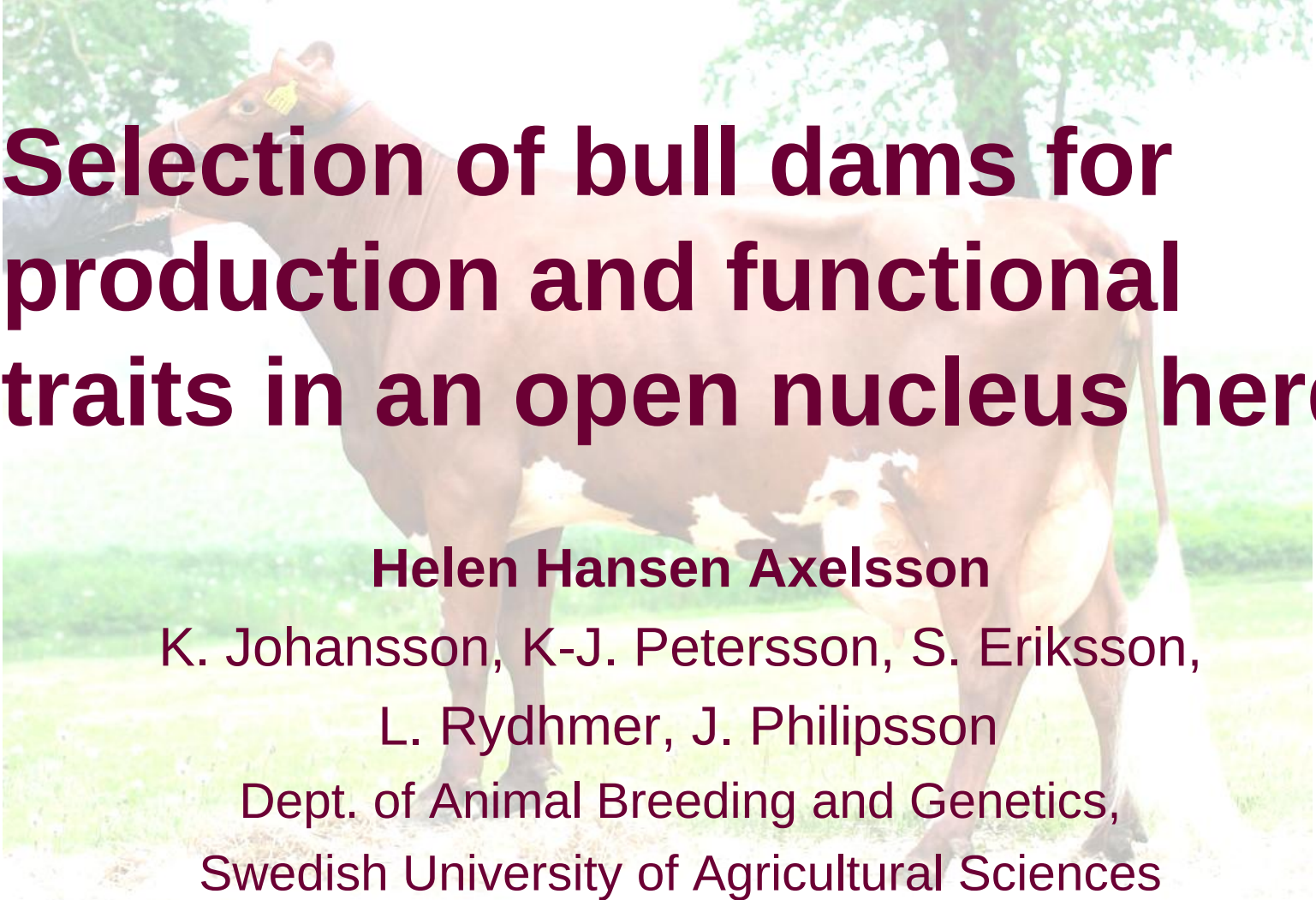




Selection of bull dams for production and functional traits in an open nucleus herd

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Background

- Breeding schemes with nucleus herds and MOET are used by breeding companies
- Possibility to gather the best female genetic material
- Possibility to control the environment
- More accurate test of bull dams
- Increases the genetic improvement of dairy populations





Problem

Individual testing of bull dams tends to:

- favor production and conformation traits
- worsen functional traits
- increase inbreeding

Aim



- to estimate the genetic response in functional and production traits from selection of bull dams in an open nucleus herd using current economic weights
- to determine the economic weights needed to keep functional traits in selected bull dams unchanged

Material and methods



- Deterministic simulation study
- Selection index methodology
- Field and nucleus recorded fertility and udder health traits used simultaneously
- Genetic and phenotypic parameters from the literature
- Economic weights adapted from Nordic Cattle Genetic Evaluation
- Genetic response is expressed per generation

Material and methods, cont



- Traits measured in field (F) and in nucleus (N)
- Economic weights in euro/genetic stand. dev.

