Effect of Five Different Rest Periods on Tiller Regrowth of Ryegrass

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The XIX International Grassland Congress took place in São Pedro, São Paulo, Brazil from February 11 through February 21, 2001.

Proceedings published by Fundacao de Estudos Agrarios Luiz de Queiroz

ID ≠ 22 – 05

EFFECT OF FIVE DIFFERENT REST PERIODS ON TILLER REGROWTH OF RYEGRASS.

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Abstract

Five rest periods were imposed from April to May on a mixed pasture of two ryegrass (*Lolium multiflorum* Lam.) varieties and white clover (*Trifolium repens* L.). The rest period starting dates were: April 4, April 18, May 2, May 16, and May 30, for rest periods 1, 2, 3, 4, and 5, respectively. The total area allocated to the experiment was 1.1 ha, which was divided into 22 pastures. The experimental design used was a split-plot. Rest period was assigned to the main plot, grass to the subplot and legume to the subsubplot. The pastures were "mob-grazed" by cattle from 1 to 4 days to a prescribed residue level. The number of tillers per 0.25 m^2 decreased linearly with advanced rest periods, at rates of approximately 40 tillers/0.25 m^2/week. The percentage of tillers with seed heads increased linearly with advanced rest periods. The percentage of tillers with ripe seeds increased with later rest periods and reached 98% by rest period 5. The decrease in length of seed head probably was responsible for the decrease in seed weight/tiller. However, estimates indicated that because of the increase in percentage of tillers with ripe seeds with later rest periods about 100, 83, and 103 kg/ha of ripe seeds were produced

in rest period 3, 4, and 5, respectively. This amount of seed produced is more than enough for a self-reestablishment of the pasture for the following winter.

Keywords: grazing, seed heads, sodseeded, temperate grass, temperate legume.

Introduction

Pastures in many parts of the world have much more importance today than they had a few years ago. The concept, today is not only to maintain the animals year-round on pasture, but also to finish them on forages. In cool, subtropical areas, low temperatures preclude production of warm season perennial grasses. One alternative for overcoming the deficiency of forage during the winter is to use winter-annual species for overseeding on dormant permanent pastures. Several factors contribute to a profitable winter-pasture program. Among these are high total yield, a more uniform distribution of forage during the year, a longer grazing season, and better quality forage (Allen et al., 1971). An important point for overseeding winter- annual grasses into perennial grass sods is that no land preparation will be required and an uninterrupted grazing season throughout the year is assured (Utley et al., 1976). The objectives of this research were a) to verify the feasibility of a pasture system in which ryegrass (*Lolium multiflorum* Lam.) and white clover (*Trifolium repens* L.) were seeded into a bahiagrass (*Paspalum notatum* Flugge) sod, b) to follow the development of ryegrass through the production of tillers, and e) to determine the influence of grazing management upon the reseeding of ryegrass.

Material and Methods

The area used was a typical flatwoods site, located at Gainesville, Florida, USA, 30º N latitude and 82º5'W longitude. The average organic matter content of the soil was 2.77; pH 4.0; extractable nutrients were for Ca, 75; Mg, 24; P, 0.75 and K, 15 ppm. Calcitic and dolomitic limestone were applied at the rate of 3400 kg/ha of each one in november. Nitrogen fertilizer was applied in July, December and March of the next two years, for a total N aplication of 83.3 kg/ha. Mineral fertilizers were applied on two occassions November of the first year and December of the second year, for a total of 47.7 kg/ha of P, 90.6 kg/ha of K, and 31 kg/ha of FTE. The total size of the experimental area was 1.1ha. Twenty two pastures, each 10x50 m were provided. On October before seeding the ryegrass-clover combinations, the Pensacola bahiagrass was sprayed with "Paraquat". On November the ryegrass-clover combinations were seeded in plots 2 x 10 m across each pasture. During the period from November until March, the area was mob-grazed by cattle to a prescribed residue level from 1 to 4 days. The experiment was designed to study the effect of five rest periods during April through May. The five rest period starting dates were: April 4, April 18, May 2, May 16 and May 30, for rest periods, 1, 2, 3, 4 and 5, respectively. The seeding rates were: Florida Reseeding ryegrass and Gulf ryegrass alone 33.6 kg/ha and in mixture with clover 16.8 kg/ha, Florida selection white clover alone 6.8 kg/ha and with ryegrass 3.4 kg/ha. During the fifth week following initiation of each rest period a set of ryegrass samples was colleted for tiller measurement. The total number of ryegrass tillers per 0.25 m^2 was counted, as well as the number of tillers with seed heads. A subsample of 15 seed heads was colleted and the head length was measured to the nearest centimeter. The number of seed heads with ripe seeds was also recorded for rest periods 3, 4 and 5. All samples colleted and measurements taken refer

