Crossbreeding, genomic test, sexed semen and beef semen

Simulation study of the effects on genetic merit and herd profitability in Swedish dairy herds

Presented by **Julie Clasen**, PhD Student, Swedish University of Agricultural Sciences (SLU), Sweden

EAAP, Ghent, 2019

Lotta Rydhmer (SLU), Erling Strandberg (SLU), Freddy Fikse (Växa Sverige),
Morten Kargo (Aarhus University & SEGES), Søren Østergaard (Aarhus University & SimHerd)

Background & Aim

Sexed semen (SS)

Beef semen

Genomic breeding values (GEBV)

Crossbreeding

What are the effects on herd economy combining these tools, including both genetic and operational aspects?

Scenarios

Average performance and management level

Swedish Red x Holstein

2x → conventional

GT all purebreds

Minimum heifer surplus

Crossbreeding	Sexed Semen	Genotyping	Beef semen
Yes (terminal XB) No (PB Holstein)	No (SS0) 50% heifers (SS50) 90% + 45% 1st par. Cows (SS90C)	Yes No	Yes

12 scenarios in total

Combining two simulation models*

Operational

- SimHerd Crossbred *(Østergaard et al., 2018)*
  - Stochastic simulation of a dairy herd → herd dynamics
  - Extended model of SimHerd *(www.simherd.com)*
  - Additive breed differences and heterozygosity
  - No genetic progress

