Cattle Ranching and Challenges for Environmental Conservation in the Amazon[1]

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From 1990 to 2003, the cattle herd in the Legal Amazon grew by 140% from 26.6 million to 64 million heads. Increasing demand and the sector's advantages in the Amazon suggest that ranching will continue to grow in the region. Nevertheless, the growth of extensive ranching in the region is worrying –especially because of increased deforestation. In this study, we analyze the causes of the rapid growth of cattle ranching in the Amazon and future scenarios for this activity. We also propose policies to reconcile cattle ranching development and environmental conservation.

The Growth of Cattle Ranching in the Amazon

From 1990 to 2003, the average annual growth rate of the cattle herd in the Legal Amazon (6.9%) was ten times greater than in the remainder of the country (0.67%)[2]. Accordingly, the Legal Amazon increased its participation in the national herd from 22% to 33%[3]. In this period, Mato Grosso and Para were the principal producers, accounting for almost 60% of the region's herd in 2003 (Figure 1). The three principal producing states in 2003 (Mato Grosso, Para and Rondonia) contributed 81% of herd growth from 1990 to 2003. The highest growth rates occurred in Rondonia (14%/year), Acre (12.6%/year), Mato Grosso (8%/year) and Para (6%/year). Even the lower herd growth rates – Amapa (1.2%/year) and Roraima (1.6% /year) – were higher than the average growth rate in the remainder of Brazil (0.7%/year).

The growth of cattle ranching in the region is largely responsible for deforestation and its negative consequences[4]. For example; almost 80% of the area deforested up to 1995 was pasture.

The growth of deforestation has faced criticisms in Brazil and internationally. In an opinion survey in Brazil, 88% of interviewees responded that there should be greater protection of forests and 93% believed that environmental protection does not limit national development (Isa, 2000)[5]. The expansion of cattle ranching in the region should therefore consider its environmental and ecological impacts.

Causes of the Growth in Cattle Ranching in the Amazon

Cattle ranching in the Amazon is diverse, including different ecosystems and land holding sizes with high and low productivity. According to the IBGE, the most productive ranching operations used an average stocking of 1.4 animals per hectare in 1995, whereas low productivity ranching used only 0.50 head/ha[7]. We explain the growth of these two types of ranching below.

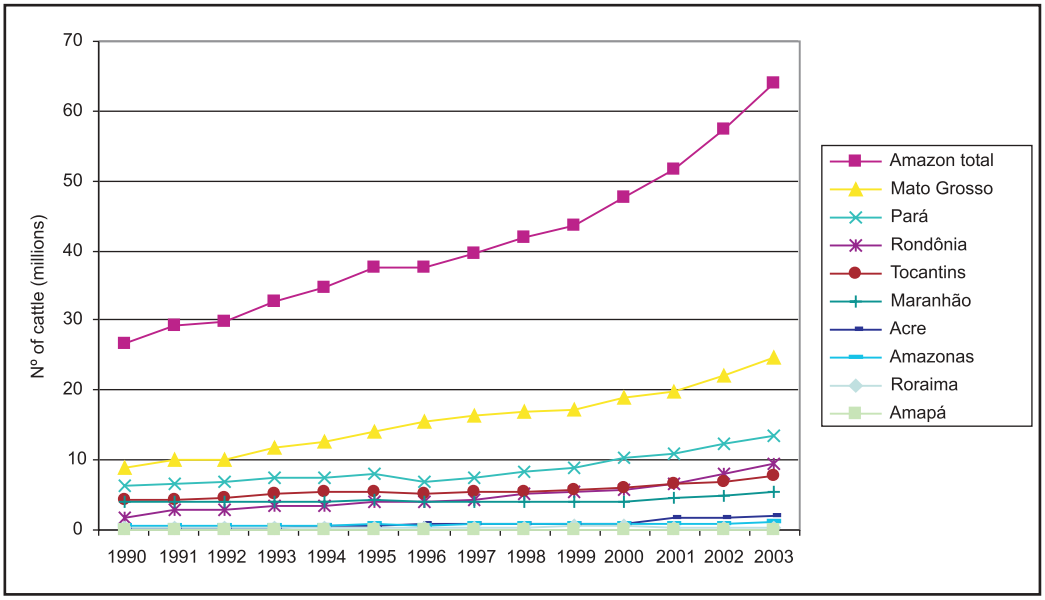

Figure 1. Cattle herd evolution in the Legal Amazon States between 1990 and 2003.[6]

Profitability, Low Land Prices and Productivity. The most productive ranching is increasing in the Amazon because it is more profitable than in other regions of Brazil. For example, the average rate of return on investment of 4.6% –defined as a percentage of net profit on assets – for the large-scale system of self-reproducing herds in the main producing regions of the Amazon (South of Para, Mato Grosso, Rondonia)[8] was around 35% greater than in the Center-South of Brazil (3.4%). Other large-scale cattle raising systems are also significantly more profitable. Medium-scale systems, with only 500 animals, were also more profitable in the Amazon[9].

