

1. INTRODUCTION

Cattle keeping in the Brazilian Amazon is expanding, which is seen as a threat to both the rainforest and the crop-fallow system. There is a growing demand for meat in the region, but beef production does not appear to be the most profitable enterprise for the smallholder. These contradictions are worth exploring.

The savannahs and floodplains of the Amazon region have supported large ruminants for the last 300 years. The savannahs occupy 17% and the floodplains 7% of the 4.9 million km² which legally constitute the Brazilian Amazon. Floodplains and savannas offer already open areas, often covered with natural pastures. The majority of the cattle are kept in another ecological zone, the non-flooded areas¹, which are naturally covered by a heterogeneous composition of different rainforest types (TOLEDO & SERRÃO 1982, NASCIMENTO & HOMMA 1984). The deforestation for pastures started approximately 30 years ago and 13% has been cleared to date, of which at least 80% is or has been used as pastures (FEARNSIDE 1996). The slashing and burning of forest during drier periods implies the local loss of nutrients, the extinction of species and the temporal increase of smoke clouds, which can change the climate in the short run, while the loss of biomass is supposed to alter the climate in the long run. The management is further characterised by wasting valuable resources, e.g. the non-removal of most of the timber before land clearing by burning amounted to a loss of approximately 2.5 billion US\$ annually in Brazil (REPETTO 1990).

Cattle production is normally associated with ranching. For example, in Pará² state, where this study was located, 65% of the 37 131 farms bigger than 100 ha possessed cattle totalling 4.93 million head, i.e. on average 205 head per farm. However, nearly a quarter of 169 273 smallholders also had cattle, totalling 1.15 million head of cattle, i.e. on average 27 head per farm. Small-scale cattle keepers are simultaneously crop-farmers as cattle/pasture is normally only one sub-system among others. So pastures compete for limited land in crop/fallow systems. Planted pasture accounted for a quarter of the total farm area of 225 202 km² in Pará in 1995, land used for cropping for 3.6%, natural pastures for 7.2%, while the remaining 60% were constituted by fallow and forest. At the end of 1995, small farms in Pará state with up to 100 ha produced 22% of the overall Pará revenue from cattle and buffalos, where their contribution to the gross output of all farms was 51%. The small farms accounted for only 19% of the arable land but employed 77% of the rural manpower (IBGE 1998). Thus, the specific resources and limits of smallholders differ by a great extent from those of the ranchers specialised on cattle production. Also, little is known how the adoption of cattle to the existing crop/fallow systems has affected

¹ Non-flooded areas are sometimes called uplands in the literature, referring to the fact that floods do not affect these soils, but not implicitly meaning that they are located high above sea level.

² Pará is one of the nine states contained in the legal Brazilian Amazon that comprises 60% of the national territory. Pará lies in the east of the region.

the resources of the small farmers. So far, research has mostly dealt with pastures, less with animals, and was principally related to big holdings.

The rainforest destruction, or opening up of northern Brazil, has been fuelled by economic incentives at least in the 1960s and 1970s when the military government decided to explore the huge northern areas of the country prosecuting hegemony and control through settlement (OLIVEIRA 1999). Moreover, the colonisation involved the immigration of European settlers, and more recently Japanese, as well as the migration of Brazilians inside the country, from densely populated areas in the South and from the drought prone Northeast (HOMMA 1998, OLIVEIRA 1999). Consequently, the demand for agricultural products increased with growing population densities (FAMINOW 1997).

Growing urbanization accompanied the increase in population density. Urbanization provokes shifts in the food demand (TRIGO 1995). The habits of food consumption in the capital of the Pará state showed a high preference for animal proteins compared to Brazil as a whole. The additional home consumption of fresh meat in the town of Belém was elevated (+60% compared with the total Brazilian consumption) as well as that from poultry and eggs (+50% at Belém) and fish (+350% at Belém) (IBGE 2001^c). Especially meat from cattle is highly valued. Beyond this, cattle are even subject to cultural events and activities.

Problematic for beef producers is the limited productivity of pastures on non-flooded areas because of low soil quality, especially lack of P, and rapid regrowth of secondary forest. Only 6 to 8% of the Brazilian Amazon area is supposed to provide soil and site conditions appropriate for the implantation of new land use systems (BLUM 1980). Actual pasture practices seem to be inadequate as quantity and quality of forages decline rapidly. Moreover, large ruminants are not native to this environment so animal performance is supposed to be very limited. Herd productivity of cattle was observed to be low (VEIGA *et al.* 1996), consequently, cattle production does not seem to be an economically sound activity judging on the base of a classical animal scientist approach, which is contradictory to the high numbers of smallholders taking up this activity. Thus the conventional analysis is inadequate for the purpose of valuing the benefits of cattle for smallholders. Therefore the aim of this study is to find a way of correcting this deficiency in the analysis preceded by checking the productivity of cattle in smallholdings.

2. LITERATURE REVIEW

2.1. Expansion of cattle husbandry in the Brazilian Amazon

The knowledge about the development of cattle production in the region helps to clarify how farmers actually perceive the value and qualities of cattle. While the first hundreds of years showed a slow and not very far-reaching adoption, the recent decades showed a rapid development of numbers with regional differences in importance. The current rash expansion alarms the opponents of massive cattle keeping because it is seen as a threat to both rain forest and fallow cropping systems. It can be presumed that cattle production will highly respond to future changes of the general conditions, such as e.g. the increasing urbanization.

With the exception of a decline between 1995 and 1996, the number of cattle kept in the Brazilian North³ is growing, having doubled in ten years (Figure 1). Other important species like chicken and pigs have stagnated during the past four years, but cattle have not. The sole other species that profoundly gained in importance in 2000 compared to 1990 is Guinea fowl.

