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MORE THAN MILK

Improving the Stability of the Test-Day Repeatability Model for Production Traits in Italian Brown Swiss

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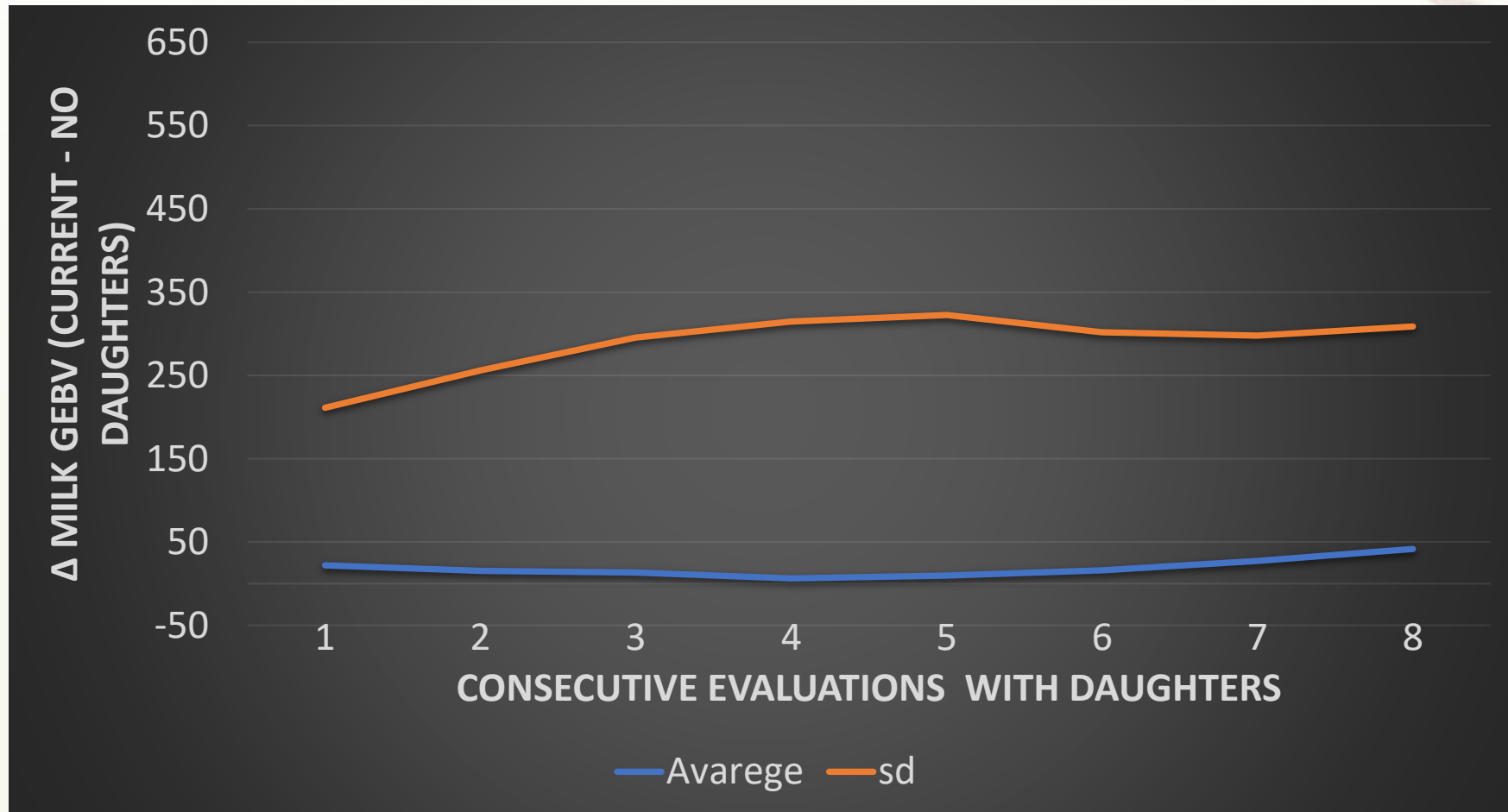
Introduction

- Since 2000: Test day model
- Repeatability model:
 - Many small herds (mountain area and mixed herds)
 - needs to provide a service to all farmers
- Since 2011: Genomic evaluation
- Since 2019: Single Step genomic Evaluation
 - Based on deregressed EBVs



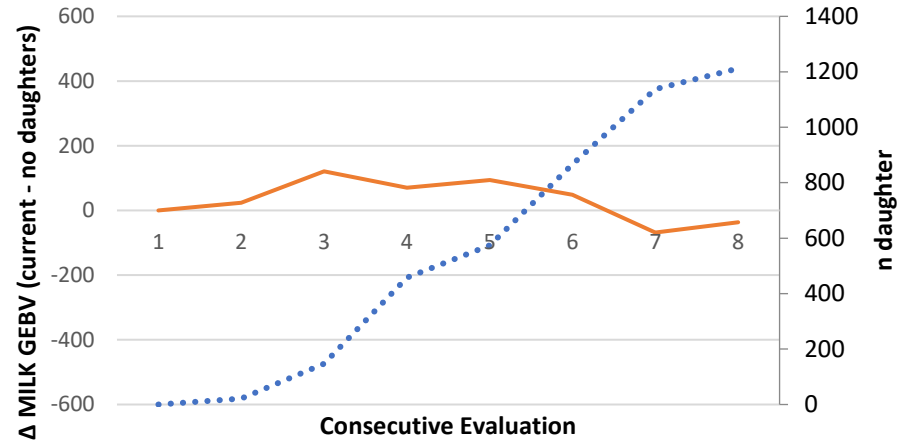
Focus of the Study

- Assess the stability of genetic evaluations as the number of daughter records increases

