|  |  |  |  |
| --- | --- | --- | --- |
| Model | AIC | R2 | RSD |
| poly\_fixed | 91548.92 | 0.5414456 | 3.478394 |
| poly\_r1 | 81419.73 | 0.7830840 | 2.327714 |
| poly\_r2 | 79306.26 | 0.8236944 | 2.055511 |
| poly\_r3 | 77813.40 | 0.8473101 | 1.887347 |

|  |  |  |  |
| --- | --- | --- | --- |
| Model | WAIC | R2 | RSD |
| GMM\_fixed | 91642.70 | 0.538880 | 4.933206 |
| GMM\_dfi0 | 82180.35 | 0.743704 | 3.656864 |
| GMM\_dfiA | 78924.62 | 0.791391 | 3.310443 |
| GMM\_dfi0A | 77022.04 | 0.820865 | 3.073747 |
| GMM\_dfi0Ak | 77021.06 | 0.820863 | 3.074068 |
| GMM\_dfi0Ak2 | 77021.65 | 0.820829 | 3.074050 |
| GMM\_dfi0Ac | 77509.98 | 0.817585 | 3.101077 |
| GMM\_dfi0Ac2 | 76898.02 | 0.821854 | 3.065757 |

* Best model for GMM - *GMM\_dfi0Ac2*, function as follow:

form8 <- bf(

FI ~ DFI0 + (((DFIA + dfia) - DFI0) \* (Day / k)^(c + b\*dfia)) / (1 + (Day / k)^(c + b\*dfia)),

DFIA + k + c + b ~ 1,

DFI0 ~ 1 + (1 | SowID),

dfia ~ 0 + (1 | SowID),

nl = TRUE

)

* Best model for Polynomial - poly\_r3, function as follow:

poly\_r3 <- lmer(FI ~ t1 + t2 + t3 + (1 + t1 + t2 | SowID), data = data\_trimmed)

t4 is not significant, so only use 3 degrees.