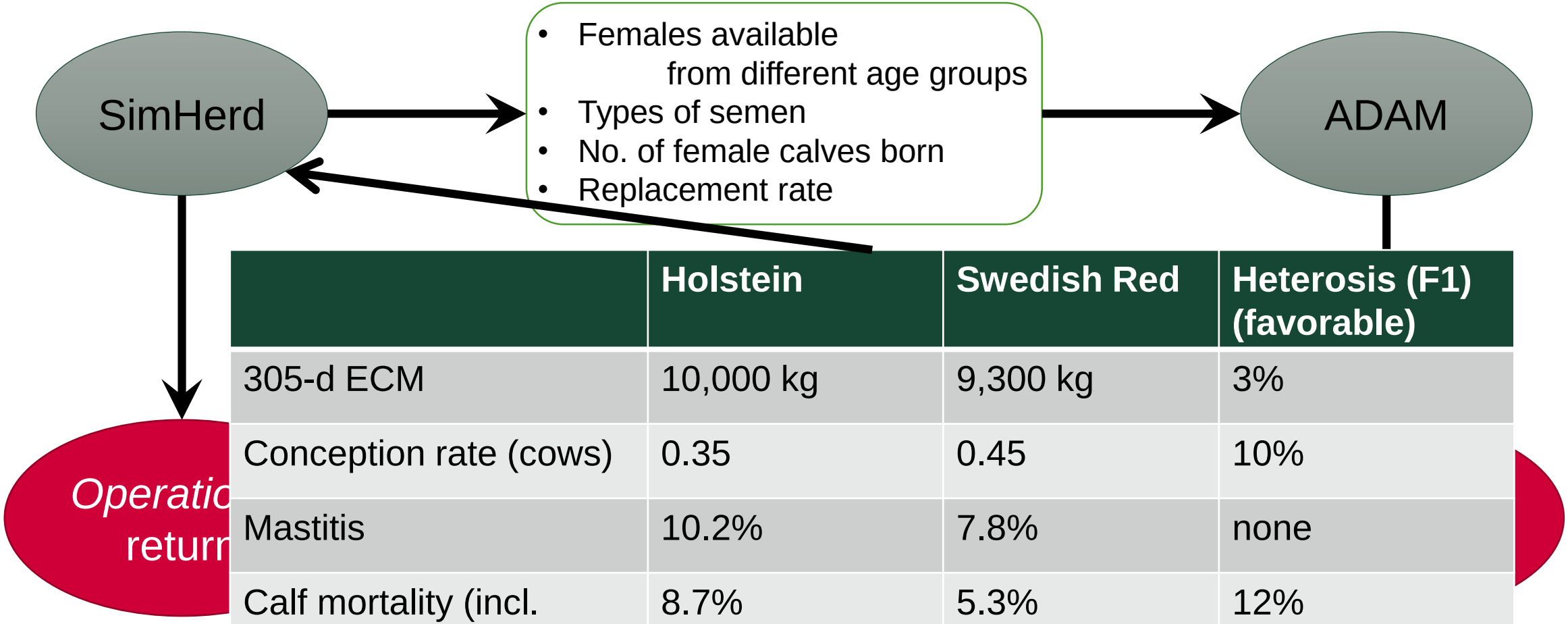
Genetic

- ADAM *(Pedersen et al., 2009)*
  - Stochastic simulation of breeding schemes → genetic merit
  - Mimics Nordic Total Merit Index
  - No breed differentiation or heterosis

Assumed similar genetic parameters and accuracies between breeds

*) *combined before by Hjortø et al. (2015), Ettema et al. (2017) and Clasen et al. (2019)*

Simulation process

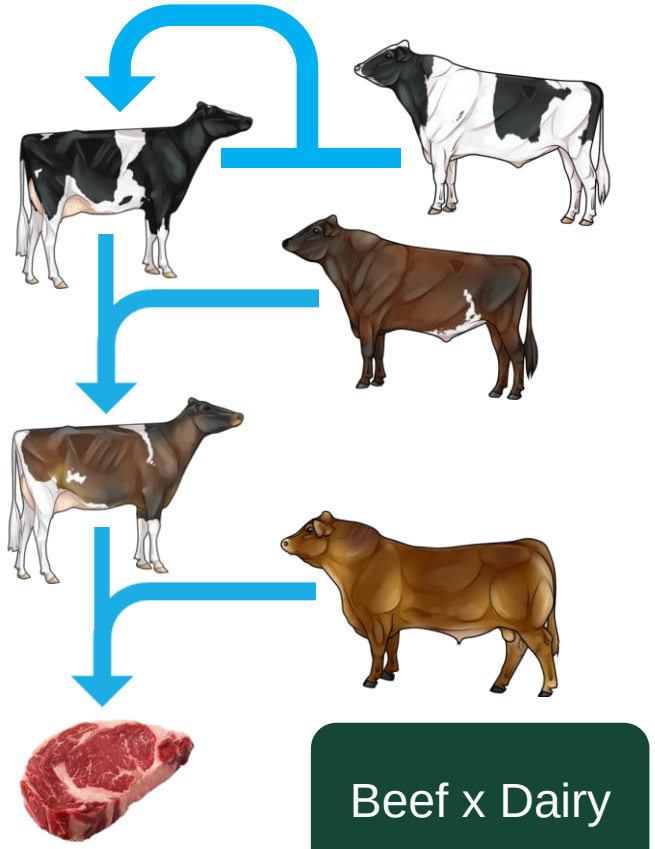


	Holstein	Swedish Red	Heterosis (F1) (favorable)
305-d ECM	10,000 kg	9,300 kg	3%
Conception rate (cows)	0.35	0.45	10%
Mastitis	10.2%	7.8%	none
Calf mortality (incl. stillbirth)	8.7%	5.3%	12%

Terminal crossbreeding strategy within the herd

Nucleus
Holstein

F1 crossbreds
Swedish Red x Holstein



Beef x Dairy

Why only this breeding strategy?

- No GEBV models for crossbred animals in Sweden (yet)
- ADAM does not model crossbreeding

