DEFOLIATION EFFECTS ON DIGESTIBLE DRY MATTER YIELD OF TALL WHEATGRASS

M.A. Brizuela[1,2], S. Laplace[1] and M.S. Cid[1,3]
[1] Fac.Cs. Agrarias, UNMdP, (7620) Balcarce, Argentina
[2] CIC Pcia. Buenos Aires, Argentina
[3] CONICET, Argentina

ABSTRACT
The objective of our study was to assess the effect of four different defoliation frequencies upon the digestible dry matter (DDM) yield of tall wheatgrass (*Thinopyrum ponticum*) during the spring season in Balcarce, Buenos Aires province, Argentina. Four sets of three plots in a wheatgrass dominated pasture were defoliated every 7, 14, 21 and 28 days. Neither total pasture nor wheatgrass DM yields accumulated throughout the experimental period differed ($p>0.05$) among treatments. DMivD of wheatgrass declined ($p<0.05$) through time in all treatments. The accumulated DDM yield differed ($p< 0.05$) among treatments (F7=967.6b; F14= 1036.6ab; F21= 1167.6ab; F28= 1419.0a DDM kg ha-1). A 28 day defoliation frequency should be applied to tall wheatgrass to obtain the highest digestible dry matter yields.

KEYWORDS
Tall wheatgrass, *Thinopyrum ponticum*, digestible dry matter yield, defoliation frequencies, Pampean Region, Argentina

INTRODUCTION
Cattle production is the main activity in the Flooding Pampa in the central-east portion of the Pampean Region (Cascardo et al., 1991). This zone represents about nine million hectares. Cattle breeding is mainly developed on humid-alkaline grasslands with marked seasonality of forage production, which quality decreases at the beginning of the summer. It is estimated that 10% of the Fooding Pampa has cultivated pastures; therefore there is a strong necessity for forage species adapted to its environmental conditions.

Tall wheatgrass (*Thinopyrum ponticum*) is one of the grass species that has shown capacity to develop in the Flooding Pampa (Gómez *et al*., 1982). During the spring, wheatgrass registers its highest growing rates when plants reach their reproductive stage. Simultaneously, this species shows a marked decrease in dry matter digestibility. Thus, the defoliation regimen would be an important tool to balance yield and quality of forage.

We carried out this study to assess the effect of defoliation frequency in the digestible dry matter harvest of wheatgrass during the spring season.

MATERIALS AND METHODS
The study was carried out at Balcarce, Buenos Aires province, Argentina (37° 45'S, 58° 18'E), from September 9 to December 23, 1992. The region is characterized by a temperate humid climate, with a mean temperature of 14.5 °C and an average precipitation of 919 mm. The trial was located on a Natracuol soil. The tall wheatgrass (*Thinopyrum ponticum*) dominated pasture was sown in 1965, with tall fescue, perennial ryegrass and strawberry clover as minor components in the mixture.

The defoliation treatments were applied using a completely randomized block design with three replications. For each treatment three 15 m^2 plots were available. On August 12, all plots were cut at 5 cm above the soil level. Later, each plot was defoliated every 7 (F7), 14 (F14), 21 (F21) and 28 (F28) days. Plant biomass was sorted to determine the botanical composition of the pasture. Then, all the components were dried at 60°C during 24 hrs to determine the percentage of dry matter (DM) and to calculate the DM yield (DMY) of pasture and wheatgrass. The corresponding fractions of wheatgrass were processed to determine their dry matter in vitro digestibility (DMivD). For each treatment and date, we calculated the yield of digestible dry matter (DDM) as DMY times DMivD. The data were analysed by ANOVA and mean comparisons were made using the Tukey's test (alfa =0.05).

RESULTS AND DISCUSSION
The yields of DM accumulated by the pasture throughout the experimental period did not differ ($p>0.05$) among treatments, averaging 2204 kg DM ha-1. Wheatgrass represented about 70% of the pasture biomass. Tall fescue was the second main component.

Wheatgrass DMivD declined ($p<0.05$) through time in all the treatments (Fig. 1). This decrease could be related to the advance of the phenological stage, even in the treatment of highest defoliation frequency. Mayland *et al*. (1992), evaluating several species of wheatgrass, found that the yield of dry matter increased in time, while the quality declined in proportion to plant maturity. In our study, the treatments of lower frequency allowed the tillers to reach more mature stages. Thus, it will be possible to have an increase in the amount of senescent biomass or even the presence of reproductive parts with lower digestibility in late spring. The decrease of digestibility became more notorious starting from November. This was coincidental with the commencement of the reproductive stage in plants maintained without defoliation in other plots close to this trial (Laplace et al., 1997).

