



# Breed-environment interaction: suitability of Dutch cattle breeds for low input systems

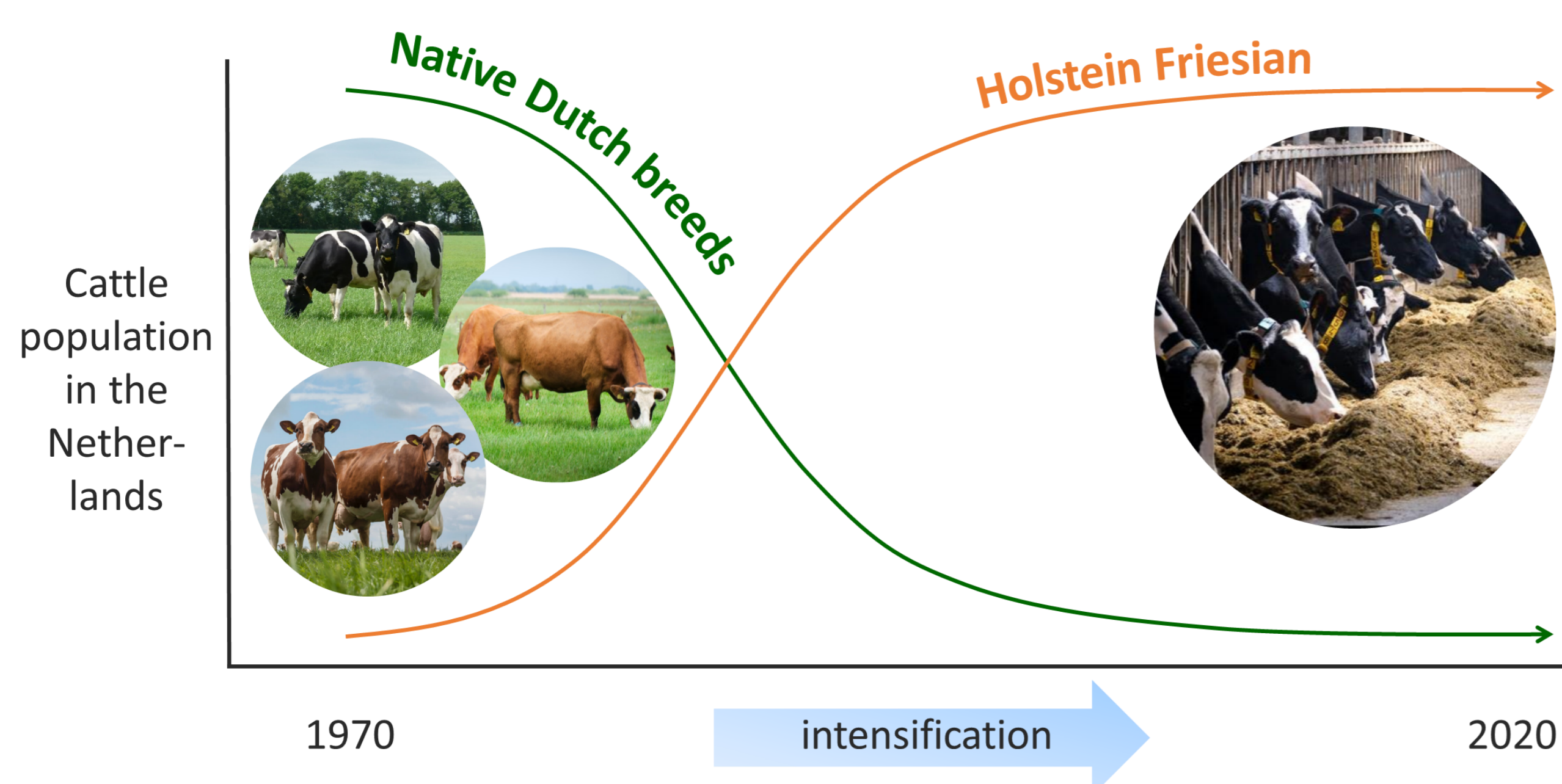
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## New opportunities for native Dutch cattle breeds?

Intensification of Dutch agriculture led to a large replacement of native Dutch cattle breeds by Holstein Friesian since 1970. However, with the transition towards more sustainable and agroecological farming systems, there is a renewed interest in the native cattle breeds. Especially their dual purpose and robust characteristics are mentioned by farmers as reasons for choosing to work with (one of) these breeds.



## Research questions

- What is the range of herd environments local Dutch cattle breeds are kept in?
- What is the performance of native Dutch cattle breeds for production, health and fertility in different herd environments compared to Holstein Friesian?

