

Does pasture phase duration affect barley and wheat yields on ICLS?

Barro R.¹, Rubio V.¹, Mesa W.¹, Quincke J.A.¹

¹ Instituto Nacional de Investigación Agropecuaria, La Estanzuela, Colonia, Uruguay

*rbarro@inia.org.uy

Integrated crop livestock systems (ICLS) generate ecological interactions between the components promoting the preservation of natural resources and increasing total productivity. Our goal in this study was to assess the impact of the duration of pasture phase on winter crop yields on ICLS relative to continuous agriculture. We examined 15 years of yield data (1999-2014) collected in a long-term experiment at INIA La Estanzuela. We considered five agricultural production models all with 6-years sequences but differing in the duration of the pasture phase within the sequence: continuous agriculture (CC: sorghum–barley and sunflower-wheat); one-third pasture (PP34: the CC sequence plus a red clover pasture); one-half mixed grass/legume pasture (PP50A: the CC sequence plus a tall fescue/white clover/birdsfoot trefoil pasture); one-half legume pasture (PP50B: idem but with pure birdsfoot trefoil pasture); and two-thirds pasture (PP67: the CC sequence plus the pasture as in PP50A, plus a red clover pasture). The experimental design is a randomized complete block design with three replications. Treatments were fertilized according to soil test recommendations. Crop grains were harvested. Pastures were cut and all biomass returned to the plot. The duration of the pasture phase had a significant effect on yield for both annual winter crops, compared to continuous cropping: Average grain yields from wheat (3136 ± 1246 kg/ha) and barley (3054 ± 1411 kg/ha) were higher ($p < 0.0001$) in treatments with pastures in the rotation compared to continuous cropping in the following order: SS50B > SS50A > SS34 > SS67 > CC. The mean differences between the systems of greatest (PP50B) and least grain yield (CC) were 1121 (SE=11.67) and 1594 kg/ha (SE=12.91) for wheat and barley, respectively. Our preliminary results indicate that besides duration of pasture phase, the choice of species to compose ICLS will determine the synergic relationship between crop-pasture phases.

Keywords: winter crops, long term experiment, mixed cropping systems, integrated crop-livestock systems, crop rotation, forage legumes
