Supplementary Table S1. Associations between gross milk traits, milk FA levels and *PLIN2* c.\*302T>C (Region 5).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Traits | Mean ± SE1 | | | P value 2 |
| A5A5 (n = 69) | A5B5 (n = 218) | B5B5 (n = 122) |
| Milk yield (L) | 22.16 ± 0.444 | 22.04 ± 0.262 | 21.92 ± 0.339 | 0.896 |
| Milk fat (g/100g milk) | 5.10 ± 0.066 | 5.05 ± 0.039 | 5.04 ± 0.050 | 0.699 |
| Milk protein (g/100g milk) | 4.19 ± 0.034 | 4.15 ± 0.020 | 4.10 ± 0.026 | **0.044** |
|  |  |  |  |  |
| Milk individual FAs (g/100g milk FA) |  |  |  |  |
| C4:0 | 1.29 ± 0.016 | 1.26 ± 0.009 | 1.25 ± 0.012 | 0.080 |
| C6:0 | 1.57 ± 0.014 | 1.56 ± 0.008 | 1.55 ± 0.010 | 0.504 |
| C8:0 | 1.17 ± 0.011 | 1.19 ± 0.007 | 1.20 ± 0.009 | 0.147 |
| C10:0 | 3.18 ± 0.045 | 3.24 ± 0.026b | 3.33 ± 0.034 | **0.013** |
| C10:1 | 0.29 ± 0.006 | 0.28 ± 0.003 | 0.28 ± 0.004 | 0.441 |
| C11:0 | 0.06 ± 0.002 | 0.06 ± 0.001 | 0.06 ± 0.002 | **0.021** |
| C12:0 | 3.86 ± 0.059 | 3.93 ± 0.035 | 4.06 ± 0.045 | **0.010** |
| C13:0 iso | 0.08 ± 0.002 | 0.08 ± 0.001 | 0.08 ± 0.002 | 0.890 |
| C12:1 | 0.09 ± 0.002 | 0.09 ± 0.001 | 0.09 ± 0.002 | 0.444 |
| C13:0 anteiso | 0.04 ± 0.001 | 0.04 ± 0.000 | 0.04 ± 0.000 | 0.237 |
| C13:0 | 0.12 ± 0.003ab | 0.12 ± 0.002b | 0.13 ± 0.002a | **0.027** |
| C14:0 | 12.45 ± 0.108 | 12.39 ± 0.064 | 12.60 ± 0.082 | 0.106 |
| C14:1 cis-9 | 0.98 ± 0.027 | 0.95 ± 0.016 | 0.94 ± 0.020 | 0.452 |
| C15:0 iso | 0.29 ± 0.003 | 0.30 ± 0.002 | 0.30 ± 0.003 | 0.174 |
| C15:0 anteiso | 0.62 ± 0.011 | 0.64 ± 0.007 | 0.66 ± 0.009 | 0.069 |
| C15:0 | 1.47 ± 0.021 | 1.46 ± 0.012 | 1.50 ± 0.016 | 0.259 |
| C15:1 | 0.28 ± 0.004 | 0.28 ± 0.002 | 0.29 ± 0.003 | 0.249 |
| C16:0 | 37.91 ± 0.374 | 37.01 ± 0.221 | 36.52 ± 0.286 | **0.010** |
| C16:1 cis-9 | 1.26 ± 0.031 | 1.27 ± 0.018 | 1.24 ± 0.024 | 0.593 |
| C17:0 iso | 0.55 ± 0.008 | 0.55 ± 0.005 | 0.55 ± 0.006 | 0.708 |
| C17:0 | 0.87 ± 0.010 | 0.87 ± 0.006 | 0.87 ± 0.007 | 0.985 |
| C17:1 | 0.19 ± 0.003 | 0.20 ± 0.002 | 0.20 ± 0.002 | 0.494 |
| C18:0 | 8.66 ± 0.158 | 8.76 ± 0.093 | 8.84 ± 0.121 | 0.636 |
| C18:1 trans-11 | 2.69 ± 0.091 | 2.83 ± 0.053 | 2.93 ± 0.069 | 0.095 |
| C18:1 cis-9 | 12.94 ± 0.195 | 13.37 ± 0.115 | 13.18 ± 0.149 | 0.130 |
| C18:2 trans-9,12 | 0.41 ± 0.005 | 0.42 ± 0.003 | 0.42 ± 0.004 | 0.097 |
| C18:2 cis-9, trans-13 | 0.28 ± 0.004 | 0.29 ± 0.003 | 0.29 ± 0.003 | 0.257 |
