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Reviewing the definition of mortality in broiler chickens

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Introduction

- Mortality detrimental to financial gain
- Mortality may be due to different genetic and biological factors at different life stages
- Possibility of maternal effect on mortality

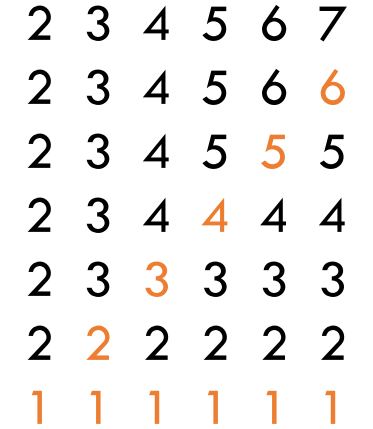
- Objective:
 - Investigate alternative models and trait definitions of mortality
 - Exploring the classification of mortality into different life stages
 - Including a maternal effect in the model

Datasets Provided

- 3 broiler lines with mortality records
 - Overall mortality (OM) : 0,1
 - Weekly mortality (WM): 0-10

| Line | Pedigree | Genotypes | Number of Records | |
|------|----------|-----------|-------------------|--------|
| | | | OM | WM |
| 1 | 353,293 | 100,881 | 322,039 | 20,136 |
| 2 | 291,836 | 80,283 | 264,607 | 33,214 |
| 3 | 245,506 | 77,099 | 223,882 | 35,019 |

Trait Definition



BMORT

Died within first 6 weeks (0,1)



Repeatability (Cumulative)



EMORT

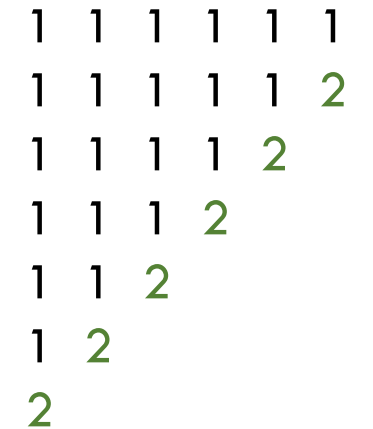
LMORT

Died within first 3 weeks (0,1)

Died within last 3 weeks (0,1)



Repeatability (Binary)



Models and Analyses

➤ Single Trait

- Overall Mortality
- BMORT
- Repeatability
 - Cumulative
 - Binary

$$y = X\beta + Z_1u_d + e$$

$$y = X\beta + Z_1u_d + Z_2u_{pe} + e$$

➤ Two Trait

- EMORT & LMORT
- EMORT & LMORT with maternal

$$y = X\beta + Z_1u_d + Z_2u_m + e$$

Models and Analyses

➤ BLUPF90 family of programs

➤ LR Validation

➤ Accuracy (acc)

$$\text{acc} = \sqrt{\frac{\text{cov}(\text{GEBV}_p, \text{GEBV}_w)}{(1 - \bar{F})\sigma_u^2}}$$

➤ Transformation of threshold VCE to linear scale

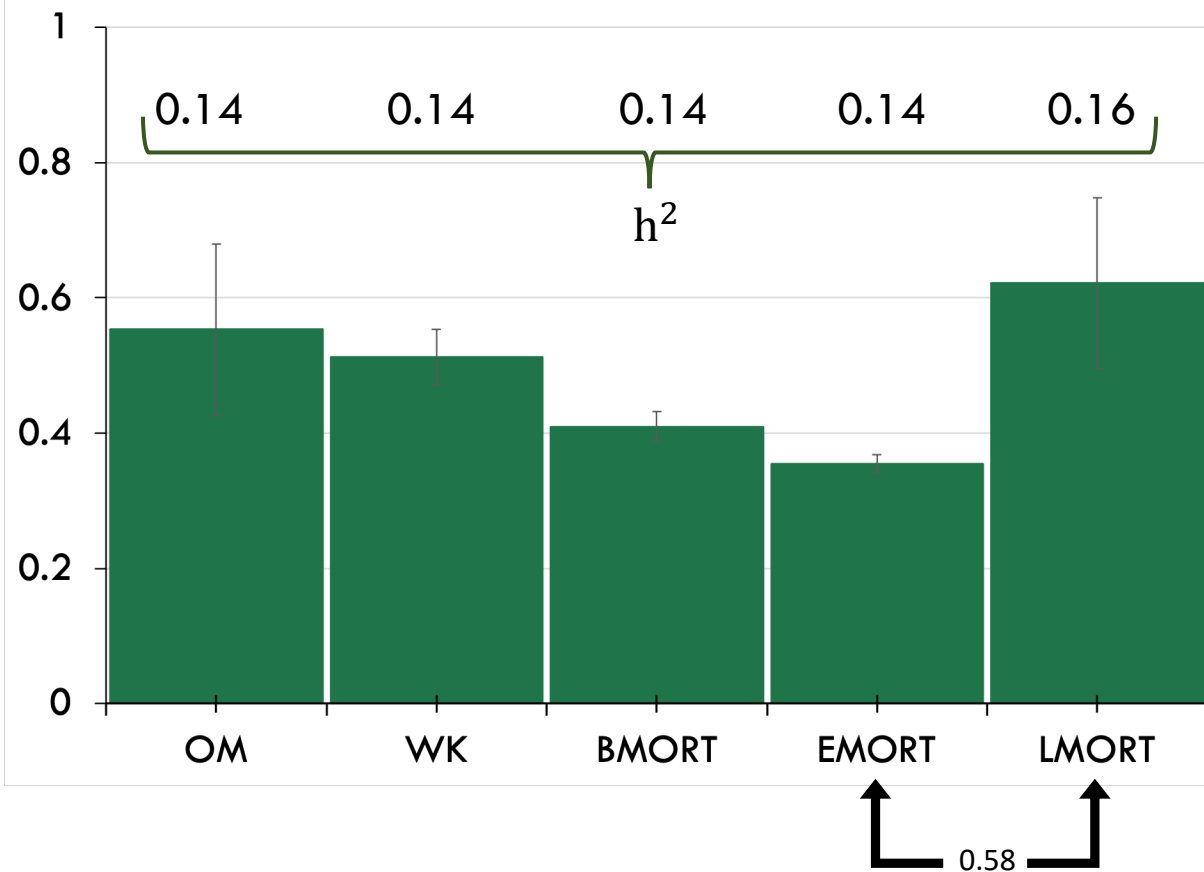
➤ All models except those with repeated records

