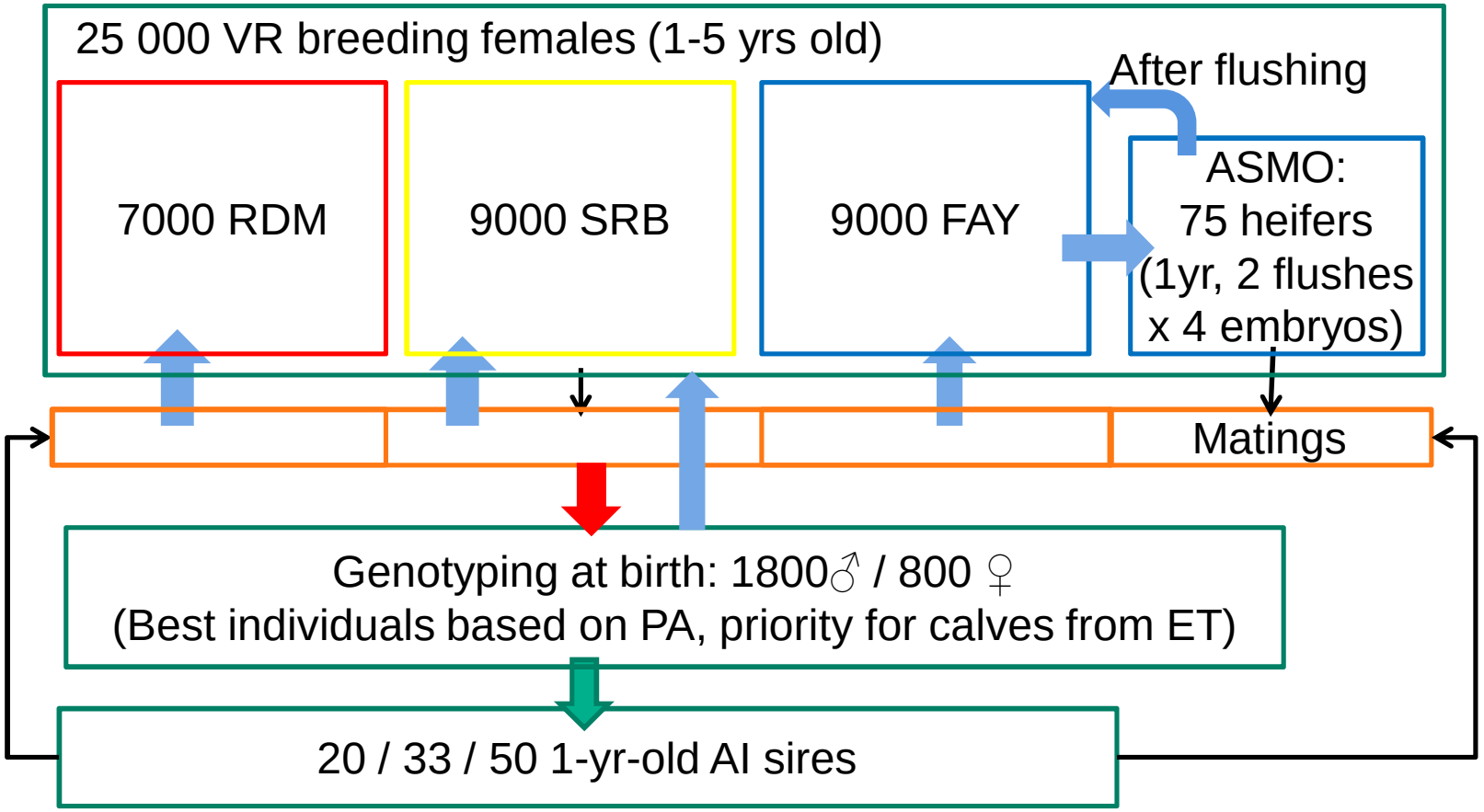
Copenhagen 12.12.12

Simulations by Alban Bouquet
Using Adam software by Foulum team

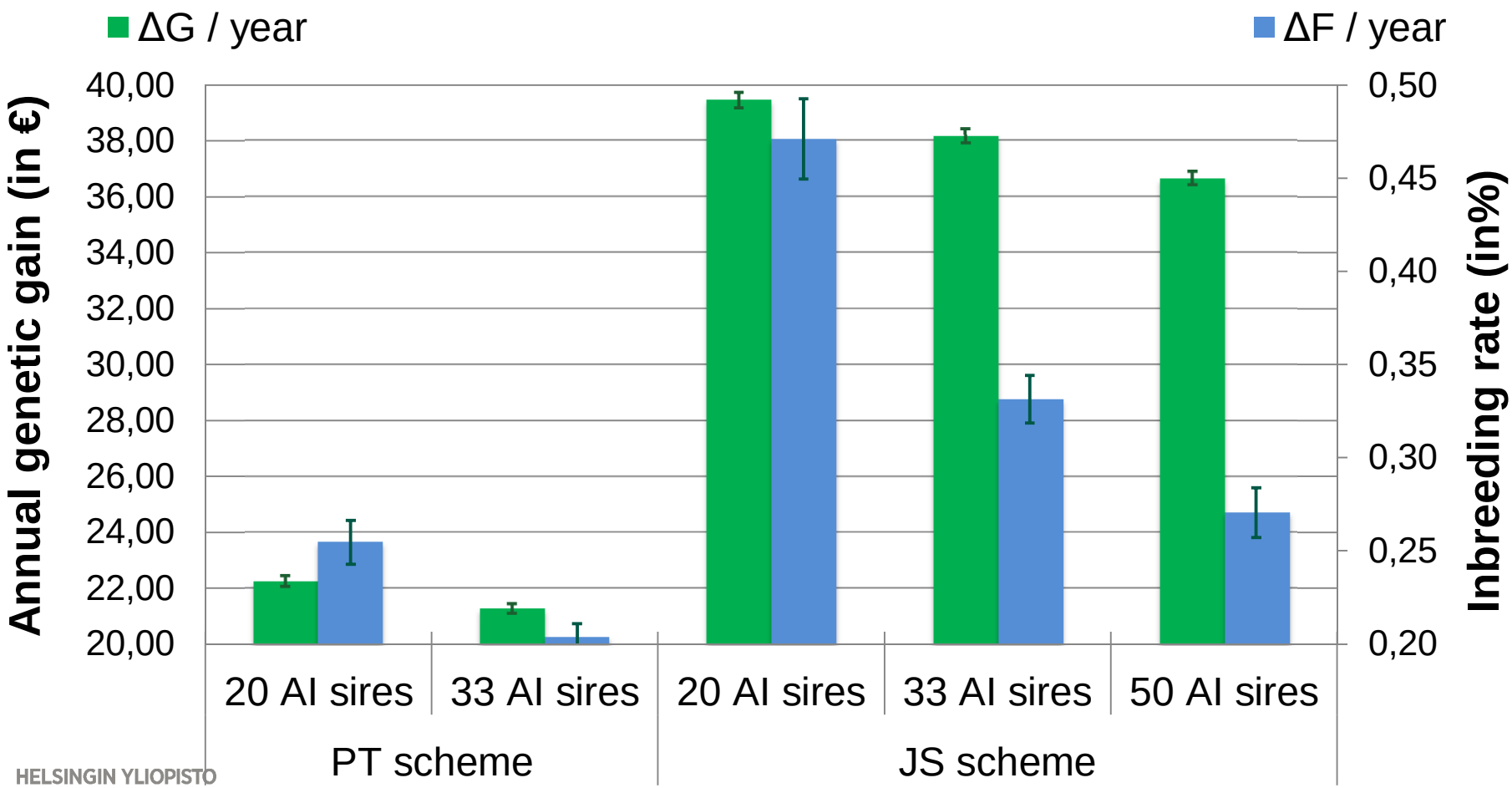
Outline

1. Introduction
2. Description of simulated genomic scenario
3. Some results
4. Conclusions

Juvenile genomic scheme (JS)



Annual response vs. inbreeding



Genomic scheme

1. Large increase in genetic gain expected with JS
2. Most genetic gain achieved on the production trait
3. JS may double annual inbreeding rates if the #AI sires remains constant
4. Recommended to increase the #sires to 33-50
    1. Small reduction in genetic gain
    2. Important reduction in inbreeding rates
    3. Important to have at least inbreeding rates per generation < 1% (FAO, 1998)

What about female path?

