

99. Effect of stage of lactation and live weight change on regression coefficients of milk yield, NEL content and concentrate level for predicting DMI of dairy cows (Einfluss des Laktationsstadiums und der Lebendmasse-Veränderung auf die Regressionskoeffizienten für Milchleistung, NEL-Gehalt und Kraftfuttermenge für die Vorhersage der Futteraufnahme von Milchkühen). L. Gruber*, T. Guggenberger, A. Steinwider, A. Schauer, J. Häusler – Irdning

Feeding dairy cows according to their nutrient requirements is of great physiological, economical and ecological importance. Therefore, in order to design rations which meet those requirements, an accurate estimate of the animals' feed intake is a prerequisite. Hormonal changes have a marked effect on cows' metabolism during lactation (INRA 1989). The energy deficit present in early lactation causes the cow to mobilise reserves, depending on her milk yield potential and nutrient supply provided by the diet (catabolic metabolism). In the middle of lactation, there is normally a balance between feed intake and milk yield. Towards the end of the lactation period, the energy intake exceeds the requirements for milk yield, and body reserves are replenished (anabolic metabolism). It can therefore be expected that the statistical relationship (i.e. regression coefficients) between feed intake and essential animal parameters as well as nutritional parameters will be affected during lactation.

Materials and methods: Data was pooled from 23 feeding experiments carried out at BAL Gumpenstein between 1983–2000 (n=4,555 from 421 different cows). The data is characterised by a wide variation in both animal parameters (live weight, milk yield, stage of lactation, parity), as well as nutritional factors (NEL content and composition of forage, concentrate level; GRUBER et al. 2001).

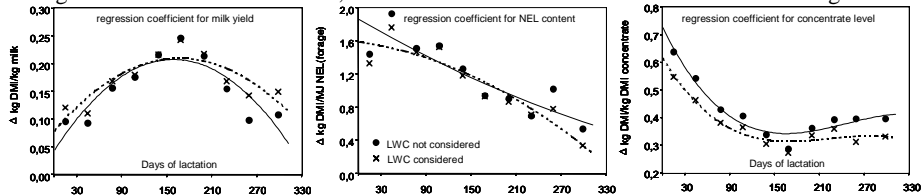
Results and conclusions:

Fig. 1 shows that the regression coefficients for milk yield, NEL content of forage and concentrate level do indeed change significantly during lactation. Moreover, the regression coefficients are influenced, whether live weight change (LWC) is considered in the statistical model or not.

The regression coefficients for milk yield are lower at the beginning and end of lactation, since the mobilisation and replenishment of body reserves interfere with the relationship between milk yield and feed intake. At the start of lactation, a part of the energy necessary for milk yield is derived from body reserves (and not from feed) and at the end of lactation part of the feed energy is partitioned into body reserves. Similarly, the regression coefficients for NEL content and concentrate level are higher at the start of lactation, i.e. in periods of high energy demand, whereas at the end of lactation, additional energy (derived from higher NEL content or increased concentrate level) would lead to an energy surplus (physiological regulation of feed intake).

Differences between the regression coefficients for milk yield, NEL content of forage and concentrate level, with and without considering LWC, mainly appear at the onset and end of lactation, i.e. at periods of marked changes in live weight. When considering LWC, the regression coefficient for milk yield is higher in these two periods, since the relationship between milk yield and feed intake is no longer masked by the energy derived from or partitioned to body mass. Similarly, the regression coefficients for NEL content of forage and concentrate level are lower in these cases, since part of the energy supply is not being derived from feed energy but from body mass. Taking mobilisation and replenishment into account when formulating rations has a marked influence on the resulting energy density of the formulated diet.

Fig. 1: Regression coefficients for milk, NEL and concentrate with and without considering LWC



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