



KNOWLEDGE CENTRE FOR AGRICULTURE

Cattle

# Genomic selection strategies for use of genomic tests at herd level

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## Three reasons for use of genomic test

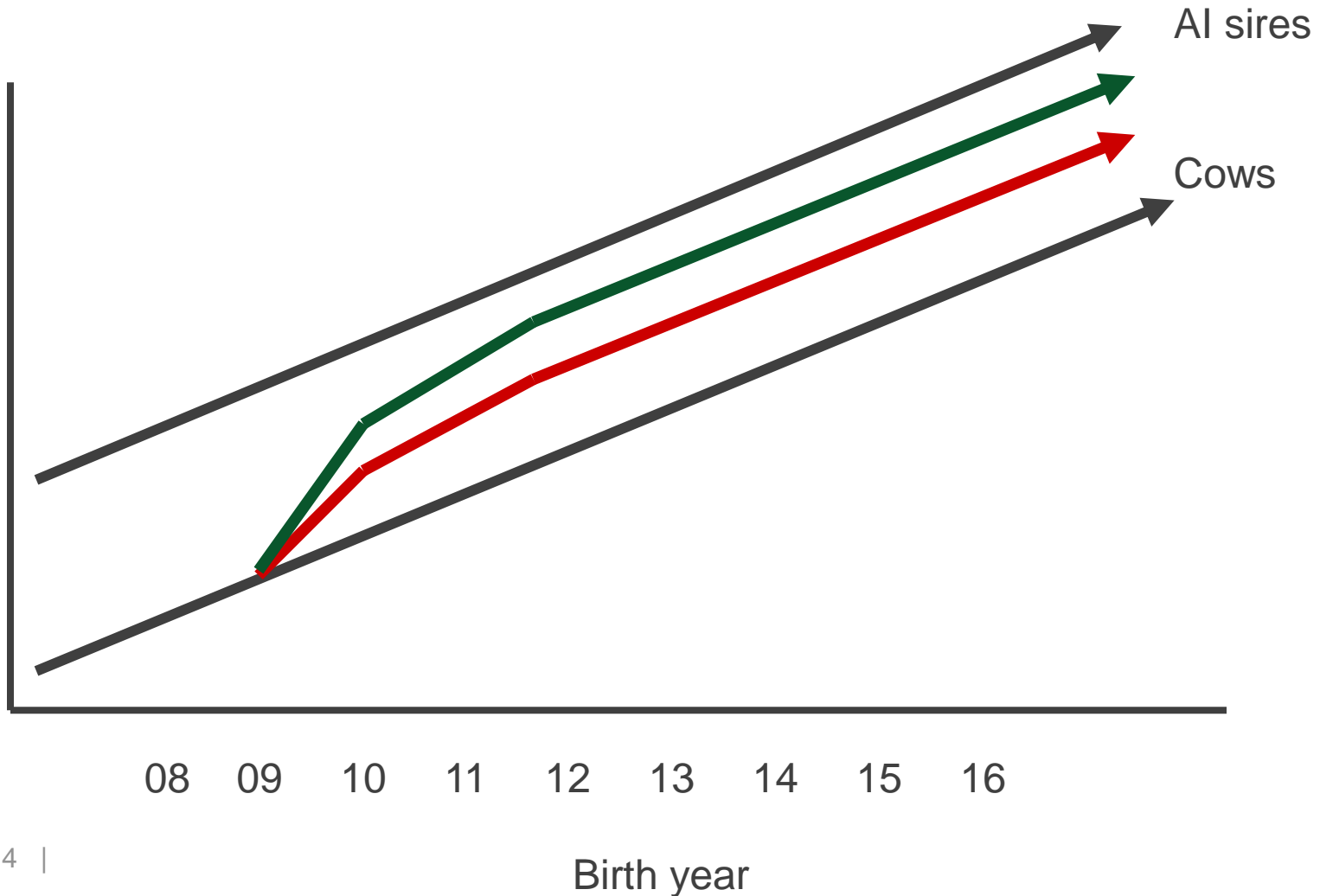
- Testing few high ranking females
  - For the farmer: Finding best cows for MOET
  - At population level: Higher genetic level of bull dams, but no improvement of reference population
- **Management purposes**
- Improving the reference population

## 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

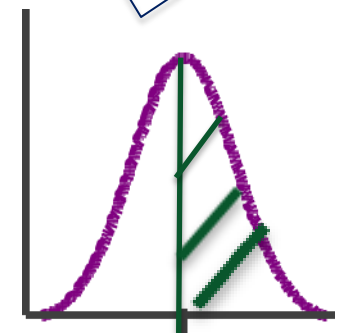
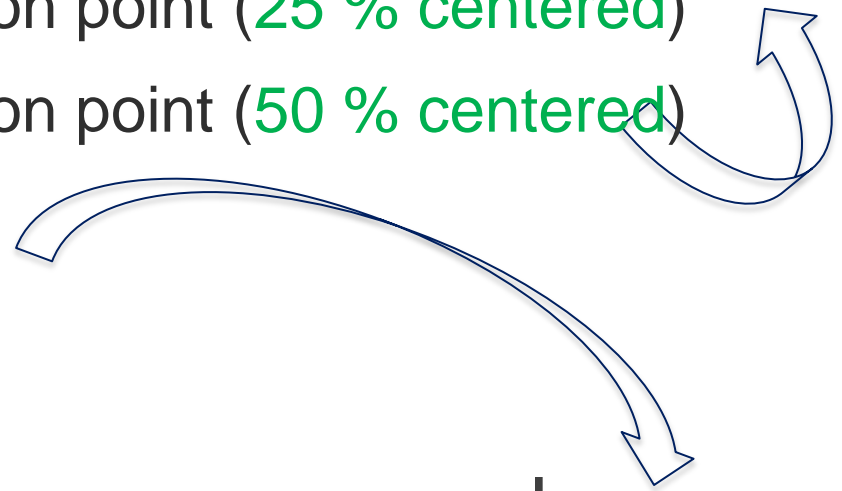
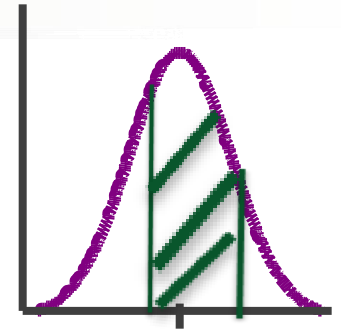
## Sexed semen scenarios

- 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:

<b>Purebred heifer just before calving</b>	<b>1,330 €</b>
Purebred bull calf	70 €
Beef cross – heifer calf	60 €
Beef cross – bull calf	147 €

<b>Conventional semen plus visit and insemination</b>	<b>24 €</b>
Sexed semen plus visit and insemination	<b>49 €</b>
Beef semen plus visit and insemination	25 €

# Results

## # of tested heifers

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

# Results

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

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

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-scenarios							
		0	40	60	80	40	40	60	60
		0	0	0	0	20	40	20	40
GT scenarios	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-scenarios							
		0	40	60	80	40	40	60	60
Heifers, %		0	40	60	80	40	40	60	60
Cows, %		0	0	0	0	20	40	20	40
GT scenarios	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-scenarios							
Heifers, %		0	40	60	80	40	40	60	60
Cows, %		0	0	0	0	20	40	20	40
GT scenarios	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.

<b>Avr (41 %)</b>	<b>40</b>
<b>High (38 %)</b>	<b>35</b>

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

