Supplementary Table S1 Spearman rank correlations\* between pedigree-based breeding values for DMI of evaluated animals for which phenotypic observations were available on different number of traits across reference populations with phenotypes available for different traits.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Traits recorded on evaluated population |  | NO1 | | | | FPCM3 | | LW4 | |
|  | Traits recorded on reference population | DMI2 | DMI and FPCM | DMI and LW | DMI, FPCM and LW | DMI and FPCM | DMI, FPCM and LW | DMI and LW | DMI, FPCM and LW |
| NO | DMI  and FPCM | 0.95 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI and LW | 0.92 | 0.89 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI, FPCM and LW | 0.89 | 0.94 | 0.95 |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| FPCM | DMI  and FPCM | 0.81 | 0.84 | 0.75 | 0.78 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI, FPCM and LW | 0.76 | 0.79 | 0.80 | 0.83 | 0.95 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| LW | DMI and LW | 0.61 | 0.61 | 0.67 | 0.66 | 0.58 | 0.63 |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI, FPCM and LW | 0.58 | 0.63 | 0.64 | 0.69 | 0.59 | 0.65 | 0.98 |  |
|  |  |  |  |  |  |  |  |  |  |
| FPCM and LW | DMI, FPCM and LW | 0.59 | 0.64 | 0.64 | 0.67 | 0.69 | 0.73 | 0.96 | 0.97 |

\* Standard errors across cross-validation sets ranged from 0.002 to 0.052

1 Phenotypes on none of the traits available

2 Phenotypes on dry matter intake available

3 Phenotypes on fat-protein-corrected milk available

4 Phenotypes on live weight available

**Supplementary Table S2** Spearman rank correlations\* between genomic-based breeding values for DMI of evaluated animals for which phenotypic observations were available on different number of traits across reference populations with phenotypes available for different traits.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Traits recorded on evaluated population |  | NO1 | | | | FPCM3 | | LW4 | |
|  | Traits recorded on reference population | DMI2 | DMI and FPCM | DMI and LW | DMI, FPCM and LW | DMI and FPCM | DMI, FPCM and LW | DMI and LW | DMI, FPCM and LW |
| NO | DMI  and FPCM | 0.96 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI and LW | 0.94 | 0.92 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI, FPCM and LW | 0.89 | 0.95 | 0.96 |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| FPCM | DMI  and FPCM | 0.90 | 0.93 | 0.85 | 0.87 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI, FPCM and LW | 0.86 | 0.90 | 0.91 | 0.94 | 0.95 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| LW | DMI and LW | 0.78 | 0.77 | 0.82 | 0.81 | 0.76 | 0.80 |  |  |
|  |  |  |  |  |  |  |  |  |
| DMI, FPCM and LW | 0.74 | 0.78 | 0.79 | 0.82 | 0.76 | 0.81 | 0.98 |  |
|  |  |  |  |  |  |  |  |  |  |
| FPCM and LW | DMI, FPCM and LW | 0.73 | 0.77 | 0.78 | 0.81 | 0.80 | 0.85 | 0.97 | 0.99 |

\* Standard errors across cross-validation sets ranged from 0.002 to 0.030

1 Phenotypes on none of the traits available

2 Phenotypes on dry matter intake available

3 Phenotypes on fat-protein-corrected milk available

4 Phenotypes on live weight available