

# RELATIONSHIP BETWEEN HEIGHT AND SWARD QUALITY IN ROTATIONAL DAIRY SYSTEMS

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## ABSTRACT

Height is a good guide for management in dairy systems. Intake by dairy cows depends on amount offered and quality of pasture and for this reason a relationship between that offered and pasture quality with height should be studied. The experiment was conducted in NW of Spain with three different stocking rates in dairy systems. A lower quality sward was found in the taller offered pasture as indicated by its higher ADF and lower CP percentages. Total sward ADF (kg x ha<sup>-1</sup>) was higher in taller offered pasture, which indicated a lower pasture quality, however the total CP was positively related with the pasture height in the offered pasture interval studied. Offered pasture lower than 2500 kg/ha (a height of 17.5 cm) had higher protein content but reduced digestibility (increased the ADF) compared with lower offered pasture.

## KEYWORDS

Acid Detergent Fibre, Crude Protein, Grassmeter

## INTRODUCTION

Target height is a good criteria for cow movement in dairy rotational systems. It is a tool for measuring total dry matter availability being more accurate in assessing the fresh grass quantity than the traditional visual method (Pike, 1978). Milk production in dairy systems based on grassland depends on grass quantity but also on grass quality (Minson, 1982). Grass quality is mainly described by Acid Detergent Fibre (directly related with Digestibility of Organic Matter) (Osoro and Cebrian, 1986) and crude protein content. These quality parameters usually change with grass development and dry matter production, with old pasture and higher dry matter pasture production having worse quality than young and lower available pasture. Management decisions such as target height, stocking rate or fertiliser inputs affect pasture production and grass quality and milk production. Therefore, it is important to know how to change sward quality through height target decisions in dairy system management. The objective of the present experiment was to study the relationship between grass height (grassmeter) and sward quality (ADF and CP) in 3 real dairy systems with three different grazing pressures.

## MATERIALS AND METHODS

The present experiment was conducted in Galicia (north-west of Spain) and it was part of an experiment about stocking rate effects on different grass parameters in a dairy rotational system (Mosquera, 1993).

The grazing area consisted of 27 plots of 0.3 ha being the average re-growth period and the mean number of grazing days of 24 and 2 days, respectively.

Prior to grazing five grass square samples of 0.3 x 0.3 m<sup>2</sup> were taken per plot in all the rotations during the spring. Height was measured in each square before cutting. Grassmeter was used for measuring height which consists of a light, horizontal, metal plate of 0.3 x 0.3 m which can slide up or down a central, vertical and graduated stem (Frame, 1981). Grass samples were transported to laboratory for dry matter and chemical quality analysis. Two randomised samples were

analysed for Acid Detergent Fibre (ADF) (Goering and Van Soest, 1970) and Crude Protein (CP) (Castro et al, 1990). Linear and quadratic regression models were fitted between ADF and CP and height.

## RESULTS AND DISCUSSION

Dry matter production and height of offered pasture were 800 and 2500 kg/ha and 6.8 and 27.4 cm, respectively. Dry matter production was positive and significantly related to height as showed the equation 1.

$$\text{Equation 1: DM (kg/ha)} = 138h + 88.01 \quad r=0.87$$

Height relationship with ADF, as percentage and kg per ha is presented in Figure 1. Both parameters are positively related to height. The range for ADF(kg/ha) was between 330 and 1100 kg/ha being the percentage range between 19 and 32%. The regression curves were significantly fitted in both cases resulting in the correlation coefficient of 0.95 and 0.71 for ADF as kg/ha and percentage, respectively. ADF is directly related to ODM as demonstrated Osoro and Cebrian (1986). Higher offered pasture, measured as height or as dry matter production per ha had lower quality than lower offered pasture (Mosquera, 1993). That is to say that pasture height of 10 cm increased by 12 ADF units when it rose to 28 cm. Milk production depends on intake and sward quality. Intake increased when offered pasture is higher, but at the point sward quality is reduced intake will be reduced too. Therefore, it is very important to recommend an adequate offered pasture height (as an easier and quick method than dry matter production estimated by cut of a selected area) for ensuring high intake of a high quality pasture (Newberry et al, 1983).

The relationship between protein production and protein content with grassmeter height is presented in Figure 2. The protein production per ha was positively and significantly related to height, but the crude protein percentage of pasture is higher at lower heights. The range for crude protein production (kg/ha) was between 100 and 300 kg/ha in the studied height interval being the percentage crude protein range between 11 and 20%. The correlation coefficient was 0.72 and 0.71 for protein production per hectare and protein percentage, respectively.

Several authors found that higher quantities of forage per hectare was associated with a lower protein percentage, as we found. The lower percentage of protein content is compensated by the higher heights of offered pasture that is to say the pasture production which can be seen to have a positive relationship between height and CP (kg/ha).

## CONCLUSIONS

A lower quality sward was found in the higher offered pasture as showed its higher ADF and lower CP percentages.

Total sward ADF (kg x ha<sup>-1</sup>) was higher in higher offered pasture, which indicated a lower pasture quality, however the total CP was positively related with the pasture height in the offered pasture

interval studied. Offered pasture lower than 2500 kg/ha (a height of 17.5 cm) increase the Protein content but reduced its digestibility (increased the ADF).

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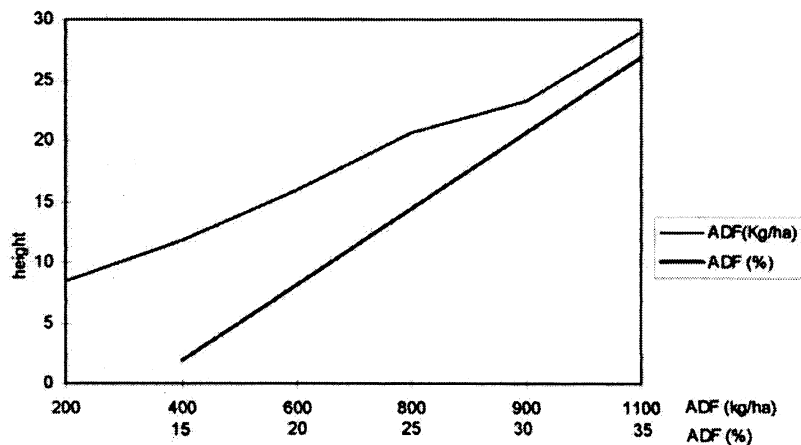
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**Figure 1**  
ADF (kg/Ha and %) and height relationship in a rotational system.



**Figure 2**  
Crude protein (CP) (kg/ha and %) and height relationship in a dairy rotational system.