## Observed breed-environment interactions

With GLM, all breed x herd environment (PC1-4) interactions were significant ( $p < 0.0001$ ) for milk production, fat and protein content, somatic cell count and calving interval. As shown in the figures:

- Fat content of the milk increases only slightly with more agroecological land use for Holstein Friesian, while it increases more strongly in native Dutch breeds.
- Calving interval decreases a bit with more agroecological land use, strongest for Dutch Friesian, while calving interval of Groningen White Headed slightly increases.

## Conclusions

- Large variation in herd environments were observed. The variation was explained in directions of intensity, scale, feed, soil type and agroecological land use of the farms.
- On average native Dutch cattle breeds were kept in more extensive production systems, with more grazing, and more agroecological land use.
- Breed-environment interaction were significant: breeds react differently to differences in herd environments.

## National data on animals and farms

Animal registration and performance data and annual nutrient cycle assessment data at farm level (76 indicators) were combined for the period of 2016 until 2020. 493 farms with predominantly native Dutch cattle and 493 neighbouring farms with predominantly Holstein Friesian cows were included. There were ~276,000 lactations available of pure bred animals.

### Animal data:

- Breed code
- Birth and calf dates
- Milk production
- Somatic cell count
- Fertility

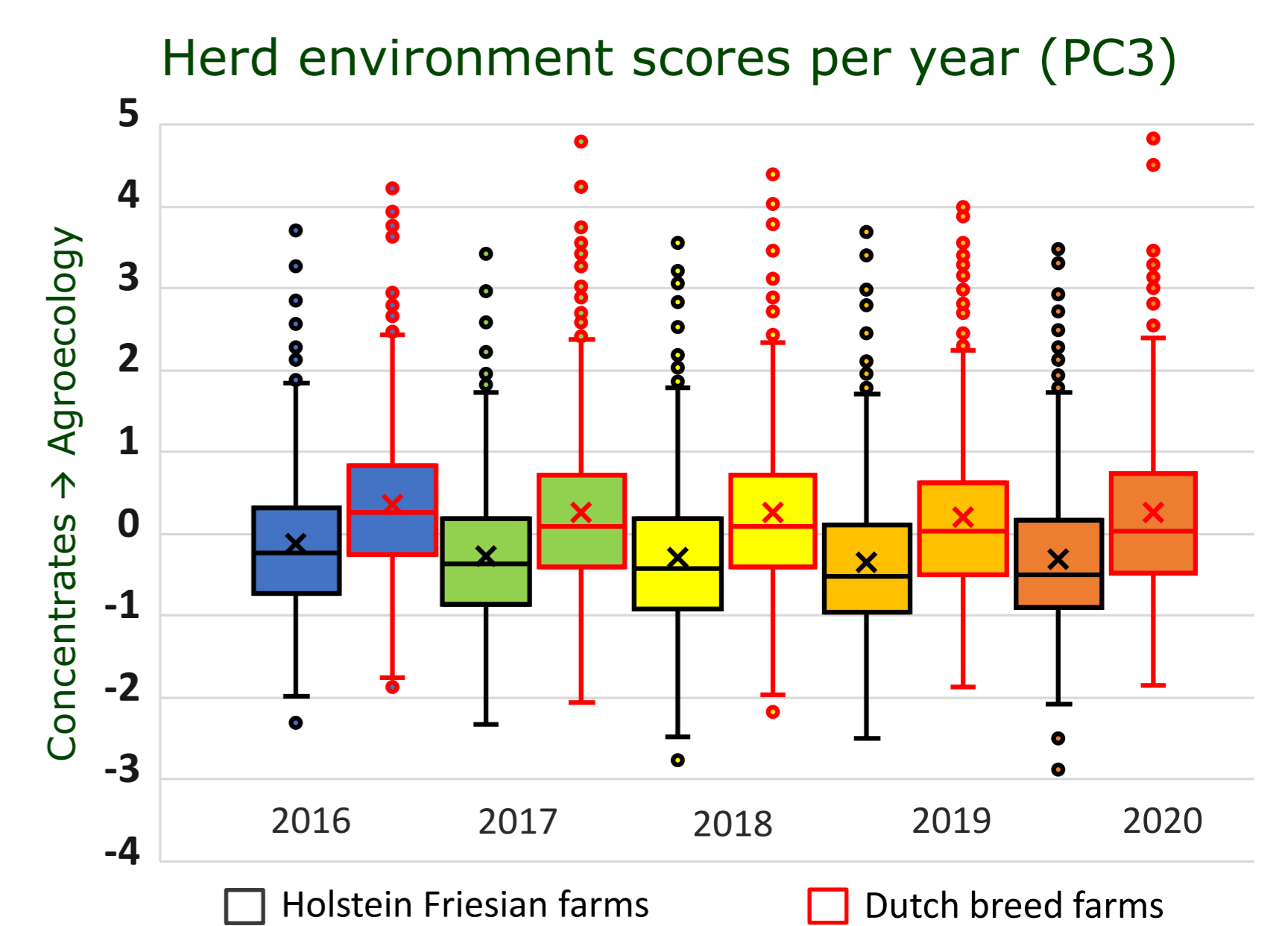
### Farming system data:

- Land use types
- Soil type
- Grazing time
- Nutrient use efficiency
- Feed composition

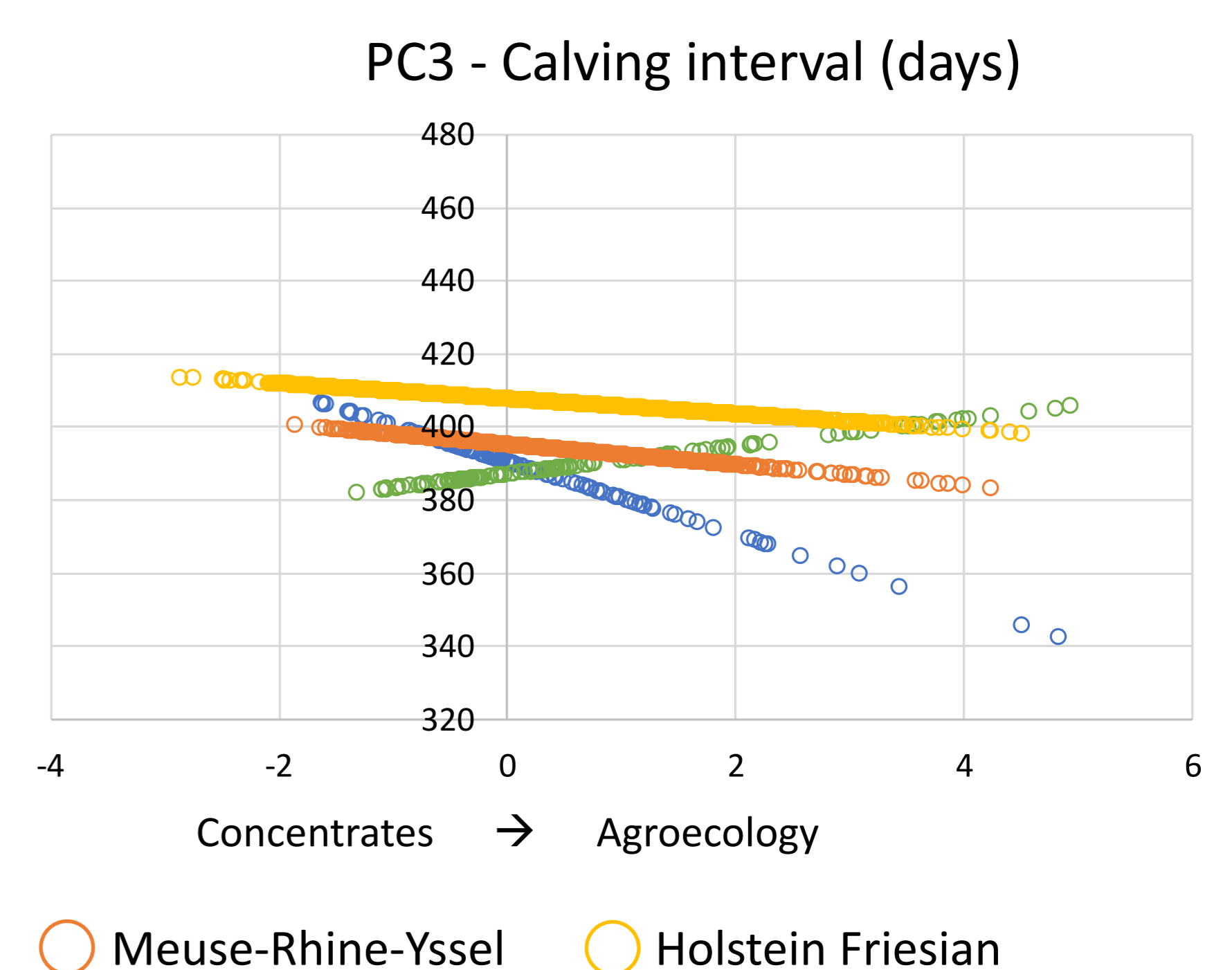
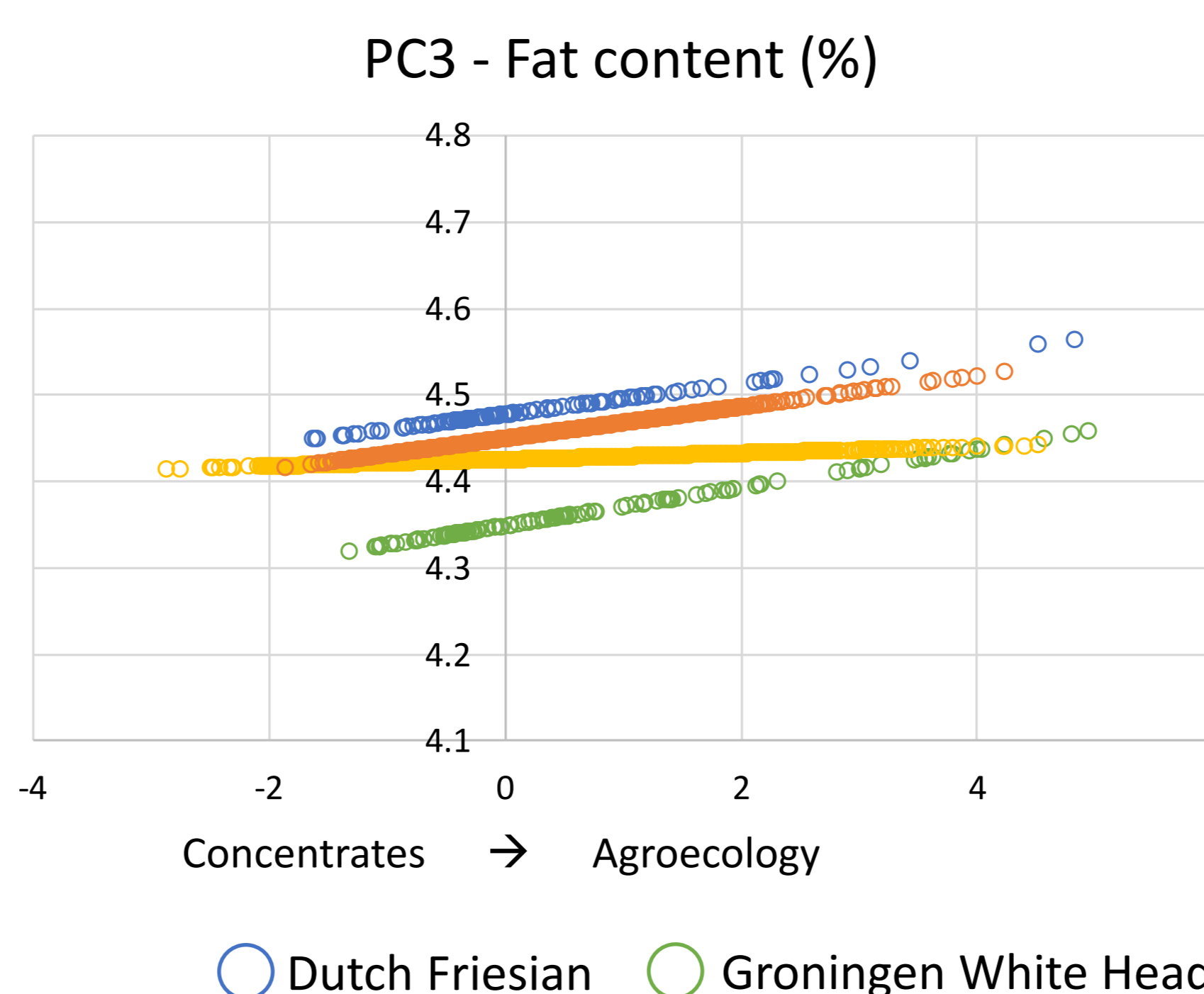
## Description of herd environments

Four principal components (PC) were extracted from the data.

- PC1: High production and maize vs. lower production and grazing
- PC2: Small scale and maize on sand vs. large scale and grass silage on clay
- **PC3: High concentrate use vs. agroecological land use**
- PC4: Year effect of milking system and genetic selection



Native Dutch breeds are kept on average in different herd environments than Holstein Friesian, but there is overlap and a lot of variation within groups.



## Next steps

In-depth analysis of technical and economical data of 30 participating farms and interviews about breeding and farming strategies. Results will be used as input for breeding goal discussions, and to explore the added value native Dutch cattle breeds for low input systems.

## Acknowledgements

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