| C18:2 cis-9, trans-12 | 0.07 ± 0.003 | 0.07 ± 0.002 | 0.07 ± 0.002 | 0.176 |
| C18:2 trans-9, cis-12 | 0.47 ± 0.015 | 0.48 ± 0.009 | 0.49 ± 0.011 | 0.457 |
| C18:2 cis-9,12 | 0.69 ± 0.010 | 0.70 ± 0.006 | 0.70 ± 0.008 | 0.498 |
| C19:0 | 0.14 ± 0.003 | 0.14 ± 0.002 | 0.15 ± 0.002 | 0.089 |
| C18:3 cis-6,9,12 | 0.07 ± 0.001 | 0.07 ± 0.001 | 0.07 ± 0.001 | 0.450 |
| C18:3 cis-9,12,15 | 0.80 ± 0.014 | 0.81 ± 0.008 | 0.80 ± 0.011 | 0.804 |
| CLA cis-9, trans-11 | 0.98 ± 0.037 | 1.04 ± 0.022 | 1.04 ± 0.028 | 0.375 |
| C20:0 | 0.13 ± 0.002 | 0.13 ± 0.001 | 0.13 ± 0.002 | 0.866 |
| C20:1 cis-5 | 0.06 ± 0.002 | 0.06 ± 0.001 | 0.06 ± 0.001 | 0.815 |
| C20:1 cis-9 | 0.15 ± 0.003 | 0.15 ± 0.002 | 0.15 ± 0.002 | 0.622 |
| C20:1 cis-11 | 0.08 ± 0.002 | 0.08 ± 0.001 | 0.08 ± 0.001 | 0.391 |
| C20:3 cis-8,11,14 | 0.03 ± 0.001 | 0.03 ± 0.000 | 0.03 ± 0.001 | 0.334 |
| C20:4 cis-5,8,11,14 | 0.04 ± 0.001 | 0.04 ± 0.000 | 0.04 ± 0.001 | 0.830 |
| C22:0 | 0.07 ± 0.002 | 0.06 ± 0.001 | 0.07 ± 0.001 | 0.177 |
| C20:5 cis-5,8,11,14,17 | 0.09 ± 0.001 | 0.09 ± 0.001 | 0.09 ± 0.001 | 0.659 |
| C24:0 | 0.05 ± 0.001 | 0.04 ± 0.001 | 0.05 ± 0.001 | 0.297 |
| C22:5 cis-7,10,13,16,19 | 0.12 ± 0.003 | 0.12 ± 0.002 | 0.12 ± 0.002 | 0.885 |
|  |  |  |  |  |
| Milk grouped FAs (g/100g milk FA) |  |  |  |  |
| SCFA | 2.86 ± 0.027 | 2.82 ± 0.016 | 2.80 ± 0.021 | 0.177 |
| MCFA | 20.67 ± 0.202 | 20.74 ± 0.119 | 21.19 ± 0.155 | **0.030** |
| LCFA | 49.28 ± 0.331 | 48.48 ± 0.195 | 48.11 ± 0.253 | **0.014** |
| Omega 3 | 1.01 ± 0.014 | 1.02 ± 0.009 | 1.01 ± 0.011 | 0.859 |
| Omega 6 | 0.82 ± 0.011 | 0.84 ± 0.006 | 0.83 ± 0.008 | 0.428 |
| MUFA | 19.85 ± 0.234 | 20.43 ± 0.138 | 20.32 ± 0.179 | 0.089 |
| PUFA | 4.06 ± 0.059 | 4.17 ± 0.035 | 4.18 ± 0.045 | 0.191 |
| Branched FA | 1.58 ± 0.019 | 1.61 ± 0.011 | 1.62 ± 0.014 | 0.109 |
| Total UFA | 23.91 ± 0.277 | 24.60 ± 0.163 | 24.49 ± 0.212 | 0.083 |
| Total SFA | 69.13 ± 0.300 | 68.29 ± 0.177 | 68.22 ± 0.230 | **0.028** |
|  |  |  |  |  |
| Unsaturated index (%) |  |  |  |  |
| C10:1 index 3 | 8.329 ± 0.176a | 8.077 ± 0.104ab | 7.753 ± 0.135b | **0.020** |
| C12:1 index 4 | 2.282 ± 0.044 | 2.245 ± 0.026 | 2.227 ± 0.034 | 0.587 |
| C14:1 index 5 | 7.283 ± 0.193 | 7.109 ± 0.114 | 6.924 ± 0.147 | 0.291 |
| C16:1 index 6 | 3.222 ± 0.072 | 3.326 ± 0.042 | 3.293 ± 0.055 | 0.424 |

