KNOWLEDGE CENTRE FOR AGRICULTURE
Cattle

Genomic selection strategies for use of genomic tests at herd level

Line Hjortø
Jehan Ettema
Morten Kargo
Christian Sørensen
Torben Nørremark
Anders Fogh

Den Europæiske Union ved Den Europæiske Fond for Udvikling af Landdistrikter og Ministeriet for Fødevarer, Landbrug og Fiskeri har deltaget i finansieringen af projektet.

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Three reasons for use of genomic test

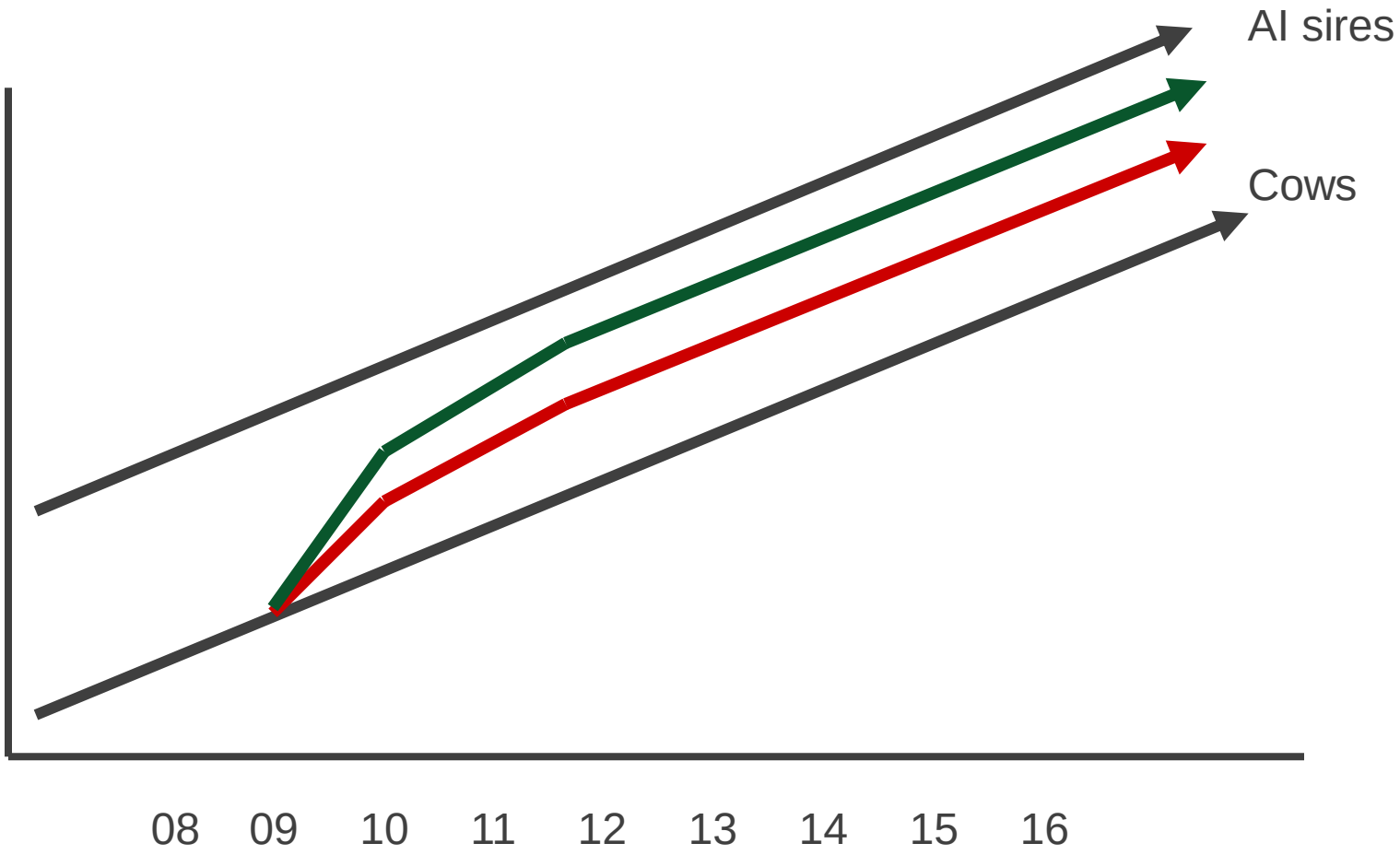
- Testing few high ranking females
  - For the farmer: Finding best cows for MOET
  - At population level: Higher genetic level of bull dams, but no improvement of reference population
- **Management purposes**
- Improving the reference population

Genetic effect of sexed semen at herd level

- The sexed semen have same genetic level as conventional semen - maybe a bit optimistic
- The effect is a consequence of better dams!
  - Reduced genetic lag

New situation

We can increase the accuracy for females



Aim of investigation

- To investigate technical and economical consequences for use of genomic tests at herd level
- To investigate which groups of animals to test

