

## **CATTLE RANCHING IN THE AMAZON RAINFOREST**

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### **SUMMARY**

Since the 1960s, the cattle herd of the Amazon Basin has increased from 5 millions to more than 70-80 million heads. Around 15% of the Amazon forest has been replaced and around 80% of the deforested areas have been covered by pastures (approximately 900 000 km<sup>2</sup>). Cattle expansion occurs in the new agricultural frontier areas of the “Arc of deforestation”, from the Eastern Brazilian Amazon (States of Maranhão and Pará), through the Southern Brazilian Amazon (States of Tocantins, Mato Grosso and Rondônia) and the Bolivian rainforests, to the Andean Amazon ecosystems of Bolivia, Peru, Ecuador, Colombia and Venezuela. Based on 1990s data from different agricultural frontiers of the Amazon basin, the authors try to identify the main factors responsible for cattle expansion. Whereas there are some promising and sustainable land use alternatives emerging in particular regions, adequate solutions to avoid or minimize the negative ecological impact of Amazon basin development still have to be found.

*Keywords:* cattle, beef, sustainability, deforestation, farming systems

### **INTRODUCTION**

With 7.5 million km<sup>2</sup>, the Amazon is the largest tropical forest in the world. The Amazon basin covers eight countries: Brazil (67% of the area), Peru and Bolivia (25% together), Colombia, Venezuela, Ecuador, Guyana, Surinam and French Guyana. It comprises high diversity ecosystems: lowlands along the Eastern Amazon river until its delta, savannas in Colombia and Brazil, respectively located in the basin's North-West and South-East, Andean Amazonian highlands in the West, Guyana plateau in the North and, last but not least, the typical Amazon rainforest, which covers the main area in the center of the basin.

Cattle ranching in the Brazilian Amazon started in the 16<sup>th</sup> century, at the beginning of the Portuguese colonization, when navigators brought the first animals to satisfy farmers demand for milk and animal draught (Desfontaines 1956). Cattle ranching has then expanded in the Low Amazon River regions, from Santarém to the Marajó Islands, based on extensive farming systems on natural grasslands (Teixeira 1953). At the beginning of the 20<sup>th</sup> century, the Brazilian Amazon herd was made of 750 000 cattle and 250 000 buffaloes. In the Andean Amazon, cattle ranching started later, in the 19<sup>th</sup> and 20<sup>th</sup> centuries, by catholic missions from the Andean Sierras, where cattle ranching had been developed during the Spanish colonization. Although cattle ranching is an old farming system in the Amazon, its expansion has not been as fast as in Brazilian and Andean regions (Medeiros Neto 1970; Olmedo *et al.* 2001).

### **COLONIZATION IN THE AMAZON**

The rise of colonization in the Amazon is strongly linked with the new policy decisions of the national government in the 1960s. These choices were motivated by several political, economic and social objectives: (i) to secure the integrity of national territories (ii) to exploit regional natural and hydro-carbonic resources, (iii) to provide land to farmers that were excluded from economic growth in other regions because of land concentration or agricultural mechanization. Thus, starting in the 1960s, public investments have led to road building and other colonization projects in this region.

In the Brazilian case, three main roads have been built in order to link the Amazon to the Southern States: the Belém – Brasília (Br 010), the Cuiabá – Santarém (Br 163), and the Cuiabá - Rio Branco (Br 364). Another road has been built in the Eastern-Western axis, the Transamazon (Br 230). In Andean countries, each government has built between one to three roads linking the Amazon to the coastal regions through the Cordilleras. Finally, a marginal road has also been built along the Eastern Cordillera from Santa Cruz de la Sierra (Bolivia) to Venezuela. Farmer's migrations have been stimulated by the construction of these roads, both spontaneously and organised by governments.

Other policies have stimulated agricultural colonization. The Brazilian government has implemented a tax-exemption program, in order to stimulate the “organization and establishment of large farms, almost all for beef production, considering the pioneer role cattle have played in Brazilian agricultural history” (Santiago 1986). In the Andean countries, recent studies have shown that low-interest and short-term public loans have favored cattle ranching rather than perennials crops (Olmedo *et al.* 2001; Valencia *et al.* 2001). Thus it can be said: “cattle feet have carried out the world greatest forest colonization”.

### CATTLE RANCHING AS THE MAIN FARMING SYSTEM IN THE AMAZON BASIN

Since the beginning of the colonization in the 1960s, around 15% of the Amazon forest has been removed through agricultural practices. Slash and burn is the most common way to open primary forest: high-valued timber is sold to timber companies; annual crops are planted in the first year; sometimes perennials crops are planted as well on good soils; pasture follows annual crops. Nowadays, around 0.5 to 1% of the Brazilian Amazon forests is opened through slash and burn, followed by pasture establishment, 3 to 18 months later depending on the region (Tourrand *et al.* 1999; Alves 2001). Pastures cover 80 % of deforested areas and represent the main land use, thus cattle herd growth is a good indicator of expansion of the agricultural frontier.