Trait	Abb.	Measured	Ec. w NAV
Conception rate	CR	F, N	0.54
Int. between calving and first insemination	CFI	F	-0.56
Number of fertility treatments	NFT	F,N	-2.97
Heat intensity	HI	N	0
Progesterone	PROG	N	0
Int. between calving and first insemination	CFI N	N	0
Clinical mastitis	CM	F,N	-2.51
Lactation somatic cell score	LSCS	F	0
Lactation somatic cell score	LSCS N	N	0
Protein yield	PY	F, N	4.81

Genetic parameters



Heritability:

- protein yield 0.35
- fertility 0.02...0.10
- udder health 0.03...0.14

Genetic parameters



Genetic correlations:

- between PY and conception rate $-0.3...-0.35$
- between PY and int. calving to first ins. 0.35
- between PY and udder health $0.15...0.30$

Scenarios



Four basic scenarios:

1. Only pedigree index (PI)
2. PI and own records on protein yield (PY)
3. PI and own records on PY and fertility (F)
4. PI and own records on PY, F and udder health (U)

Genetic response in breeding goal traits

Scenario	Traits				
	CR	CFI	NFT	CM	PY
1 PI	-0.19	0.20	0.06	0.12	0.52
2 PI+PY	-0.26	0.26	0.08	0.14	0.70
3 PI+PY+F	-0.27	0.29	0.09	0.15	0.71
4 PI+PY+F+U	-0.27	0.29	0.09	0.21	0.73

- Unfavorable genetic gain in functional traits



Restricted index



- The aim was to derive new weights for selection of bull dams
- Desired gain in CR, CFI and CM equal to zero

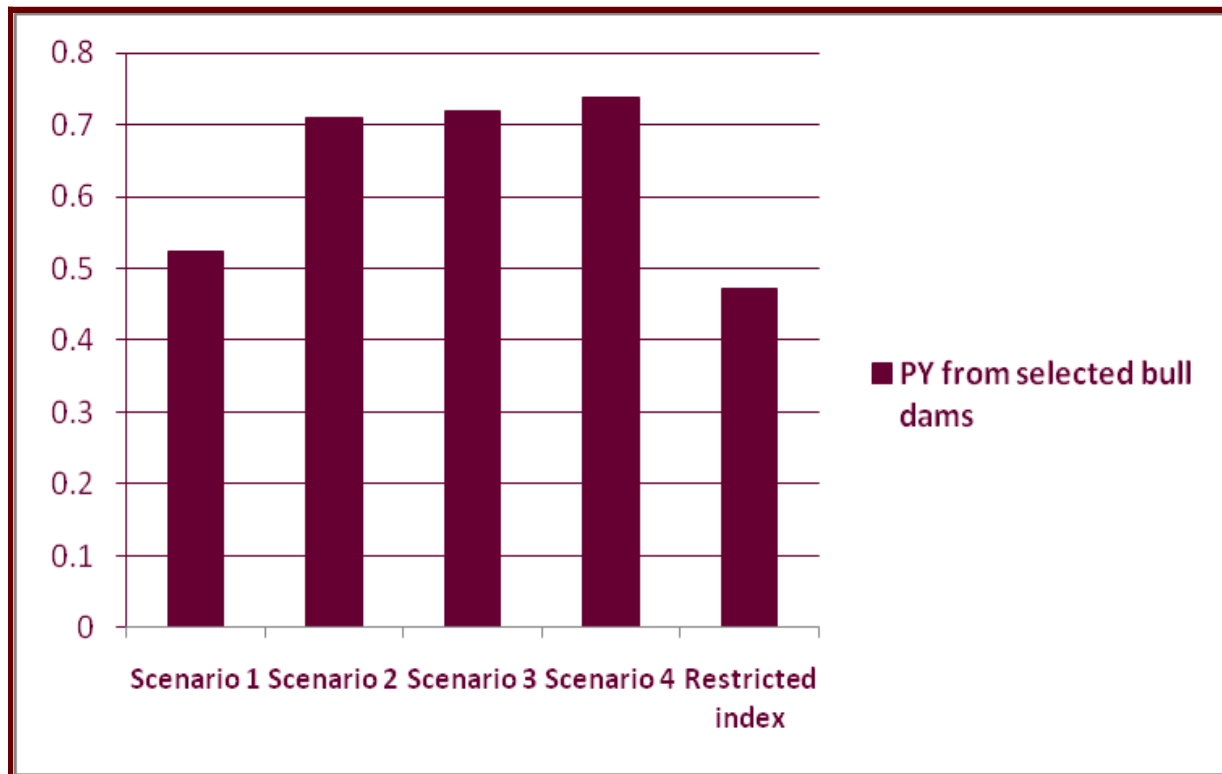


Comparison of weights

Trait	Current weights	Restricted index
CR	0.54	9.10
CFI	-0.56	-12.57
CM	-2.49	-6.82
PY	4.81	4.81

- More weight should be put on functional traits

Genetic response in PY from selected bull dams



Conclusions



- **Selection of bull dams in a nucleus herd favors production**
- **Much higher weight should be put on functional traits in order to avoid the unfavorable change in selected bull dams' genetic value**
- **Additional recordings in nucleus herd do not give any effect unless more weight is put on functional traits**

Future aspects



- The value of nucleus herd selection of bull dams is questionable when genetic evaluation of bulls based on extensive field records for functional (low heritability) traits is in place
- Implementation of genomic selection makes individual testing of bull dams in nucleus herds less interesting?

Thank you!