Within herd genomic testing affects contribution margin

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CENTER FOR QUANTITATIVE GENETICS AND GENOMICS QGG

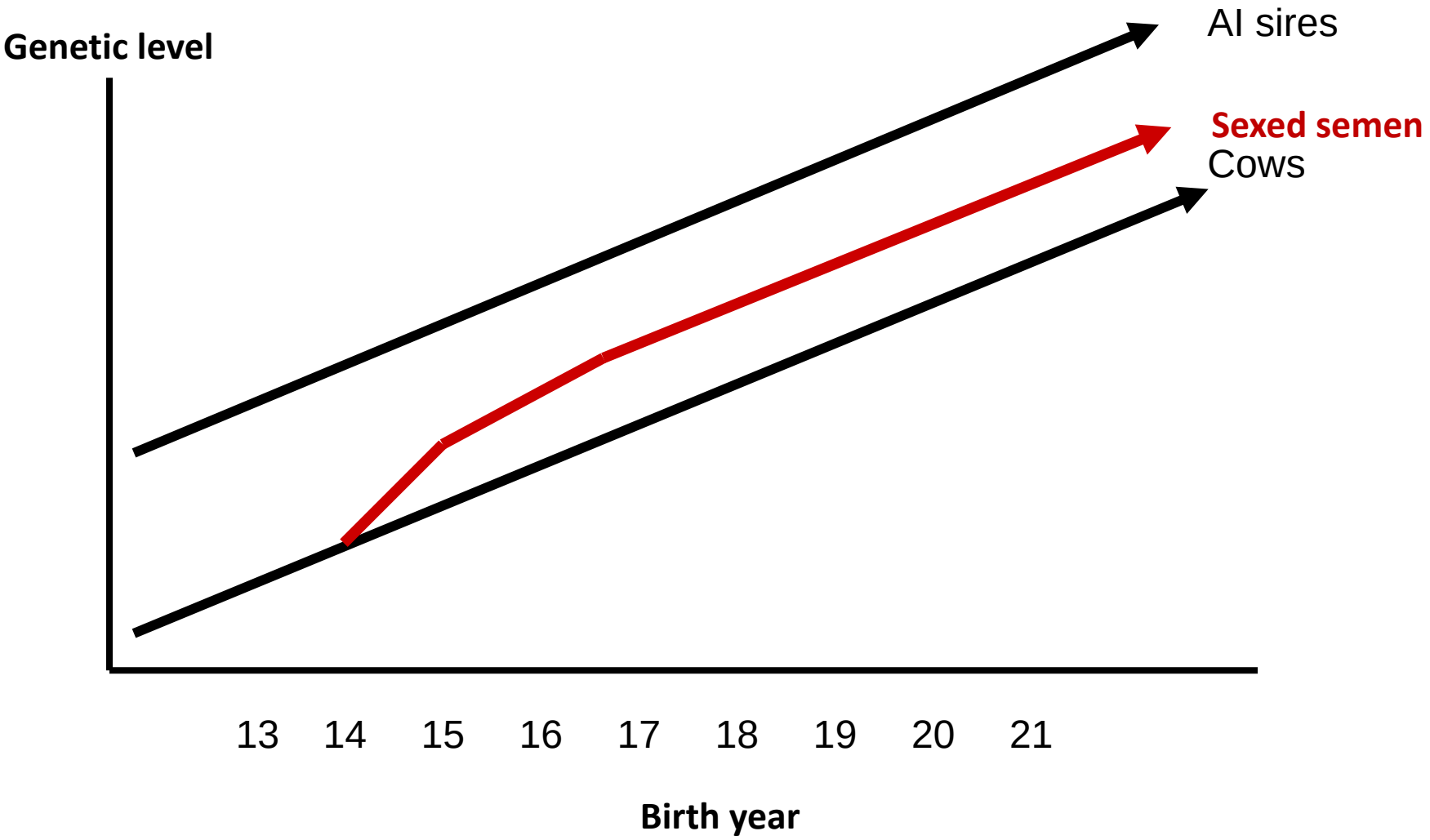
KNOWLEDGE CENTRE FOR AGRICULTURE