1Predicted means and standard error of those means derived from GLMM. ‘Cow age’, ‘days in milk’ and ‘herd’ were fitted to the models as fixed effects.

2*P* < 0.05 in bold.

3 C10:1 index = C10:1/( C10:1 + C10:0) × 100.

4 C12:1 index = C12:1/( C12:1 + C12:0) × 100.

5 C14:1 index = C14:1 *cis-*9/( C14:1 *cis-*9 + C14:0) × 100.

6 C16:1 index = C16:1 *cis-*9/( C16:1 *cis-*9 + C16:0) × 100.

Supplementary Table S2. Association between milk fat composition and *PLIN2* variant c.\*302T>C (corrected for *DGAT1, FABP4* and *SCD1* genotype).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Traits | Mean ± SE 1 (g/100 g milk FA)  associated with PLIN2 genotype | | |  | P value 2 | | | |
| A5A5 (n = 67) | A5B5 (n = 212) | B5B5 (n = 119) | *DGAT1* | *FABP4* | *SCD1* | *PLIN2* |
| Milk yield (L) | 22.51 ± 0.484 | 22.34 ± 0.329 | 22.26 ± 0.394 |  | **<0.001** | 0.867 | 0.293 | 0.896 |
| Milk fat (g/100g milk) | 4.96 ± 0.058 | 4.92 ± 0.039 | 4.91 ± 0.047 |  | **<0.001** | 0.732 | 0.413 | 0.734 |
| Milk protein (g/100g milk) | 4.15 ± 0.036 | 4.11 ± 0.025 | 4.06 ± 0.030 |  | **<0.001** | 0.880 | 0.786 | 0.060 |
|  |  |  |  |  |  |  |  |  |
| Milk individual FAs (g/100g milk FA) |  |  |  |  |  |  |  |  |
| C4:0 | 1.30 ± 0.017 | 1.27 ± 0.012 | 1.26 ± 0.014 |  | 0.340 | 0.561 | 0.134 | 0.061 |
| C6:0 | 1.57 ± 0.015 | 1.56 ± 0.011 | 1.55 ± 0.013 |  | **0.014** | 0.800 | 0.222 | 0.500 |
| C8:0 | 1.18 ± 0.013 | 1.19 ± 0.009 | 1.20 ± 0.011 |  | 0.074 | 0.271 | 0.184 | 0.130 |
| C10:0 | 3.21 ± 0.050 | 3.26 ± 0.034 | 3.36 ± 0.041 |  | 0.320 | 0.081 | **0.012** | **0.014** |
| C10:1 | 0.28 ± 0.005 | 0.28 ± 0.003 | 0.28 ± 0.004 |  | 0.369 | 0.111 | **<0.001** | 0.645 |
| C11:0 | 0.06 ± 0.002 | 0.06 ± 0.002 | 0.06 ± 0.002 |  | **<0.001** | **0.048** | **0.001** | **0.007** |
| C12:0 | 3.89 ± 0.067 | 3.94 ± 0.045 | 4.09 ± 0.054 |  | 0.393 | 0.068 | 0.294 | **0.009** |
| C13:0 iso | 0.08 ± 0.002 | 0.08 ± 0.001 | 0.08 ± 0.002 |  | 0.398 | 0.081 | **<0.001** | 0.795 |
| C12:1 | 0.09 ± 0.002 | 0.09 ± 0.002 | 0.09 ± 0.002 |  | 0.476 | **0.044** | **<0.001** | 0.241 |
| C13:0 anteiso | 0.04 ± 0.001 | 0.04 ± 0.000 | 0.04 ± 0.001 |  | **<0.001** | 0.083 | 0.742 | 0.177 |
| C13:0 | 0.12 ± 0.003 | 0.12 ± 0.002 | 0.13 ± 0.003 |  | **<0.001** | 0.063 | **<0.001** | **0.017** |
| C14:0 | 12.64 ± 0.111 | 12.52 ± 0.075 | 12.74 ± 0.090 |  | **<0.001** | **0.015** | **0.029** | 0.052 |
| C14:1 cis-9 | 0.94 ± 0.023 | 0.92 ± 0.016 | 0.92 ± 0.019 |  | 0.121 | 0.164 | **<0.001** | 0.599 |
| C15:0 iso | 0.29 ± 0.004 | 0.30 ± 0.002 | 0.30 ± 0.003 |  | **<0.001** | 0.105 | 0.621 | 0.163 |
