## **Prediction of Body Weight of Primiparous Dairy CowsThroughout Lactation**

*M.-L. Vanrobays*\*, J. Vandenplas \*,<sup>†</sup>, H. Hammami \*,<sup>†</sup> & N. Gengler\* \* University of Liège. Gembloux Agro-Bio Tech – Gembloux. Belaium

> <sup>†</sup> National Fund for Scientific Research – Brussels, Belgium Contact: mlvanrobays@ula.ac.be

GEMBLOUX AGRO-BIO TECH

g



- Body weight (BW) of cows can be computed (CBW) from linear conformation traits
- CBW associated to a classification date
- Need to predict BW (PBW) throughout lactation
  - For management and genetic purposes
  - e.g., allowing feed intake prediction

#### **Objective:** Prediction of BW of cows throughout lactation from initial CBW using a two-step approach

Conclusion: More accurate PBW of cows with the two-step approach

### Material & Methods



#### Results

Figure 1. Averaged CBW (•••) and PBW2 (—) of cows across days in milk (DIM)



Figure 2. Daily CBW (▲) and PBW for a given cow across DIM using only the first step (PBW1; —) or the two steps (PBW2; +) of the two-step approach



Wallonie

The Ministry of Agriculture of the Walloon Region of Belgium (Service Public de Wallonie – Direction générale de l'Agriculture, des Ressources naturelles et de l'Environnement, Direction de la Recherche) is acknowledged for its financial support through the research project D31-1304. The authors thanks the Walloon Breeding Association for providing access to cow conformation data and Eric Froidmont (Walloon Agricultural Research Center) for providing additional body weight data. The authors are grateful to the CÉCI for the use of their supercomputers. M.-L. Vanrobays acknowledges University of Liege for travel grant to attend 10<sup>th</sup> WCGALP.



## > Prediction of Body Weight of Primiparous Dairy CowsThroughout Lactation

M.-L. Vanrobays\*, J. Vandenplas \*,†, H. Hammami \*,† & N. Gengler\*

\* University of Liège, Gembloux Agro-Bio Tech – Gembloux, Belgium <sup>†</sup> National Fund for Scientific Research – Brussels, Belgium Contact: mlvanrobays@ulg.ac.be

## Material & Methods

### Data

- 25,061 linear conformation data
  - Angularity, chest width, stature, body depth, and body condition score (BCS)
- **24,919 primiparous Holstein cows from 622 herds**
- 232,436 test-day (TD) records from milk recording

## **Body weight estimation**

- 2 CBW equations (Laloux, 2008) based on:
  - 1)Age, angularity, chest width, stature, body depth, and BCS for cows in early (EL) lactation (R<sup>2</sup>=0.86)
  - 2)Age, angularity, stature, body depth, and BCS for cows in mid-late (ML) lactation (R<sup>2</sup>=0.73)

### Two-step approach

1. PBW1 → random regression TD model weighted on used CBW equation

 $y = Xb + d_{l}\alpha_{l} + d_{q}\alpha_{q} + Z_{el}h_{el} + Z_{ml}h_{ml} + Z_{el}a_{el} + Z_{ml}a_{ml} + e$ where y = Vector of observations (i.e., CBW)

- **b** = Vector of fixed effects
- ightarrow Year and season of TD, classes of gestation stage & age at calving x lactation stage
- $d_1$  and  $d_2$  = Linear and quadratic regression variables across DIM
- $\alpha_1$  and  $\alpha_n$  = Fixed regression coefficients
- $\mathbf{h}_{el}$  and  $\mathbf{h}_{ml}$  = Correlated random herd effects
- $\mathbf{a}_{el}$  and  $\mathbf{a}_{ml}$  = Random animal genetic effects
- X,  $Z_{el}$  and  $Z_{ml}$  = Incidence matrices assigning observations to effects e= Vector of residuals
- PBW2 → same model with changing means and (co)variances of prior distributions for a<sub>el</sub> and a<sub>ml</sub> using priors developed from results of PBW1



The Ministry of Agriculture of the Walloon Region of Belgium (Service Public de Wallonie – Direction générale de l'Agriculture, des Ressources naturelles et de l'Environnement, Direction de la Recherche) is acknowledged for its financial support through the research project D31-1304. The authors thanks the Walloon Breeding Association for providing access to cow conformation data and Eric Froidmont (Walloon Agricultural Research Center) for providing additional body weight data. The authors are grateful to the CÉCI for the use of their supercomputers. M.-L. Vanrobays acknowledges University of Liege for travel grant to attend 10<sup>th</sup> WCGALP.



Ø

# > Prediction of Body Weight of Primiparous Dairy CowsThroughout Lactation



Wallonie

The Ministry of Agriculture of the Walloon Region of Belgium (Service Public de Wallonie – Direction générale de l'Agriculture, des Ressources naturelles et de l'Environnement, Direction de la Recherche) is acknowledged for its financial support through the research project D31-1304. The authors thanks the Walloon Breeding Association for providing access to cow conformation data and Eric Froidmont (Walloon Agricultural Research Center) for providing additional body weight data. The authors are grateful to the CÉCI for the use of their supercomputers. M.-L. Vanrobays acknowledges University of Liege for travel grant to attend 10<sup>th</sup> WCGALP.



GEMBLOUX

**AGRO-BIO TECH** 

g