**Parameters for daily feed intake (kg/d) fitted to the generalized Michaelis-Menten function**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Estimate | SE | l-95% CI | u-95% CI | R2 | RSD | WAIC |
| **Fixed effects model** | | | | | | | |
| DFIA | 21.41 | 0.34 | 20.81 | 22.12 | 0.5389 | 4.9332 | 91643 |
| DFI0 | 7.58 | 0.16 | 7.25 | 7.87 |  |  |  |
| C | 2.32 | 0.12 | 2.09 | 2.56 |  |  |  |
| K | 9.67 | 0.18 | 9.36 | 10.05 |  |  |  |
| Var(e) | 3.49 | 0.02 | 3.45 | 3.53 |  |  |  |
| **One random effect model (dfiAi)** | | | | | | | |
| DFIA | 25.16 | 0.40 | 24.43 | 25.99 | 0.7914 | 3.3104 | 78925 |
| DFI0 | 5.12 | 0.15 | 4.84 | 5.42 |  |  |  |
| C | 1.34 | 0.04 | 1.27 | 1.41 |  |  |  |
| K | 10.56 | 0.25 | 10.08 | 11.06 |  |  |  |
| Var(dfiAi) | 5.13 | 0.15 | 4.85 | 5.44 |  |  |  |
| Var(e) | 2.34 | 0.01 | 2.32 | 2.37 |  |  |  |
| **One random effect model (dfi0i)** | | | | | | | |
| DFIA | 33.51 | 0.29 | 32.95 | 34.05 | 0.7437 | 3.6569 | 82180 |
| DFI0 | 5.09 | 0.21 | 4.69 | 5.48 |  |  |  |
| C | 1.04 | 0.02 | 1.00 | 1.08 |  |  |  |
| K | 18.96 | 0.32 | 18.33 | 19.60 |  |  |  |
| Var(dfi0i) | 3.52 | 0.09 | 3.34 | 3.70 |  |  |  |
| Var(e) | 2.59 | 0.01 | 2.56 | 2.62 |  |  |  |
| **Two random effect model (dfiAi and dfi0i)** | | | | | | | |
| DFIA | 22.18 | 0.28 | 21.65 | 22.76 | 0.8209 | 3.0737 | 77022 |
| DFI0 | 7.35 | 0.12 | 7.11 | 7.59 |  |  |  |
| C | 2.09 | 0.07 | 1.97 | 2.22 |  |  |  |
| K | 10.06 | 0.14 | 9.81 | 10.34 |  |  |  |
| Var(dfiAi) | 4.17 | 0.12 | 3.93 | 4.41 |  |  |  |
| Var(dfi0i) | 2.09 | 0.06 | 1.97 | 2.22 |  |  |  |
| Var(e) | 2.17 | 0.01 | 2.15 | 2.20 |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Estimate | SE | l-95% CI | u-95% CI | R2 | RSD | WAIC |
| **Two random effect model with K as linear function of dfi0i** | | | | | | | |
| DFIA | 22.19 | 0.27 | 21.68 | 22.74 | 0.8209 | 3.0741 | 77021 |
| DFI0 | 7.35 | 0.12 | 7.11 | 7.59 |  |  |  |
| C | 2.09 | 0.06 | 1.96 | 2.21 |  |  |  |
| K | 10.07 | 0.14 | 9.81 | 10.35 |  |  |  |
| b | 0 | 0 | 0 | 0 |  |  |  |
| Var(dfiAi) | 4.17 | 0.12 | 3.94 | 4.40 |  |  |  |
| Var(dfi0i) | 2.09 | 0.06 | 1.97 | 2.22 |  |  |  |
| Var(e) | 2.17 | 0.01 | 2.15 | 2.20 |  |  |  |
| **Two random effect model with K as linear function of dfiAi** | | | | | | | |
| DFIA | 22.19 | 0.27 | 21.67 | 22.74 | 0.8208 | 3.0741 | 77022 |
| DFI0 | 7.34 | 0.12 | 7.09 | 7.57 |  |  |  |
| C | 2.08 | 0.07 | 1.95 | 2.22 |  |  |  |
| K | 10.07 | 0.14 | 9.82 | 10.36 |  |  |  |
| b | 0 | 0 | 0 | 0 |  |  |  |
| Var(dfiAi) | 4.16 | 0.12 | 3.94 | 4.40 |  |  |  |
| Var(dfi0i) | 2.10 | 0.06 | 1.98 | 2.22 |  |  |  |
| Var(e) | 2.17 | 0.01 | 2.15 | 2.20 |  |  |  |
| **Two random effect model with C as linear function of dfi0i** | | | | | | | |
| DFIA | 22.11 | 1.25 | 20.77 | 24.54 | 0.8176 | 3.1011 | 77510 |
| DFI0 | 7.06 | 0.39 | 6.21 | 7.58 |  |  |  |
| C | 2.24 | 0.26 | 1.77 | 2.56 |  |  |  |
| K | 9.80 | 0.97 | 9.07 | 11.73 |  |  |  |
| b | 0.04 | 0.28 | -0.49 | 0.29 |  |  |  |
| Var(dfiAi) | 4.12 | 0.58 | 3.46 | 5.18 |  |  |  |
| Var(dfi0i) | 2.45 | 0.83 | 0.96 | 3.23 |  |  |  |
| Var(e) | 2.19 | 0.04 | 2.11 | 2.25 |  |  |  |
| **Two random effect model with C as linear function of dfiAi** | | | | | | | |
| DFIA | 21.85 | 0.24 | 21.39 | 22.34 | 0.8219 | 3.0658 | 76898 |
| DFI0 | 7.62 | 0.10 | 7.41 | 7.81 |  |  |  |
| C | 2.39 | 0.07 | 2.25 | 2.52 |  |  |  |
| K | 10.08 | 0.11 | 9.87 | 10.30 |  |  |  |
| b | -0.07 | 0.01 | -0.08 | -0.06 |  |  |  |
| Var(dfiAi) | 4.74 | 0.14 | 4.48 | 5.01 |  |  |  |
| Var(dfi0i) | 1.87 | 0.06 | 1.75 | 1.98 |  |  |  |
| Var(e) | 2.17 | 0.01 | 2.14 | 2.19 |  |  |  |

