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Economic viability of integrated crop-livestock-forest systems: a comparative analysis

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Introduction

Several studies have shown the agronomic benefits of integrated crop-livestock systems (ICL) and integrated crop-livestock-forest systems (ICLF). However, from an economic point of view, there is lack of information. This work aims to analyze the economic viability of three integrated production systems, with different densities of eucalyptus trees.

Material and Methods

Three integrated systems [ICL (soybean + hay + cattle); ICLF1 (ICL + 227 eucalyptus trees/ha); and ICLF2 (ICL + 357 eucalyptus trees/ha)] were studied in Campo Grande region, MS, Brazil. The systems were established in 2008 as strategies to recover degraded pasture and consisted of four-year cycles: one year with crop (soybean) followed by three years with *Brachiaria brizantha* cv. BRS Piatã, with or without *Eucalyptus grandis* × *E. urophylla*. Investment analysis was used to assess the systems economic viability and a12-year cash flow was built for each project. From 2008 to 2014, experimental data were used. For the following years, the parameters were estimated. Prices refer to 2014, with beef quoted at R$ 3.46/kg live weight, soybeans at R$ 59/bag of 60 kg, Piatã hay at R$ 166.70/ton, coal at R$ 46/m^3 and wood at R$ 123/m^3. The net present value (NPV) and the benefit-cost ratio were calculated for a discount rate of 10%. For further descriptions of the production systems, including their implementation costs, see Costa et al. (2012).

Results and Conclusions

All three integrated production systems were economically viable. The ICLF2 presented the highest economic return, followed by ICLF1 and ICL, as indicated by the NPV's of the projects (Table 1).

Table 1. Investment parameters of three integrated production systems

Parameters	ICL	ICLF1	ICLF2
NPV (R$/ha)	3,425	6,391	8,618
Benefit/Cost	10.7	6.3	6.2
Initial Investment (R$/ha)	2,182	2,641	2,974
Payback period (year)	1	3.5	7.2

The payback period, the initial investment and the negative cash flow may limit the adoption of integrated systems that include forestry. It is worth noting that these parameters are not the only ones used in investment decision-making.

References cited

Costa, F.P., Almeida, R.G., Pereira, M.A. et al. Avaliação econômica de sistemas de integração lavoura-pecuária-floresta voltados para a recuperação de áreas degradadas em Mato Grosso do Sul. *In:* VII Cong. Latinoamericano de Sistemas Agroflorestais para a Produção da Pecuária Sustentável. Belém: Univ. Fed. do Pará, 2012. v. 1. p. 523-527.