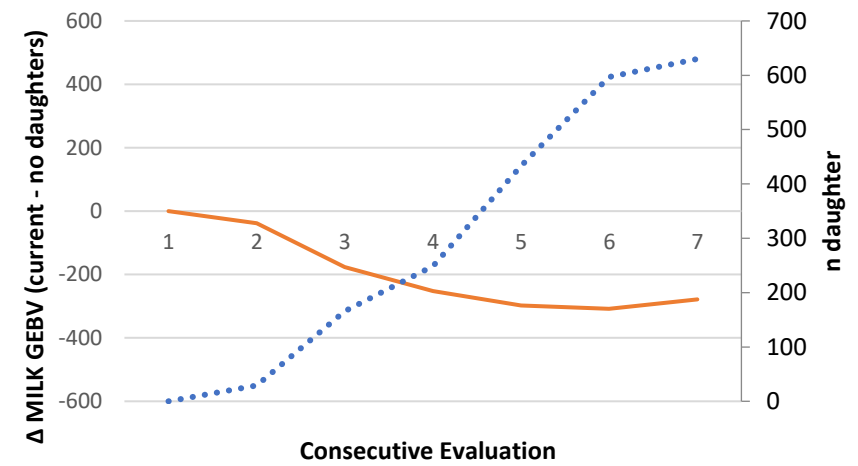


Some examples: 3 bulls

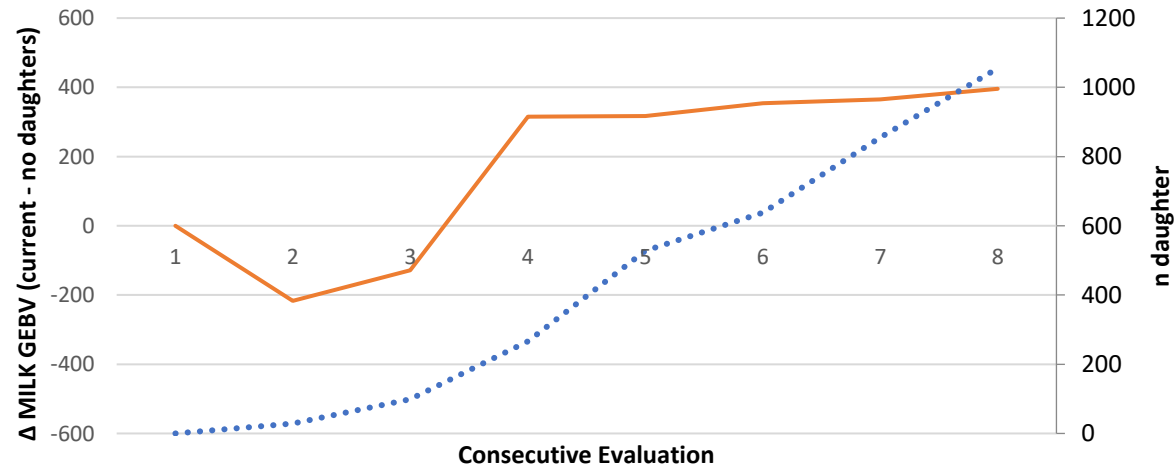
GEV Variability Across Successive Evaluations



GEV Variability Across Successive Evaluations

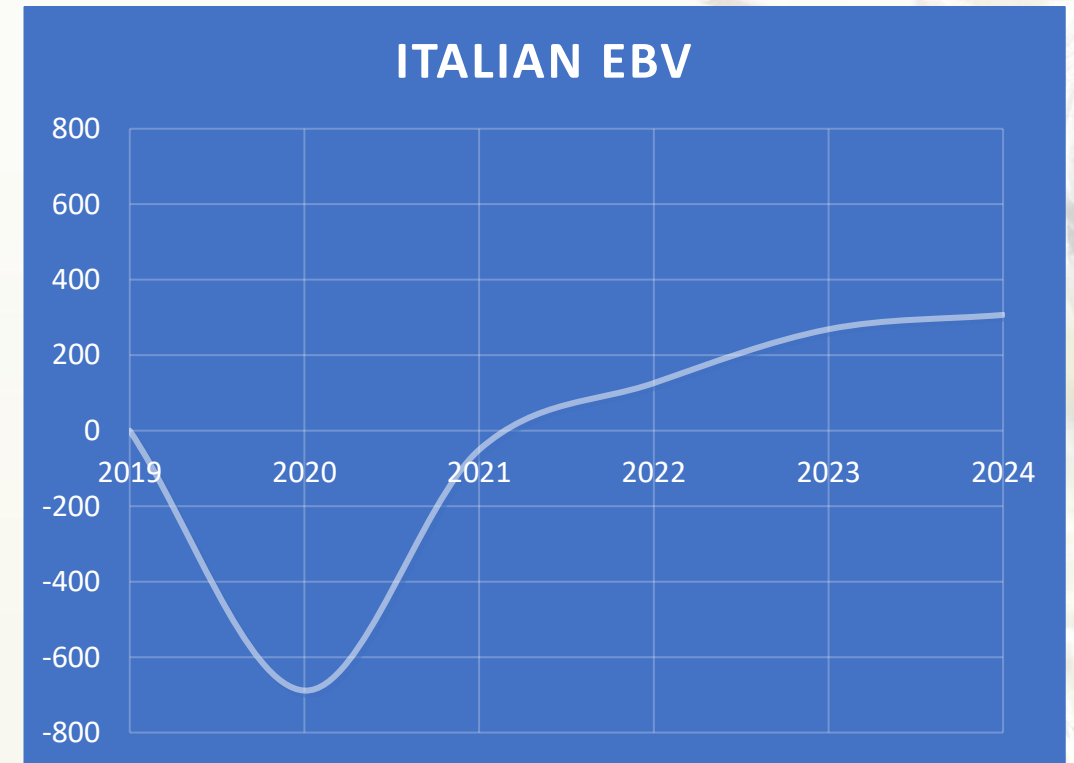


GEV Variability Across Successive Evaluations



Which sires are involved?

