



Implementation of genomic selection in small populations – Croatian case

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THE GLOBAL STANDARD
FOR LIVESTOCK DATA

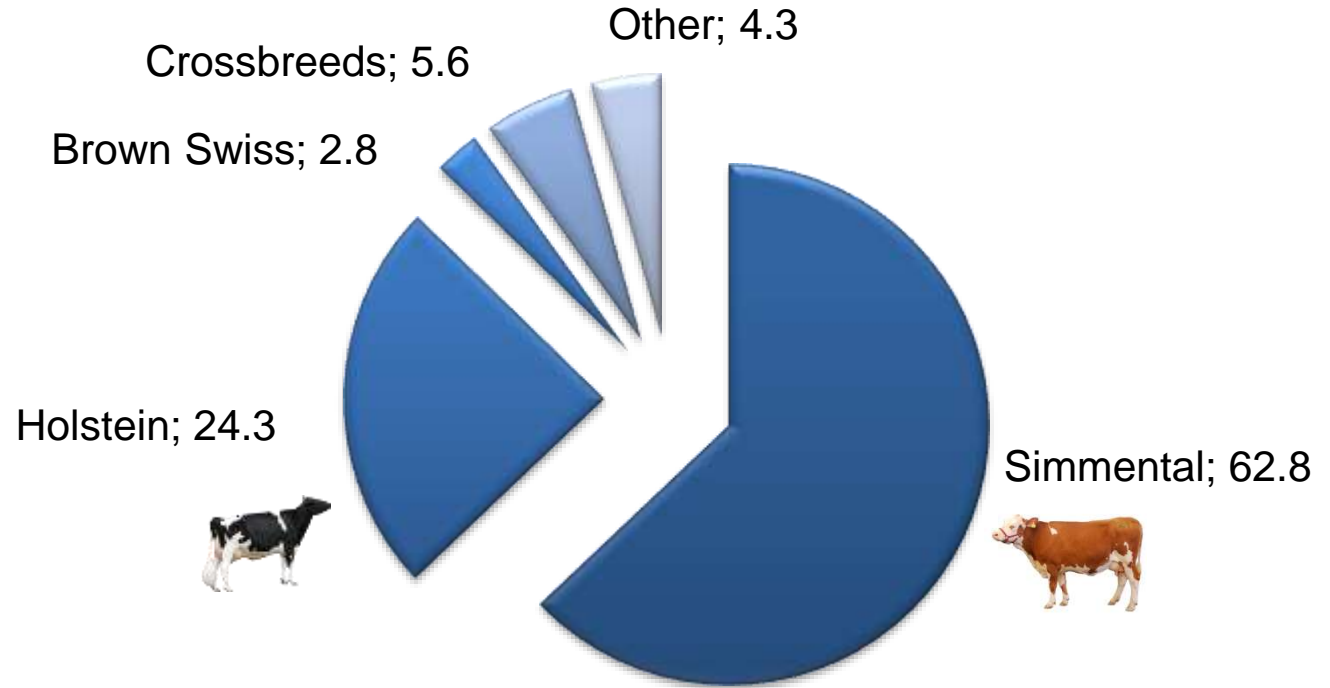


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Marija Špehar, Zdenko Ivkić, Maja Dražić, Zdravko Barać

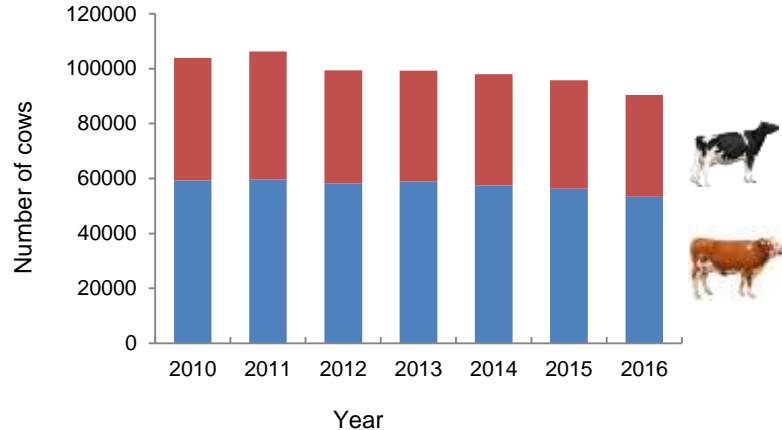
Croatian Agricultural Agency,
<http://www.hpa.hr/>

Structure of Croatian cattle population



Figures and milk recording cows in Croatia

- Cattle population – 462,000
- All cows – 168,000
- Dairy and dual purpose cows – 151,000
- Milk recorded cows – 93,000
- Herds in milk recording – 5,000 (avg. 19)



Past –
present –
future

- Transition period – lack of powerful breeding organizations
- Limitation factors
 - Use of average bulls - do not provide expected genetic gain
 - Huge import of heifers
 - Small number of tested bulls from the national breeding program
- **Revitalization - genomic selection (GS)**