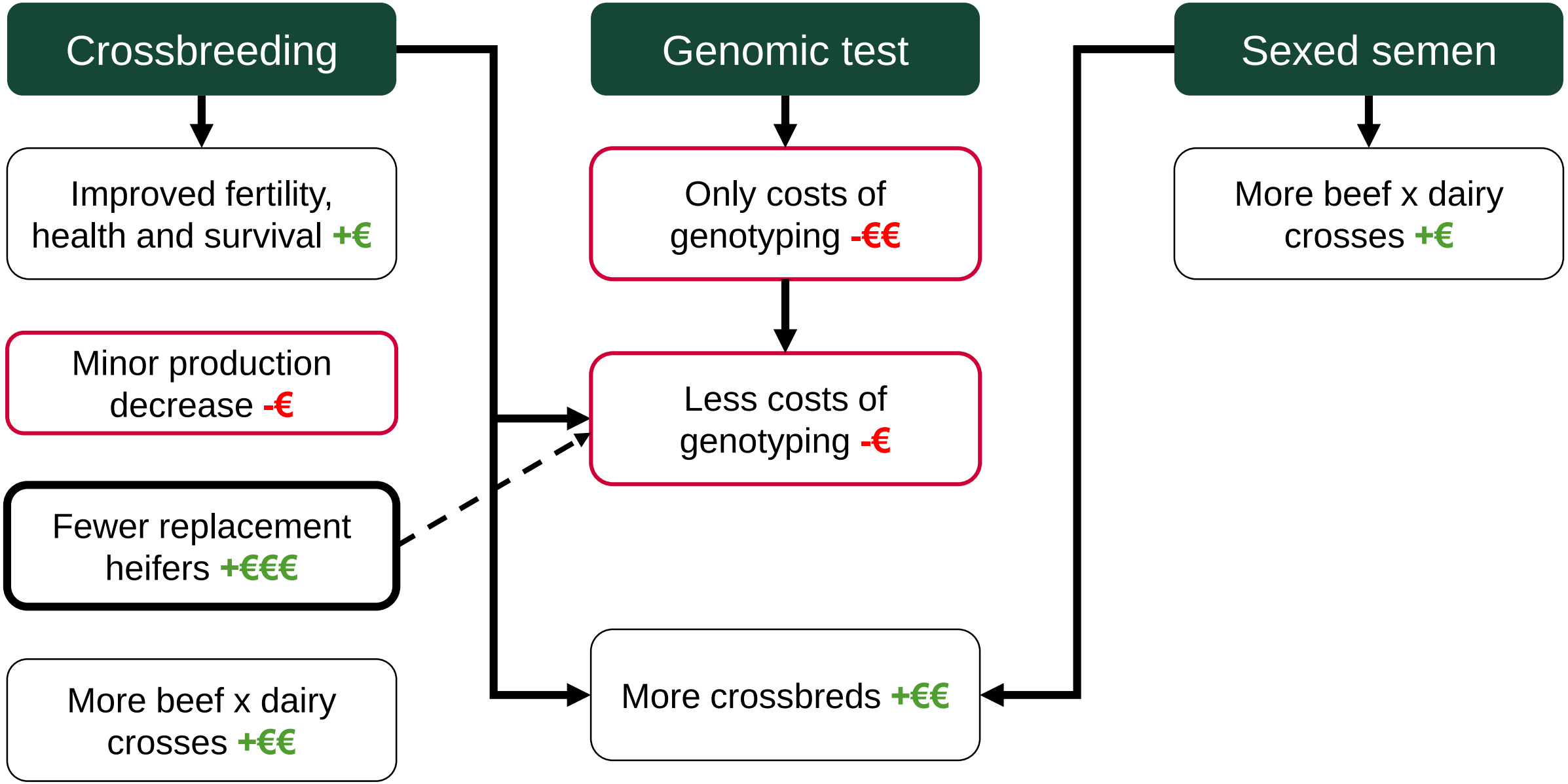
Sexed semen, beef semen & crossbreeding

More sexed semen used in purebreds allows