Strategies

- Production of crossbred calves for beef production
- Strategies with different reproduction efficiency and replacement rate
- Strategies with varying use of sexed semen and genomic tests

Repro scenarios

Cows

- Low 44 %:
  - Ins %: 27 %, Conc. rate: 35 %, replac. rate: 44 %
- Avr 41 %:
  - Ins %: 36 %, Conc. rate: 42 %, replac. Rate:41 %
- High 38%:
  - Ins %: 51 %, Conc. rate: 49 %, replac. Rate:38 %

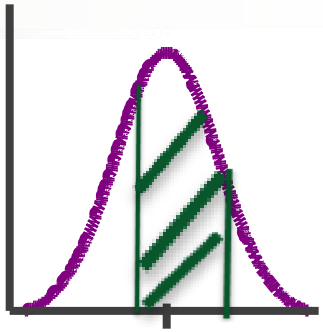
Heifers

- Reproduction efficiency is kept stable over scenarios

Sexed semen scenarios

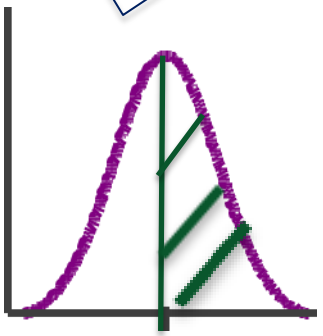
- No use of sexed semen
- 40 % of heifers
- 60 % of heifers
- 80 % of heifers
- 40 % of heifers and 20 % of first lactation cows
- 40 % of heifers and 40 % of first lactation cows
- 60 % of heifers and 20 % of first lactation cows
- 60 % of heifers and 40 % of first lactation cows

GT scenarios



- No use of genomic test (No)
- 25 % around the truncation point (25 % centered)
- 50 % around the truncation point (50 % centered)
- 50 % best (50 % best)
- 100 % (All)

- The selection criteria is NTM
- Reliability for GEBV(NTM) is 50% (HF)
- Price per GT 100 €



Scenarios

Price assumptions

From ”ReproManagement – sund fornuft” except:

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 €

Results
of tested heifers

	GT-strategy			
Repro scenario	25 % centered	50 % centered	50 % best	all
Avr. (41 %)	22	44	44	87
High (38 %)	20	40	40	81

Results

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

		SS-strategy							
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
Repro scen.	Low (44 %)	0	12	11	17	9	15	12	15
	Avr (41 %)	0	20	20	33	25	30	27	32
	High (38 %)	0	13	14	9	25	26	26	23

In accordance with previous calculations!

In some situations is it worth using genomic tests

DB (1,000 €) for herds with average reproduction efficiency including genetic gains

		SS-scenarious							
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
GT scenarious	No	373	377	376	378	378	378	377	378
	25 % centered	373	376	378	377	377	378	379	379
	50 % centered	372	376	377	375	374	375	378	377
	50 % best	371	376	376	376	377	378	376	377
	100 %	369	374	374	371	374	375	373	376
			+ 0.5	+ 0.7	+0.9	+ 0.6	+ 0.8	+ 0.8	+ 1.0

NB: No discount is taken into consideration

In some situations is it worth using genomic tests

DB (1,000 €) for herds with high reproduction efficiency including genetic gains

		SS-scenarious							
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
GT scenarious	No	375	378	377	376	380	380	379	379
	25 % centered	376	380	378	379	380	378	379	380
	50 % centered	374	380	378	377	379	380	379	379
	50 % best	374	379	377	379	377	380	379	378
	100 %	373	377	376	377	376	377	376	376
		+ 0.4	+ 0.6	+0.8	+ 0.5	+ 0.6	+ 0.7	+ 0.8	

NB: No discount is taken into consideration

A reduction of the test price to eg. 50 € will change the conclusion

DB (1,000 €) for herds with high reproduction efficiency including genetic gains

		SS-scenarious							
	Heifers, %	0	40	60	80	40	40	60	60
	Cows, %	0	0	0	0	20	40	20	40
GT scenarious	No	375	378	377	376	380	380	379	379
	25 % centered	377	381	379	380	381	379	380	381
	50 % centered	376	382	380	379	381	382	381	381
	50 % best	376	381	379	381	379	382	381	380
	100 %	379	381	380	381	380	381	380	380
		+ 0.4	+ 0.6	+0.8	+ 0.5	+ 0.6	+ 0.7	+ 0.8	

NB: No discount is taken into consideration

Results

The maximal price (€) to pay for a genomic test on all heifers calculated as average across all sexed semen scenarios.

Avr (41 %)	**40**
High (38 %)	**35**

NB: No discount is taken into consideration

Conclusion

- Small effect of genomic tests with the assumed economic circumstances
- Best to test around the truncation point
- There must be a surplus of females before it is relevant to test
- These results represent a Holstein situation

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