During the last twenty years, cattle herd growth in the Brazilian Amazon has been impressive (see Table 1). The main part of the Maranhão State, particularly the eastern part, has been colonized before the 1960s, and the cattle expansion in the western has mostly occurred before 1990 and, since then, cattle herd seems to be stabilized at around 1 head/hectare. A similar evolution occurred a little later in the Tocantins State, and now, as in Maranhão, there is no more forest and pasture is the main land use.

**Table 1: Bovine herd in legal Brazilian Amazon (x1000 head)**

States	1980	1985	1990	1995	1996	1997	2000*	2001*	Ratio 97/98
Acre	292	334	400	471	854	863	892	902	5.1
Amapá	46	47	70	93	195	205	238	250	13.1
Amazonas	356	425	637	637	771	810	940	988	5.0
Maranhão	2 836	2 973	3 791	4 162	3 992	3 962	3 868	3 838	0.8
Mato Grosso	3 442	6 547	8 815	14 153	15 597	16 363	18 888	19 814	2.5
Pará	2 730	3 479	6 182	8 058	7 198	7 925	10 577	11 645	10.6
Rondônia	251	771	1 719	3 928	3 948	4 342	5 779	6 357	17.9
Roraima	314	306	377	282	400	378	319	301	12.5
Tocantins	1 574	4 199	5 045	5 544	5255	5 363	5 708	5 828	1.7
Amazon	11 841	19 081	27 036	37 328	38 210	40 211	47 209	49 923	8.5

Source: IBGE and *DBO* rural magazine; \* Estimation from 96/97 data

Today, the Brazilian agricultural frontiers are crossing Rondônia, Roraima, Eastern Pará and Northern Mato Grosso. Since the 1990s, these regions have shown the highest deforestation rates, according to the Brazilian Secretary of Environment (MMA, 2001), and the highest cattle growth rates. New regions are developing through the conversion of forest in pastures. Villages and little cities are growing rapidly. Local agribusiness is based on sawmills, slaughterhouses, dairy and leather factories, , as well as on timber and cattle transport. Recently, in some regions, mechanized soybean, rice and maize production has increased.

The agricultural frontier is now expanding as well through western Pará and Southern Amazonas, which are still mainly covered by tropical forest. Colonization there remains based on timber extraction and cattle ranching. If this trend persists, these regions will probably show the same pattern of change as the other regions (MMA, 2001).

The situation in Acre and Amapá States is a little different, since local public policies try to prevent anarchic frontier expansion through an effective control of timber and cattle activities and a promotion of sustainable natural resources management, as self-sustainable forest management. The monitoring of the development seems also to be easier since these States are smaller, still somewhat remote, and with a low population density. Thus, agricultural frontier expansion appears to be more stable. Even if cattle numbers are increasing, it seems to be due to farming intensification rather than to pasture expansion.

It should be recognised that previously cited figures of the Brazilian Amazon herd may be underestimated (Veiga *et al.*, 2001b). Indeed, some cattle usually are not counted: (i) smallholders

herds (10 to 20% of total); (ii) calves (around 20%); (iii) some herds of large companies, temporarily kept in other ranches (5 to 10%). Thus, the real figures could be between 60 and 70 million head.

The previous analysis shows that, only 35 years ago, livestock in the Amazon was based only on 5 million head herd, whereas today the figure is close to 80 millions head, with an annual growth rate of between 5 and 8%. Another important transformation is the replacement of natural grassland by sown pastures in former forest areas. The distribution of the cattle herd along the different sub-regions may be estimated as following: Eastern Brazilian Amazon (20-25 millions heads), Southern Brazilian Amazon (25-30 millions heads), South-Western Amazon (10-12 millions heads), Central Andean Countries Amazon (8 millions) and Northern Andean Countries Amazon (5 millions bovines).

## **DETERMINANTS OF CATTLE RANCHING EXPANSION IN THE AMAZON**

Cattle ranching in the Amazon is often criticized in the scientific literature because of its numerous harmful consequences on economic, social and ecological grounds (deforestation, land concentration, biodiversity loss, land tenure concentration, and small contribution to regional development). Opposing these viewpoints, some authors have argued that cattle ranching is a suitable agricultural activity for the Amazon, is a good alternative for smallholders and allows safe returns on investment. It is clear that most of these opposing arguments are valid under specific conditions and generalizations cannot be easily made. Apart from these ideological positions, several researches in the 1990s have identified the main factors responsible for cattle expansion in Amazon.

