IMPLEMENTATION OF SCC BREEDING VALUES IN ITALIAN JERSEY BREED

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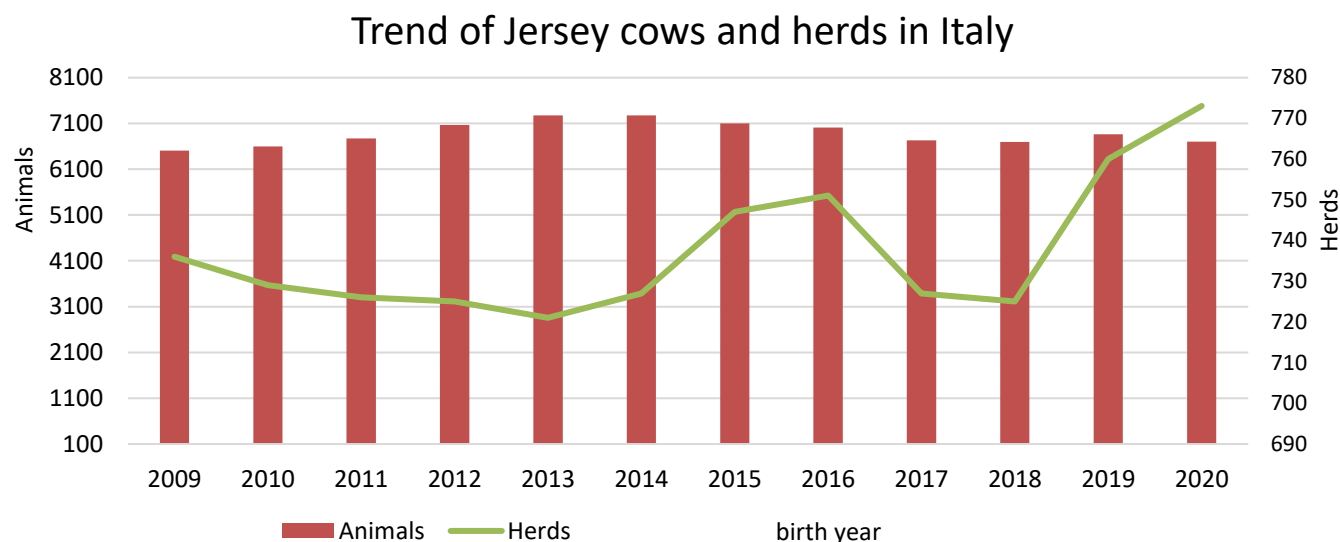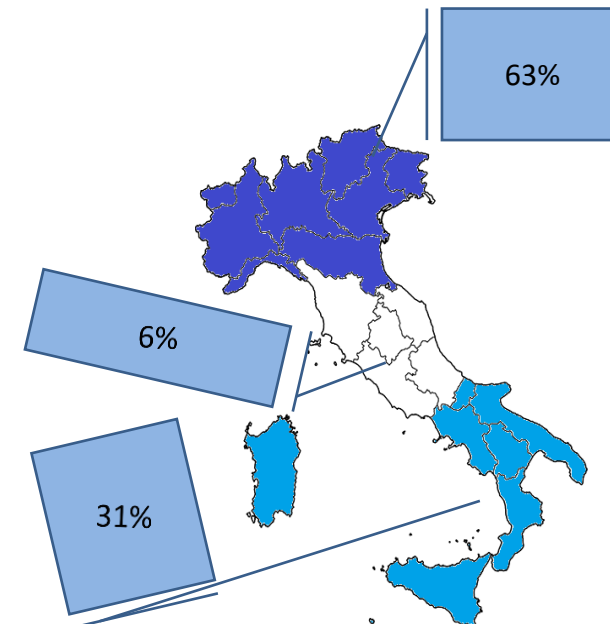
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Italian Jersey – Herd Book and background

- Jersey is farmed in Italy since 1980s

- Jersey Herd Book managed by ANAFIBJ since 1999

- 6701 cows in 773 herds (AIA 2020)

