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Relationship Between In-line Recorded Milk Flow Rate and Longevity in Estonian Holstein Cows

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INTRODUCTION

- **60%** of all dairy cows in Estonia are housed in new or reconstructed farms.
- Robotic milking – **52** farms, **168** robots.
- Total number of dairy cows in Estonia **90,516**, of which **95.4%** are in milk recording.
- Productivity of Estonian Holstein (EHF) cows: **9,062 kg** milk, **3.90%** fat, **3.32%** protein.
- **Homogeneity of cows-related farm procedures** has become an essential economic factor.
- A major impact to the profitability of the dairy industry, is **cows' functional longevity**.

THE AIM

- The relationships between in-line recorded **average milk flow rate** (AFR, kg/min) and **survival rate** (SR) and **culling reasons** (CR) in Estonian Holstein cows were investigated.
  – AFR express the efficiency of the milking process.
  – SR and CR characterising the longevity.

MATERIAL AND METHODS

- **20,363 first parity EHF cows** AFR records from 2010–2015 was used.
- The **number of culled cows** was **5,190** (25.5%).
- AFR was divided into three classes:
  slow ≤1.66 kg/min, **moderate** 1.66–3.16, **fast** >3.16.
- The Cox proportional-hazards regression model was built and regression tree with package 'partykit' in R was constructed to study the effect of AFR on censored longevity.
- The correspondence analysis (CA) was used to discover the common patterns among final nodes of regression tree and culling reasons.

RESULTS

- The **overall AFR** was **2.16 kg/min** (SD=0.79).
- The **AFR** of **culled cows** was **2.08 kg/min** (SD=0.77).
- The **SR** was the **highest** on the cows with AFR **>3.16 kg/min**.
- The **SR** was the **lowest** on the cows with AFR **<1.24 kg/min** (Fig. 1).
- The **slow AFR** was related with culling due to the **low milk yield** and **various udder** and **teat defects**, and especially with **poor milkability** (Fig. 2).
- The **moderate AFR** was correlated with culling due to the **reproductive disorders**.
- The **fast AFR** was associated with culling due to the **gastrointestinal diseases**.

CONCLUSIONS

- EHF cows with **faster AFR survive longer** than cows with the moderate or slower AFR.
- The **faster milking** EHF cows have **longer productive life** and **incidence rate of mastitis doesn't increase** significantly.