Cattle

SimHerd
Improves Your Decisions

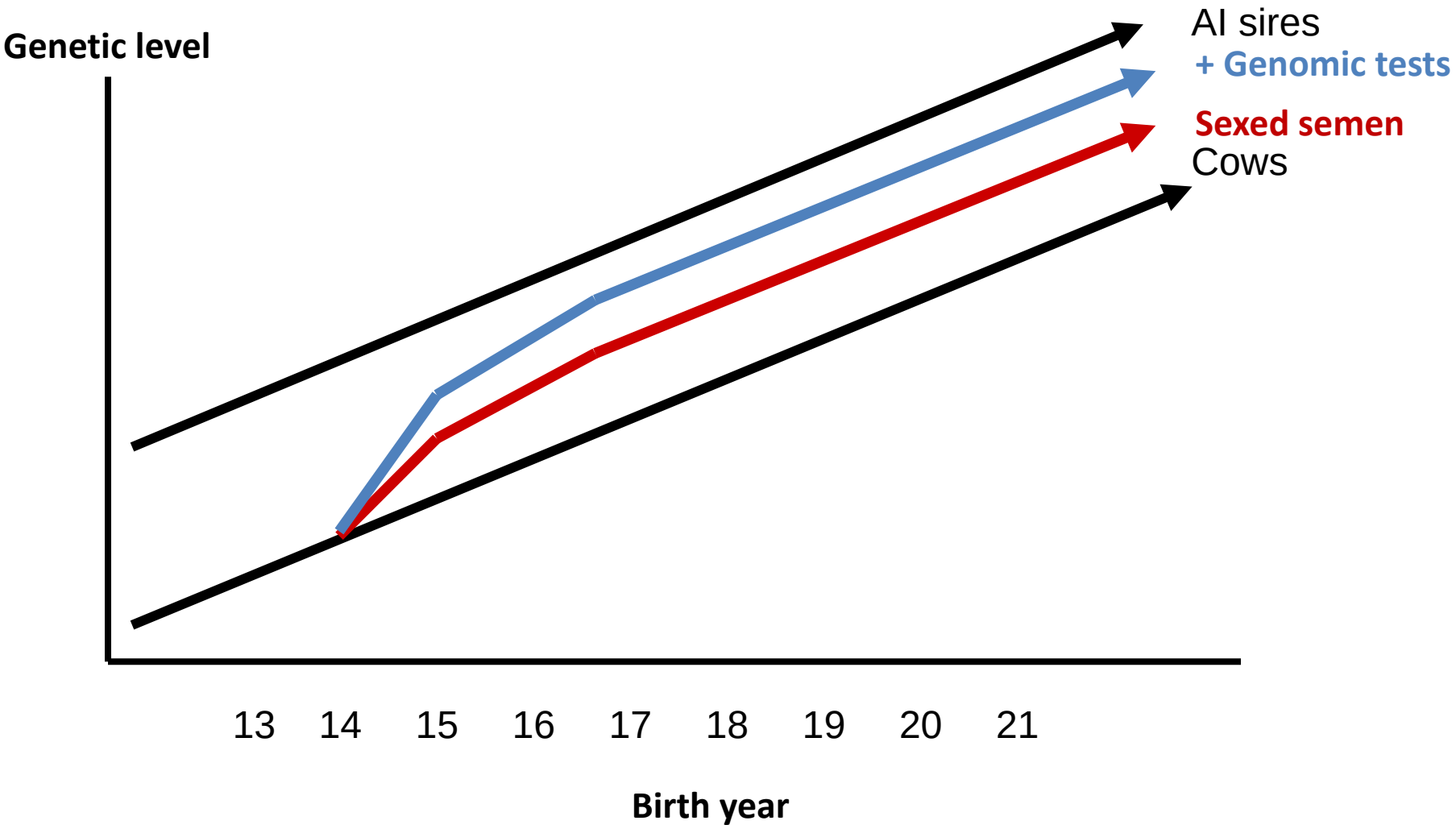
Reasons for genomic test of females

- Finding MOET candidates
- Finding potential bull dams
- Improving the reference population
- Management purposes