- Herds: 63% in North Italy, 31% in South Italy, 6% in the Central Italy

63%

6%

31%

Trend of Jersey cows and herds in Italy

Animals / Herds — birth year

Animals   Herds

- Average productions: 6794 kg/lactation, 4.86% fat, 3.91% protein

- High quality milk: 82% K-cas BB, 62% β-cas A2A2

- Often farmed in herds with other breeds

Trend of milk, fat and protein production in Italian Jersey
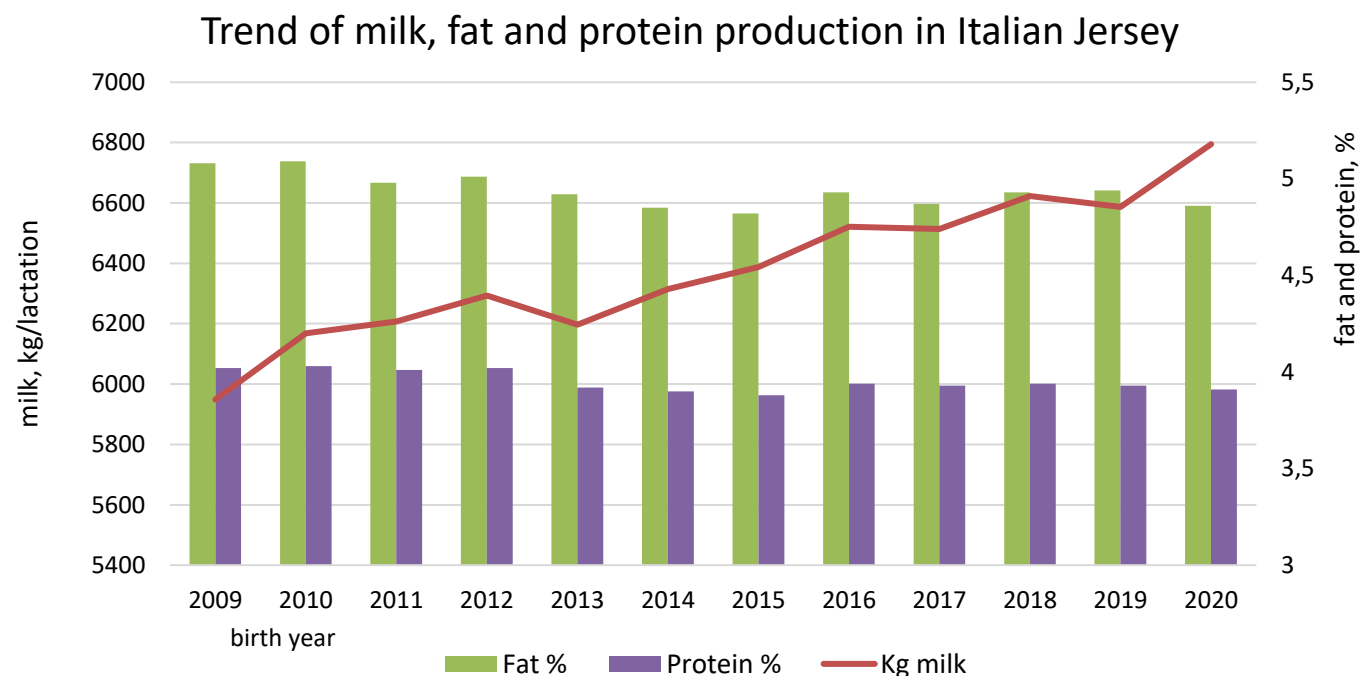
Italian Jersey selection scheme - IQJ

- **Jersey Quality Index** (IQJ) is used from 2001

- At the beginning it include only for milk and protein production

- From 2005 udder morphology was added

- Ratio between **production : morphology** ratio is **84 : 16**

- Italy doesn't select for any health trait in Jersey: lack of data, few animals, recent selection scheme