| C15:0 anteiso | 0.63 ± 0.013 | 0.65 ± 0.009 | 0.66 ± 0.010 |  | **0.001** | 0.630 | 0.608 | 0.108 |
| C15:0 | 1.48 ± 0.023 | 1.47 ± 0.016 | 1.50 ± 0.019 |  | 0.218 | 0.516 | 0.112 | 0.240 |
| C15:1 | 0.28 ± 0.004 | 0.29 ± 0.003 | 0.29 ± 0.003 |  | 0.002 | 0.832 | 0.684 | 0.248 |
| C16:0 | 37.44 ± 0.398 | 36.59 ± 0.271 | 36.08 ± 0.325 |  | **<0.001** | **0.017** | 0.126 | **0.008** |
| C16:1 cis-9 | 1.27 ± 0.033 | 1.28 ± 0.023 | 1.25 ± 0.027 |  | **<0.001** | 0.947 | **<0.001** | 0.577 |
| C17:0 iso | 0.55 ± 0.009 | 0.56 ± 0.006 | 0.56 ± 0.007 |  | 0.124 | 0.066 | **<0.001** | 0.508 |
| C17:0 | 0.87 ± 0.011 | 0.87 ± 0.007 | 0.87 ± 0.009 |  | **0.001** | 0.874 | 0.121 | 0.996 |
| C17:1 | 0.20 ± 0.004 | 0.20 ± 0.002 | 0.20 ± 0.003 |  | 0.424 | 0.333 | **0.004** | 0.442 |
| C18:0 | 8.55 ± 0.179 | 8.67 ± 0.122 | 8.75 ± 0.146 |  | 0.562 | 0.306 | 0.884 | 0.571 |
| C18:1 trans-11 | 2.77 ± 0.102 | 2.92 ± 0.070 | 3.00 ± 0.083 |  | 0.518 | 0.426 | 0.236 | 0.124 |
| C18:1 cis-9 | 13.08 ± 0.208 | 13.52 ± 0.142 | 13.33 ± 0.170 |  | **<0.001** | 0.057 | 0.698 | 0.109 |
| C18:2 trans-9,12 | 0.41 ± 0.005 | 0.42 ± 0.004 | 0.42 ± 0.004 |  | **<0.001** | 0.105 | **0.035** | 0.079 |
| C18:2 cis-9, trans-13 | 0.29 ± 0.005 | 0.30 ± 0.003 | 0.30 ± 0.004 |  | **<0.001** | 0.107 | **0.001** | 0.309 |
| C18:2 cis-9, trans-12 | 0.07 ± 0.003 | 0.08 ± 0.002 | 0.07 ± 0.002 |  | **0.006** | 0.661 | **<0.001** | 0.131 |
| C18:2 trans-9, cis-12 | 0.48 ± 0.017 | 0.50 ± 0.011 | 0.51 ± 0.014 |  | 0.244 | 0.219 | 0.663 | 0.345 |
| C18:2 cis-9,12 | 0.69 ± 0.011 | 0.71 ± 0.007 | 0.70 ± 0.009 |  | **<0.001** | 0.103 | 0.967 | 0.530 |
| C19:0 | 0.14 ± 0.004 | 0.14 ± 0.002 | 0.14 ± 0.003 |  | 0.537 | 0.058 | **0.019** | 0.089 |
| C18:3 cis-6,9,12 | 0.07 ± 0.001 | 0.08 ± 0.001 | 0.08 ± 0.001 |  | **<0.001** | 0.878 | 0.675 | 0.423 |
| C18:3 cis-9,12,15 | 0.80 ± 0.015 | 0.81 ± 0.010 | 0.81 ± 0.013 |  | **<0.001** | 0.419 | 0.738 | 0.748 |
| CLA cis-9, trans-11 | 1.04 ± 0.041 | 1.09 ± 0.028 | 1.09 ± 0.034 |  | **<0.001** | 0.514 | 0.175 | 0.380 |
| C20:0 | 0.13 ± 0.002 | 0.13 ± 0.002 | 0.13 ± 0.002 |  | 0.400 | 0.444 | 0.232 | 0.737 |
| C20:1 cis-5 | 0.06 ± 0.002 | 0.06 ± 0.001 | 0.06 ± 0.002 |  | 0.097 | 0.693 | 0.515 | 0.690 |
| C20:1 cis-9 | 0.15 ± 0.003 | 0.15 ± 0.002 | 0.15 ± 0.003 |  | **0.031** | 0.771 | 0.353 | 0.624 |
| C20:1 cis-11 | 0.07 ± 0.002 | 0.07 ± 0.001 | 0.08 ± 0.001 |  | 0.655 | 0.249 | 0.267 | 0.295 |
| C20:3 cis-8,11,14 | 0.03 ± 0.001 | 0.03 ± 0.001 | 0.03 ± 0.001 |  | 0.831 | 0.957 | 0.276 | 0.279 |