to the ryegrass component. The experimental design used was a split-plot. Rest period was assigned to the main plot, grass to the subplot and legume to the subsubplot. The data were analysed by analysis of variance and regression.

Results and Discussion

Number of tillers per unit of area. There was an interaction ($P<0,01$) between rest period and legume. The number of tillers/0.25 m^2 ranged from 387 (rest period 1) to 46 (rest period 5) whenever the two ryegrass varieties were grown alone, and from 263 (rest period 1) to 26 (rest period 5) when grasses were grown with white clover (Figure 1). The general trend for grasses grown alone and with white clover was to decrease the number of tillers as the rest period increased (Figure 1). Looking at both estimated equations (Figure 1) for number of tillers per unit area, one can see that the decline in number of tillers was faster when the grasses were grown alone (45 tillers/0.25 m^2/week) than when grasses were grown with the legume (31 tillers/0.25 m^2/week). This explains why the tiller density of the grasses did not differ ($P<0.05$) after rest period 3, even though this density was 387 and 263 tillers/0.25 m^2, respectively, for grasses alone and for grasses with legume. This decline in the number of tiller per unit area in the sward is supported by Alburquerque (1966) who found a decrease in the number of tillers of tall fescue (*Festuca arundinacea* Schreb.) during the growing season.

Percentage of tillers with seed heads. There was an interaction ($P<0.05$) between rest period and legume. Tillers with seed heads ranged from 30.4 (rest period 1) to 100% (rest period 5) for grasses grown alone and from 35.0 (rest period 1) to 100% (rest period 5) for grasses grown with white clover (Figure 2). The percentage of tillers with seed heads for grasses grown

alone and with white clover increased with later rest periods until reached 100% on rest period 5 (Figure 2). The rate of increase in tillers with seed heads/week was about 8.8 percentage units.

Percentage of tillers with ripe seed. It was not the same ($P<0.01$) for all rest periods. Grasses from rest periods 3, 4, and 5 had 19.2, 65.5, and 98.5% of their tillers with ripe seeds. The two ryegrass varieties had 60.4 and 59.3% of their tillers with ripe seeds when they were grown alone and with the legume, respectively. The production of ripe seeds was, roughly, 100, 83, and 103 kg/ha for rest period 3, 4, and 5. This seed production was more than three times the seeding rates used for establishing the experiment, then it should be enough seed for a self-reestablishment of the pasture for the following winter.

Length of the seed head. It was not the same ($P<0.01$) for all rest periods. It ranged from 14.5 cm (rest period 1) to 6.1 cm (rest period 5). Seed head of the grasses was shorter ($P<0.01$) when grown alone (9.6 cm) than when grown with the legume (10.4 cm). The length of the two varieties of ryegrass declined with later rest periods at a rate of about 1.1 cm/week during April through June. The linear equation $Y = 16.58 – 2.20X$, explained 85% of the total variation.

The grazing pressure used was too heavy, and tiller stability was reached at lower densities. Ripe seed produced in three of the five rest periods, assured a self-reestablishment of the pasture for the following winter. It is possible and feasible to establishing a winter pasture by overseeding ryegrass and white clover into a bahiagrass sod.