In fact, the return on investment can be even more attractive in the Amazon when we consider the potential to increase land value. For example, Margulis (2003)[10] estimated that the internal rate of return on cattle ranching investment in the Amazon where there was land value appreciation was 34% greater than areas where there was no appreciation (respectively 15.5% *versus* 11.5%)[11].

Cattle ranching in the Amazon is more profitable because of two main advantages compared to other cattle ranching regions in Brazil. The principal advantage is the low land price which reduces the cost of production. The price of pasture in the Amazon between 1970 and 2000[12] was around five times lower than in Sao Paulo and, in 2002, was equivalent to 35% to 65% of the price found in the Center-South region of Brazil[13]. Pasture prices in the Center-South region increased because in part of these lands it is possible to practice mechanized agriculture (grains or sugar cane) which, in general, is more profitable than ranching. On the other hand, land prices in a large part of the Amazon are low because there are still no alternative uses to ranching.

Besides the low land price, pasture in the main producing regions in the Amazon is more productive than in other regions of Brazil. For example, average productivity of various large-scale cattle raising systems in the Amazon was around 10% more than in the remainder of Brazil (Table 1)[14]. The more productive ranching in the Amazon tends to be within zones of suitable rainfall –that is, above 1,600 mm/year and below 2,200 mm/year– a region that corresponds to approximately 40% of the Amazon[15]. In addition to good rainfall distribution, ranchers explain the higher productivity in the main Amazonian ranching areas as due to the absence of frosts in the region[16].

The higher productivity and lower pasture price are sufficient to compensate for the lower cattle prices received in the Amazon; that is, the producers manage to obtain a higher return on investment than in the Center-South even though they receive cattle prices 10% to 19% lower than the prices paid to producers in that region[17].

Table 1. Productivity of large-scale beef cattle raising (five thousand animals) in planted pastures in the most productive regions in the Amazon and in other regions of Brazil[18].

System	Average Productivity (@/ha)		
	Most productive Amazon	Other Brazilian Satates	Difference (%) between the Amazon and other States
Self-reproducing herds	4.11	3.72	10.5
Calf production	3.85	3.50	10.2
Suckled calf and range fattening	5.45	4.93	10.6

Natural and Financial Subsidies. Besides the better return on investment, Amazonian ranchers count on additional advantages to expand their activities. For example, the relatively easy access to public lands and the limited application of the forest law allow capital accumulation through illegal timber harvesting; part of this capital is invested in cattle ranching. Additionally, national funds designated for the Legal Amazon (FNO) offer two key advantages: they lend money at interest rates of 6% to 10.75% a year (well below that practiced in the market[19]); and they give 15% discount on interest rates for producers paying on schedule. Between 1989 and 2002, the Banco da Amazônia (Amazon Bank) lent around U$ 5.8 billion from the FNO (except for Mato Grosso and Maranhao), of which at least US$ 2.36 billion (40%) was for cattle ranching.

The Role of the Market. In 2000, around 87% of meat produced by the officially registered slaughterhouses in the Amazon was for the national market (mostly the Northeast and Southeast), while only 13% were consumed in the Amazon. The Amazon is therefore a net exporter of meat to the rest of Brazil (Figure 2). In addition, slaughterhouses from Mato Grosso, Rondonia and Tocantins already export to other countries.

