



# Preliminary results of bivariate analysis in joint Croatian and Slovenian evaluation for milk traits in Holstein breed

Špehar M.<sup>1</sup>, Ivkić Z.<sup>1</sup>, Klopčič M.<sup>2</sup>, Barać Z.<sup>1</sup>, Gantner V.<sup>3</sup>, Čepon M.<sup>2</sup>, Krsnik J.<sup>2</sup>, Štepec M.<sup>2</sup>, Gorjanc G.<sup>2</sup>, Potočnik K.<sup>2</sup>

<sup>1</sup>Croatian Agricultural Agency, Ilica 101, 10000 Zagreb, Croatia, e-mail: [mspehar@hpa.hr](mailto:mspehar@hpa.hr)

<sup>2</sup>University of Ljubljana, Biotechnical Faculty, Department of Animal Science, Groblje 3, 1230 Domžale, Slovenia

<sup>3</sup>University of J.J. Strossmayer in Osijek, Faculty of Agriculture, Trg Sv. Trojstva 3, 31 000 Osijek, Croatia



# Introduction

- Joint evaluation - greater accuracy due to the enlarged population size
- Austria and Germany
  - Simmental and Brown Swiss
- Nordic countries (Sweden, Denmark, Norway, Finland)
  - Holstein and Red cattle



# Objective

Estimation of genetic parameters for milk traits in Holstein breed



Croatian (CRO)



bivariate model



Slovenian (SVN)

$NAT_{CRO}$

JOINT  $CRO-SVN$

$NAT_{SVN}$



# Material

- Central database
  - Croatian Agricultural Agency
  - Slovenian Agricultural Institute
- Test-day records from routine GE for daily milk (DMY), fat (DFY) and protein (DPY) yields
- Records from Jan 2000 (**SVN**) and 2003 (**CRO**) to Apr 2012



# Data preparation

- Parity (1 – 5 and 1 – 10 (7+))
- Days in milk (6 – 305 and 5 – 400)
- Data editing:
  - Animals without birth, calving, or test date
  - Age at calving
  - Herd, no. cows per herd-year of testing



# Descriptive statistics

Trait	n	$\bar{x}$	$\sigma$
<b>CRO</b>			
Daily milk yield (kg)	1 831 627	21.79	8.26
Daily fat yield (kg)	1 724 245	0.88	0.36
Daily protein yield (kg)	1 762 094	0.73	0.26
<b>SVN</b>			
Daily milk yield (kg)	2 680 001	23.38	7.55
Daily fat yield (kg)	2 680 001	0.94	0.33
Daily protein yield (kg)	2 680 001	0.76	0.23



# Pedigree structure

	CRO	SVN	Jointly
Animals with records	111 218	127 774	238 991
Base animals (%)	30.2	6.1	18.9
Average No. of progenies per sire	8.7	85.3	17.4
Average No. of progenies per dam	1.2	1.5	1.4
Total number of animals	204 831	179 093	382 991



# Pedigree structure

Item/Country	CRO		SVN		Jointly	
	n	%	n	%	n	%
Animal with records	111,217	54.3	127,774	71.4	238,991	62.4
Non base animals	142,879	69.8	168,171	93.9	310,623	81.1
- both parents known	133,787	65.3	155,574	86.9	288,991	75.5
- only sire known	2,439	1.2	7,050	3.9	9,439	2.5
- only dam known	6,653	3.2	5,547	3.1	12,193	3.2
Base animals	61,952	30.2	10,922	6.1	72,368	18.9
Total number of animals	204,831	100.0	179,093	100.0	382,991	100.0
Average number of progenies per sire	8.7	/	85.3	/	17.4	/
Average number of progenies per dam	1.2	/	1.5	/	1.4	/
No of common bulls in the pedigree	16,562	/	4,602	/	668	/
No of common bulls with recorded daughters	11,772	/	1,435	/	251	/





# Method

- SAS
  - Data preparation (SQL)
  - Pearson and rank correlations
  - Genetic trends
- VCE-6
  - Variance components estimation
  - Breeding value prediction