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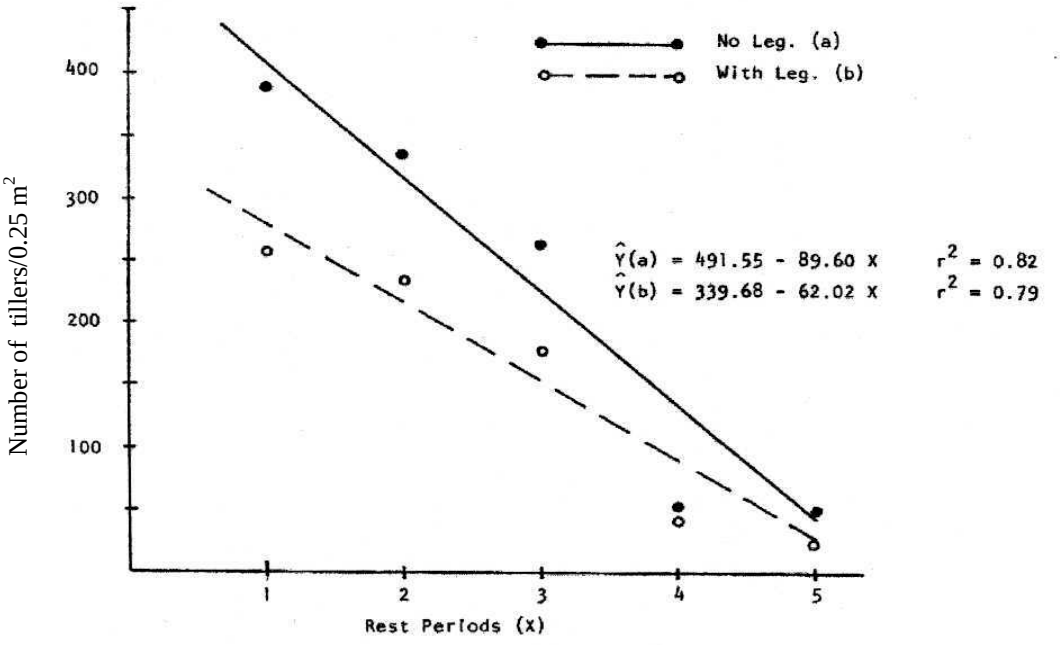

Figure 1 - Relationship between tiller density and rest period

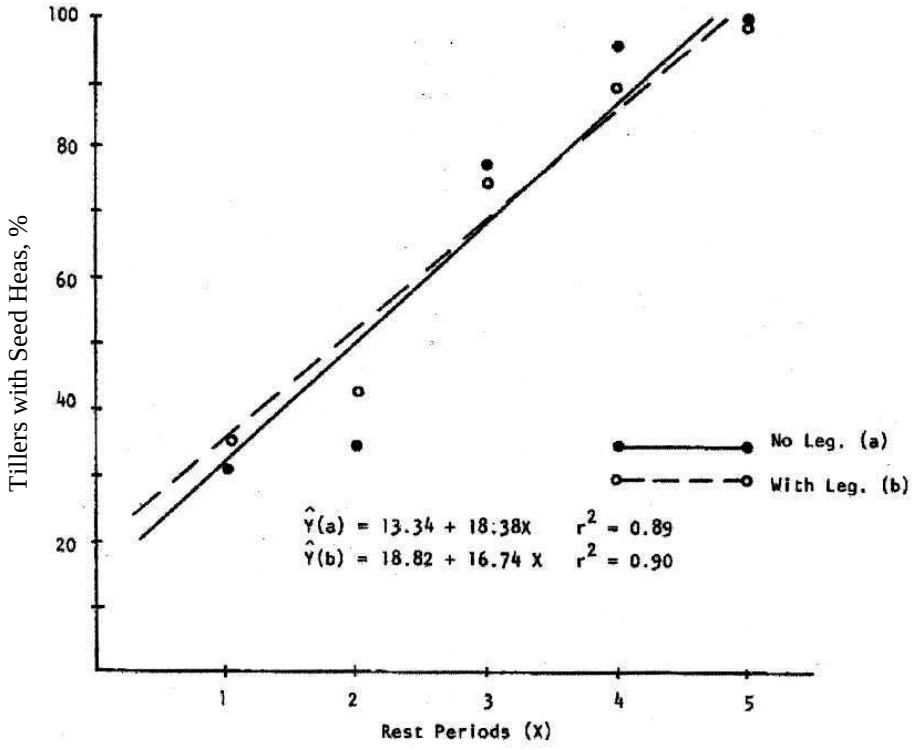

Figure 2 - Relationship between percentage of tillers with seed heads and rest period