- Bulls widely used as young genomic
- Bulls in high demand from the start of their use
- Bulls with strong appeal for breeders with high management levels



Possible sources of instability examined:

- High percentage of short lactations
- All test-day records from first-parity cows
- High percentage of cows that calved at a young age
- Non-random distribution of first daughters
 - Issues with heterogeneity of variance
 - Interactions between herd and other fixed effect

Repeatability Model

Linear model used for genetic evaluation:

$$y = \text{htd} + Y_e \times \text{nlat} \times \text{age} \times \text{dim} \times \text{prg} + \text{pe} + a + e$$

htd: Herd-Test-Day

Ye: Year (quinquennium)

nlat: Lactation number,

age: Calving age

dim: Days in milk

prg: Pregnancy days

Repeatability Model

Linear model used for genetic evaluation:

$$y = \text{htd} + \text{Ye} \times \text{L} \times \text{nlat} \times \text{age} \times \text{dim} \times \text{prg} + \text{pe} + \text{a} + \text{e}$$

htd: Herd-Test-Day

Ye: Year (quinquennium)

nlat: Lactation number,

age: Calving age

dim: Days in milk

prg: Pregnancy days

L: Herd level (primiparous vs multiparous gap)



herd level (production gap Primiparous vs Pluriparous)

Level definition:

Average production difference between first-parity and multiparous cows over the three years prior to the test year.

Editing criteria:

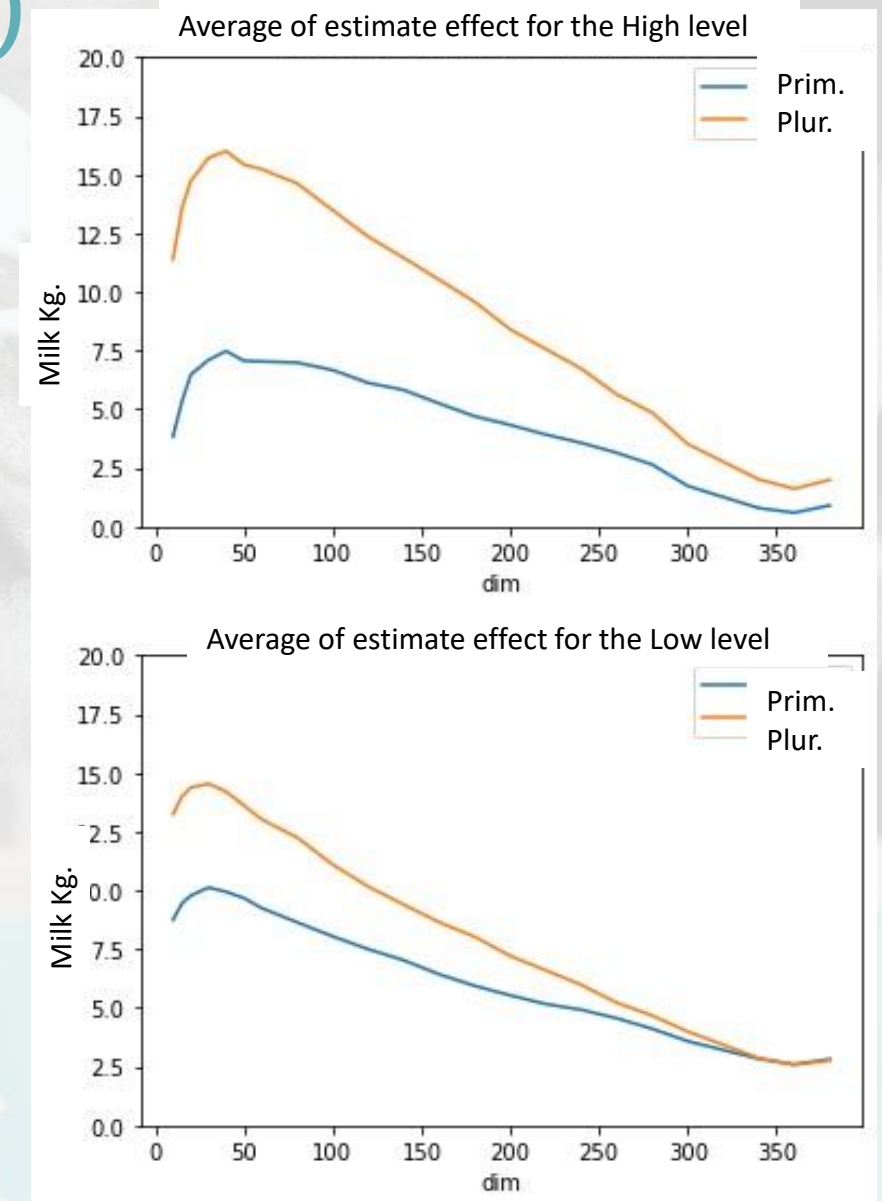
At least 5 completed lactations per year for both first-parity and multiparous cows.