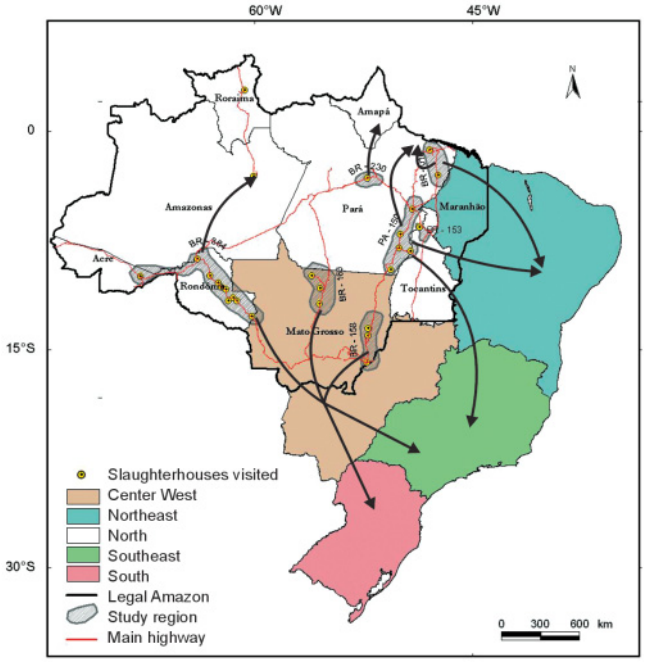

Figure 2. Destination of meat sales from slaughterhouses surveyed in the Amazon in 2000.

Low Productivity Cattle Ranching

Low productivity cattle ranching in the Amazon exists for several reasons. One important reason is the fact that land speculators use cattle ranching to occupy public land. In this case, the productivity is low because the speculators plant pasture without correctly preparing the land and neglect animal husbandry. This land occupation seems rewarding due to timber harvesting and from sale of the land to ranchers when infrastructure improves. These incoming ranchers usually improve productivity when the frontier matures.

The limited government presence in the frontiers favors the illegal occupation of public lands which, in turn, reduces land prices and facilitates cattle ranching in the region. This occupation is problematic because vast forests are settled without zoning of the best forms of land use.

Productivity is also low in lands with low agricultural and livestock-raising potential[20]. This situation is undesirable, as it causes environmental impacts without generating significant socio-economic benefits. In the Legal Amazon in 1995, almost 6.8 million hectares –or 14% of the deforested areas of agricultural holdings– were "unused productive lands" (IBGE, 1996)[21]. This IBGE classification is an approximate indicator of the extent of degraded or abandoned lands in the region. Finally, productivity is low in degraded pastures. However, ranchers may improve productivity of part of these pastures where it is feasible to plough and fertilize the soil.

Trend Towards Increased Production

Many factors are likely to favor the growth of beef cattle ranching in the Amazon. The expansion of control of foot and mouth disease would allow increased meat exports from the region. Mato Grosso, Tocantins, Rondonia and Acre, which hold 68% of the regional herd, are already accredited to export. The South of Para is also advanced in its control and is requesting export approval. The outbreaks of foot and mouth in Mato Grosso do Sul in October of 2005 will probably not affect exports to current buyers in the long term. Nonetheless, they may delay the opening of important new markets. Additional export growth will therefore depend on the continued control of this disease.

If control is maintained and expanded, the region would be able to meet an increasing demand for meat. The demand would grow because of: (i) increased income of developing countries that tends to raise *per capita* meat consumption –in particular, in the poorer segments of the population; (ii) population increase; (iii) the occurrence of mad cow disease (Bovine Spongiform Encephalopathy –BSE) in Europe and North America that could increase demand for extensive pasture-raised meat, as produced in the Amazon; and (iv) agreements for the reduction or complete removal of subsidies to European Union and United States farmers[22]. Production costs in the Amazon are lower than in these countries and, therefore, Amazonian ranchers could win part of these markets.

Cattle ranching in the Amazon would also be stimulated by the reduction of pasture in the Center-South of Brazil. The substitution of pasture by intensive agriculture would continue because its profitability tends to be greater than that of pasture, and there are projections of a significant increase in grain production in Brazil in the next decade[23]. Finally, infrastructure investments planned for the Amazon –such as the asphalting of the Highway BR-163 (Cuiaba-Santarem), of one stretch of the BR-364 in Acre and of the BR-319 (Manaus - Porto Velho)– will make cattle ranching in the region even more competitive.

Recommendations for Public Policies

Continued almost free access to public forests and the weakness of environmental policies will facilitate increased production through deforestation. Indiscriminate deforestation will threaten sensitive environments (for example, soils with a high risk of erosion) and regional biodiversity. This scenario could stimulate environmental barriers against meat exports from the region and ranchers would

probably face resistance from national public opinion. We recommend two strategies to reconcile cattle ranching development with biodiversity conservation and environmental quality in the Amazon.

