



Characterization of Dual-Purpose Blue milk compared to Holstein milk based on mid-infrared spectrometry



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There is nowadays a growing interest for developing local breed-derived products with high added value, for example, cheese. However, most of the time, milk properties of local breeds are not well known. Predictions based on milk mid-infrared (MIR) spectra can help to unravel milk properties of local breeds.

Objective

- Characterize the milk spectral variability of Dual-Purpose Blue cows compared to this of Holstein cows



Data

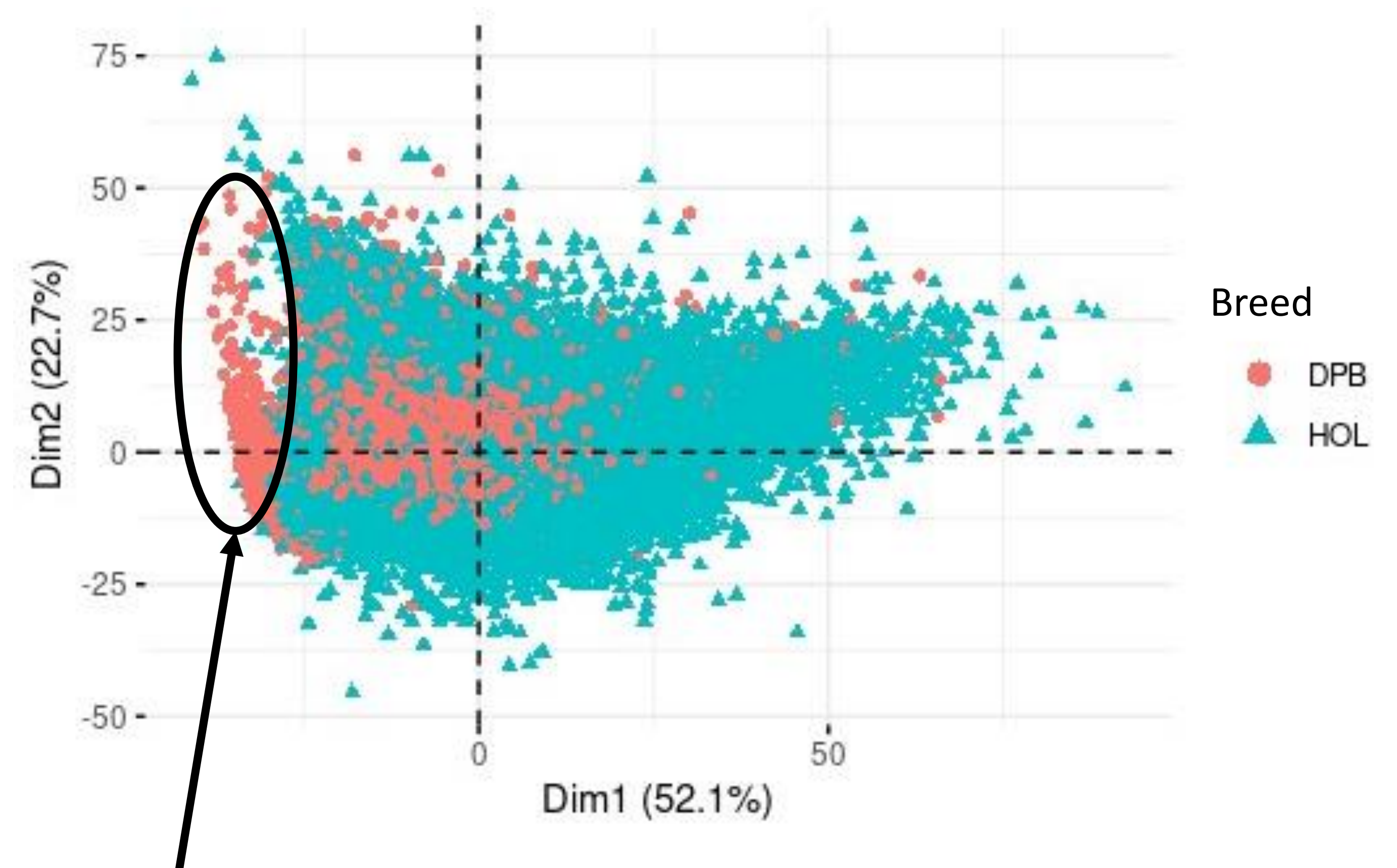
- Standardized spectra from 2012 to 2023 and from 2 Walloon (Southern Belgium) cattle populations:
 - Holstein (HOL)
 - Dual-Purpose Blue (DPB)
- Selection of representative spectra by localization index (HOL: 144,566 spectra and DPB: 46,469 spectra)
- Pre-treatment of spectra by first derivation of traditional regions
- 122 milk MIR predictions locally available

Methodology

- Removal of MIR predictions with $R^2 < 0.70$
- Removal of data with unexpected negative values for predictions
- Removal of data for which at least one prediction is outside mean ± 3 SD
- Removal of spectra with GH > 10
- 40,212 DPB and 118,659 HOL spectra after data cleaning
- 73 milk MIR predictions after cleaning
- PCA for milk MIR spectra with predictions as supplementary variables
- Characterization of DPB animals with spectra outside the HOL spectral variability

Results

Figure 1. First two dimensions of a principal component analysis based on MIR spectra of Dual-Purpose Blue and Holstein cows.



- One zone with DPB spectra outside the spectral variability of Holstein
- 78 spectra from 75 DPB cows are represented in this zone
- From these 75 DPB cows, 65 have spectra only in this region
- This zone shows a tendency to:
 - Increased butter pH
 - Increased yoghurt syneresis
 - Increased Rennet Coagulation Time and K20
- This type of spectra have lower cheese and butter making properties but might be interesting for yoghurt production

Take-home message

- The spectral variability of DPB is not completely included in the spectral variability of HOL
- This implies lower cheese and butter making properties of milk from some DPB cows but potentially interesting properties for yoghurt production
- Possibility of using DPB milk variability for improving ability of the breed's milk to be transformed to dairy products