Level limits:

High: Top 25% of herds with the largest differences

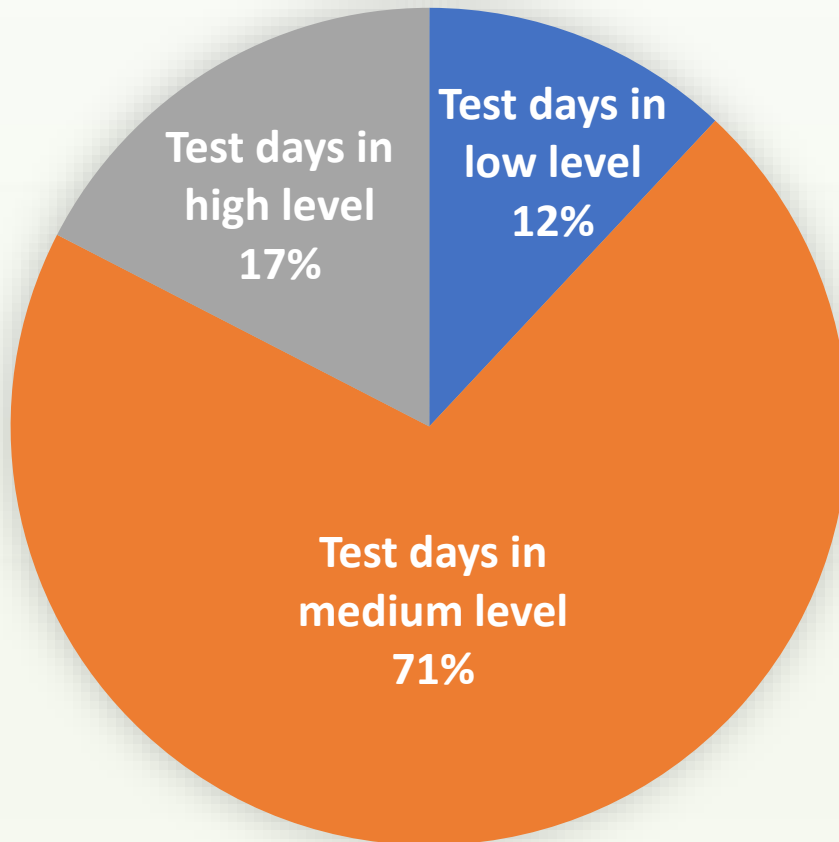
Low: Bottom 25% of herds with the smallest differences

Medium: All remaining herds

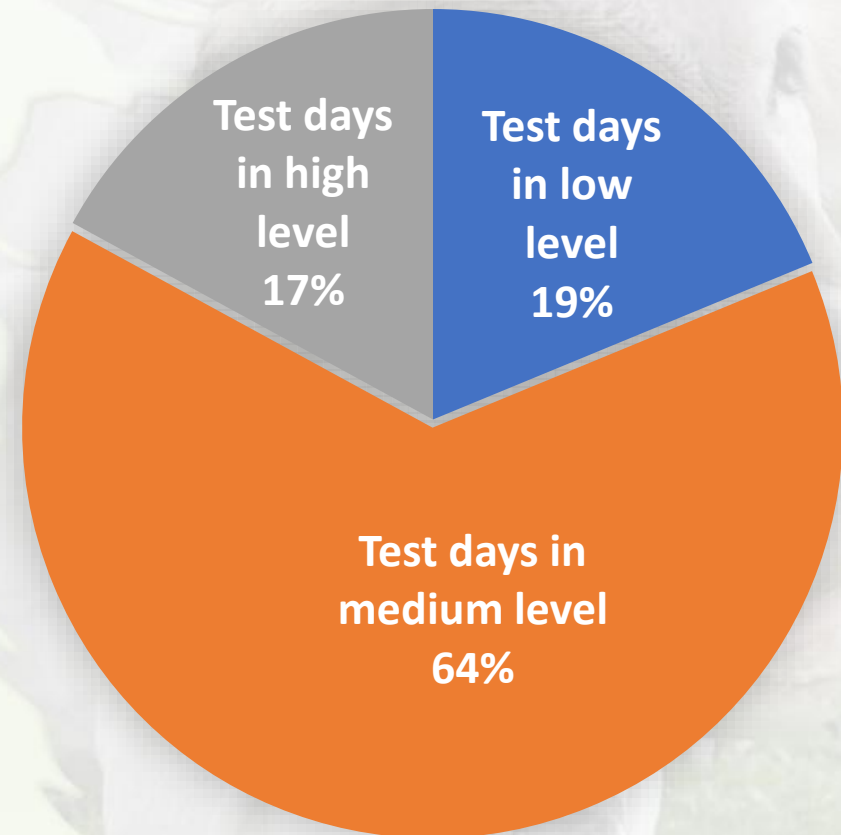


Why Do Bulls Show Different Trends?

