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Session G2.9: Breeding schemes and functional genetics – Free comunications

Across country evaluation of clinical mastitis and somatic cell count by multitrait model

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Background

- Rapid genetic progress in milk yield
- Increased interest in udder health
- Strategies vary across countries

Countries participated in interbull evaluation for udder health

Evaluation Year	No. of countries	
	SCC	CM
August 2001	12	4
August 2002	18	4
August 2003	18	4
August 2004	20	4

source: http://www-interbull.slu.se/udder/

Nordic countries

- National recording for health data in dairy
- Clinical mastitis in breeding programs
- Genetic link - Joint evaluation

Nordic cooperation

Joint testing and evaluation

- joint testing and use of AI bulls
- accurate comparison and selection
- efficient utilisation of resources

SCC - CM

- Reasons for culling – single trait model biased
- Indicators of different aspects of udder health
- CM – info. from correlated trait important
- Breeding goal- subsequent lactations needed

Objective

Test multitrait model for joint genetic evaluation of bulls for udder health traits

Source of data

Finland and Sweden

Trait definition

SCC

Lactation mean of log transformed (log_escc) test-day somatic cell count (in 1000/ml)

CM

”0” / ”1”

Veterinary records/culling due to udder diseases within 7days before and 150 days after calving

Description of the data set

	Finland	Sweden	Joint
Cows (mill.)	1,1	1,0	2,2
Lactations	1-3	1-3	1-3
Records (mill.)	2,2	2,1	4,4
Bulls in pedigree			
- With daughters	6060	4358	10,381
- Total	---	---	11,280

Mean SCC and CM by lactation

Mean	Finland	Sweden
SCC		
scc1	4.37(0.9)	3.97(0.9)
scc2	4.38(0.9)	4.14(1.0)
scc3	4.39(0.9)	4.43(1.1)
CM (%)		
cm1	8.2	7.3
cm2	8.6	8.8
cm3	10.6	11.2

Joint across country model

	MT-MP sire model (scc+cm)
Fixed effects	Calv age x Parity x Country
	HY5
	YM x Country
Random effects	
	HY
	Sire
	Residual

Heritability and genetic correlations of SCC and CM in the 1st, 2nd and 3rd lactations

Traits	*scc1*	*scc2*	*scc3*	*cm1*	*cm2*	*cm3*
scc1	0.137					
scc2	0.899	0.122				
scc3	0.811	0.981	0.119			
cm1	0.721	0.664	0.577	0.023		
cm2	0.654	0.704	0.681	0.868	0.020	
cm3	0.577	0.696	0.687	0.759	0.955	0.022

Results

I. Univariate *vs.* Multivariate

Correlation between EBV's from joint multitrait and joint univariate model

Group of bulls	No. Bulls	Traits					
		SCC			CM		
		scc1	*scc2*	*scc3*	*cm1*	*cm2*	*cm3*
Old (1991- 93)	660	0.998	0.998	0.998	0.924	0.924	0.906
Young (1995-97)	330	0.996	0.996	0.998	0.864	0.865	0.867

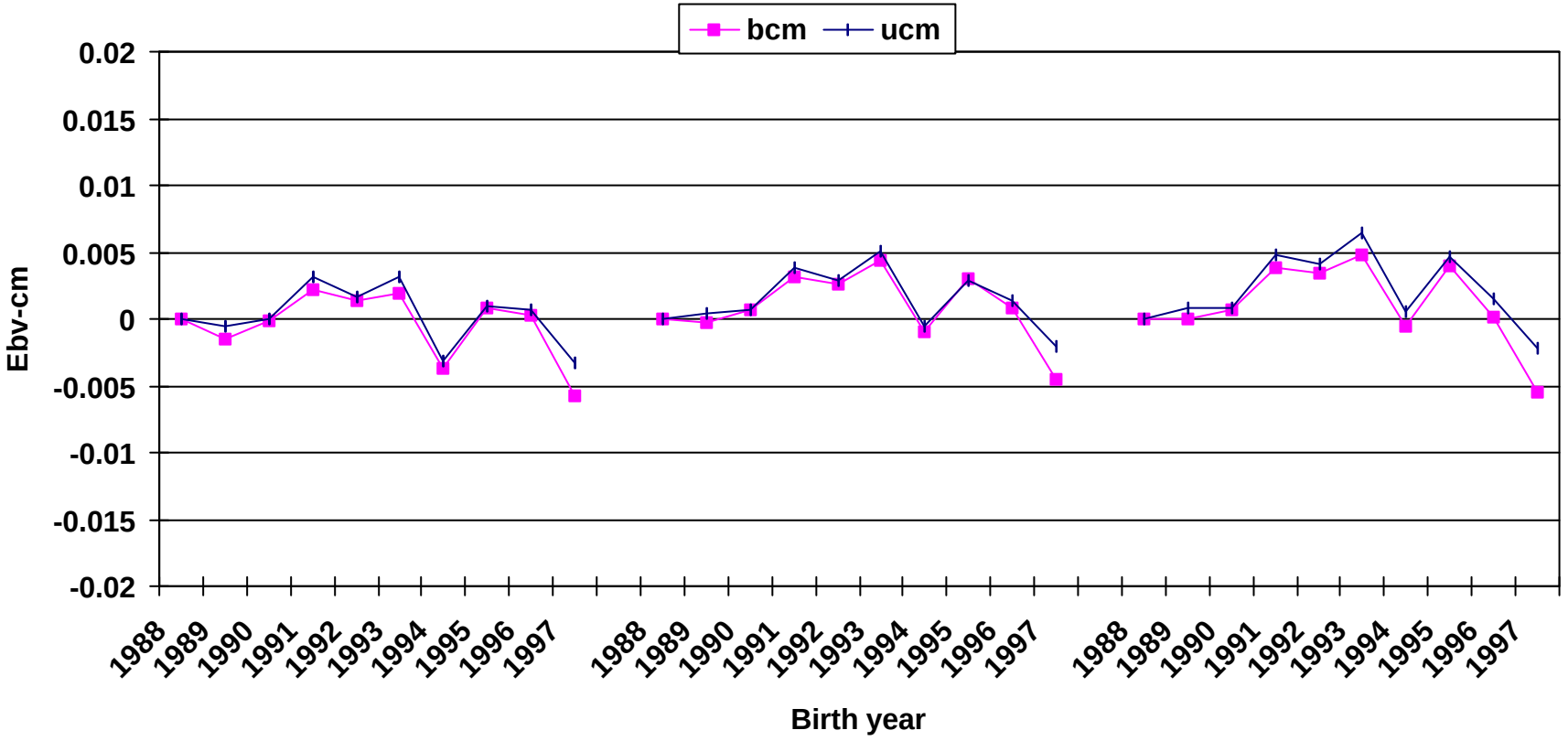
Ranking top bulls: No. bulls common with the univariate model

