

# PASTURE HETEROGENEITY CREATED BY GRAZING OF CATTLE BIOTYPES WITH DIFFERENT BODY SIZE

M.S. Cid<sup>1,2</sup>, M.A. Brizuela<sup>1,3</sup>, M.S. Aello<sup>1</sup> and C. Ferri<sup>4</sup>

<sup>1</sup> Fac. Cs. Agrarias, UNMDP, (7620) Balcarce Argentina

<sup>2</sup> CONICET

<sup>3</sup> CIC Pcia. Buenos Aires

<sup>4</sup> Fac. Agr., UNLPam

## ABSTRACT

Cattle grazing leads to the generation of patches differing in forage quality and quantity even in virtually monoespecific pastures. This work assesses the effect of two biotypes of different growth rate and mature body weight on the patchiness of a tall fescue pasture. We analysed height, herbage mass by unit surface, and proportions of heavily and lightly utilized patches through a residual herbage mass gradient generated by both biotypes at four stocking rates from March to December. At the end of spring the residual herbage of paddocks grazed by the small biotype was more heterogeneous. The percentage of heavily utilized patches was higher but the lightly utilized patches had more herbage mass by unit surface, and tended to be taller. This suggests that both biotypes develop different tactics of forage utilization when pasture growth rate declines in late spring.

## KEYWORDS

Herbage structure, patch grazing, cattle biotypes, tall fescue

## INTRODUCTION

Under grazing conditions individual and per hectare meat production is subject to genetic-environment interactions. In the pampean region of Argentina cattle are usually fattened on pastures. Several studies have been conducted to determine which cattle biotypes are more appropriate to meat production in fescue dominated pastures. Their results showed that on tall fescue pastures at high stocking rates smaller mature animals tend to produce meat more efficiently both, individually and per hectare (Molinuevo et al., 1982; Mezzadra et al., 1992).

Cattle graze selectively even in virtually monoespecific pastures creating vegetation mosaics in which heavily utilized patches alternate with others that are taller and lighter grazed (Shiyomi et al., 1983; Illius et al., 1987). This utilization pattern determines the coexistence of patches in which herbage mass, nutritive value and relative growth rate differ (Illius et al., 1987; Ferri, 1994). A previous study showed that residual herbage mass quality and quantity of fescue pastures used at similar stocking rate by biotypes of different mature body size did not differ (Aello et al., 1995). However, the relationship between pasture structure and instantaneous grazing pressure (Ferri et al., 1995) suggests biotype effects. This work analysed the grazing impact of cattle biotypes of different mature body size upon pasture patchiness through a residual herbage mass gradient.

## MATERIALS AND METHODS

The study was conducted in the south east of the Buenos Aires province, Argentina (37°45'S, 58°18'W; 130 m above sea level) in a 32 ha pasture dominated by tall fescue (*Festuca arundinacea* Schreb.). Pasture was grazed from March to December of 1992 with two biotypes of A. Angus steers at four stocking rates (1.8, 2.3, 2.8 and 3.2 animal/ha) and two replicates. The biotypes were: small biotype (initial weight 183±22.7 kg, frame 1) and large biotype (initial weight 222±24.8 kg, frame 3), both aged 7 months in March. For each combination of biotype and stocking rate, the pasture was divided in two paddocks. Each paddock was grazed alternatively every 14 days. Vegetation measurements were made monthly from

September to December at the beginning of the rest period in a given paddock. Areas with nearly all available forage consumed and signs of recent defoliation were considered as heavily utilized patches (**HUP**). On the contrary, those ungrazed or with signs of light defoliation were considered as lightly utilized patches (**LUP**). Total herbage mass of each patch type was estimated by clipping. Vegetation height and the relative percentage of each patch type were estimated from its length along three 30 m transects (see details in Ferri, 1994). Total forage availability for each biotype and stocking rate was computed from the percentage of each patch type and its herbage mass. Animal weight by hectare was registered simultaneously (see Mezzadra et al., 1992). Canopy heterogeneity was analysed by frequency distributions of canopy height. Proportion and herbage mass of each patch type were related to residual herbage mass per hectare by regression analysis. The effect of biotype was assessed by parallelism and coincidence tests.

## RESULTS AND DISCUSSION

Each month, the residual herbage mass per hectare was independent of biotype and inversely related to animal biomass per ha ( $y=a+b\exp(-x/c)$ ,  $p<0.01$ ; see Fig. 1). Late in spring the grazing of both biotypes has different impact on pasture structure. Paddocks grazed by the smaller biotype had higher proportion of **HUP** (coincidence test  $p=0.04$ ; Fig. 2) but **LUP** had more herbage mass per unit surface (coincidence test  $p=0.09$ ) and tended to be taller (height frequency distributions non shown).

Patchy grazing implies nutritional facilitation (McNaughton, 1984; Illius et al., 1987). Localized grazing modifies sward conditions to produce a grazing lawn of higher digestibility regrowths with a sward structure more suitable for subsequent grazing. Both biotypes used forage patchily throughout the experimental period. However, the different structure of the residual herbage mass suggests that they applied different tactics of forage utilization in late spring when pasture relative growth rate declines. In patchy grazed communities, when the regrowth rate does not cover the animal requirements, cattle are forced to graze in other sites (Ring et al., 1985). This can occur by two different ways. First, they can increase the use of the top of the lightly utilized patches, determining a gradual reduction on their height. Second, they can add patches with high utilization or enlarge the **HUP** already established. Our results show that both biotypes increase the percentage of **HUP** through time. In addition, as stocking rate increases, both biotypes increase the use of **LUP** tops. However, at the end of the spring, when pasture growth rate declines (Ferri, 1995) large mature biotype utilizes the pasture more uniformly. They relatively maintain lower percentages of areas with high utilization level but increase the use of the remaining forage.

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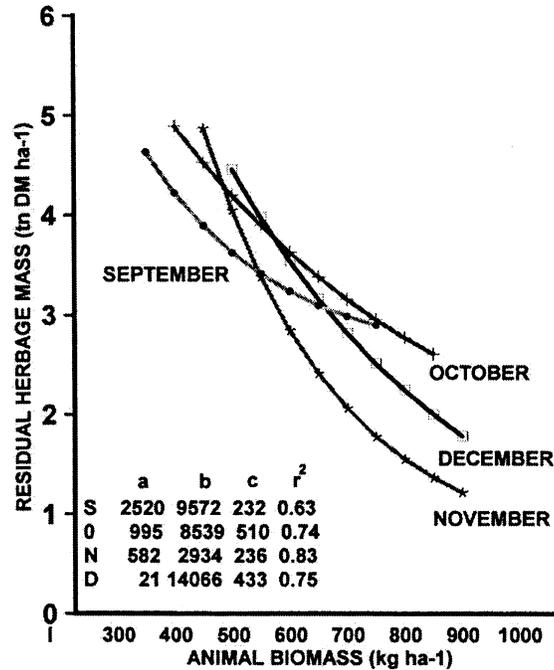
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**Figure 1**

Monthly relationship between animal biomass and residual herbage mass per hectare in a tall fescue dominated pasture grazed by two cattle biotypes of different mature body weight.



**Figure 2**

Relationship between residual herbage mass and percentage of heavily utilized patches (HUP) in a tall fescue dominated pasture grazed by two cattle biotypes of different mature body weight.