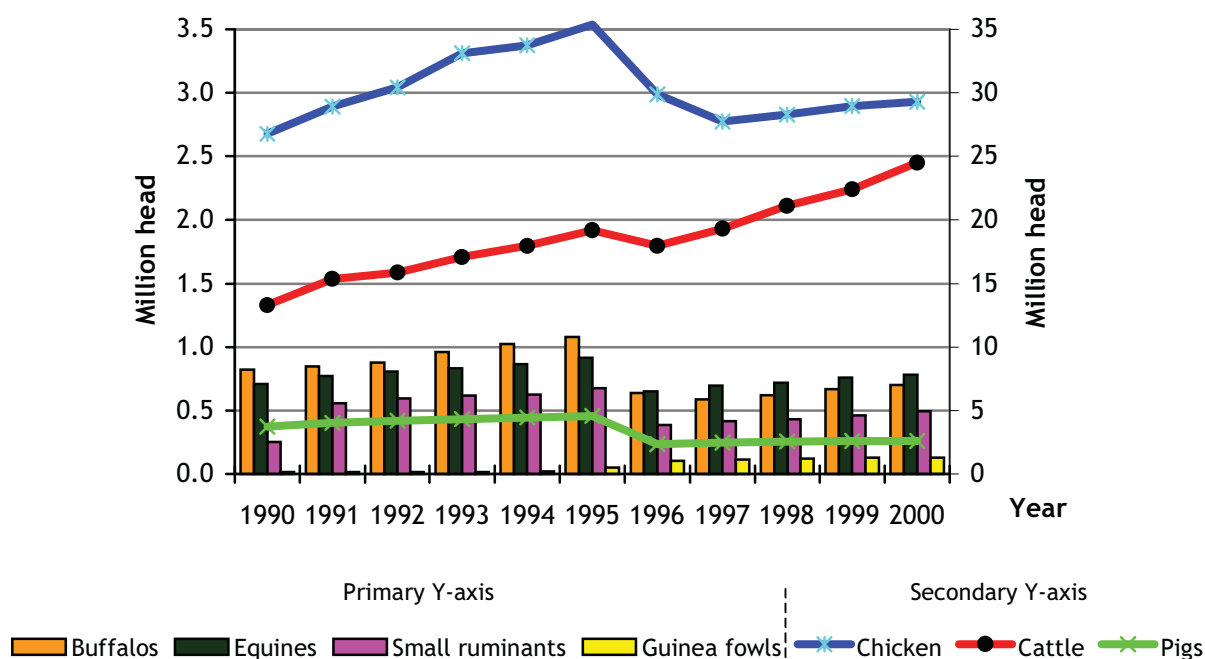


Figure 1: Development of number of farm animals in Northern region of Brazil between 1990 and 2000
(Data from IBGE 2001^a)

³ Brazil is divided into five geographic regions. The “North” corresponds nearly with the Amazon region, however there are differences as it is an administrative and not an ecological division.

The numbers of the official Brazilian census might be even underestimating reality as VEIGA *et al.* (2001) pointed out. Relative to cattle numbers they discovered that calves up to one year old are not included, that shared cattle are not fully integrated and that in general animals from family farms might not be fully considered in the statistics. They suggested to add at least 50-60% to the official numbers.

Furthermore, VEIGA *et al.* (2001) predicted that the Amazon region will be one of the world's most important cattle production centres of the future because of annual growth rates around 5 to 8%. Indications from worldwide comparisons have however toned down this expectation. On a decade scale, the whole geo-economical region of Central and South America showed negative growth rates of head of cattle in the grassland based systems (-0.4%) of the humid and sub-humid tropics and sub-tropics, and positive growth rates in the mixed rainfed systems (1.9%), whereas the beef and veal production showed positive growth rates slightly beyond proportion, with 0.2% and 3.0% respectively; these growth rates were not very different from worldwide averages, i.e. not specifically depicting this region for extraordinary growth (SERÉ & STEINFELD 1996). The numbers looked different when focusing on total amount of beef and veal production, then, Central and South America were clear leaders worldwide in the grassland-based and mixed rainfed systems (SERÉ & STEINFELD 1996).

Some forty years ago, the Amazon region was not considered a cattle production centre. What happened? In order to answer this question, one needs a look on the historical roots of cattle production in South America as they relate to the Amazon region.

In 1532 the Portuguese introduced the first cattle into Brazil when they founded a colony on the northeast coast (PAYNE & WILSON 1999). According to RIFKIN (2001) there are two main streams of how people have integrated cattle in their spiritual and practical view of the world: via the "male concept" with grazing animals for fighting and exploiting the land, or with the "female concept", docile and giving birth, caring for land resources and for persistence. The South American cattle culture resulted from the Iberian one, which is "masculine" and considers cattle as a means for colonisation, that often leads to land exploitation.

The Portuguese humpless cattle breeds were extensively crossed among each other almost without contact and exchange with the other Spanish American cattle breeds because of the natural barriers such as the rainforest (PAYNE & WILSON 1999). It has been claimed that cattle also have been introduced together with the slaves in the sixteenth century (PAGOT 1992). Slaves, especially Bantu, brought along some knowledge about cattle production (FREYRE 1998). The first confirmed introduction of Zebu breeds was as late as 1813 from India. In spite of the importation of at least 14 breed-types till 1964, only 3 are actually recognized - Gir, Guzerat and Nelore - plus one composite breed, the Indu-Brazil. Some of these breeds came to the United States via Brazil where they were used for upgrading, creating finally synthetic breeds, like Santa Gertrudis (Zebu X Shorthorn), which in the 20th century were introduced to Brazil (PAYNE & WILSON 1999).