Stable sire: evaluation 2020

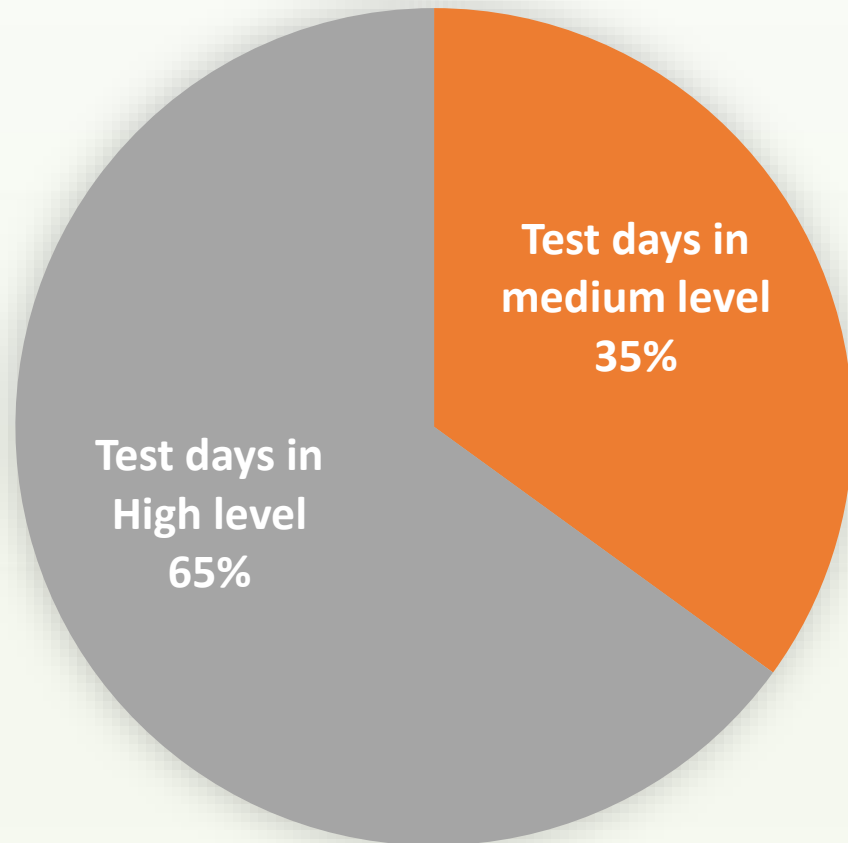


Stable sire: evaluation 2024

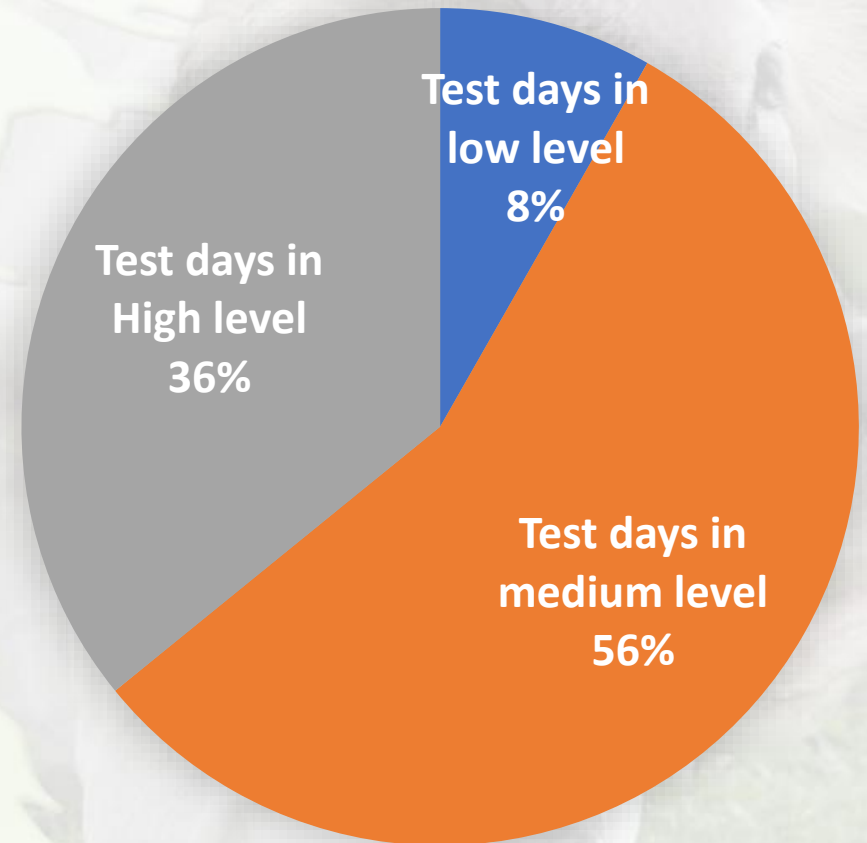


Why Do Bulls Show Different Trends?