for more crossbreds or more beef semen

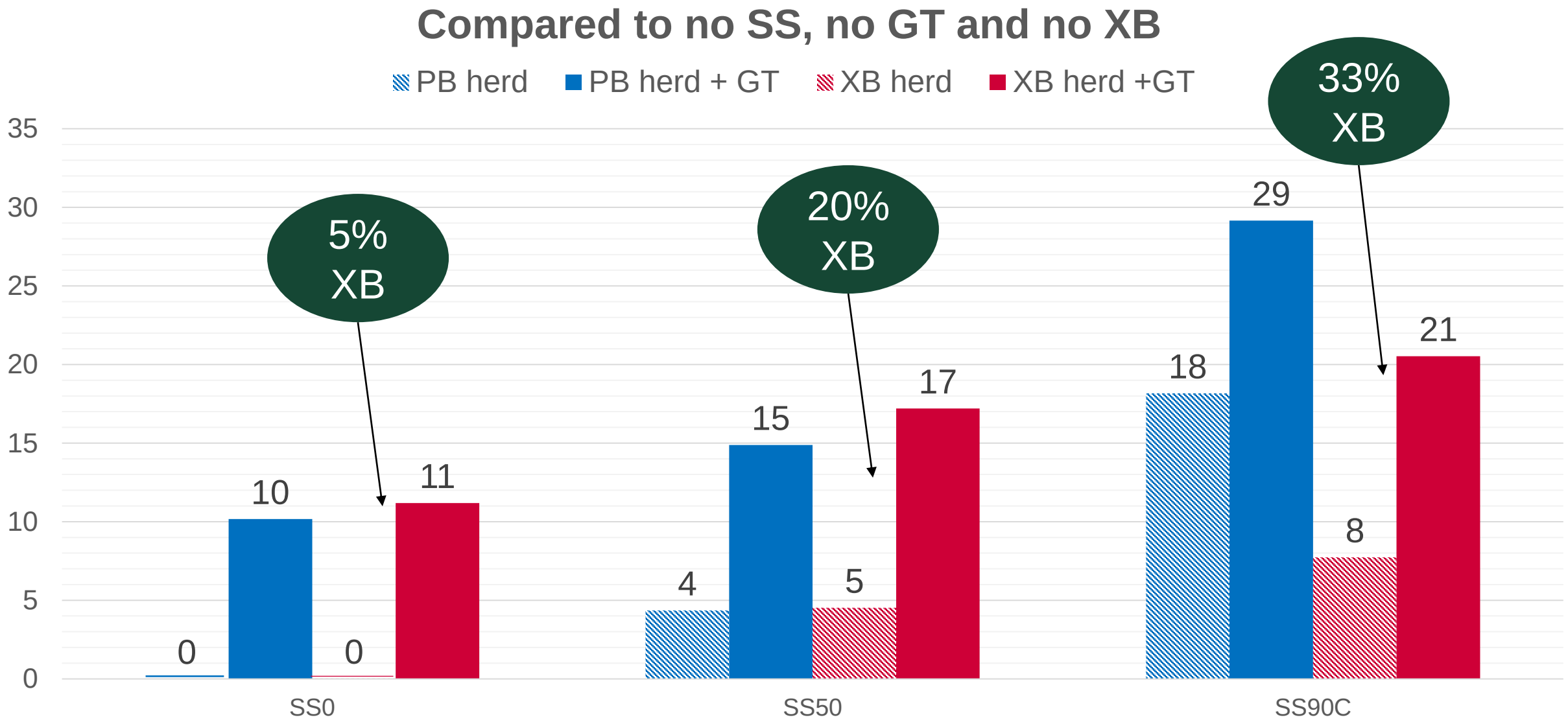
	XB+SS0	XB+SS50	XB+SS90C
% crossbreds	5	20	33