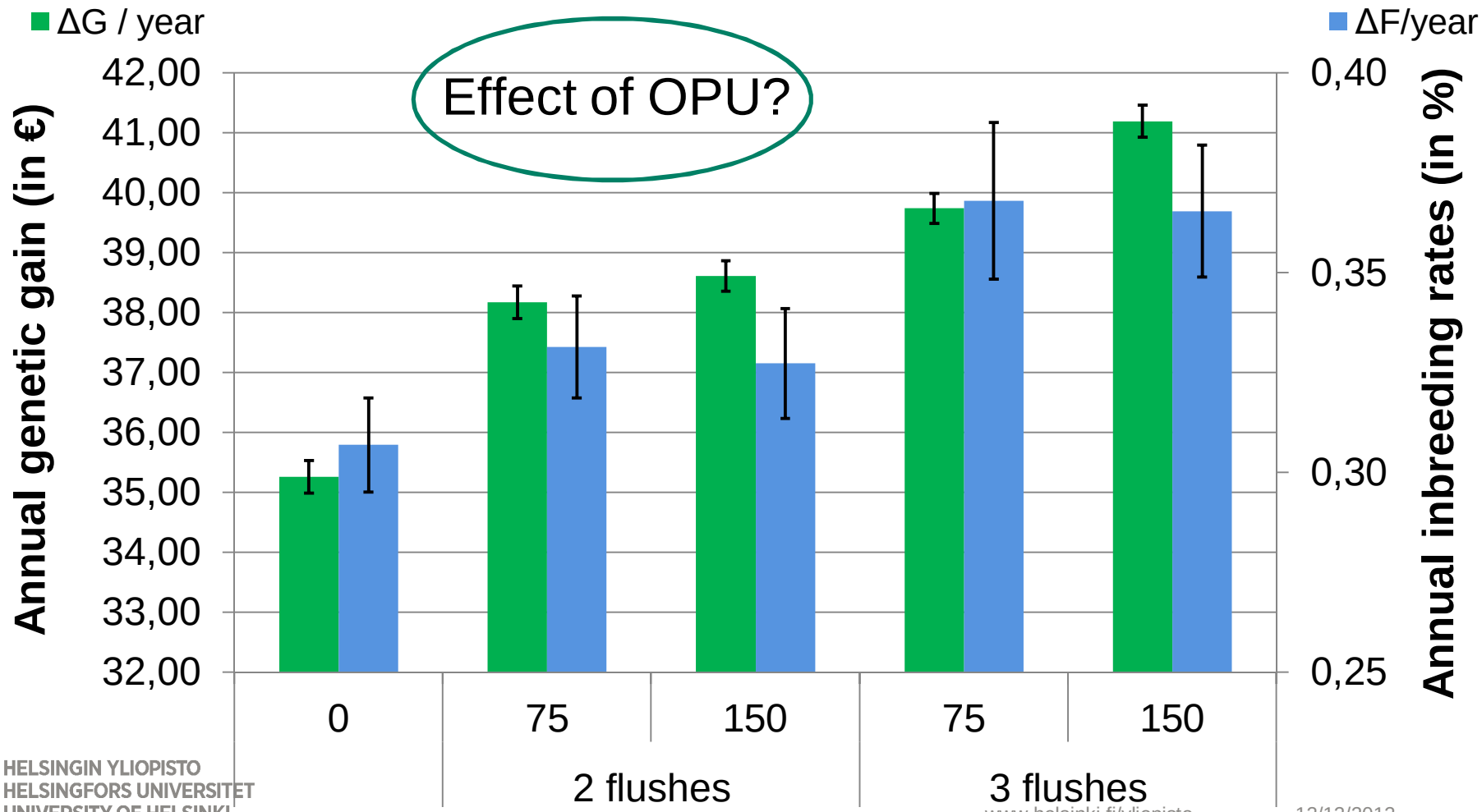
Table 3 Four pathways of selection, genome-wide strategy

		Accuracy		Generation	
Pathway	Selection %	i	r_{TI}	Interval, L	$i \times r_{TI}$
Sire of bulls	5	2.06	0.75	1.75	1.54
Sire of cows	20	1.40	0.75	1.75	1.05
Dams of bulls	2	2.42	0.75	2	1.82
Dams of cows	85	0.27	0.50	4.25	0.14
Total				9.75	4.55

Larry Schaeffer J. Anim. Breed.Gen. 2006

MOET
OPU
Sexed semen

Effect of varying # flushings and ASMO size (33 sires, 800 ♀ genotypings)



Conclusions Genomic MOET

Genomic selection: huge increase in ΔG compared with PT schemes

MOET allows further increasing the genetic gain obtained with genomic selection.

Increasing the number of flushings per donor strongly increased genetic gain

$\Rightarrow$ However, significant increase in inbreeding rates, although moderate: +0.03% / yr

With a constraint on the flushing capacity:

$\Rightarrow$ More efficient to increase # flushings rather than # flushed heifers

Optimal configurations of the nucleus

No real technical “optimum”: the best results in terms of genetic gain and inbreeding rates are obtained for

- The largest flushing capacities (MOET nucleus size, number of flushings / donor) – Expanding to DNK and SWE?
- The largest genotyping capacities

The constraints are rather technical/practical (herd size, # flushing, # recipients) and economical

Costs analyses must be done to determine the economical optimum by integrating all costs related to MOET, genotypings, OPU, sexing etc.

Market value of the surplus embryos?

What next?