**Supplemental Table S2.** Analysis of variance from model M2 (no fat and casein; contemporary inclusion of minerals) for fat, casein, mineral contents, coagulation and cheese-making traits with *F*-value and significance for fixed factors and the proportion of variance (in percentage) explained by random factors.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Random factors | | | | |  | | | Fixed factors | | | | | | | | | | | | | | |  | RMSE1 |
| (% on total variance) | | | | | (*F*-value and significance) | | | | | | | | | | | | | | |
| Trait | | Herd | | | Breed | |  | | | DIM | Parity | |  | | Ca | | P | | Na | K | | | Mg | |  |
| *Milk components, %* | |  | | |  | |  | | |  |  | |  | |  | |  | |  |  | | |  | |  |  |
| Fat | | 11.9 | | | 20.1 | |  | | | 0.8 | 0.5 | |  | | 0.9 | | 0.8 | | 0.6 | 0.9 | | | 1.7 | |  | 32.8 |
| Casein | | 13.1 | | | 43.7 | |  | | | 6.8\*\*\* | 0.2 | |  | | 4.3\*\* | | 13.2\*\*\* | | 1.6 | 6.9\*\*\* | | | 2.2 | |  | 57.2 |
| *Minerals, mg/L* | |  | | |  | |  | | |  |  | |  | |  | |  | |  |  | | |  | |  |  |
| Ca | | 8.55 | | | 17.1 | |  | | | 2.8\* | 1.8 | |  | | - | | 13.2\*\*\* | | 1.7 | 2.3 | | | 3.8\* | |  | 83.5 |
| P | | 32.3 | | | 11.4 | |  | | | 2.3\* | 5.7\*\* | |  | | 12.0\*\*\* | | - | | 2.2 | 3.8\*\* | | | 3.5\*\* | |  | 65.8 |
| Na | | 11.5 | | | 12.5 | |  | | | 3.9\*\* | 18.2\*\*\* | |  | | 1.8 | | 2.9\* | | - | 1.8 | | | 9.1\*\*\* | |  | 33.2 |
| K | | 10.6 | | | 10.4 | |  | | | 3.3\*\* | 0.4 | |  | | 3.1\* | | 2.7\* | | 2.5\* | - | | | 0.4 | |  | 88.2 |
| Mg | | 20.7 | | | 5.94 | |  | | | 3.7\*\* | 8.5\*\*\* | |  | | 4.6\*\* | | 3.2\* | | 6.5\*\*\* | 0.9 | | | - | |  | 8.42 |
| *Traditional MCP2* | |  | | |  | |  | | |  |  | |  | |  | |  | |  |  | | |  | |  |  |
| RCT, min | | 13.2 | | | 8.60 | |  | | | 3.4\*\* | 2.8 | |  | | 2.7\* | | 1.5 | | 2.2 | 1.5 | | | 0.7 | |  | 4.45 |
| k20, min | | 7.09 | | | 2.92 | |  | | | 0.2 | 1.6 | |  | | 4.0\*\* | | 2.8\* | | 2.0 | 3.6\*\* | | | 2.2 | |  | 1.36 |
| a30, mm | | 15.7 | | | 8.18 | |  | | | 1.9 | 2.3 | |  | | 3.8\*\* | | 1.5 | | 2.0 | 2.9\* | | | 0.8 | |  | 12.6 |
| a45, mm | | 10.8 | | | 5.53 | |  | | | 0.8 | 3.0 | |  | | 2.8\* | | 3.7\*\* | | 0.4 | 1.6 | | | 1.4 | |  | 10.0 |
| a60, mm | | 10.5 | | | 4.67 | |  | | | 1.5 | 1.8 | |  | | 2.4 | | 4.2\*\* | | 0.3 | 1.7 | | | 0.9 | |  | 9.70 |
