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Population size is of greater importance than differences in trait definitions and relative weighting for the advantage of co-operation between Nordic and US Holstein

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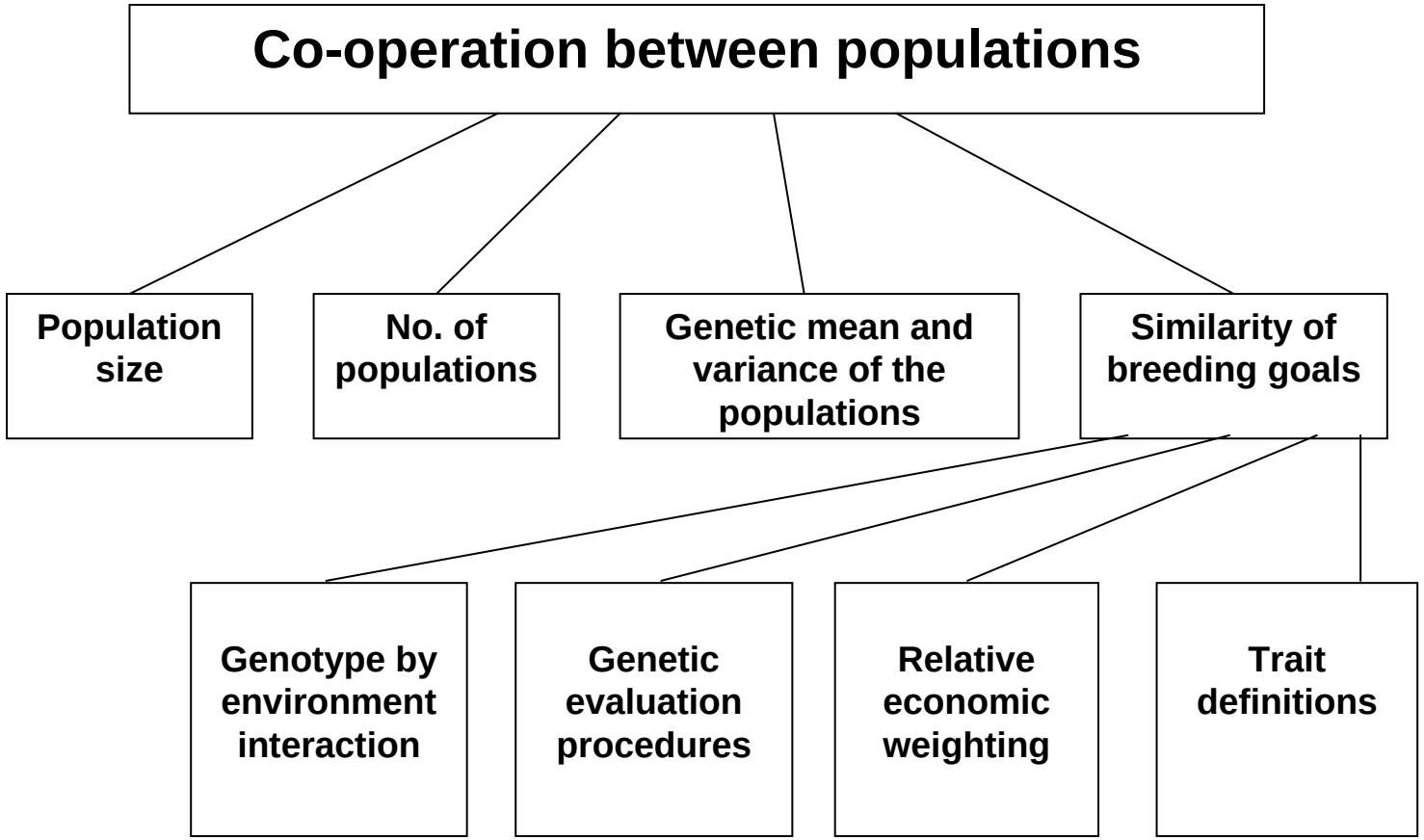
Co-operation

- Higher selection intensity and thus the possibility of higher genetic progress
- Lower degree of inbreeding within populations
- Sale of genetic material

Factors that affects the value of co-operation



Objective

- To quantify the effect of uniform definitions of the female fertility traits on genetic gain
- To quantify the effect of a more similar relative weighting of the index traits across populations on genetic gain

Set up

- Stochastic simulation
  - Nordic Holstein (601,000 milk-recorded cows)
  - US Holstein (3,866,000 milk-recorded cows)
- Correlation matrix: literature study
- Timeframe: 25 years - 15 replicates

Set up

	Nordic	US
Test bulls per year	355	1100
Daughter group size	125	70
Herd size	100	200
Maximum no. of bulls exchanged per year	10	10

Breeding goals

Trait	Nordic	US
Protein yield	202	570
Mastitis resistance	315	
Somatic cell score		166
Daughter pregnancy rate		295
No. of ins.	41	
Days from calving to first ins.	45	
Days from first to last ins.	105	

Economic values in US dollars per phenotypic standard deviation unit

Scenarios

Population	Nordic	US			
Scenario	I-IV	I	II	III	IV
Protein yield	202	570	570	570	300
Mastitis res.	315				
SCS		166	166	166	166
Preg. rate		295	295		
No. of ins.	41			64	64
Calv. - 1. ins.	45			69	69
1. - last ins.	105			162	162
Co-operation		No	Yes	Yes	Yes

Progress in total merit in genetic standard deviation units per year

Scenario	I	II	III	IV
Nordic	0.244	0.258	0.259	0.260
US	0.301	0.294	0.298	0.285

Co-operation increased ΔG in Nordic Holstein

Progress in total merit in genetic standard deviation units per year

Scenario	I	II	III	IV
Nordic	0.244	0.258	0.259	0.260
US	0.301	0.294	0.298	0.285

Uniform definitions did not change ΔG

Progress in total merit in genetic standard deviation units per year

Scenario	I	II	III	IV
Nordic	0.244	0.258	0.259	0.260
US	0.301	0.294	0.298	0.285

A more similar relative weighting did not change ΔG in Nordic Holstein

Genetic progress in genetic standard deviation units per year in Nordic Holstein

Scenario	I	II
Protein yield	0.217	0.242
Mastitis resistance	0.050	0.036
Somatic cell score	0.062	0.049
No. of inseminations	-0.069	-0.080
Days from calving to first ins.	-0.020	-0.034
Days from first to last ins.	-0.034	-0.042

Genetic progress in genetic standard deviation units per year in US Holstein

Scenario	I	II
Protein yield	0.298	0.284
Somatic cell score	-0.012	0.005
Daughter pregnancy rate	-0.070	-0.048
No. of inseminations	-0.104	-0.087
Days from calving to first ins.	-0.075	-0.064
Days from first to last ins.	-0.120	-0.101

Conclusion

Population size is of greater importance than differences in trait definitions and relative weighting for the advantage of co-operation between Nordic and US Holstein

Conclusion

because:

- Co-operation increased ΔG in Nordic Holstein but it did not change ΔG in US Holstein
- Uniform definitions of the fertility traits did not change ΔG
- A more similar relative weighting of the selection index traits did not change ΔG in Nordic Holstein and it decreased ΔG in US Holstein

Recommendations

- Nordic Holstein should co-operate with US Holstein as it increases ΔG
- US Holstein should for reasons of welfare co-operate with Nordic Holstein