

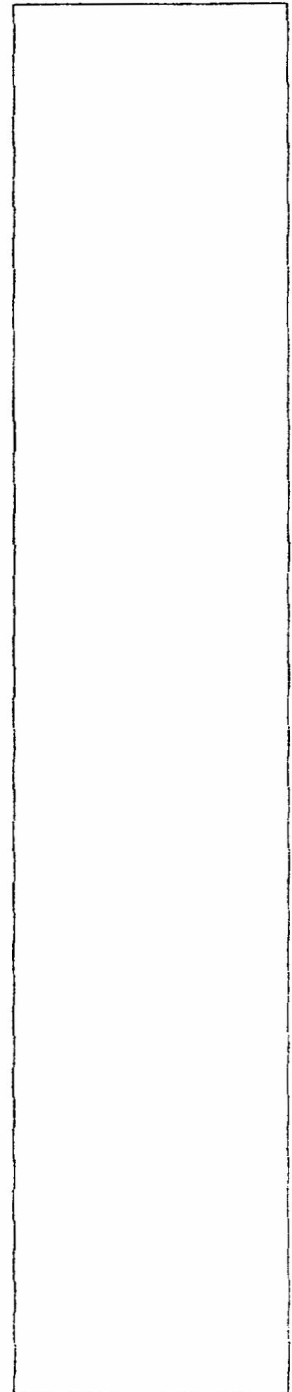
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The economics of cattle discourages pasture improvement on small-scale farms in the Brazilian Eastern Amazon

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Introduction The Bragantina Region in the Northeast of the State Pará is an old agricultural frontier where slash-and-burn cultivation of annual crops (cassava, maize and cowpea) has been practiced for more than one hundred years. Since the eighties the smallholders in the region have increasingly planted pastures and kept cattle (IBGE, 1998), a phenomenon called 'pecuarização'. A series of studies were conducted as part of a Brazilian-German project from November 1998 to March 2002 to understand the economic and ecological implications of cattle keeping for the farming system. This paper will focus on the impact of the economics of cattle keeping on management practices and the implication for animal scientists and grassland specialists. It is using the results of a farm study, which started in July 1999 and was continued till March 2002.

Material and Methods Three study sites (municipalities) with different characteristics representative for the Bragantina Region were selected. In these three sites 47 farms distributed over six clusters were selected representing the prevailing types of land use associated with cattle keeping. The selection criteria included: farm management by the farmer or his family, residence on the farm or nearby, reliance on family labour, farm size ≤ 100 ha. Data on all inputs and outputs of cash, labour, capital and products were collected every month from August 1999 to October 2000. For the cost/benefit analysis the data from the 37 farms still participating in October 2000 was used. In addition to the economic study forage production was measured on 36 paddocks in a subsample of 12 farms. A total of 1030 samples on biomass of the forage grasses (*Brachiaria humidicola* and *B. brizantha*) were collected during the three seasons in the region (in the dry season in November/December 2000, at the peak of the rainy season in February/March 2001 and in the transition period in August 2001), of which composite samples were prepared to analyse forage quality.

Results There was a high variation in all three levels of farm income that resulted from an unsteady input in establishment and maintenance of pasture and non-stable herds. The mean annual net cash flow was 376 R\$ (se=160, median 234 R\$) and made up 5 % (se=4.3) of the total net cash flow in the farm. The net cash plus non-cash transactions including home consumption was 670 R\$ (se=175, median=450 R\$), and comprised 12 % (se=3.3), and the enterprise income (including net herd growth and changes in pasture) was 1126 R\$ (se=252, median 623) and made up 16 % (se=3.6) of the farm enterprise income. High net cash income was negatively correlated to net herd growth (Pearson correlation coefficient: -0.59, $p=0.0001$), i.e. cash earnings were mainly achieved by reducing the herd size.

To allow a realistic comparison with cassava, the core cropping activity of the smallholders, the average farm characteristics (15 ha pasture, 0.5 LU ha⁻¹ (1 LU=450 kg)) and the production parameters calculated from the sample were used to model the herd offtake, keeping the herd size stable according to a herd growth projection described by Gittinger (1982). The costs for the input included annual shares for pasture establishment and maintenance assuming one year of pasture establishment followed by 12 years productive use plus the costs directly related to the number of cattle. The comparison of land and labour productivity and benefit:cost ratio showed that cattle keeping could not compete with cassava production (Table 1).

Table 1 Comparison of net benefits from cattle keeping with cultivation of cassava (with and without flour production)

Setting	Net benefits			Benefit:cost ratio (R\$/R\$)
	R\$/ha	R\$/ha (+ fallow) ¹	R\$/man-day	
Cattle				
15 ha pasture, 3 paddocks, 0.5 LU ha ⁻¹	19.79	18.27	1.73	1.57
Cassava				
Mix of family and wage labour, flour production	1,679.37	122.11	9.95	8.42
Family labour, selling non harvested cassava	393.87	28.34	4.17	65.23

¹Fallow period of 10.4 years for cassava. Pasture use 12 years plus 1 year of establishment.

The use of the cattle offtake showed that the majority was used for investment (Table 2) and that farmers do not judge cattle keeping as important for income generation (Table 3).

Table 2 Use of cattle offtake from August 1999 to October 2000 (number of cases with clear indication)

	Medical emergency	Investment in			Maintenance of			Gift
		Crops	Cattle/Pasture	Household	Crops	Cattle/Pasture	Household	
n	3	11	28	12	9	6	9	3

Table 3 The utility of farm activities according to farmer votes

	Cattle	Cassava	Cowpea	Perennials
Reserves	9	8	2	6
Household expenses	0	8	during time of harvest	0
Income generation	0	10	during time of harvest	during time of harvest

This financing function resulted in a discontinuity of cattle keeping with only 32 % keeping stable herds here defined as decreasing or increasing the herd by at most one livestock unit. From July 1999 to April 2002, eight of the 37 farmers sold their entire herds, of which two bought some animals again within six months of selling. As the area of pasture is more restricted, this behaviour resulted in highly variable and unbalanced stocking rates, that varied from 0.37 to 3.53 LU ha⁻¹ across the farms. Some flexibility in forage availability was achieved by 53 % of the farmers renting pastures. The farmers aimed for a high standing biomass (3 t DM ha⁻¹) by using over-mature forage grasses of a low quality (a high proportion of litter (609 g kg DM⁻¹), low crude protein content of leaves (62.6 g kg DM⁻¹) and stems (55.2 g kg DM⁻¹) (n=617); and low *in vitro* digestibility of organic matter of leaves (0.38) and stems (0.30) (n=360)). A visual estimation of the botanical composition of pastures showed that a quarter of the 37 farms had degraded pastures with less than 25 % cover of forage grass and a further third had plots, which were prone to degradation with 25 to 50 % cover of forage grass.

Conclusions The farm study showed that cattle keeping is not as attractive as the core cropping activity, cassava, in the narrow sense of land, labour and capital productivity. On the other hand, selling cattle presents the best means of obtaining finance, if extra capital is needed, because it is easy and independent of the season. Credit programmes are available to smallholders but are tied to strict conditions. Low input management is the logical consequence of keeping cattle as living "stock". Herd and pasture productivity are only of secondary importance, and do not justify recommendations for a more intensive management system. It also severely hampers the possibilities of introducing types of pastures tested by the project that are ecologically more appropriate than the conventional grass monoculture, because they proved to be very susceptible to unadjusted stocking rates.

References

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