Traits	No. of common bulls in the top 20
SCC1	19
SCC2	16
SCC3	18
CM1	9
CM2	5
CM3	7

Correlations between EBVs from randomly split data sets

Daughters per sire	Models			
	Univariate		Multivariate	
	SCC	CM	SCC	CM
20-100	0.635	0.601	0.640	0.674
101-200	0.740	0.651	0.750	0.688
>200	0.841	0.611	0.843	0.746

Genetic trend for CM from joint multivariate (bcm) *Vs* univariate (ucm) model



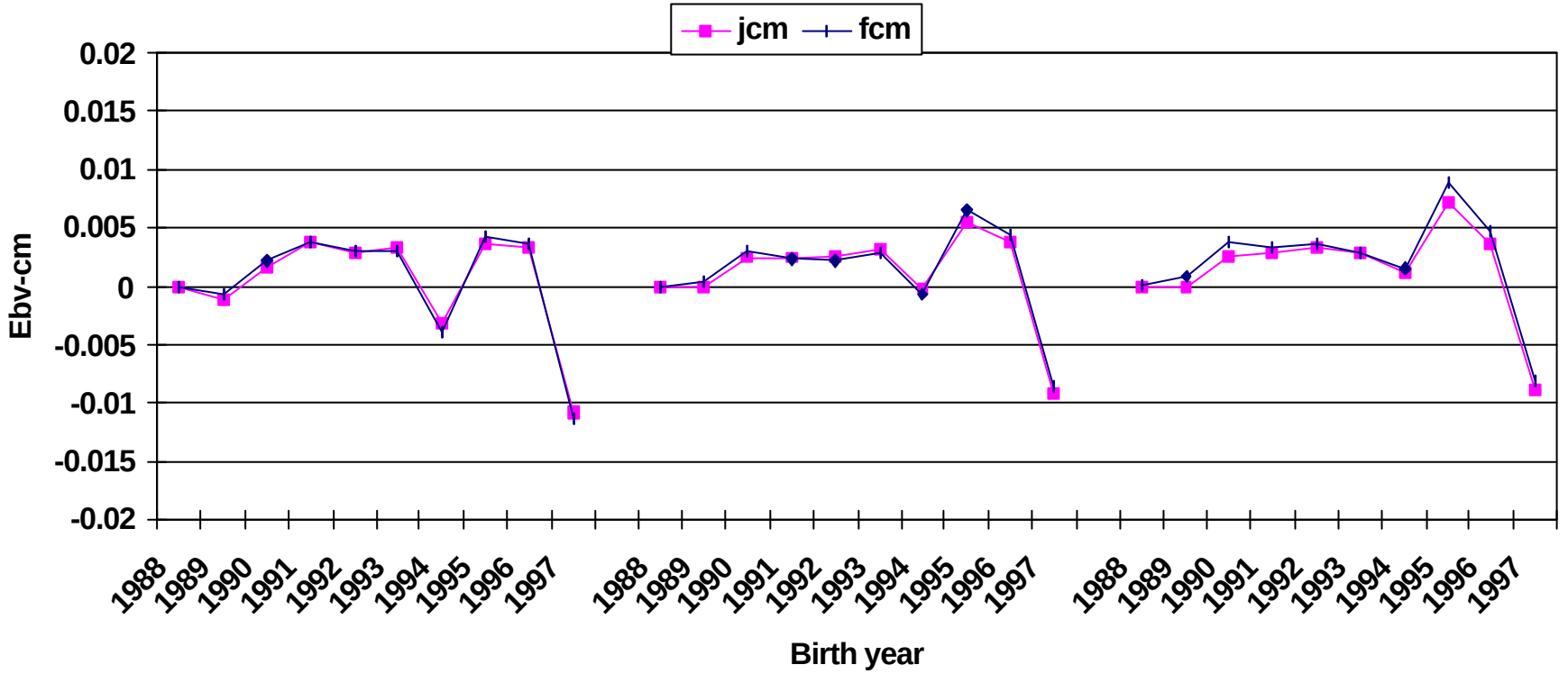
Results

II. Across country *vs.* within country model

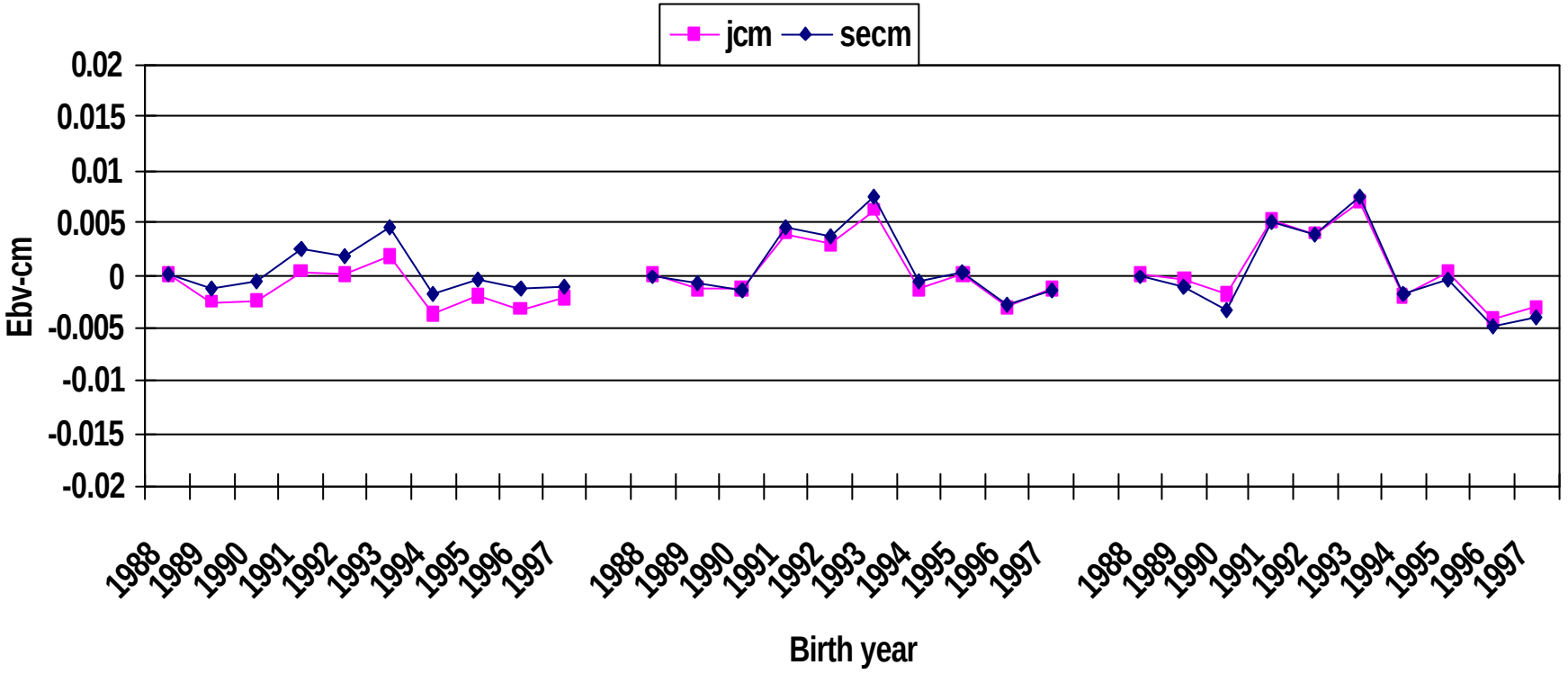
Correlations between EBVs from joint across country *Vs.* within country models

Country	Group of bulls	No. Bulls	Traits					
			SCC			CM		
			scc1	*scc2*	*scc3*	*cm1*	*cm2*	*cm3*
FINLAND	(1991- 93)	338	0.98	0.97	0.97	0.99	0.98	0.97
	(1995-97)	215	0.96	0.96	0.95	0.99	0.98	0.98
SWEDEN	(1991- 93)	329	0.99	0.99	0.99	0.99	0.99	0.99
	(1995-97)	219	0.99	0.98	0.97	0.97	0.97	0.97

Finnish within country vs. joint across country model for CM



Swedish within country vs. joint across country model for CM



Conclusions

- More accutrate prediction of EBVs for CM from MT model.
- MT model stable for predicting breeding value solutions in future records of animals.
- Good agreement between the joint and national models.