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Modelling and monitoring farrowing rate at herd level

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AIM

Develop a dynamic monitoring system for farrowing rate in order to detect changes in production results

Conclusions

1. **The model has proven to be a useful tool for monitoring farrowing rate**
2. **Implementation of a parity-specific alarm system may improve the monitoring method**
3. **A management tool (i.e. software) that enables the farmers to monitor production and detect changes in *real-time* can be developed from this work**

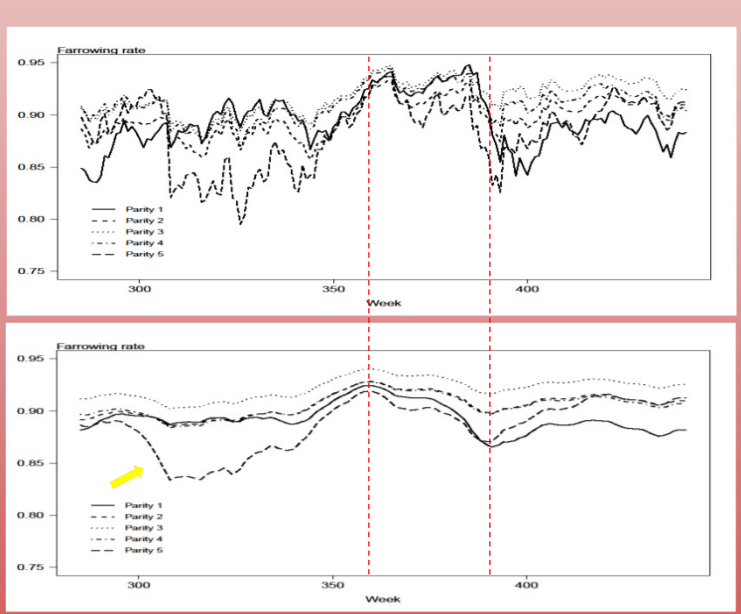

Fig.1. Filtered and smoothed data for one herd. Dotted red lines refer to alarms obtained by V-mask

a) No alarms for Control Chart detection merthod

b) 2 alarms for Cusum + V-Mask detection

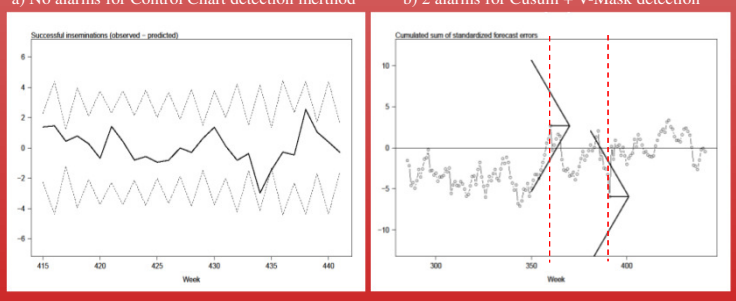

Fig.2. The two monitoring methods applied for one herd. (a) Short period of detection (26 weeks) based on a Control Chart. The central line represents the deviations between observed and predicted values. Dotted lines are, respectly, the upper and lover control limits. (b) Long period of detection (156 weeks) based on Cusum combined with a V-mask

Methods

A farrowing rate model is implemented using a Dynamic Generalized Linear Model (DGLM)

- Farrowing rates for the first 5 parities (θ_1 - θ_5), slope (θ_6) and re-insemination rate (θ_7) are the parameters used to build the model
- The use of DGLM provides ***weekly update*** of farrowing rates
- ***Monitoring methods*** are applied to detect deviation from expected levels and to give alarms if critical changes are found

Results

→High correlations between subsequent parities have been found. This allows, in normal situation, the farrowing rate of the first 5 parities not to drift independently from each other

→EM-algorithm provided stable and suitable convergence of the system variance components

→Monitoring methods: (Figure 2)
- Control Chart: Short time horizon (26 weeks);
- V-mask applied on Cusum: Long time horizon (3 years)

→V-mask on Cusum was not able to detect parity-specific deviation (Fig.1, Yellow arrow)