| *CFt parameters3* | |  | | |  | |  | | |  |  | |  | |  | |  | |  |  | | |  | |  |  |
| RCTeq, min | | 14.2 | | | 9.00 | |  | | | 3.7\*\* | 2.9 | |  | | 2.7\* | | 1.5 | | 2.4 | 1.6 | | | 0.8 | |  | 4.43 |
| kCF, %/min | | 5.26 | | | 4.10 | |  | | | 0.8 | 2.3 | |  | | 4.5\*\* | | 0.7 | | 1.5 | 2.5\* | | | 0.1 | |  | 2.32 |
| kSR, %/min | | 2.46 | | | 4.47 | |  | | | 0.9 | 2.7 | |  | | 2.4\* | | 0.7 | | 1.3 | 1.4 | | | 0.1 | |  | 0.25 |
| CFP, mm | | 10.2 | | | 9.77 | |  | | | 1.4 | 2.8 | |  | | 3.4\* | | 4.4\*\* | | 0.2 | 2.4 | | | 1.1 | |  | 11.5 |
| CFmax, mm | | 10.2 | | | 9.77 | |  | | | 1.4 | 2.8 | |  | | 3.4\* | | 4.4\*\* | | 0.2 | 2.4 | | | 1.1 | |  | 8.56 |
| tmax, min | | 7.44 | | | 6.07 | |  | | | 1.4 | 5.2\*\* | |  | | 3.3\* | | 0.6 | | 3.5\*\* | 2.1 | | | 0.9 | |  | 8.03 |
| *Cheese yields, %* | |  | | |  | |  | | |  |  | |  | |  | |  | |  |  | | |  | |  |  |
| CYCURD | | 21.6 | | | 34.9 | |  | | | 3.5\*\* | 0.1 | |  | | 6.5\*\*\* | | 2.9\* | | 0.8 | 3.4\* | | | 1.3 | |  | 1.37 |
| CYSOLIDS | | 21.1 | | | 34.0 | |  | | | 1.9 | 0.3 | |  | | 3.4\* | | 1.3 | | 0.5 | 1.8 | | | 1.6 | |  | 0.78 |
| CYWATER | | 12.9 | | | 32.5 | |  | | | 3.2\*\* | 0.5 | |  | | 7.2\*\*\* | | 4.0\*\* | | 0.8 | 3.9\*\* | | | 0.9 | |  | 0.82 |
| *Nutrients Recovery %* |  | |  |  | |  | |  |  | | |  | |  | |  | |  | | |  |  | |
| RECFAT | | 6.76 | | | 10.2 | |  | | | 0.9 | 1.7 | |  | | 4.6\*\* | | 4.4\*\* | | 2.1 | 1.6 | | | 1.1 | |  | 3.60 |
| RECPROTEIN | | 5.48 | | | 4.30 | |  | | | 0.9 | 0.8 | |  | | 0.5 | | 6.9\*\*\* | | 9.7\*\*\* | 1.1 | | | 0.6 | |  | 1.47 |
| RECSOLIDS | | 13.4 | | | 18.8 | |  | | | 1.9 | 0.6 | |  | | 4.6\*\* | | 2.0 | | 0.6 | 1.7 | | | 0.8 | |  | 3.13 |
| RECENERGY | | 7.00 | | | 13.0 | |  | | | 1.8 | 1.2 | |  | | 5.5\*\*\* | | 2.0 | | 3.0\* | 2.3 | | | 2.0 | |  | 2.88 |

1RMSE = Root Mean Square Error; 2RCT = measured rennet gelation time; k20 = time interval between gelation and attainment of curd firmness of 20 mm; a30, a45 and a60 = curd firmness 30, 45 and 60 min after rennet addition; 3RCTeq = rennet coagulation time estimated by CFt modeling; kCF = curd firming instant rate constant; kSR = syneresis instant rate constant; CFP = asymptotic potential curd firmness; CFmax = maximum curd firmness achieved within 45 min; tmax = time at achievement of CFmax. \**P* < 0.05; \*\**P* < 0.01; \*\*\**P* < 0.001.