Sexed semen reduces genetic lag



Genomic tests increase the accuracy of female selection



Aims

- **To investigate economical consequences of using sexed semen and genomic tests at herd level**

- **To investigate which groups of animals to test**

General assumptions

- **No surplus replacement heifers**
  - **Crossbred calves for beef production**
- **Herd size: 210 Holstein cows**
- **Evaluated at equilibrium – no discounting**

SimHerd

- **Simulates the management of the herd weekly**
- **A mechanistic, dynamic and stochastic simulation program**
- **Assumptions:**
  - **Average Danish management level**
  - **Except good fertility management: Top 25%**

Sexed semen (SS) scenarios

- **Percentage inseminated with sexed semen**

	SS scenarios							
Heifers, %	0	40	60	80	40	40	60	60
Cows, %	0	0	0	0	20	40	20	40

ADAM

- Simulates the breeding scheme annually
- A stochastic simulation program
- Assumptions:
  - Reliability for GEBV(NTM): 50 %
  - Price per Genomic Test: EUR 50

Genomic test (GT) scenarios

- **Percentage genomically tested**
  - **No use of genomic test (No)**
  - **25 % around the truncation point (25 % centred)**
  - **50 % around the truncation point (50 % centred)**
  - **50 % best (50 % best)**
  - **100 % (All)**

Difference in herd marginal contribution × EUR 100 compared to no GT and no SS

		SS scenarios							
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
GT scenarios	No	0	+ 34	+ 35	+ 39	+ 37	+ 42	+ 41	+ 45
	25 % centred	+ 11							
	50 % centred	+ 14							
	50 % best	+ 10							
	100 %	+ 10							

Average of SS scenarios: EUR 3,900
Average of GT scenarios: EUR 1,100

Herd marginal contribution × EUR 100 of GT strategy within SS scenario

		SS scenarios							
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
GT scenarios	No	0	0	0	0	0	0	0	0
	25 % centred	+ 11	+ 12	+ 11	+ 3	+ 16	+ 15	+ 11	+ 9
	50 % centred	+ 14	+ 21	+ 13	+ 3	+ 25	+ 25	+ 14	+ 14
	50 % best	+ 10	+ 14	+ 17	+ 12	+ 22	+ 23	+ 17	+ 18
	100 %	+ 10	+ 14	+ 18	+ 13	+ 21	+ 19	+ 15	+ 17

Interactions of GT and SS in herd marginal contribution × EUR 100

		SS scenarios						
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
GT scenarios	No		0	0	0	0	0	0	0
	25 % centred	0	+ 1	0	-8	+ 5	+ 4	-	- 2
	50 % centred	0	+ 7	- 1	- 11	+ 11	+ 11	-	-
	50 % best	0	+ 4	+ 7	+ 2	+ 12	+ 13	+ 7	+ 8
	100 %	0	+ 4	+ 8	+ 3	+ 11	+ 9	+ 5	+ 7