■ Protein, Kg   ■ Milk, Kg   ■ Fore udder
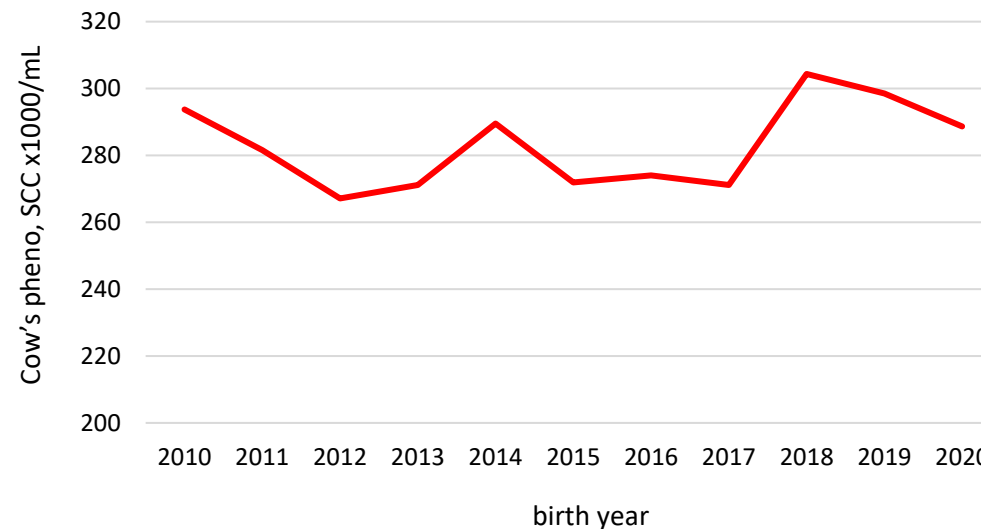
■ Udder support   ■ Udder depth
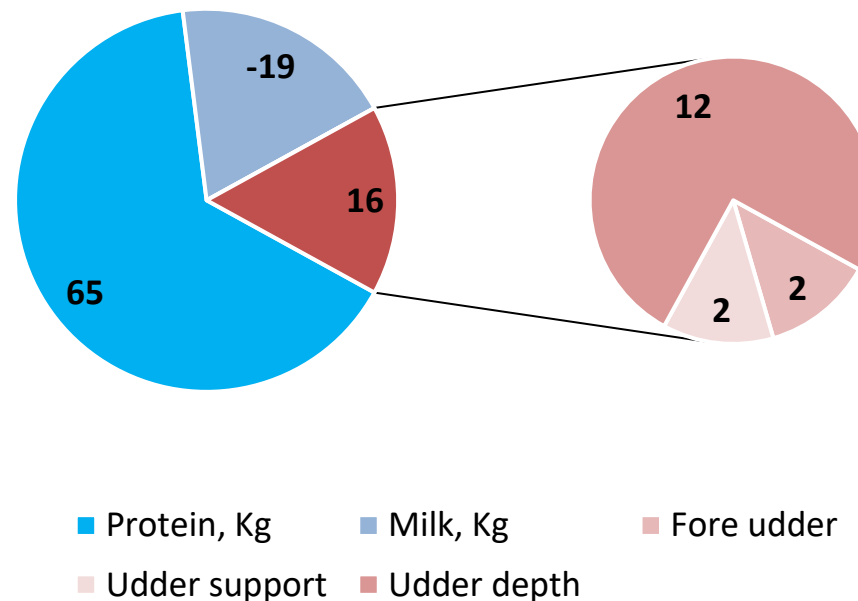
Udder health and mastitis

- Less mastitis = higher udder health

- Udder health = animal welfare = less veterinary costs = milk quality payment

- Jersey has quite high SCC

Trait	Mean	DS
SCC, 10^3cells/mL	293.35	± 346

Mean and DS of Somatic Cell Counts
in Italian Jersey cattle (all dataset)

Phenotypic trend of SCC in Italian Jersey

Objective

- LATTeco project (PSRN): ANAFIBJ focused on **animals health and welfare**

- Relationship between Somatic Cells Count (SCC) and mastitis is well known

- Setup and implement Jersey SCS breeding value in order to select a **progeny more resistant to mastitis → reduction of veterinary costs** and a **valorisation of milk** in quality payment systems

- EBVs for bull is required, and likely it will be implemented in IQJ

Material & Methods

- Starting point: official test days file

- Data: from 2005 to 2016

- 284,904 records on 19,305 animals in 774 herds

- Days in milk (DIM): 5 - 305 d

- Parity up to 3

- At least 2 HTD

Repeatability Test-day animal model

- Y = HTD + parity + DIM + season + PE + animal

- Bulls' breeding values were estimated using a **repeatability test-day animal model**
  - <u>fixed effects</u>
    - herd-test-day (26,866 levels) as contemporary group
    - parity (first, second and third lactation)
    - days in milk (10 classes, 30-d each)
    - season of calving (4 classes, 3 months each)
  - <u>random effects</u>
    - permanent environment
    - additive genetic animal
    - the residual

Results

Somatic Cell Score (3 + log2(SCC/100)) was standardised to mean 100 and standard deviation 5, as all functional traits in ANAFIBJ

Statistics for bull with at least 20 daughters in 10 herds (requirement for publication, 185 bulls)

	Mean	DS	Minimum	Maximum
SCC_daughter	275.41	± 72	162	558
EBull_SCS100	99.47	± 6.72	83	116
Reliability (%)	87	± 7	68	99

Statistics for cows in all dataset

	Mean	DS	Minimum	Maximum
SCC_pheno	293.35	± 346	4	7029
ECow_SCS100	100	± 5.24	78	118
Reliability (%)	50	± 5.63	30	69