# Models

<u>Effect / Trait</u>	<u>CRO</u> DMY, DFY, DPY	<u>SVN</u> DMY, DFY, DPY
<u>Fixed</u>		
Calving season	+	+
Region	+	
Ali-Schaeffer lact. curve nested within parity	+	+
Age at first calving	QR*	
<u>Random</u>		
Additive genetic effect	+	+
Permanent environment	+	+
Contemporary group	Herd-year	Herd

\*Quadratic regression



# Results



# Estimated variance ratios and correlations

Trait		$h^2$	$r_{aCRO,SVN}$	$c^2$	$p^2$
DMY (kg)	CRO	0.19±0.002	0.78±0.070	0.16±0.002	0.22±0.002
	SVN	0.23±0.002		0.22±0.005	0.25±0.002
DFY (kg)	CRO	0.15±0.001	0.64±0.001	0.15±0.002	0.15±0.001
	SVN	0.19±0.001		0.21±0.005	0.19±0.001
DPY (kg)	CRO	0.17±0.002	0.63±0.001	0.17±0.003	0.18±0.002
	SVN	0.21±0.001		0.27±0.005	0.21±0.002

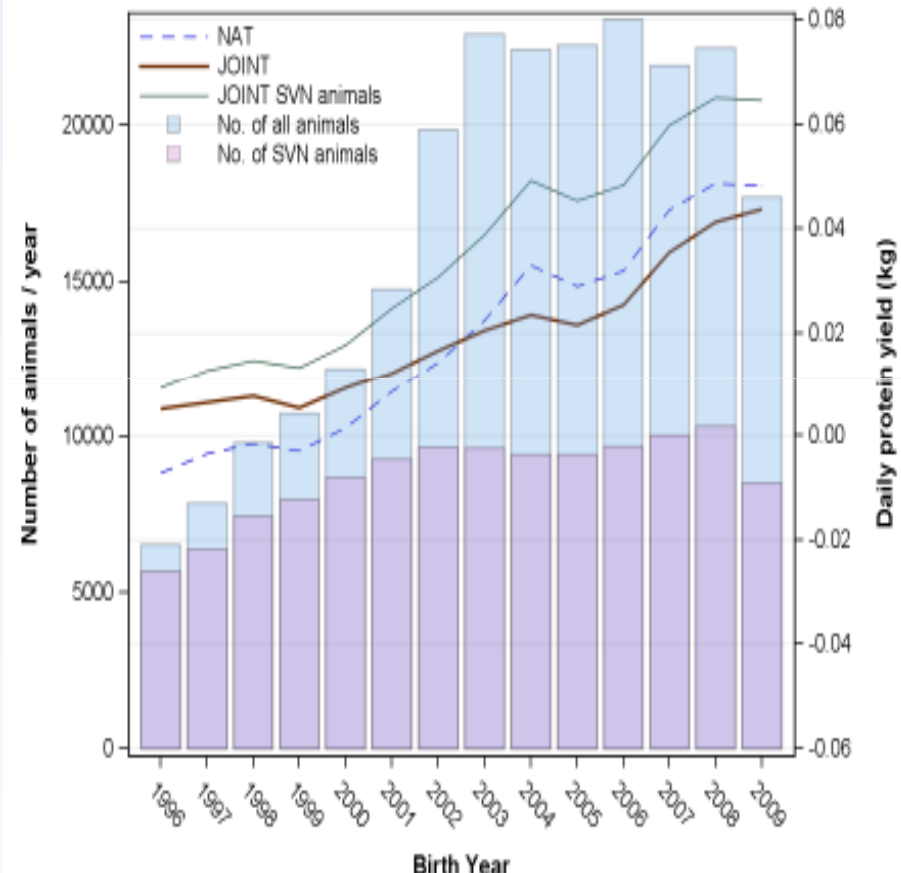
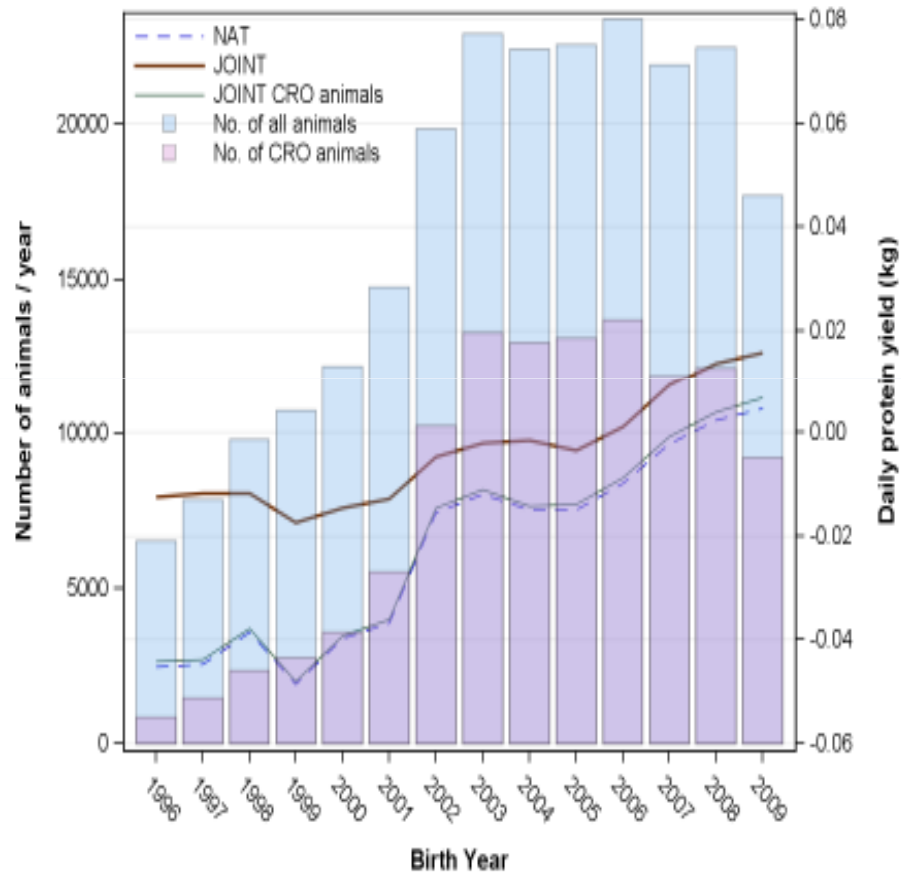


