



Crop-Livestock Integration System as a sustainable production strategy in regions with climate risks

Ramon C. ALVARENGA⁽¹⁾, Miguel M. GONTIJO NETO⁽¹⁾, Emerson BORGHI⁽¹⁾, Rubens. A. de MIRANDA⁽¹⁾, Maria Celuta M. VIANA⁽²⁾, Patricia M. COSTA⁽³⁾, Fabiano A. BARBOSA⁽³⁾

¹ Embrapa Milho e Sorgo, Rod MG 424 km 45, CEP: 35701-970, Zona Rural, Sete Lagoas, MG, Brazil,

² Empresa de Pesquisa Agropecuária de Minas Gerais-EPAMIG, 35715-000, Prudente de Moraes, Brazil

³ Universidade Federal de Minas Gerais, Belo Horizonte, 23890-000, BH, Brazil

E-mail address of presenting author*: ramon.alvarenga@embrapa.br

Introduction

The crop-livestock integration system (ILP, in Portuguese) is a sustainable production strategy for climate regions with two issues that are important for crop yields and livestock: the dry spell and the dry fall and winter.

Material and Methods

To demonstrate the potential of ILP, in 2005 was installed at Embrapa Maize and Sorghum, located in the city of Sete Lagoas-MG, Brazil (19°28'S, 44°15'W) and 732 m altitude. The climate is Aw (Koppen), i.e., typical savannah with dry winter. The ILP system was implemented in four plots with area of 5.5 ha each, with no-till system, rotation and intercropping of soybean, maize-*Brachiaria* (*Urochloa brizantha*), sorghum-Tanzania (*Panicum maximum* cv. tanzania), and tanzania pasture.

Results and Conclusions

The dry spell occurred in all years except 2006/2007 and affected the crop yields (Table 1). However, they were always above the average observed in the region. In the first year it caused the loss of maize. Sorghum was the last crop to be planted and, even so, it was less affected by the water deficit, unlike soybean, which was the most affected crop. Pastures were more productive, especially during the dry season compared with pastures in the region. The use of crossbred cattle potentiated the meat gain in the ILP system, and these animals were finished in feedlots.

Table 1. Income of ILP from Embrapa Maize and Sorghum for ten years. Sete Lagoas, MG, 2015.

Year	Exploitation Type				Meat @/ha	Occurrence of Dry Spells
	Soybean	Maize Silage	Maize Grain	Sorghum Silage		
			Mg/ha			
2005/2006	1.80	NE	0.00	31.00		Severe = S
2006/2007	2.43	NE	6.40	53.00	9.18	Absent = A
2007/2008	1.98	NE	8.17	41.40	9.38	Low = L
2008/2009	2.80	NE	8.07	40.30	NE	Low = L
2009/2010	2.20	NE	8.72	36.60	11.30	Low = L
2010/2011	2.37	NE	6.09	37.70	8.30	Medium = M
2011/2012	2.90	NE	7.15	20.08	NE	S
2012/2013	0.85	52,99	7.28	52.18	NE	Two (Nov = L and Jan = S)
2013/2014	NE	32,00	6.67	32.00	28.00	Two (Nov = L and Jan = SS)
2014/2015	in evaluation	39,00	in evaluation	43.20	in evaluation	S

NE = Not evaluated

In these ten years of experiments with ILP in the region, the results show that the rotation of crop with pasture is good strategy to increase both plant and animal productivity and enable at least reasonable harvests in the dry periods, which is a chronic problem. They also show that the crop-pasture intercropping may be conducted in order to maximize crop productivity without damages to pasture. These results were shared with farmers, technicians, and students through seminars and field days.