SCS Genetic parameters

- 0.087 h²

- repeatability = 0.297

- Genetic correlations between traits weak: small population and not stable data

Traits	r	SE
Milk yield	-0.052	0.117
Fat	0.073	0.099
Protein	0.03	0.101
Lactose	-0.277	0.102
Caseine	-0.053	0.111
Urea	0.184	0.125
Fore udder attachment	-0.144	0.148
Rear udder height	0.072	0.181
Udder support	-0.164	0.187
Udder depth	-0.228	0.041
Front teeth placement	-0.019	0.173
Front teeth length	0.074	0.171

Table 4. Genetic correlations and standard error between SCS with several traits.
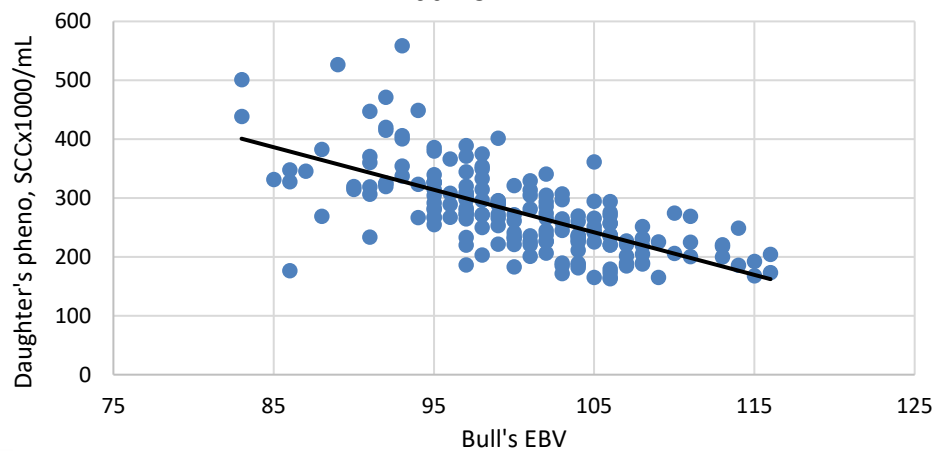
Bull's EBV

Table 5. Bulls with at least 20 daughter in 10 herds were divided into 3 groups for EBV

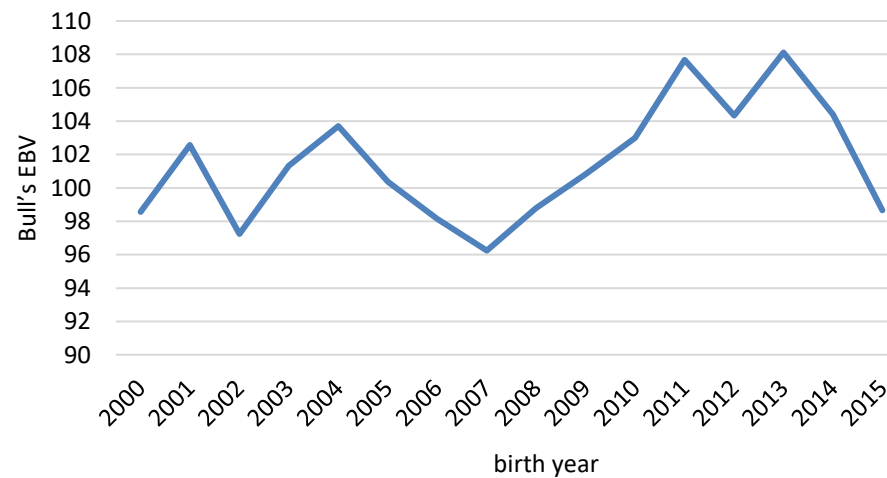| SCS_100	SCC_mean	SCC_DS	mean of n. daughter	bulls
< 95	365.26	± 83.17	84	32
95-105	273.91	± 51.99	118	110
> 105	217.03	± 33.81	90	43