**Parameters for daily feed intake (kg/d) fitted to the Polynomial function.**

(Note, the variable generated by poly(Day, 3), to avoid multicollinearity issues among variables.)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item | Estimate | SE | P-value | R2 | RSD | AIC |
| **Fixed effects model** | | | | | | |
| b0 | 14.60 | 0.027 | <2e-16 | 0.5414 | 3.479 | 91549 |
| b1 | 483.9 | 3.479 | <2e-16 |  |  |  |
| b2 | -100.12 | 3.479 | <2e-16 |  |  |  |
| b3 | -33.93 | 3.479 | <2e-16 |  |  |  |
| **One random effect model (b0i)** | | | | | | |
| b0 | 14.60 | 0.086 | <2e-16 | 0.7831 | 2.3277 | 81420 |
| b1 | 482.4 | 2.400 | <2e-16 |  |  |  |
| b2 | -99.65 | 2.403 | <2e-16 |  |  |  |
| b3 | -34.09 | 2.412 | <2e-16 |  |  |  |
| Var(b0i) | 6.392 | 2.528 |  |  |  |  |
| Var(e) | 5.704 | 2.388 |  |  |  |  |
| **Two random effect model (b0i**, **b1i****)** | | | | | | |
| b0 | 14.59 | 0.086 | <2e-16 | 0.8237 | 2.056 | 79306 |
| b1 | 482.34 | 4.923 | <2e-16 |  |  |  |
| b2 | -100.07 | 2.209 | <2e-16 |  |  |  |
| b3 | -32.98 | 2.220 | <2e-16 |  |  |  |
| Var(b0i) | 6.458 | 2.541 |  |  |  |  |
| Var(b1i) | 17475.075 | 132.193 |  |  |  |  |
| Cov(b0i, b1i) | 0.53 |  |  |  |  |  |
| Var(e) | 4.639 | 2.154 |  |  |  |  |
| **Three random effect model (b0i**, **b1i**, **b2i)** | | | | | | |
| b0 | 14.59 | 0.086 | <2e-16 | 0.8473 | 1.8773 | 77813 |
| b1 | 482.5 | 5.003 | <2e-16 |  |  |  |
| b2 | -100.9 | 3.926 | <2e-16 |  |  |  |
| b3 | -33.87 | 2.130 | <2e-16 |  |  |  |
| Var(b0i) | 6.434 | 2.536 |  |  |  |  |
| Var(b1i) | 18646.466 | 136.552 |  |  |  |  |
| Var(b2i) | 10147.737 | 100.736 |  |  |  |  |
| Cov(b0i, b1i) | 0.51 |  |  |  |  |  |
| Cov(b0i, b2i) | -0.64 |  |  |  |  |  |
| Cov(b1i, b2i) | 0.10 |  |  |  |  |  |
| Var(e) | 4.024 | 2.006 |  |  |  |  |

* **Effect of parity:**

poly\_r3 <- lmer(FI ~ t1 + t2 + t3 + (1 + t1 + t2 | SowID), data = data\_trimmed)

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 | P2 | P3+ |
| b0+b0i | 13.02 | 15.67 | 17.09 |
| b1+b1i | 438.85 | 503.43 | 556.61 |
| b2+b2i | -59.92 | -139.45 | -160.34 |

**GMM model: Two random effect model with C as linear function of dfiAi**

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 | P2 | P3+ |
| DFI0+dfi0i | 7.13 | 8.09 | 8.33 |
| DFIA+dfiAi | 19.1 | 23.6 | 26.3 |
| c+b\*dfiAi | 2.59 | 2.26 | 2.06 |