Average effect of interactions: EUR 400

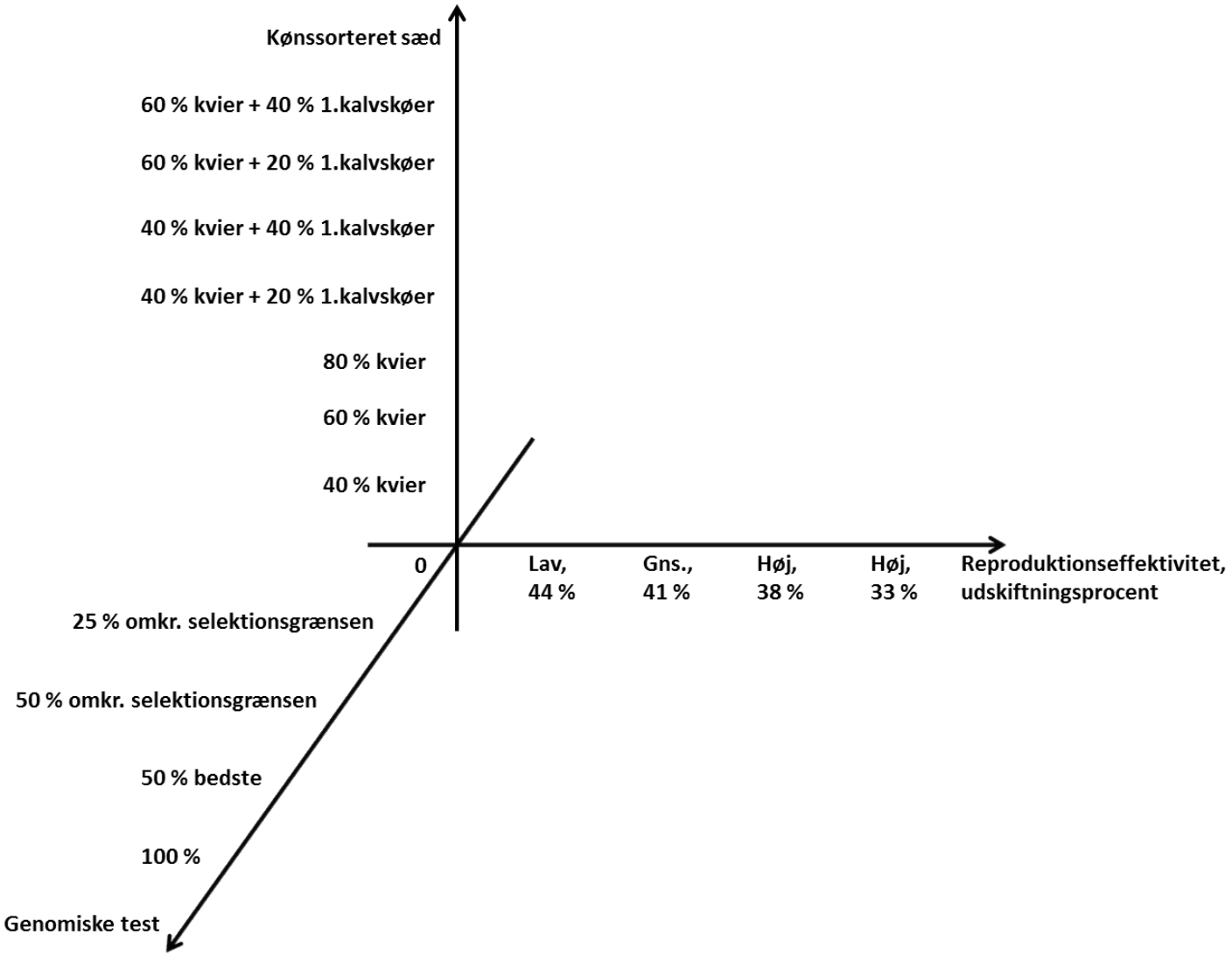
Conclusions

- **Small economic effect of genomic tests under the assumed economic circumstances**
- **There must be a surplus of females before it is relevant to test**
- **Positive interactions between use of sexed semen and use of genomic tests**