# Correlations between national and joint EBV

Trait	DMY		DFY		DPY	
	*r <sub>p</sub>	r <sub>s</sub>	r <sub>p</sub>	r <sub>s</sub>	r <sub>p</sub>	r <sub>s</sub>
<b>All animals</b>						
<b>CRO</b>	0.991	0.989	0.981	0.976	0.985	0.983
<b>SVN</b>	0.996	0.995	0.994	0.993	0.995	0.994
<b>Bulls</b>						
<b>CRO</b>	0.961	0.966	0.945	0.954	0.950	0.956
<b>SVN</b>	0.949	0.943	0.946	0.947	0.940	0.934
<b>Cows</b>						
<b>CRO</b>	0.993	0.991	0.983	0.978	0.987	0.985
<b>SVN</b>	0.997	0.996	0.995	0.994	0.996	0.995

\*r<sub>p</sub> = Pearson and r<sub>s</sub> = Spearman rank correlations

# Genetic trends



# Conclusions

- Medium to high genetic correlations
- High correlations between inferred BV from national and joint model
- **CRO** scale - national genetic trend similar to the trend observed from joint model
- **SVN** scale - more changes in genetic trends between the joint and national evaluation



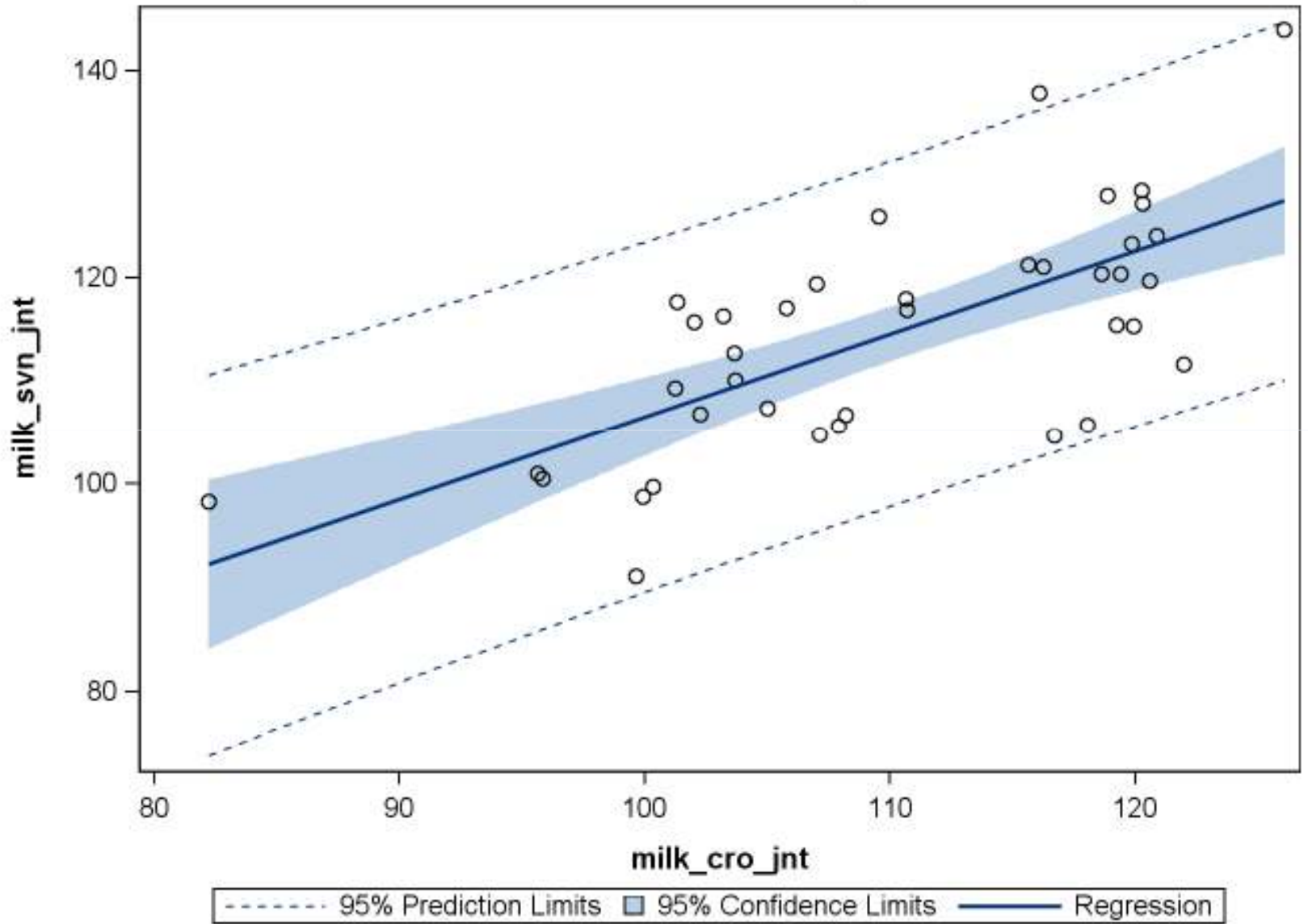
# Future work

- Data improvement (restriction)
- Genetic groups
- Detailed inspection of EBV changes by sources of information
- Single trait model





Common bulls with accuracy > 0.90



Common bulls	Milk		Fat		Protein		Daughters		Diff.milk
accur.>0.9	cro	svn	cro	svn	cro	svn	cro	svn	cro-svn
<b>DEU000341485350</b>	<b>118</b>	<b>106</b>	<b>119</b>	<b>101</b>	<b>119</b>	<b>111</b>	<b>228</b>	<b>57</b>	<b>12</b>
DEU000578448776	117	105	110	109	115	103	176	30	12
USA000131849507	122	112	98	108	109	98	142	62	10
LUX001089710678	100	91	105	97	101	90	28	30	9
NLD000159659261	120	115	126	141	129	124	14	78	5
DEU001015228401	82	98	74	87	80	99	184	108	-16
DEU000345785578	110	126	95	110	103	128	39	80	-16
CAN000000383622	101	118	98	115	95	119	7	58	-16
NLD000839380546	126	144	118	123	126	138	15	105	-18
<b>DEU000347023457</b>	<b>116</b>	<b>138</b>	<b>85</b>	<b>115</b>	<b>106</b>	<b>139</b>	<b>252</b>	<b>273</b>	<b>-22</b>