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Presenter Information

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Sward allowance at early lactation of primiparous dairy cows : III-Metabolic profiles

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Key words : early lactation, primiparous dairy cows, metabolic profiles

Introduction Major adaptive changes occur during the transition period (3 weeks before and after calving) to cope with the high energy demands of lactation. This transition from pregnant nonlactating state to the nonpregnant lactating state represents a dramatic change for the cow, as nutrients requirements exceed dietary intake potential, and thus, a state of negative energy balance is established to provide additional substrate for milk production. First calving cows recover from the negative energy balance period with more difficulty than multiparous cows (Meikle et al. 2004) and this factor is usually more dramatic under grazing conditions. Dry matter intake (DMI) is a main factor affecting energy balance, and sward state largely affects DMI under grazing (Chilbroste et al., 2005). The metabolic variations that occur during the peripartum period can be monitored by the concentration of some metabolites in blood. In this study the effect of daily sward allowance on metabolic profiles and its relation with milk production and evolution of body condition score (BCS) was investigated in primiparous cows under grazing conditions.

Materials and methods The experiment was carried out at the EEMAC Research Station, Agronomy Faculty, Uruguay (30° S). Primiparous dairy cows (n=44, BW=595±41 kg, age at calving=2.96±0.11 years and BC=3.7±0.3) were blocked by BW, age and BC, and randomly assigned from calving up to 60 days in milk to one of the following treatments (n=11 each): controls with a 100% TMR diet (ad libitum) and the grazing treatments, high (HA, 30 kg DM cow day⁻¹), medium (MA, 15 kg DM cow day⁻¹) and low sward allowance (LA, 5 kg DM cow day⁻¹). The grazing treatments were supplemented with TMR to cover their maintenance requirements. All the cows were individually supplemented at 18:00 h with a mixture of corn silage (10 kg) compound feed (4.8 kg) and grass hay (0.4) on a fresh weight basis. Cows were milked at 5:00 and 16:00 h and were allowed to graze between 8:00 and 15:00 h every day on a 7-days rotation schedule on a pasture of mixed grasses and legumes. BCS was registered weekly (scale 1=emaciated, 5=fat). Blood samples were taken every weekly from one month before to 2 months after calving. Plasmatic levels of total protein, albumin, urea, non esterified acids (NEFA), β-hydroxybutyrate (BHB) and cholesterol, determined every 2 weeks during the experimental period. BCS and metabolites were analysed as repeated measurements in time using Proc MIXED of SAS v. 8.

Results and discussion In all groups NEFA levels increased around calving and were associated with loss in the BCS. NEFA levels were higher in HA and MA reflecting more lipid mobilization which is in line with an important BCS loss observed in these groups during the first two weeks after calving. The BHB increase was observed later than NEFA increase which could be related to cetogenesis, but also with diet composition since in the Control group (100% TMR) BHB concentrations were lower than the grazing groups. Cholesterol, total protein, and albumin concentrations decreased around calving probably due to the lower intake during this period (Cavestany et al. 2005). Cholesterol levels were higher in HA and MA than in LA, and it is known that cows in better energy balance (BCS) have more cholesterol levels. On the other hand, Control cows presented the lowest cholesterol levels and had the highest BCS: this could indicate that other factors such as nutrition have a direct effect on cholesterol concentrations. Urea concentrations were higher in control and HA groups, which were the groups with the best nutritional offer. A similar trend occurred in plasma protein levels, but it was significant only in Control cows.

Conclusions This study shows that different sward allowances determined different metabolic profiles which were associated not only with BCS but also with nutrient intake.

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