$$h_{\text{lin}}^2 = \frac{z^2 h_{\text{lia}}^2}{pq}$$

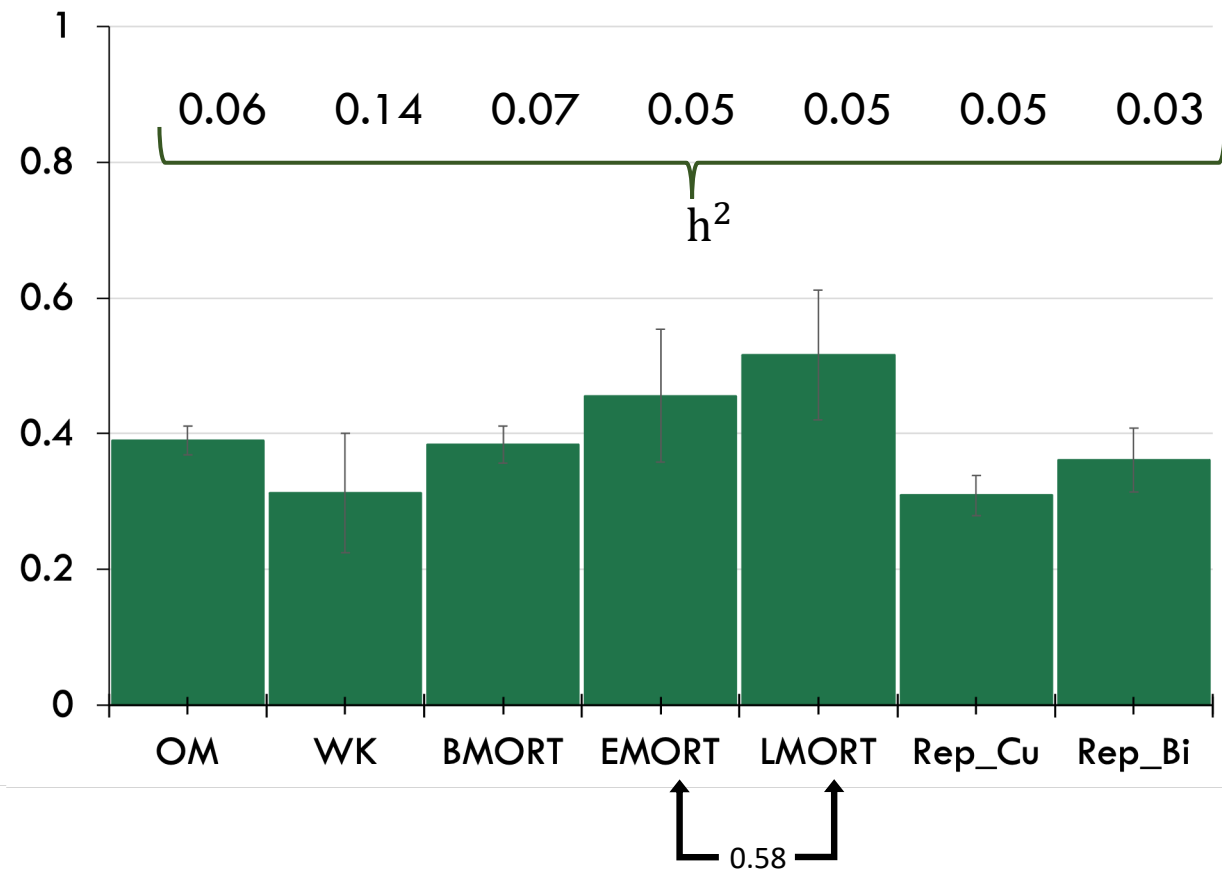


LR Accuracy

Accuracy from THR Models

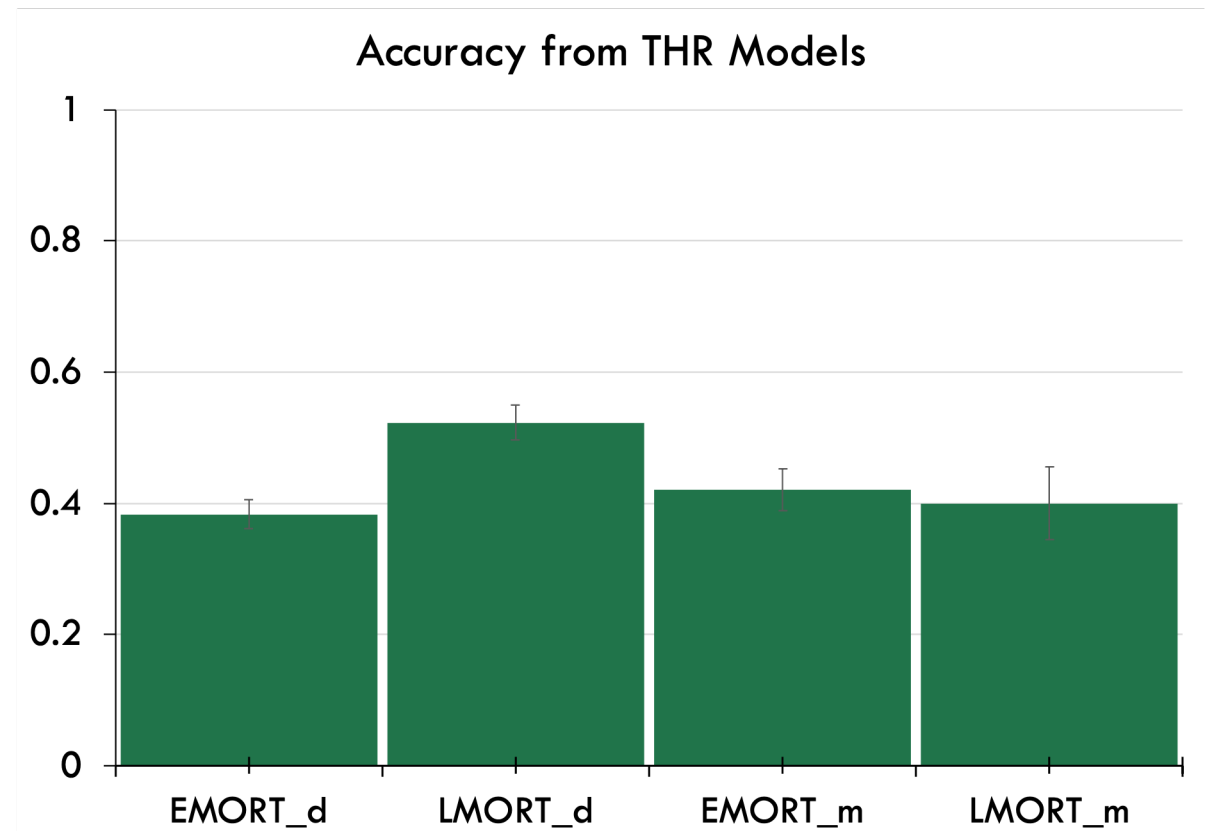


Accuracy from LIN Models



Maternal Genetic Effect

| | EMORT _d | LMORT _d | | |
|--------------------|--------------------|--------------------|--------------------|--------------------|
| EMORT _d | 0.14 | 0.58 | | |
| LMORT _d | | 0.16 | | |
| | EMORT _d | LMORT _d | EMORT _m | LMORT _m |
| EMORT _d | 0.05 | 0.56 | -0.08 | 0.02 |
| LMORT _d | | 0.13 | 0.01 | -0.27 |
| EMORT _m | | | 0.04 | 0.54 |
| LMORT _m | | | | 0.01 |



Conclusions

- Threshold models performed better than linear models
- Splitting mortality into early and late stages produced promising results
 - EMORT and LMORT are not the same trait
 - Could reduce overall mortality by using EMORT and LMORT
 - Maternal genetic effect may also help

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ONE FAMILY.
ONE PURPOSE.