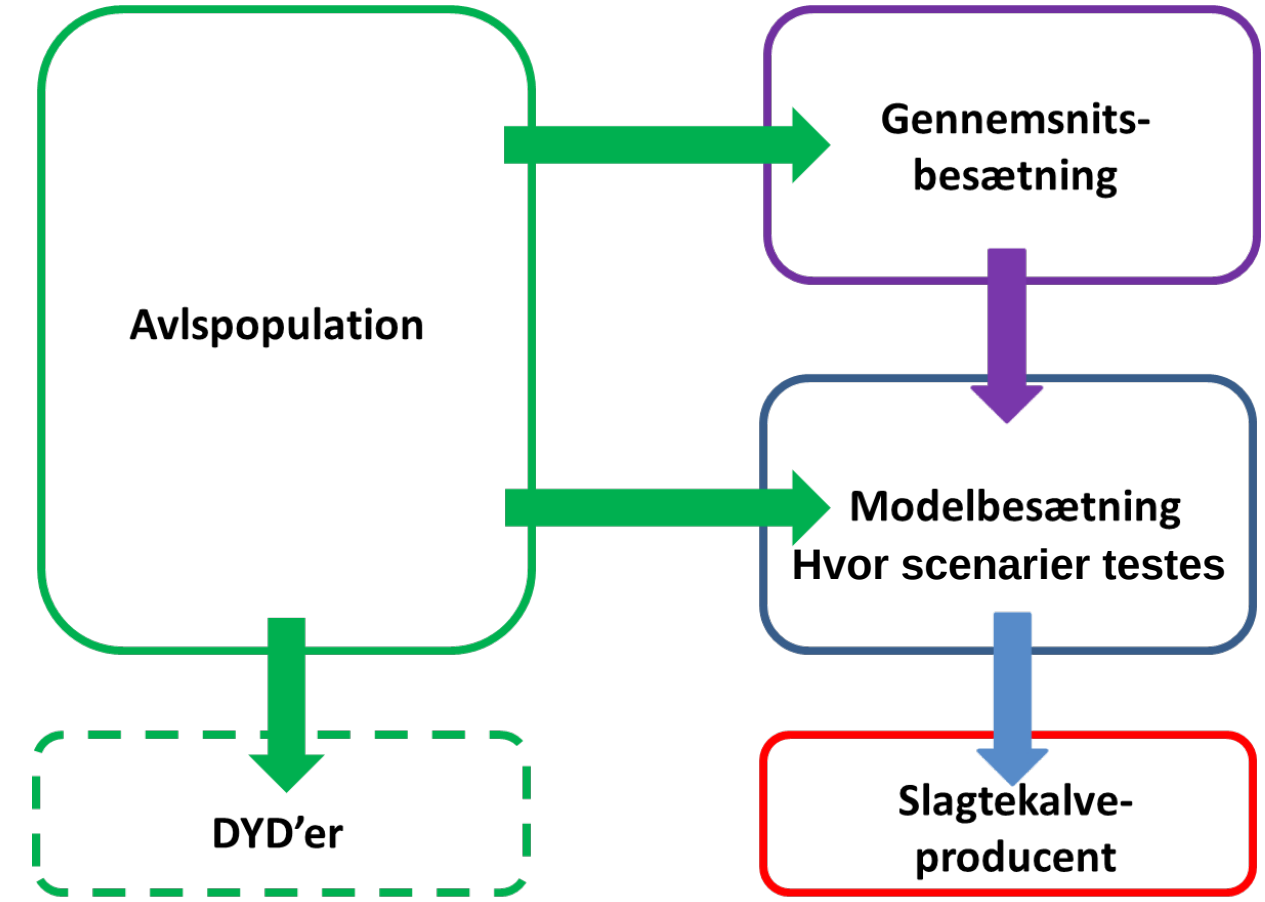
Price assumptions

Purebred heifer just before calving	1,330 €
Purebred bull calf	**70 €**
Beef cross – heifer calf	**60 €**
Beef cross – bull calf	**147 €**

Conventional semen plus visit and insemination	24 €
Sexed semen plus visit and insemination	**49 €**
Beef semen plus visit and insemination	**25 €**
Price per GT	50 €


Kønssorteret sæd
60 % kvier + 40 % 1.kalvskøer
60 % kvier + 20 % 1.kalvskøer
40 % kvier + 40 % 1.kalvskøer
40 % kvier + 20 % 1.kalvskøer
80 % kvier
60 % kvier
40 % kvier
0
Lav, 44 %
Gns., 41 %
Høj, 38 %
Høj, 33 %
Reproduktionseffektivitet, udskiftningsprocent
25 % omkr. selektionsgrænsen
50 % omkr. selektionsgrænsen
50 % bedste
100 %
Genomiske test

Populationsstruktur



100 afkomsundersøges årligt

Results
of tested heifers

	GT-strategy			
Repro scenarious	**25 % centered**	**50 % centered**	**50 % best**	**all**
High (38 %)	**20**	**40**	**40**	**81**

Value of reduced genetic lag due to use of SS without genomic tests (€ per cow year)

SS-strategy							
0	40	60	80	40	40	60	60
0	0	0	0	20	40	20	40
0	8,5	9,4	10,7	9,8	10,6	11,5	12,3

Break-even price in euros for genomic test of all heifers

Sexed semen scenarios							
0	40	60	80	40	40	60	60
0	0	0	0	20	40	20	40
40	30	50	50	40	35	45	45