GS in Simmental breed



- German-Austrian genomic evaluation system
- July 2013
- Close relation to Austrian and Bavarian breeding
 - Bull's sires
 - Long-standing import of breeding heifers
 - Bull's semen for artificial insemination (AI)

Goals of GS

- To maintain and improve production of semen from domestic young bulls
- Genomically tested young bulls
- Future perspectives - potential bulls dams



GS in Holstein breed



- German Holstein genomic selection system
- March 2016
- Long-standing import of breeding heifers

Goals of GS



- Produce young females to
 - Reduce import of breeding animals
 - Produce own replacement heifers
 - Ensure market of female breeding material
- Perspectives
 - Intergenomics for small populations (IgHOL)

(Pre) Selection criteria

- Young male and female candidates (from Croatian population)
 - Progenies of the genomically and progeny tested sires
 - Pedigree (interesting lines)
 - Parent average
 - Dam exterior

No of genotyped calves



Year	M	F	All
2013	19		19
2014	85	5	90
2015	61	6	67
2016	40	3	43
2017	35		35
All	240	14	254



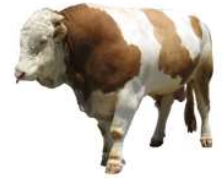
Year	F
2016	72
2017	24
All	96

Partners

- Breeding Associations
- Croatian Agricultural Agency
- AI centres



Selection criteria

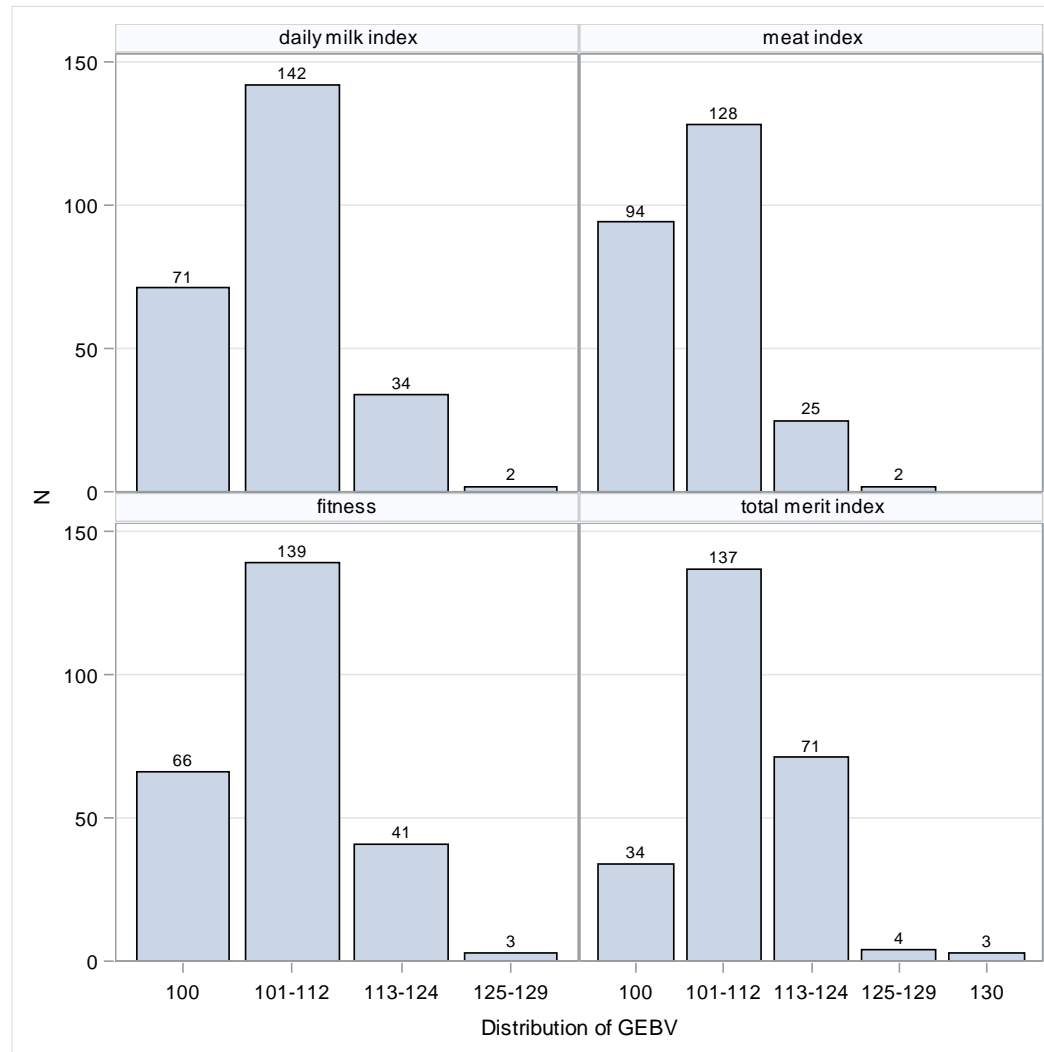


Total merit index (GEBV) \geq 130

Without known genetic defects

Seven young bulls were selected as bulls for AI

Distribution of GEBV for main group of traits



Croatian bulls in Neustadt Aisch centre



Wamures



Besamungsverein Neustadt u.d. Aisch
Bäuerlich, Vielfältig, Nachhaltig.