Firstly, the emergence of efficient beef production and marketing chains in the region allows low, but secure prices for livestock products. Farmers in the Amazon can always sell cattle at a price indexed on the biggest national markets (São Paulo, Lima, Quito, Guayaquil, Santa Cruz, Bogotá). Some other agricultural activities may give higher returns, such as pepper in Brazil, but price or yield variability often impedes security. For example, the price of annual crops (maize, rice, beans etc) shows seasonal and annual variability. Perennial crops prices also fluctuate and depend on international markets. The low variability in prices seems thus to guarantee safe returns in cattle ranching, from smallholders to large farmers and from small traders to larger agribusiness companies.

Cattle ranching in the Amazon does not depend anymore on any kind of public subsidies: very low production costs, around US\$0.03/litre of milk and US\$0.15/kg of meat (Machado 2000), make it very competitive, allowing to trade livestock products around all Amazon basin. In Peru and Ecuador, young bulls born and raised in the Amazon are fattened in Lima, Quito and Guayaquil with by-product feed supplements (Olmedo *et al.* 2001; Valencia Chamba *et al.* 2001). In Brazilian, final products are sold to the large markets of the Northeast, Southeast and South. With 25-30% of the Brazilian cattle, Amazon is indirectly contributing to the increase of national livestock products export, from 200 millions tons in 1996 to 625 millions tones in 2000 (DBO, 2002).

Secondly, sown pasture performance is a major determinant of cattle expansion in the Amazon; *Brachiaria brizantha* has become the major forage species planted in the Amazon and today, it counts for around 95% of forage seeds sold in the region (Veiga *et al.* 2001 b). Its nutritive value is not as high as of *Panicum spp*, but allows live weight gains of around 600-800 g/day. Moreover, it is very competitive with weeds that tend to grow as pasture management fails or soils fertility declines. The soil cover of *Brachiara brizantha* is dense and its roots are deep, which allows a reasonable forage production during the dry season.

Thirdly, few agricultural alternatives can compete with cattle ranching in the Amazon. Whereas mechanized soybean or annual crop may allow large benefits, few farmers and agribusiness companies are yet to invest on it. Large producers prefer to stay in the livestock production and marketing chain, while wait for specific loans to invest in agroforestry or annual crops, even if the succession of 2-3 years of annual cropping followed by 5-8 years of pastures has a great potential, particularly in drier region of the Northern Mato-Grosso or South- Eastern Pará States. These alternatives depend also on the development of local technological skills.

In many regions, some smallholders have faced major difficulties due to price fluctuations of perennial crops and to crop diseases, mainly with cocoa, sugarcane, pepper and coffee. Some small farmers who have diversified their production systems with typical Amazonian crops, such as cupuaçu and guaraná,

have not succeeded in the long term. The exploitation that may better fit to smallholders' features is milk production, also linked to cattle ranching. Diversified farming systems based on meat and milk production seems to be the main sustainable alternative for small farmers in the Amazon, what need to be confirmed in the long term (Veiga *et al.* 2001c).

### THE EMERGENCE OF MORE SUSTAINABLE FARMING SYSTEMS?

Recently, it has been noticed that large farmers are beginning to be concerned about their negative ecological impacts. In Brazil, the current strategy of some farmers is to not rely only on timber extraction and land tenure expansion. Some of them are trying to use new financial supports to reforest degraded areas or to implement agroforestry systems. For example, in the South of Para, a large cattle rancher has planted teck (a valuable timber tree) in his pastures, increasing land productivity and decreasing environmental negative externalities (Piketty *et al.* 2001). Some smallholders have also developed small-scale-agroforestry systems, integrating perennial crops with fruit or timber trees (Smith *et al.* 1996). However, these experiences are still poorly developed, and sometimes only experimental (Boulanger 2001), despite increasing governmental incentives.

### CONCLUSION

Over the last thirty years, the Amazon rainforest has become one of the main cattle ranching regions in the world. With 5 to 8% annual expansion, the growth of cattle herd is still strongly affecting forest resources in this region. Negative ecological impacts are evident, however economic and social constraint cannot always be generalized. Cattle ranching has allowed many smallholders to improve their livelihoods, particularly through dairy production. Still poorly developed, more sustainable farming systems are being encouraged by new international and national regulations, as well as by society. Adequate solutions to avoid or minimize the negative ecological impact of development of Amazon basin are necessary and part of these solutions will have to be found within the livestock sector.

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