Impact of winter feeding strategies on the growth of young dairy heifers in Wallonia.

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Introduction

With a replacement rate of 30 % in dairy herds, it is essential to ensure the best rearing conditions of young cattle for the development of future dairy cows. The potential benefits associated to an early calving, at 24 – 26 months of age, have been demonstrated for a long time. Winter feeding is a critical aspect in the management of young cattle and the aim of this study was to determine its incidence on the growth performances of dairy heifers.

Material and Methods

Winter feeding strategies and associated growth performances were studied on 507 Holstein dairy heifers, aged from 64 to 857 days and belonging to 28 farmers located in the main dairy regions in Wallonia (Chimay and Herve).

Development and growth were determined using Heart Girth (HG) measurements and compared with French references at key ages (Porrhiel et *al.*, 2005) for early calving heifers (Table 1). HG was linearly extrapolated to these ages. Growth may effectively be considered constant in a three months interval (Hoffman and Funk, 1992). Body Weight (BW) was estimated from HG using a prediction equation related to the genetic features of Walloon dairy herds (n = 256, $BW = 0.0005\ HG^{2.6161}$, $r^2 = 0.96$). Growth was evaluated by the difference of HG measurements between 2 consecutive visits conducted in farms every 3 months, and reported on a time scale of one month ($\Delta HG/30.4$ days).

Table 1 : Mean Heart Girth references (cm)

Key age (month)	HG (cm)
3	106
6	128
9	143
12	158
15	169
18	180
21	187
24	193

The farmers did not change the diets of the heifers during the winter period. Diets and feedstuffs were sampled once a winter season and analysed using NIR (FOSS NIR Systems, MD, USA, global procedure of WINISI 1.5 software) in order to deduce the theoretical NEF, DVE and OEB contents. Standard values were used for concentrates samples (Centraal Veevoederbureau, CVB, 2000). Feed intake was estimated from the French Fill Unit System. The animal feed intake capacity (IC) is linked to BW (Equation 1) and to the Fill Values (FV) of forage and concentrates (Equation 2), declined in Fill Unit (FU).

$$IC = I_{type} \times BW^{0.9} \qquad \text{Equation 1}$$

I_{type}(FU/kg) is a coefficient related to the breed of the heifer. It is worth 0.039 FU/kg for a dairy heifer over 300 kg. For the youngest, weighting less than 150 kg, 0.2 FU/kg is added to the previous coefficient. The increment for animals between 150 and 290 kg equals 0.1 FU/kg.

$$IC = (IQ_F \times FV_F) + (IQ_C \times FV_C) \qquad \text{Equation 2}$$

IQ_F and IQ_c (FU) represent respectively the amounts of forage and concentrates intake. IQ_c is known precisely with the composition of the diet, IQ_F is the variable in this system of equations. The Fill Value of concentrates (FV_C) is a function of the Fill Value of forage (FV_F - Equation 3) which is constant and published in feed tables (Sauvant and *al.*, 2007). Sg is called the Substitution rate and is also available in feed tables.

$$FV_c = Sg \times FV_F \qquad \text{Equation 3}$$

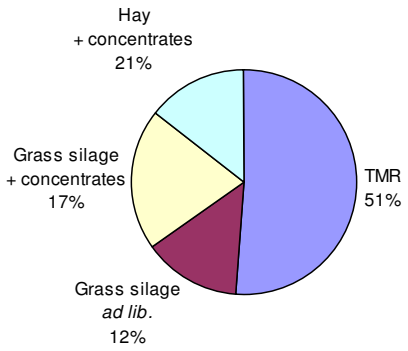
Feed intake is the addition of IQ_F and IQ_c. NEF and DVE really consumed are then easily estimated from the theoretical NIR values and the part of forage and concentrates ingested. NEF and DVE supplies were finally compared to heifers requirements, estimated in function of their punctual BW and their growth rate (L. Fabry, AWE, personal communication). Energy and protein supplies were considered adequate between 80 and 120 % of their requirements.

Results and Discussion

Conditions for early calving heifers require a sufficient conformation around insemination and calving ages, respectively at 15 and 24 months. According to mean HG measurements of the herds at these critical rearing periods, 83 % of the breeders could calve their heifers early. Lack of development appeared at 15 months for 13.5 % of the herds and around early calving age for 3.5 %.

Winter feeding strategies were various among breeders (Figure 1). Forage and concentrates were fed to heifers either as individual ingredients (49 %) or as Total Mixed Rations (TMR – 51 %). Thirty five percent of the TMR were based on maize silage, the others on grass forage.

Figure 1 : Winter feeding strategies (proportion of total distributed diets)



Energy supply was balanced in 69 % of the diets used by breeders with potential early calving heifers. Risk of excessive adiposis exists for the other 31 %. Supplies merely matched requirements (104 ± 11 % NEF supply/NEF requirements) for 74 % of the diets distributed to the heifers with growth delays. Increasing energy supply could improve their performances until the optimal recommendations. Feeding strategy could not be involved in the other cases (154 ± 20 % NEF supply/NEF requirements). Growth delays should find their explanation in other management practices. On the other hand, protein supply was globally too high (177 ± 7.1 % DVE supply/DVE requirements) among 90 % of the diets. This was due to the predominant utilization of grass silage.

Conclusions

Eighty three percent of the farmers followed in this study could pretend to an early calving. Practically, it is not realized due to a lack of a specialized management of the heifers, the ignorance of economical importance of an early calving, and sometimes to the planification of grouped calving. Low energy diets could explain 74 % of the growth delays, while protein supply was globally too high in 90 % of the farms. HG measurements could be a useful tool for farmers in order to optimize the growth of heifers, specifically during the winter.

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