Problematic sire: evaluation 2020



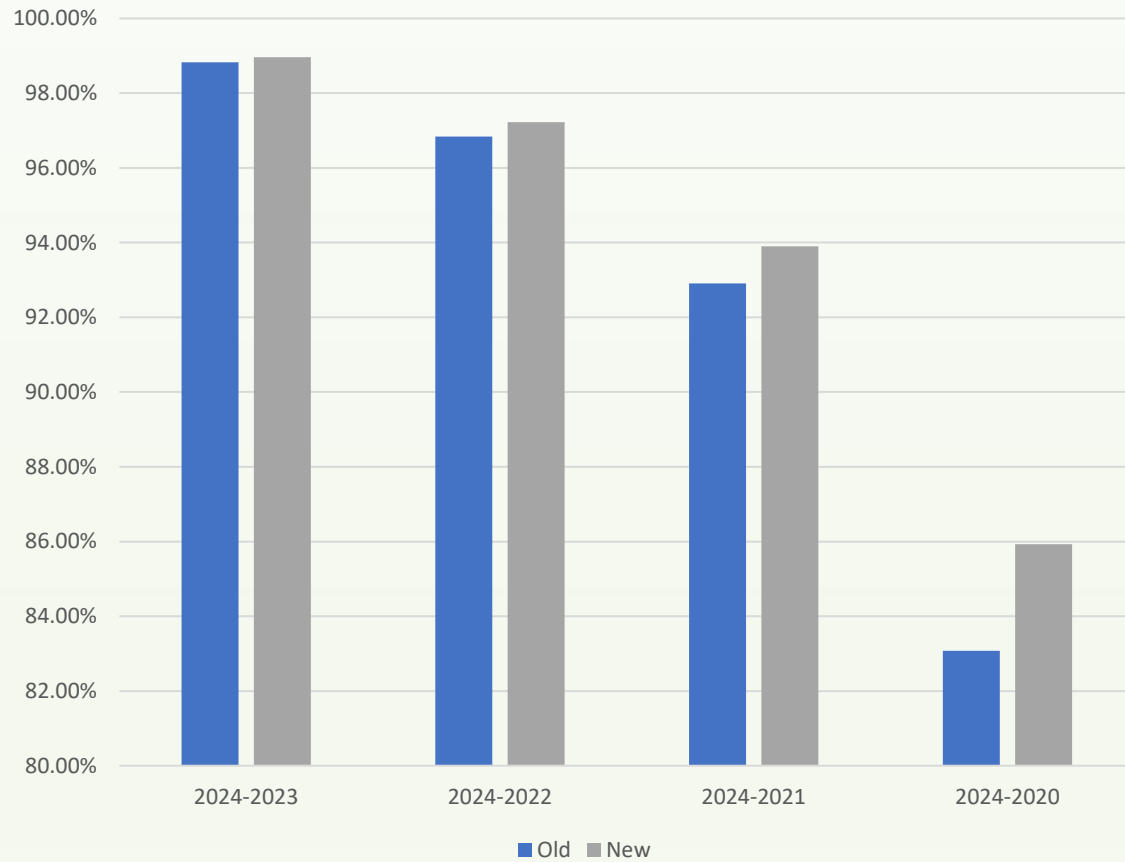
Problematic sire: evaluation 2024



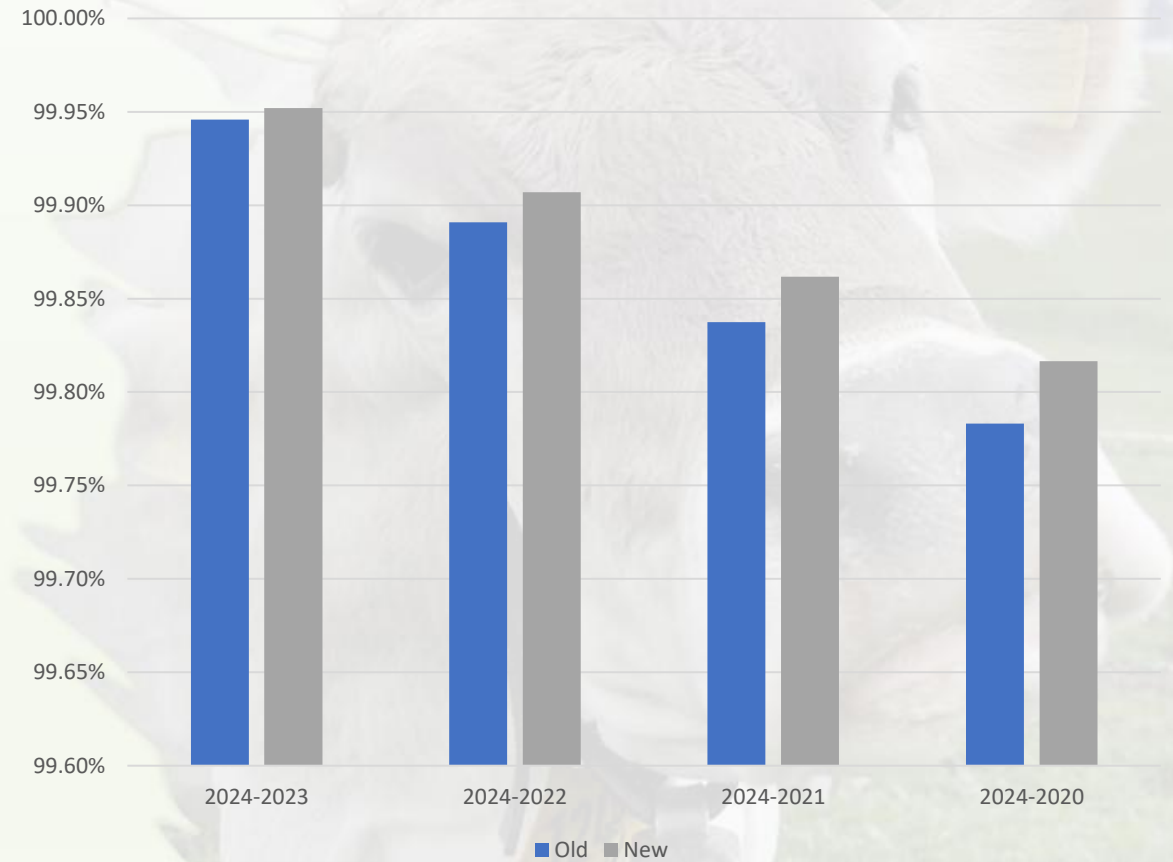


Correlation between years

Sires

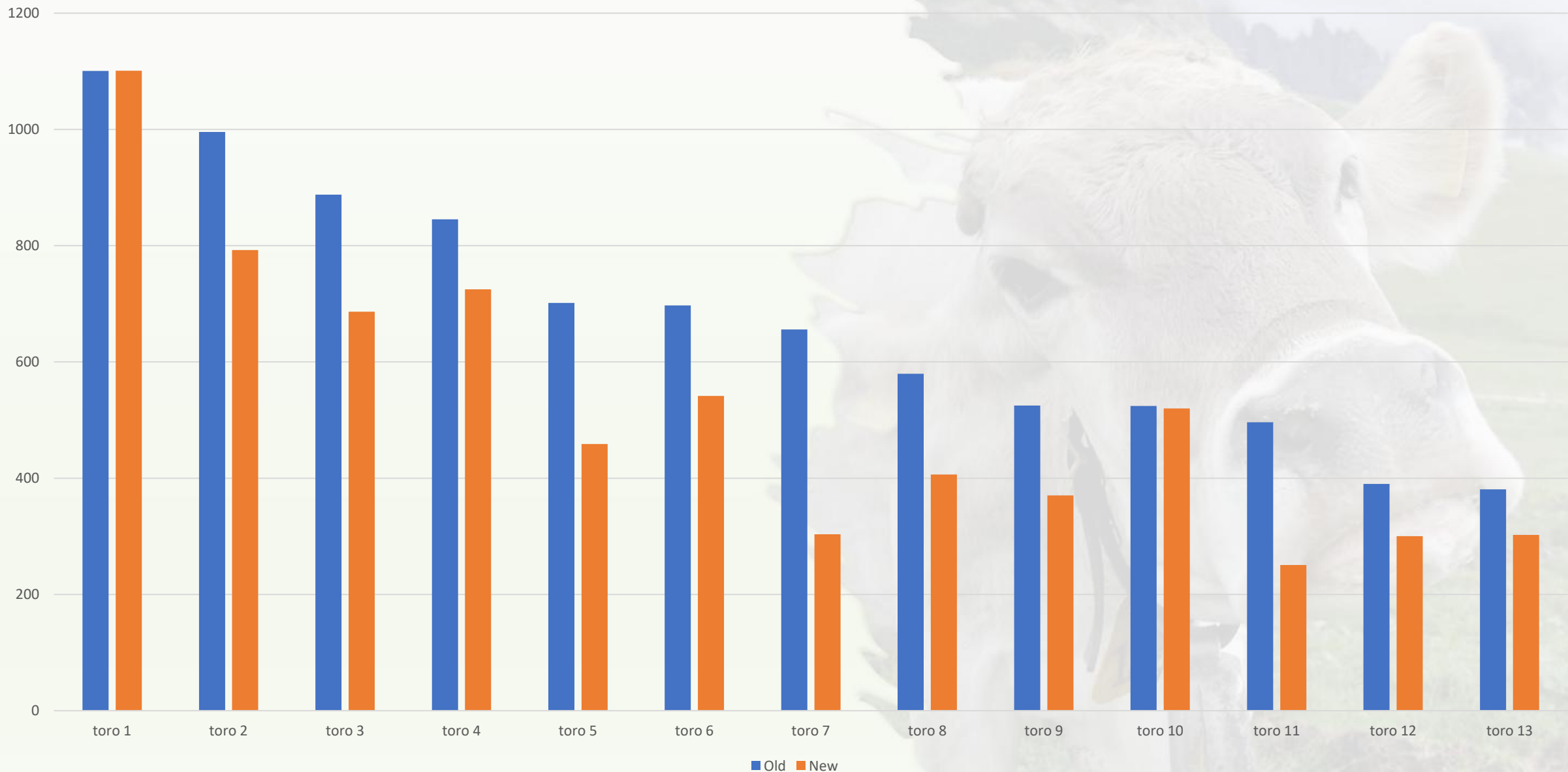


Female

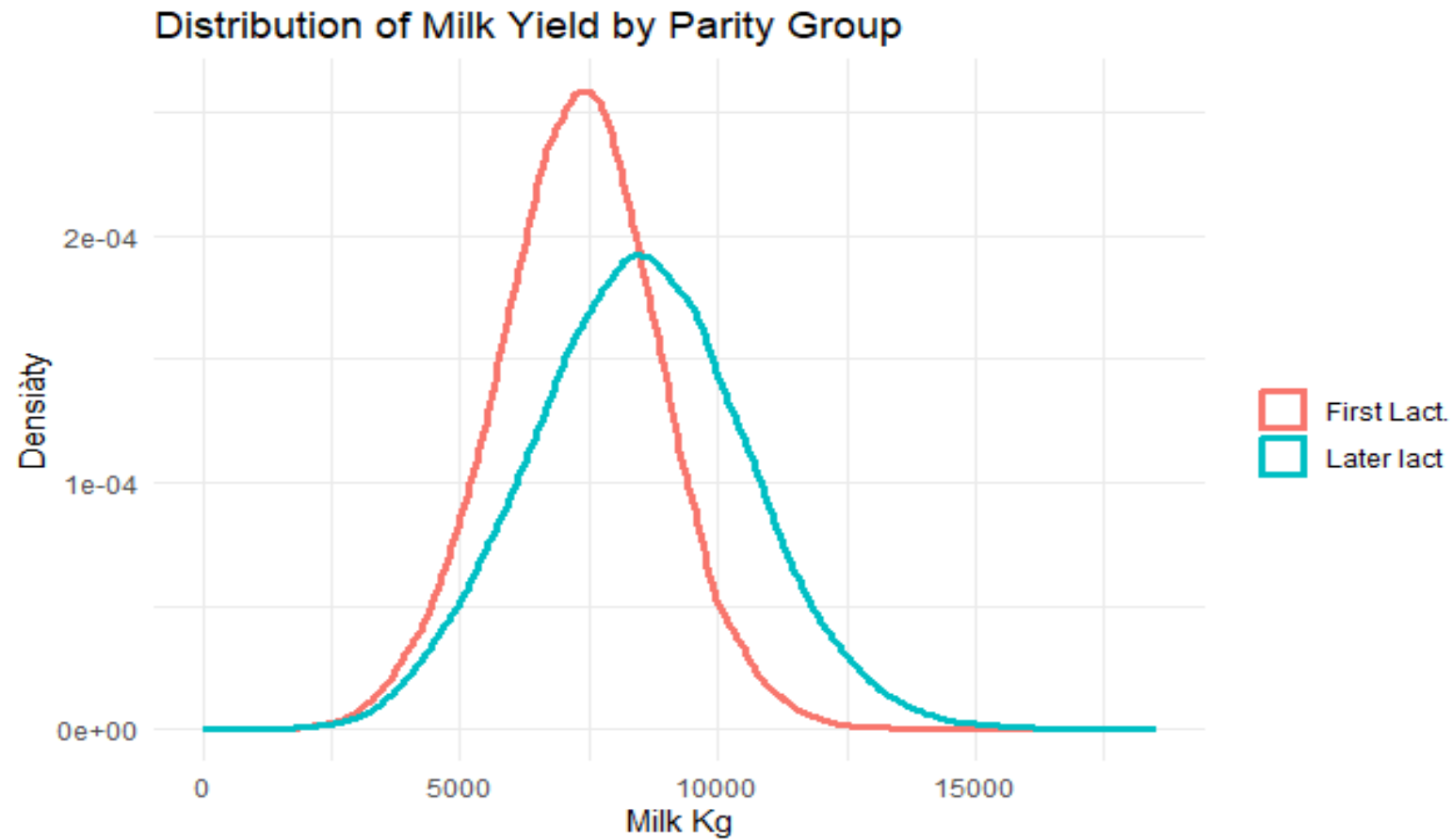




