

# Body weight prediction and genetic parameter estimation based on type traits in Italian Holstein cows

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## Abstract

Body weight (BW) is an important trait used in order to control maintenance cost within herds. It is unfeasible to get routine data collection on BW, but BW can be estimated from routine type classification scores. Body weight for Italian Holstein cows was estimated based on actual BW and linear scores for different type traits of 890 first parity cows collected in 30 different herds over a 3-yr period (2013-2015). Actual BW was collected thanks to precision dairy in herds with automatic weighting systems in milking robots. The selected type traits used to predict BW, included stature, chest width, body depth, rump width and body condition score. The predictive ability of models was tested with 2-fold cross-validation. Correlation between predicted BW in training and validation data-sets ranged from 0.62 to 0.70. The model used for actual BW genetic parameter estimation included herd-year-season of weighing cows, month of calving, age at scoring and interval in days ( $\pm 30$  days) between the weighing and the scoring days. Heritability for actual BW was  $0.51 \pm 0.06$ . The BW prediction equation was applied to the national routine type classification data. Average actual BW was equal to  $598.24 \pm 73.00$  kg and average predicted BW was equal to  $597.21 \pm 40.94$ . Genetic relationships of predicted BW with type traits included in the prediction equation have been estimated. Heritability for predicted BW was equal to  $0.21 \pm 0.01$ . Currently, the equation to predict BW has been used to estimate maintenance cost in the new economic functional index (IES) for the Italian Holstein population. Next steps will be to make use of this trait in order to develop a proxy for feed efficiency breeding values to include in the national evaluation system.

*Keywords: Body weight, precision farming, genetic parameter, feed efficiency*