Economic-Ecological Zoning. Land in the Amazon should be designated for the best uses, which take into account economic and environmental aspects. Lands rich in biodiversity and environmentally sensitive lands should be allocated to conservation (Protected Areas)[24]. A reduction in cheap lands would stimulate an increase in productivity of ranching in areas already deforested. The creation of conservation areas in regions of low agricultural potential would be the cheapest option and that of least political resistance to meet this policy objective. However, it will still be necessary to create conservation areas to protect biodiversity in zones with agricultural potential. In this case, the political and financial costs would be greater due to local pressure for the use of these areas. Public forests with production potential (timber and other products) should be designated for sustainable use. This would allow the reconciliation of economic growth and conservation in vast areas of the region.

Environmental Management on Private Lands. Environmental management on private lands, which occupied almost 24% of the Legal Amazon in 1995, and this figure has increased since then, needs to be improved. For this one will need to: (i) strengthen environmental supervision and control[25]; (ii) punish environmental crimes exemplarily[26]; (iii) guarantee that public credits would be assigned only to those rural land holders who follow the environmental legislation and conform to zoning; and (iv) create regulations for the restoration of the Legal Reserve[27] in accord with the new Forest Code. The regulations would involve –as established in the Code– the use of the economic-ecological zoning to define the regions where the rural land holders should restore the native vegetation in up to 80% or 50% of the total area of the holding. It would be financially more efficient to allow productive ranches which respect the former Forest Code – that is, those which maintained a Legal Reserve of 50%– to use up to 50% of the area for agricultural uses; whereas ranches in regions of low agricultural potential would maintain a legal reserve of 80%.

Finally, it has to be emphasized that the restoration of degraded pasture is desirable but will not guarantee a reduction in new deforestation. In fact, subsidies for the restoration of pasture in the Amazon could increase deforestation if access to public lands continues to be cheap.

References and Notes

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[1] This publication is based on the book "Cattle Ranching in the Amazon: trends and implications for Environmental Conservation" available online at: http://www.imazon.org.br/publicacoes/publicacao.asp?id=376. Details on methodology and information sources are presented in the book. The Ford Foundation and the William & Flora Hewlett Foundation and the World Bank project Global Overlay supported the research which led to this material. Nevertheless, these institutions do not necessarily support the ideas presented in the publication. This paper was translated from Portuguese to English by Ian Thompson

[2] Estimates made with data from the Pesquisa Pecuária Municipal, IBGE -Instituto Brasileiro de Geografia e Estatística for the Legal Amazon. Data available at: www.ibge.gov.br.

[3] Authors' calculations using IBGE data available at: http://www.inpe.gov.br.

[4] Inpe (Instituto Nacional de Pesquisas Espaciais) recorded an average annual deforestation of 2.5 million hectares per year in 2002 and 2003, compared to an average of 1.68 million hectares between 1997 and 2001. Data available at: http://www.inpe.gov.br.

[5] Isa (Instituto Socioambiental). Brasileiros querem mais proteção para as florestas: Instituto Socioambiental. Available at: http://www.socioambiental.org/website/pcodfor/index.htm Access on: 10th of August 2000.

[6] IBGE data. Idem note 2

[7] Arima, E. Y. & Veríssimo, A. 2002. Brasil em Ação: ameaças e oportunidades econômicas na fronteira amazônica. Série Amazônia nº 19, Belem: Imazon. 24 p.

[8] The data on percentage net profit in relation to assets in the principal producing regions of the country were obtained from Anualpec (2003). We used the eight principal producing regions in the Amazon which were in Mato Grosso, Tocantins, Rondonia and Para; States which total 86% of the Legal Amazon herd in 2003 according to the IBGE. Data from the Center-South of Brazil included the 19 main cattle raising regions of the South-east, South and Center-west of Brazil, except for Mato Grosso. Anualpec reference: Anualpec. 2003. Anuário da Pecuária Brasileira 2003. FNP Consultoria, Sao Paulo FNP.

[9] However, the difference was not statistically significant in the cases analyzed.

[10] Margulis, S. 2003. Causes of deforestation of the Brazilian Amazon. World Bank Working Paper Series. 100 p.

[11] The potential for land price rises is greater in the Amazon since land prices in the Center-South are already at a high level. In some cattle raising regions, such as the South of Para, the North of Mato Grosso and Rondonia, land prices have been rising because of grain cultivation –especially soybean.