Bulls with the greatest difference between the 2024 and 2020 evaluations



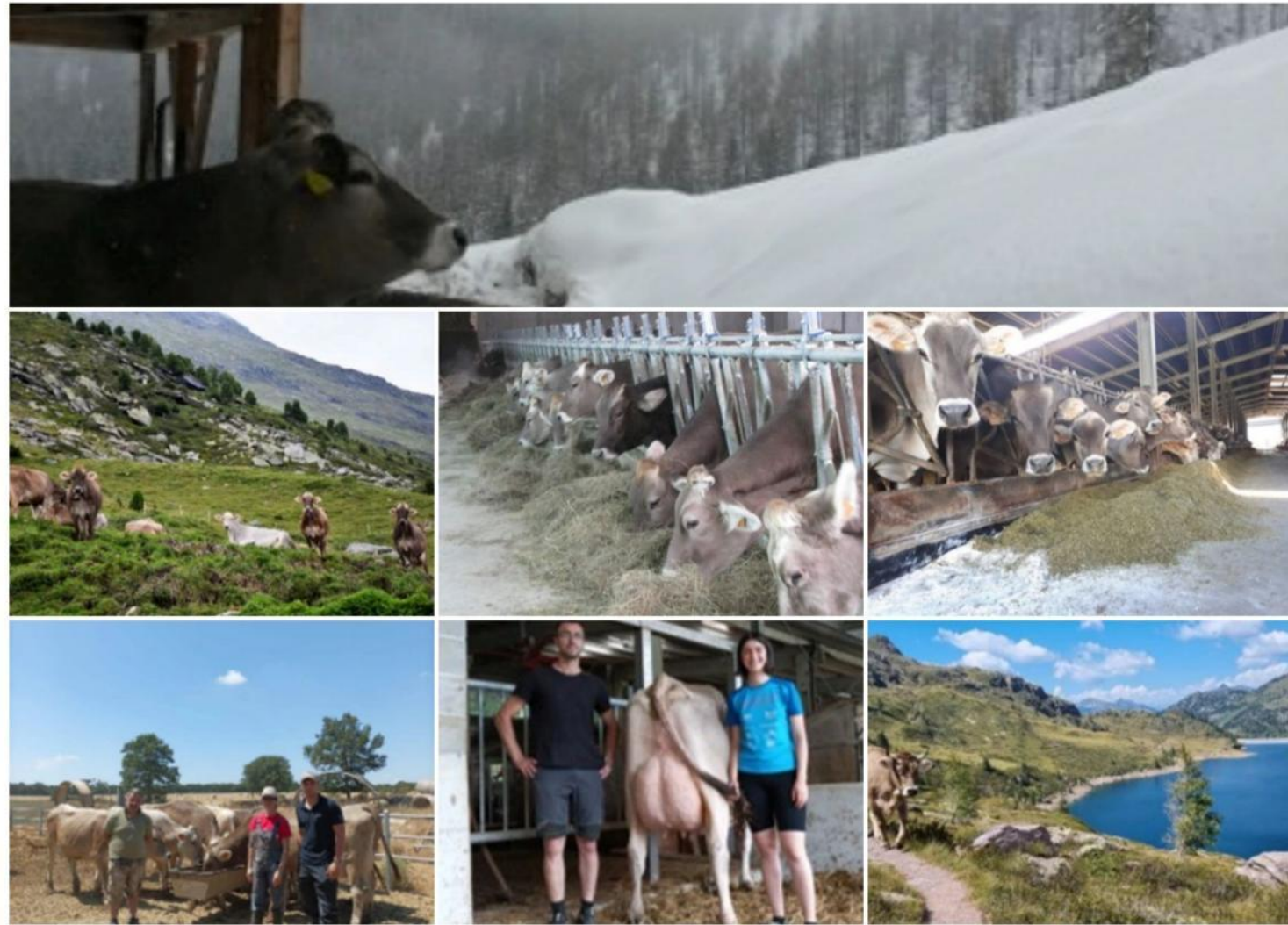
WHY IN ITALIAN BROWN SWISS?



	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Fist Lactation	1722	6265	7316	7306	8349	15792
Later Lactation	1309	7046	8467	8473	9858	18522

WHY IN ITALIAN BROWN SWISS?

- High variability in management level
- Intensive use of genomic bulls
- We are among the few using an evaluation based on daily test-day records with a repeatability model





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**Thak you for
your attention**

