

## Inferring challenges from frequently collected data

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Under real productive rearing conditions, challenge events in sheep and goats are sometimes unrecorded and from unknown source. However, frequent recording allows to observe anomalous patterns in the flock showing up as additional variability on recorded traits. To detect an unrecorded challenge, you need a series of daily recordings (milk yield, feed intake, growth) spanning at least one season. Then, challenges manifest as extra variation among individuals. To avoid the scale effect of increasing trait (growth, milk yield), analyse the natural logarithm of the daily coefficient of variation,  $\log(CV)$ . The daily  $\log(CV)$  is analyzed using a mixture model with two components, one is “normal” variation and the other one is “extra” variation. Analysis may be done in R, for instance with package normalmixEM. On output there is an indicator variable from 0 to 1 tells the probability of a day being a “challenge”. These values can be used as indicators of “challenge” days or can be directly used in norm reaction models.



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