| C20:4 cis-5,8,11,14 | 0.04 ± 0.001 | 0.04 ± 0.001 | 0.04 ± 0.001 |  | 0.645 | 0.604 | 0.855 | 0.800 |
| C22:0 | 0.07 ± 0.002 | 0.06 ± 0.001 | 0.06 ± 0.001 |  | 0.140 | **0.002** | 0.558 | 0.111 |
| C20:5 cis-5,8,11,14,17 | 0.09 ± 0.002 | 0.09 ± 0.001 | 0.09 ± 0.001 |  | 0.651 | 0.402 | 0.509 | 0.544 |
| C24:0 | 0.04 ± 0.001 | 0.04 ± 0.001 | 0.04 ± 0.001 |  | 0.140 | **0.008** | 0.314 | 0.170 |
| C22:5 cis-7,10,13,16,19 | 0.12 ± 0.003 | 0.12 ± 0.002 | 0.12 ± 0.003 |  | 0.579 | 0.286 | 0.240 | 0.812 |
|  |  |  |  |  |  |  |  |  |
| Milk grouped FAs (g/100g milk FA) |  |  |  |  |  |  |  |  |
| SCFA | 2.88 ± 0.031 | 2.84 ± 0.021 | 2.81 ± 0.025 |  | 0.197 | 0.732 | 0.152 | 0.159 |
| MCFA | 20.92 ± 0.220 | 20.90 ± 0.149 | 21.38 ± 0.179 |  | **<0.001** | **0.026** | **0.037** | **0.024** |
| LCFA | 48.72 ± 0.344 | 47.97 ± 0.234 | 47.59 ± 0.280 |  | **<0.001** | **0.019** | 0.120 | **0.012** |
| Omega 3 | 1.02 ± 0.016 | 1.02 ± 0.011 | 1.02 ± 0.013 |  | **<0.001** | 0.375 | 0.749 | 0.847 |
| Omega 6 | 0.83 ± 0.012 | 0.85 ± 0.008 | 0.84 ± 0.009 |  | **<0.001** | 0.104 | 0.965 | 0.496 |
| MUFA | 20.04 ± 0.253 | 20.64 ± 0.172 | 20.51 ± 0.206 |  | **<0.001** | 0.079 | 0.351 | 0.063 |
| PUFA | 4.15 ± 0.062 | 4.26 ± 0.042 | 4.26 ± 0.051 |  | **<0.001** | 0.183 | 0.278 | 0.160 |
| Branched FA | 1.58 ± 0.020 | 1.62 ± 0.014 | 1.63 ± 0.017 |  | **0.001** | 0.126 | **0.025** | 0.093 |
| Total UFA | 24.18 ± 0.298 | 24.90 ± 0.202 | 24.77 ± 0.242 |  | **<0.001** | 0.078 | 0.446 | 0.057 |
| Total SFA | 68.80 ± 0.323 | 67.94 ± 0.219 | 67.89 ± 0.263 |  | **<0.001** | **0.040** | 0.396 | **0.019** |
|  |  |  |  |  |  |  |  |  |
| Unsaturated index (%) | |  |  |  |  |  |  |  |
| C10:1 index3 | 8.09 ± 0.168 | 7.93 ± 0.114 | 7.62 ± 0.137 |  | 0.956 | 0.572 | **<0.001** | **0.022** |
| C12:1 index4 | 2.24 ± 0.045 | 2.21 ± 0.030 | 2.21 ± 0.036 |  | 0.766 | 0.330 | **<0.001** | 0.825 |
| C14:1 index5 | 6.94 ± 0.169 | 6.88 ± 0.115 | 6.71 ± 0.138 |  | 0.504 | 0.562 | **<0.001** | 0.350 |
| C16:1 index6 | 3.27 ± 0.076 | 3.37 ± 0.052 | 3.34 ± 0.062 |  | **0.031** | 0.895 | **<0.001** | 0.452 |

1 Predicted means and standard error of those means derived from GLMM. ‘Cow age’, ‘days in milk’, ‘herd’, ‘*DGAT1*  p.K232A’, ‘*FABP4*’ and ‘*SCD1* p.A293V’ were fitted to the models as fixed effects.

2 *P***<** 0.05 in bold.

3 C10:1 index = C10:1/( C10:1 + C10:0) × 100.

4 C12:1 index = C12:1/( C12:1 + C12:0) × 100.

5 C14:1 index = C14:1 *cis-*9/( C14:1 *cis-*9+ C14:0) × 100.

6 C16:1 index = C16:1 *cis-*9/( C16:1 *cis-*9+ C16:0) × 100.