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Determinants for Treatments in Relation to Udder Health in Danish Dairy Cattle Farms

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Introduction

Regular cow level registrations in the Danish Cattle Database include registrations about e.g. milk yield, SCC and calvings, but also about diseases and antibiotic treatments of cows. These data could potentially be a useful source of information for the development of herd-specific udder health management programs tailored to the farmer's preference. With tailored programs farmers may be more motivated to adopt effective management programs that can also enhance a prudent use of antibiotics.

What are the driving factors for antibiotic treatment in relation to udder health on dairy farms?

Data

518 Danish dairy farms with recordings for

- Antibiotic treatment
- Calvings
→ Parity
→ Lactation stage
- Milk yield
→ Average milk yield
- SCC
- Clinical registrations
- PCR

from 2009 to 2015.

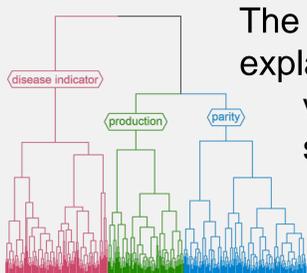
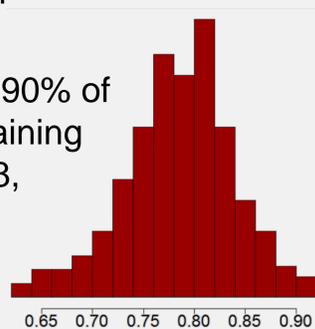
Statistical analyses

- Farm-wise
 - Logistic regressions to predict treatment
- For 458 farms without extreme regression coefficients:
- AUC to test prediction capability of the model
- For 429 farms with all coefficients available:
- Principle Component Analysis (PCA) of the regression coefficients
 - Clustering of farms

Results

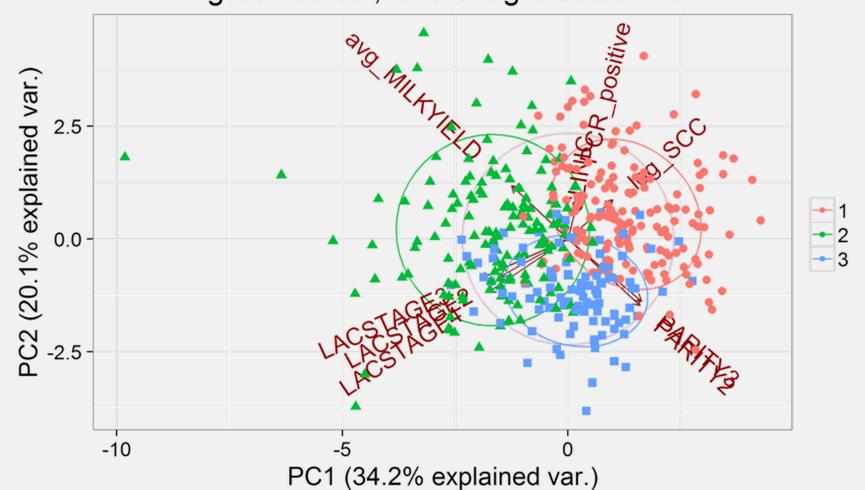
Multivariable logistic regression showed significant association between predictors and treatment, though not on all farms. On 77 farms all predictors were significant.

Fitting the regression models on 90% of the cows and testing on the remaining 10% yielded a mean AUC of 0.78, indicating a good predictive capability of the model (see histogram).



The first two principal components explain more than 50% of the variance. *PCA* and *clustering* show three clusters, one around parity, one around lactation stage and average milk yield and one around clinical registrations, PCR and SCC (see dendrogram and Figure 1).

Figure 1. PCA, clustering with ward.D2



Summary

The results indicate that farmers have different reasons for antibiotic treatment in relation to udder health. Some focus on age, or production, while others focus on disease indicators such as positive PCR or SCC.