	PB+SS0	PB+SS50	PB+SS90C
% beef semen	9	26	51

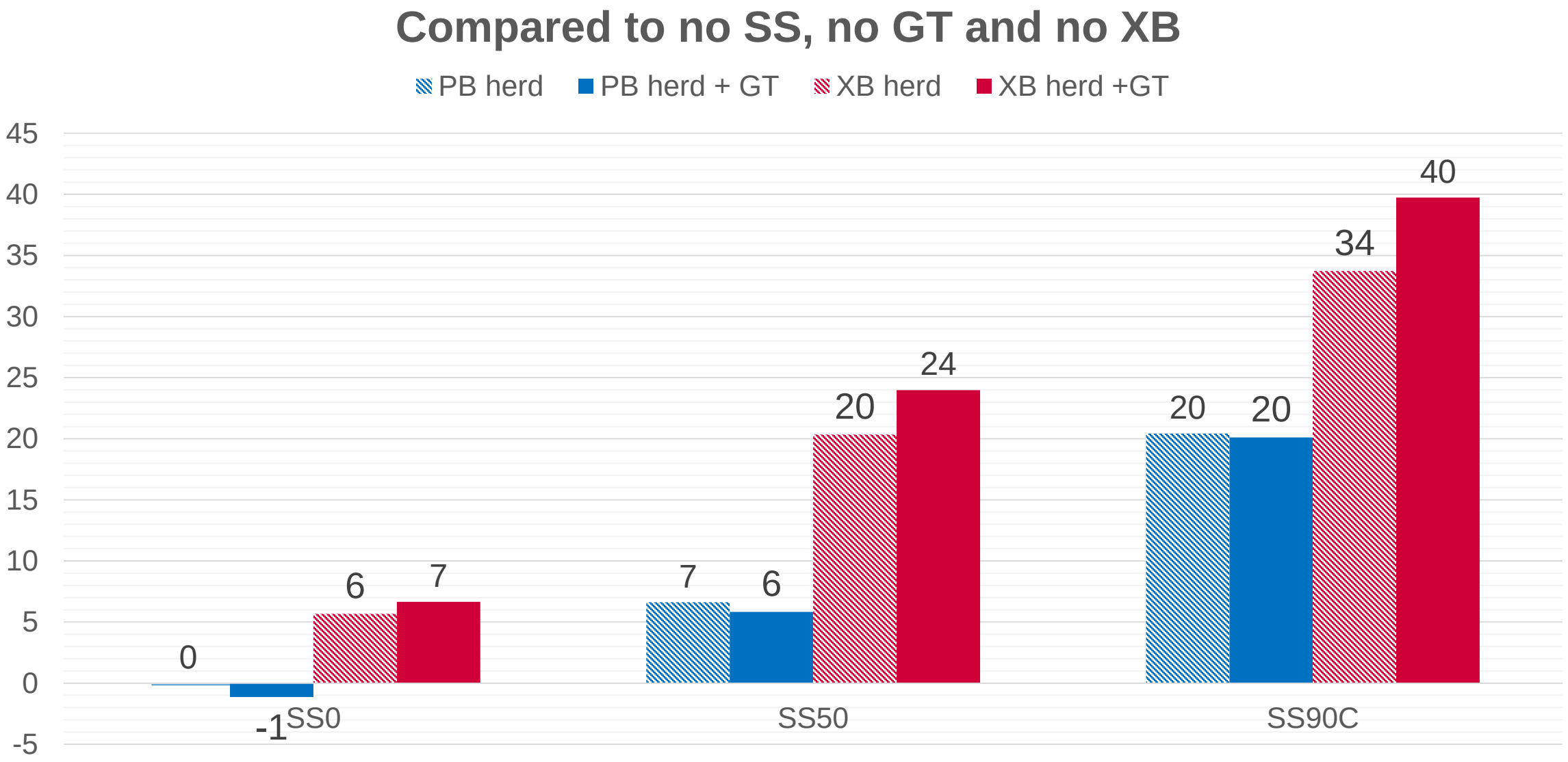
Operational effects of..



Results – genetic return (€/cow/year)



Results – total return (€/cow/year)



Conclusions

- GEBV, sexed semen, crossbreeding (and beef semen) **generally improves total herd profit** individually and combined

- Any combination with **crossbreeding increases the total herd profit** relative to purebreeding (heterosis)

- (Terminal) crossbreeding **reduces the level of *genetic* merit** in the herd

- **Next step: Add GEBV models for crossbreeding**
  – **and then make new simulations ☺**

THANK YOU

- Questions?

Contact information: **julie.clasen@slu.se**

Conclusions

- GEBV, sexed semen, crossbreeding (and beef semen) **generally improves total herd profit** individually and combined

- Any combination with **crossbreeding increases the total herd profit** relative to purebreeding (heterosis)

- (Terminal) crossbreeding **reduces the level of *genetic* merit** in the herd

- **Next step: Add GEBV models for crossbreeding**
  – **and then make new simulations ☺**

Results – genetic return (€/cow/year)