Mozilla

Selection criteria

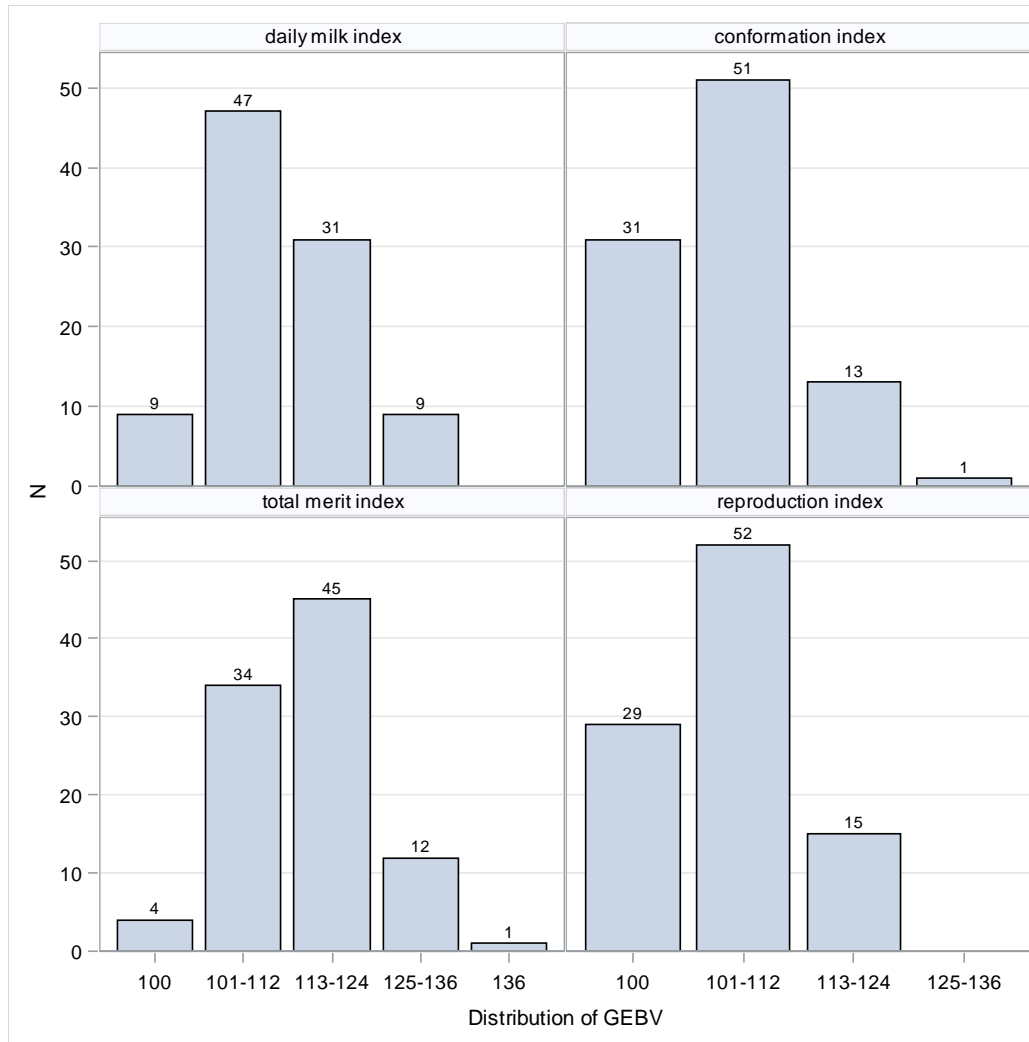


Total merit index ≥ 150

Without known genetic defects

None reached these standards so far

Distribution of GEBV for main group of traits



GS - benefits and obstacles

- Benefits
 - Parentage verification
 - Information about major gene/disease defects
 - Increased usage of semen from domestic bulls - from 8% in 2012 to 23% in 2016
 - Bring back breeders confidence in the national breeding program
- Obstacles
 - Small number of included breeders
 - Insufficient use of the 'best bulls' as bull sires
 - Adaption of German system to the national
 - A high price of GS
 - **Lumpy skin disease**

Conclusions

- Croatian Agricultural Agency - deeply included in genomic services
- Farm level - motivation of breeds to use benefits of genomics
- National level
 - Breeding revitalization through production of genomically tested young bulls
 - Usage of semen from domestic bulls
 - Marketing semen of two young bulls internationally



Fordham, Brooks, Folz, et al. 2014. *Genetics*.

Perspectives

- InterGenomics Holstein service
 - Very good solution for small population - low input for quality service
 - No duplication of work process – fast implementation
 - Results for all animals at all scales of participation countries
 - An efficient way of connecting small populations



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Thank you for your attention.

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