**Supplementary Material S1: comparison between the three-trait evaluation model and a similar two-trait model for CW and CC treating AS as a linear and quadratic covariate**

Preadjusted performances were calculated for sires based on the performances of their offspring using the three-trait model (DYD3trait) or the two-trait model with AS as a covariate (DYDcovariate). Then the two evaluations were run, considering the 20% youngest sires as a validation population with no offspring performances. In the Montbeliarde breed, 900 sires formed the training population and 225 the validation population. In the Normande breed, 740 sires formed the training population and 185 the validation population. DYDs for validation populations were estimated based on 35 offspring performances per sire on average in both breeds.

The accuracy of each evaluation was assessed computing the weighted correlation between DYDs and EBVs in the validation populations. The bias of each evaluation was estimated as the weighted difference from one of the regression coefficient of DYDs on EBVs. In both cases, the weight was the number of performances contributing to the DYDs in the validation populations.

**Table S1. Correlations between EBVs and DYDs and regression coefficients of DYDs on EBVs for the two models**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Breed | Carcass trait | DYD3trait  and EBV from | | DYDcovariate  and EBV from | |
| Model |  |  | 3-trait model | 2-trait model | 3-trait model | 2-trait model |
| Accuracy | Montbeliarde | CW1 | 0.38 | 0.38 | 0.39 | 0.39 |
| CC2 | 0.43 | 0.43 | 0.43 | 0.43 |
| Normande | CW1 | 0.29 | 0.28 | 0.30 | 0.29 |
| CC2 | 0.35 | 0.35 | 0.35 | 0.36 |
| Regression coefficient | Montbeliarde | CW1 | 0.81 | 0.76 | 0.85 | 0.79 |
| CC2 | 0.94 | 0.93 | 0.95 | 0.93 |
| Normande | CW1 | 0.78 | 0.70 | 0.81 | 0.74 |
| CC2 | 0.84 | 0.84 | 0.85 | 0.85 |

1 Carcass weight; 2 Carcass conformation