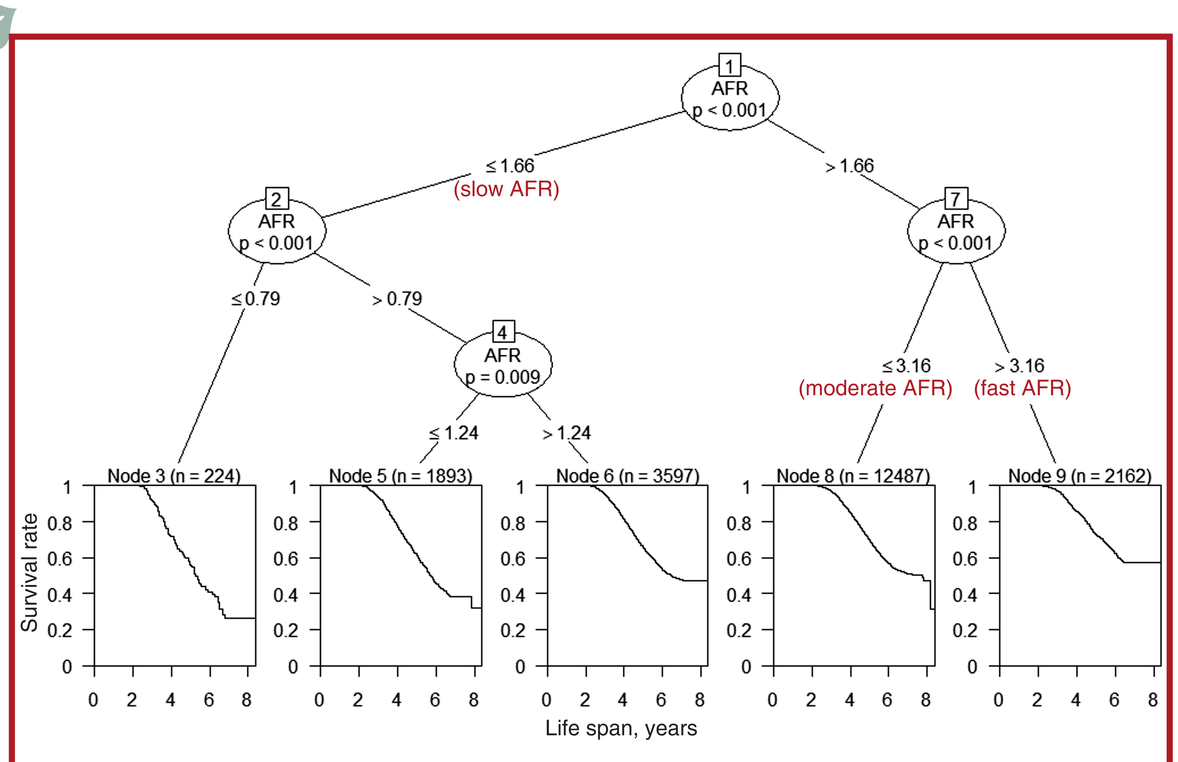

Figure 1. Tree structured survival model of cows' longevity.

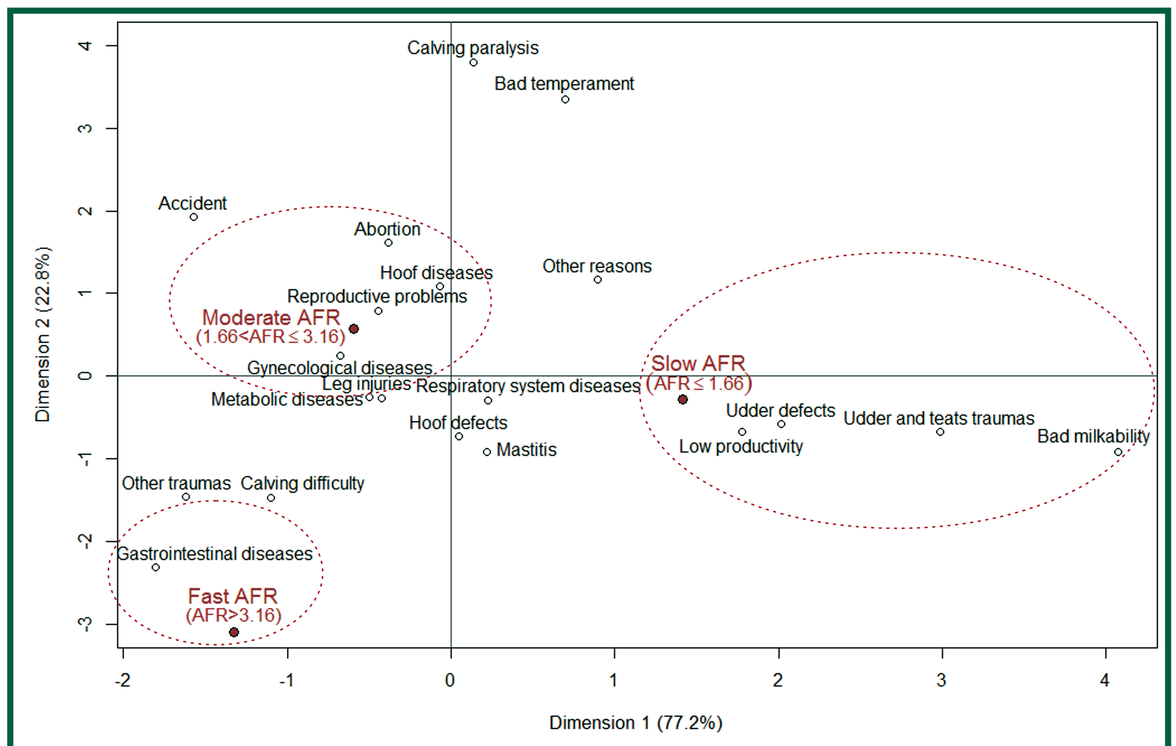

Figure 2. Correspondence analysis of culling reasons and AFR classes.

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