[12] Fundação Getúlio Vargas. Índices e preços agropecuários: preços de terras, salários e serviços. FGV. Rio de Janeiro. (various years)

[13] Barros, G. S. C. (Coordinator). 2002. Economia da pecuária de corte na região Norte do Brasil. Indicadores Pecuários. Cepea: Piracicaba, SP. Available at: http://www.bird.org.br/content/_downloadblob.php?cod_blob=1025. Accessed in: november 2005.

[14] Statistically significant differences were not found between the other regions, perhaps because of the small number of observations.

[15] According to analyses in "Schneider, R.; Arima, E.; Veríssimo, A.; Barreto, P. & Souza Jr., C. 2000. Amazônia Sustentável: limitantes e oportunidades para o desenvolvimento rural. Brasilia: World Bank

[16] Arima, E. Y. & Uhl, C. 1997. Ranching in the Brazilian Amazon in a national context: economics, policy practice. Society and Natural Resources 10 (5): 433-451.

[17] the lower price paid to the producer in the Amazon reflects the discounting of the transport cost of the cattle (or meat) from the ranch (or the slaughterhouse) to the consumer market in the Center-South. Prices of cattle collected in Anualpec, 2003. Op. cit.

[18] Estimates using data from Anualpec, 2003. Op. cit. Amazônia (9 regions, including Barra do Garças, Alta Floresta, Pontes e Lacerda, Gurupi, Redenção, Paragominas, Araguaína and Ariquemes) and other States (14 regions). Values in @/animal unit/year were multiplied by the support capacity (animal unit/ha) to obtain per hectare productivity values.

[19] Interest rates of other financing options in 2003 were 8.75%/year (Crédito Agrícola), 28%/ year (Cédula de Produto Rural) and 16% to 19%/year (Poupança Verde). Raíces, C. 2003. Guia Valor Econômico de Agronegócios. Editora Globo, Sao Paulo.

[20] Especially in regions of high rainfall and poor soils.

[21] To calculate altered area we excluded natural grassland, natural forests and naturally unusable lands. In the remainder of Brazil, "unused productive land" was equivalent to 7.7% of altered areas –that is, a value 54% less than that of the Legal Amazon. Data on areas of "unused productive lands" in IBGE. 1996. Censo Agropecuário. Rio de Janeiro: IBGE, v. II, III, IV, V, VI e VII.

[22] According to a report of the North American Department of Agriculture (Available at http://www.usda.gov/agency/oce/waob/commodityprojections/USDA%20Agricultural%20Baseline%20Projections%20to%202014.pdf), the increased demand and the advantages of Brazilian cattle ranching could permit an increase in meat exports of around 60% between 2003 and 2014.

23 Intensive agriculture would grow in Brazil because of increased international demand and the country's competitive advantage. For example, the Department of Agriculture of the USA projected that Brazilian exports of soybean flour and oil would grow respectively by 51% and 85% between 2003 and 2014 (USDA, 2005 citation in the previous note). The same study suggests that the demand for grains would increase because of the significant increases in Brazilian exports of pork and chicken meat (respectively 46% and 75% between 2003 and 2014).

[24] See priority areas for conservation in Capobianco, J. P. R. 2001. Biodiversidade na Amazônia Brasileira: avaliação e ações prioritárias para a conservação, uso sustentável e repartição de benefícios.

[25] Environmental supervision and control should: (i) restrain illegal deforestation in public lands; (ii) guarantee that new legal deforestation in private areas follow good practices which include not clearing river margins and on very steep lands (Permanent Protection Areas – PPA); and (iii) stimulate the recuperation of sensitive areas whose deforestation is illegal, such as the PPAs.

[26] Brito and Barreto (2005) showed that punishment is rare in a sample of 55 legal cases against environmental crimes in the forest sector in Para. Brito, B.; Barreto, P. & Rothman, J. 2005. New Brazilian environmental crimes law: an analysis of its effectiveness to protect the forests of Amazonia. Marrakech: Seventh International Conference on Environmental Complicance and Enforcement. Pp. 285-289.

[27] In 1996, the new Forest Code increased the area that land owners in the Brazilian Amazon should keep as native vegetation (Legal Reserve) from 50% to 80%. Those who had deforested more than 80% prior to 1996 should restore the native vegetation, unless an economic-ecological zoning establishes that the area is suitable for agricultural use. Therefore, the conclusion of zoning is crucial to regulate what landowners have to do to comply with the new Forest Code.