Number of bulls with EBV in Italy
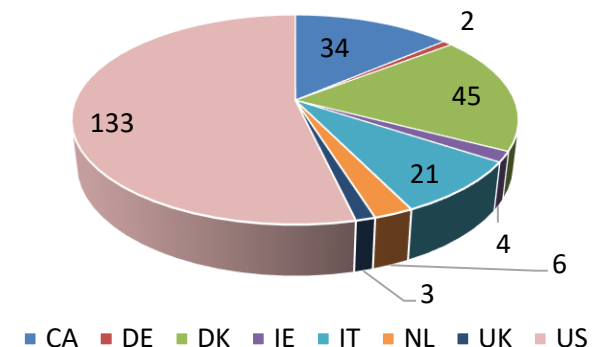
Relationship between daughter's phenotype and bull's EBV
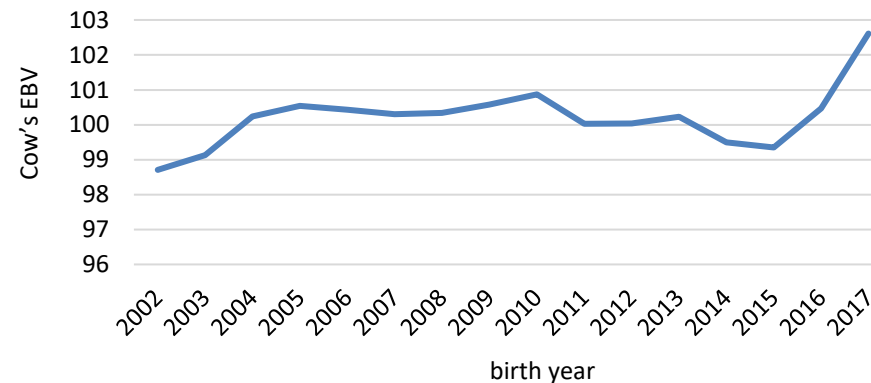

Trend of bull's EBV according to year of birth
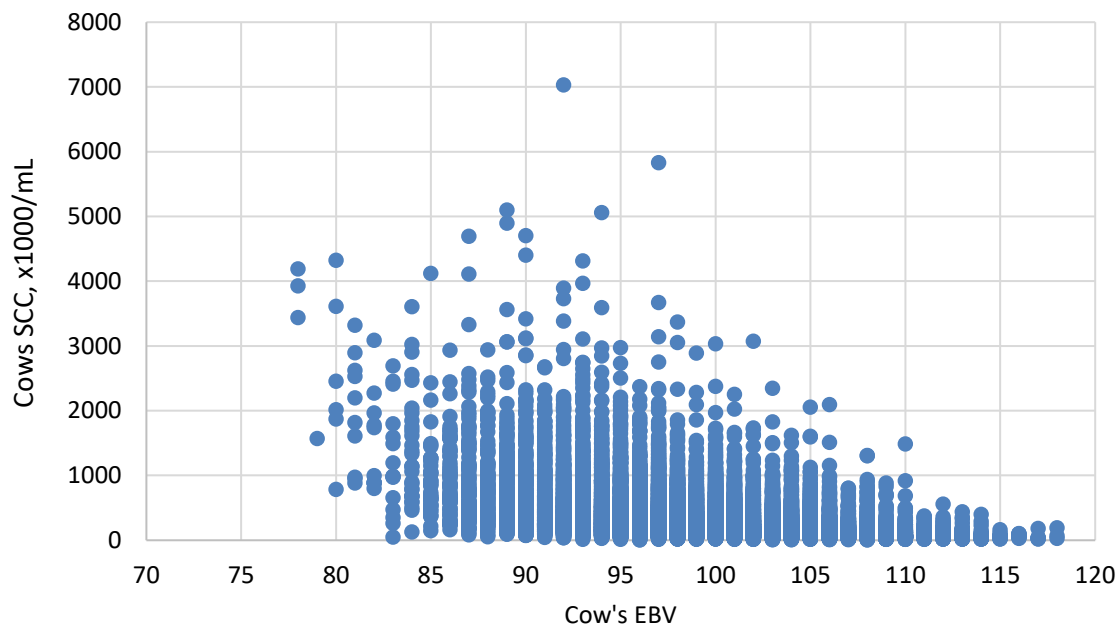
Cow's EBV

Trend not very relevant because no selection applied until now

Trend of cow's EBV according to year of birth

Relationship between cows's phenotype and their EBV

A lot of variability within indexes → selection is possible!

Conclusions

- Selection for reducing SCS in Jersey breed is possible and necessary

- Official bull's selection index since December 2020

- Official international index (Intebull validation) from April 2021

- Next steps:
  - Publish SCS for cows
  - Implementing SCS in IQJ
  - → more functional selection index

Work in progress…

- Publish Locomotion in Morphology traits

- International agreement for genomic evaluation

- New breeder's services → August 2021 'Online Tori Jersey'
  http://onlinejersey.anafi.it/AR/OnLineTori_Jersey.aspx?lang=it-IT&singoloToro=

Thank you for the attention!

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