The Grazemore Decision Support System to Predict the Quality of Pasture Grass in Dairy Production

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The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

The Grazemore decision support system to predict the quality of pasture grass in dairy production

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Key words: software, herbage growth model, forage quality, milk production

Introduction Grazemore DSS is a decision support system (DSS) developed to improve the use of grazed grass in dairy production in Europe (Hetta et al., 2005). The software consists of a herbage growth model (HGM) and an herbage intake model (HIM). The HGM predicts daily herbage growth (Barrett, Laidlaw & Mayne, 2004) and thereafter the DSS predicts crude protein (CP) and organic matter digestibility (OMD) of the herbage. Based on the information on herbage mass and quality of the grass the HIM predicts milk production, herbage intake as daily averages for the herd during the residence time in each paddock (Delagarde et al., 2004). The aim of this study was to examine if the predictions of the herbage quality of the software Grazemore DSS gives a reliable ground for grass based dairy production in the north of Scandinavia.

Materials and methods Herbage was cut weekly in paddocks of two dairy farms utilising the Grazemore DSS. In 2004 and 2005 samples were taken at farm (A) the Forage Research Centre Umeå, Sweden (63°45′N; 20°17′E; 12 m elevation) and in farm B on a commercial organic farm (B) Nordingrå, Sweden (62°52′N; 18°29′E; 20 m elevation). In 2005 samples were only taken on farm A. Herbage mass (HM) at sampling was determined by cutting several plots (0.9 m^2) per paddock and weighing the harvested grass prior to dry matter determination. The samples from both farms collected in 2004 were analysed for crude protein (CP) determined with the Dumas method and organic matter digestibility (OMD) were determined *in vitro*. The results form the estimations of HM and analysis of the quality of the herbage samples were compared with the predicted values of the DSS with regression analysis and the mean square prediction errors (MSPE) were estimated. Thereafter simulations were run to evaluate if the predictions of milk yield (MY) by the HIM improved when the values of OMD, CP and HM predicted by the DSS were replaced with the results of the cuts and the analysis of herbage.

Results and discussion The concentration of CP in the herbage was underestimated by the DSS on both farms and the relationship between actual and predicted values was poor, mean prediction error (MPE) was 24% and 31% respectively. The OMD of the herbage was slightly overestimated, but there were a significant relationship between the analysed and the predicted values and both farms had a MPE at 7%. The model gave underestimations of the HM in farm A in both in both 2004 and 2005, while the mass was overestimated for farm B in 2004. The relationship was statistically significant ($p < 0.05$) on both farms in 2004, but no significance was found for farm A in 2005. At farm A, the major part of the MSPE was due to bias for CP, OMD and HM. This might be corrected by adjustments in the model. At farm B, the major part of the MSPE was due to random for CP and OMD, and in line and random for HM. The relationship between measured and predicted MY with input from HGM was stronger then when the actual recordings of HM and herbage quality were used. Though, the MPE was relatively low, 6%, when using predicted input and MPE was 16% the MSPE was mostly due to bias.

Conclusion The Grazemore DSS has a good potential to predict OMD and HM in paddocks in the north of Scandinavia, but it takes further development to make predictions of CP more reliable.

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