The DDM yield of wheatgrass varied through time and among defoliation frequencies (Fig. 2). The accumulated DDM yield differed ($p< 0.05$) among treatments (F7= 968b; F14= 1037ab; F21= 1168ab; F28= 1419a DDM kg ha-1). Gargano *et al*. (1988) found that wheatgrass overcame other temperate perennial grasses for its spring digestibility and annual digestible dry matter yield. They reported DMivD of 63.2 and 61.5% for plants defoliated when they reached a height of 25 cm and every three months, respectively.

Although wheatgrass has low digestibility in the reproductive stage, cattle usually select diets with DMO higher than 50% in pastures dominated by this species (Gómez *et al*., 1983). Gándara and Gómez (1987) concluded that the forage DivDM is one of the characteristics of the wheatgrass pastures that more affects the animal intake, particularly in winter. This would reinforce the necessity of maintaining the pasture with high quality as longer as possible. In our study, this objective was achieved with all defoliation frequencies applied. However high values of digestibility are generally related to low biomass yields. The proper equilibrium between both parameters will be determined for the type of demand of a particular animal production system. Our results, along with those of Undersander and Naylor (1987), show that a 28 day frequency can be applied to tall wheatgrass in spring to obtain high digestible dry matter yields.

REFERENCES

Cascardo, A.R., J.B. Pizarro, M.A. Peretti and P.O. Gómez. 1991. Sistemas de Producción Predominantes. *In:* O. Barsky (ed.). El Desarrollo Agropecuario Pampeano. INDEC, INTA, IICA, Buenos Aires, Argentina. 799 p.

Gándara, F. and P.O. Gómez. 1987. El agropiro (*Agropyron elongatum*) como recurso forrajero invernal, bajo distintas condiciones de manejo. V. Valor alimenticio invernal de dos pasturas de agropiro diferidas de otoño. Rev.Arg.Prod. Anim. **7**: 147-161.

Gargano, A.O., M.A. Aduriz and H.E. Laborde. 1988. Evaluación de cuatro gramíneas templadas perennes. 2. Digestibilidad *in vitro* y proteína bruta. Rev.Arg.Prod.Anim. **8**: 385-395.

Gómez, P.O., M.S. Aello, S. Chiffet de Verde, O.R. Rosso and L. Matinata. 1982. El agropiro (*Agropyron elongatum*) como recurso forrajero invernal bajo distintas condiciones de manejo. I. Pastoreo primavero-estival 1977-78. Producción Animal **9**: 21-34.

Gómez, P.O., S. Chiffet de Verde, O.R. Rosso, P. Borelli, M. Iacomini and M.S. Aello. 1983. El agropiro (*Agropyron elongatum*) como recurso forrajero invernal bajo distintas condiciones de manejo. III. Efecto de la disponibilidad forrajera inicial y la presión de pastoreo sobre la ganancia de peso invernal. Producción Animal **10**: 357-366.

Laplace, S., M.A. Brizuela and M.S. Cid. Management implications of tall wheatgrass based on leaf appearance interval during spring growth season. XVIII International Grassland Congress (Submitted to XVIII International Grassland Congress '97).

Mayland, H.F., K. H. Asay and D.H. Clark. 1992. Seasonal trends in herbage yield and quality of Agropyrons. J. Range Manage. **45**: 369-374.

Undersander, D.J. and C.H. Naylor. 1987. Influence of clipping frequency on herbage yield and nutrient content of tall wheatgrass. J. Range Manage. **40**: 31-35.

Figure 1
Digestibility (%DMivD) of tall wheatgrass (*Thinopyrum ponticum*) under different defoliation frequencies.

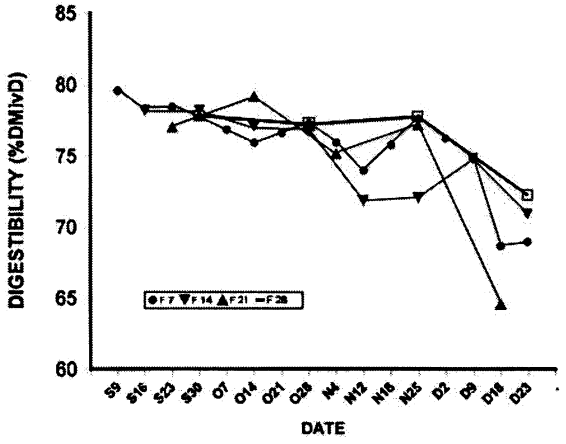

Figure 2
Digestible dry matter yield (kg DDM ha^{-1}) of tall wheatgrass (*Thinopyrum ponticum*) under different defoliation frequencies.