

The population of donkeys and mules in Brazil according to agricultural censuses from 1960 to 2017

População de jumentos e muares no Brasil segundo os censos agropecuários de 1960 a 2017

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ABSTRACT

To better understand and manage the population of donkeys and mules, it is essential to know information about its size. In developing countries, these animals are often used as working animals, mainly by poor populations in agricultural and livestock labor, but their use is decreasing in Brazil. Brazilian official data regarding donkeys and mules started to be measured at the agricultural census of 1960 and, from that time, eight agricultural censuses were published. But until the writing of this paper, no scientific paper was dedicated to the analysis of the results of the official agricultural censuses on the population of donkeys and mules in Brazil. Thus, we aim to compile and analyze the official Brazilian data from 1960 until 2017 to enhance the actions of stakeholders, researchers, and decision-makers concerned with Brazilian donkeys and mules.

Keywords: Donkey. Mules. Population size. Brazil.

RESUMO

Para entender e gerenciar melhor a população de jumentos e mulas é essencial saber informações sobre seu tamanho. Em países em desenvolvimento, esses animais são frequentemente usados como animais de trabalho, principalmente por populações pobres na agricultura e pecuária, mas seu uso está diminuindo no Brasil. Os dados oficiais brasileiros sobre jumentos e mulas começaram a ser mensurados no censo agrícola de 1960 e a partir dessa época foram realizados oito censos agrícolas. Até a redação deste artigo, porém, nenhum trabalho científico analisou os resultados dos censos agropecuários quanto à população de jumentos e mulas no Brasil. Deste modo, nosso objetivo é compilar e analisar os dados oficiais brasileiros de 1960 até 2017, para aprimorar as ações dos stakeholders, pesquisadores e tomadores de decisão preocupados com os jumentos e mulas brasileiras.

Palavras-chave: Jumentos. Muares. Tamanho populacional. Brasil.

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Introduction

The last official estimate from the Food and Agriculture Organization of the United Nations for the donkey and mule population in Brazil was 822,255 and 1,252,029

heads in 2018 (Food and Agricultural Organisation of the United Nations, 2020)¹. In animal production, Brazil is mostly known for its global contribution to cattle, poultry, and pork production because of its importance to the country's economy. Nevertheless, the population of animals such as donkeys and mules starts to get attention mostly because of its 28% decline between 2007 and 2017 (The Donkey Sanctuary, 2019).

Donkeys and mules often are managed as working animals in developing countries, due to their aptitude to work in difficult and challenging environments. In many of these places, they are used for the transport of goods with or without carts, can be ridden, and used to transport people, or in agriculture (Burn et al., 2010; Pritchard et al., 2005). Small donkeys can adapt to work in confined spaces and are easy to handle. Together with mules, they are the cheapest kind of agricultural worker because they are usually neglected regarding their needs for food, shelter (Pritchard et al., 2005), and even veterinary care.

Brazilian official data for donkeys and mules started to be measured at the agricultural census of 1960, with eight agricultural censuses carried out since then. The official data is related to animals that were on rural properties, or in common or open pastures, on the date of each census visit. Until the writing of this paper, to our knowledge, no scientific paper was dedicated to the analysis of the results of the official agricultural censuses on the population of donkeys and mules in Brazil. Thus, we aim to compile and analyze the official Brazilian data from 1960 until 2017 to enhance the actions of stakeholders, researchers, and decision-makers concerned with Brazilian donkeys and mules.

Materials and Methods

The main Brazilian agency that does population surveys and provides official data on Brazil is the Brazilian Institute of Geography and Statistics (IBGE). Data of donkeys and mules from the IBGE Automatic Recovery System (SIDRA) for the years 1995, 2006, and 2017 were collected, and for the previous years, the report of the Brazilian agricultural censuses of each year was aggregated and compiled (Instituto Brasileiro de Geografia e Estatística, 1960, 1970, 1975, 1980, 1985, 2020). Eight agricultural censuses were used, corresponding to the years 1960, 1970, 1975, 1980, 1985, 1995, 2006, and 2017. Information about the agricultural census includes data from rural areas and mainly the agrarian organization (ownership and land use), the profile of agricultural workers, and the

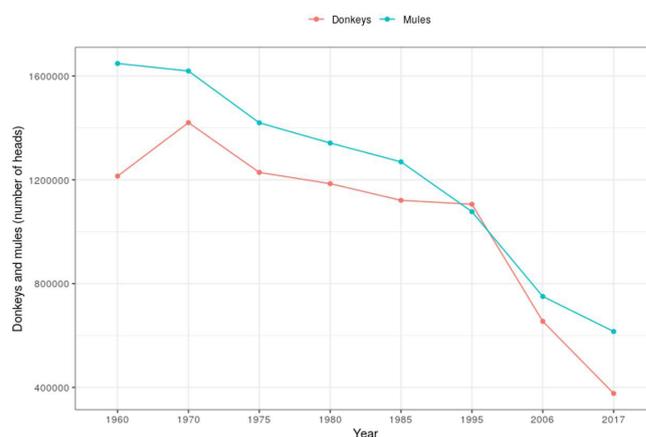


Figure 1 – Time series between 1960 and 2017 with a population of donkeys and mules in Brazil.

technological level of the production processes. All analyses were performed by the R Core Team (2020) software.

Results and Discussion

Brazilian agricultural censuses periodically assess herds of donkeys and mules in rural properties since 1960. Table 1 presents the population of donkeys and mules from 1960 to 2017, with a 65.9% and 42.9% decrease in the number of donkeys and mules, respectively, in Brazil. Figure 1 illustrates this decrease, especially in the last decades. The big difference probably occurred as a result of the rise of mechanization in the agricultural sector in the '90s (Baer, 2003) and the importance represented by leather and its by-products as pointed out by Carneiro et al. (2018). The decrease in the Brazilian donkey population is associated with multiple factors. Among them, we can mention the rise of mechanization in the agricultural sector in the '90s (Baer, 2003) and the replacement of donkeys by motorized vehicles (Salles et al., 2013), mainly in the Northeast region of Brazil. Both circumstances caused a reduction in donkey utility and economic value, therefore leading to the abandonment or release of animals on roads. Roaming free, the animals were subjected to natural and non-natural deaths (as road accidents)², and even became the raw material of unusual economic activities, such as leather and meat production³. While the project of creating a production chain of donkeys to supply the international market with by-products (Carneiro et al., 2018) was/is still not accomplished, the activity has developed in predatory conditions, contributing to the significant decrease of the donkey population in Brazil.

² The impact of uncontrolled breeding cannot be captured by the IBGE's data since they do not refer to feral populations.

³ From 2013 to 2016, there was a 20% increase in the worldwide industry of ejiao, a traditional Chinese medicine made from donkey skin (The Donkey Sanctuary, 2019).

¹ FAO's data about Brazilian animals populations are based on information provided by IBGE's agricultural censuses, annually updated according to statistical methods established by FAO.

To better describe this decrease in population numbers, Table 2 presents the number of donkeys and mules by the main economic activities of the establishments between 1970 and 2017. Agriculture and livestock are the main economic activities employing donkeys and mules. The table shows a total decrease of 76.5% and 61.9% in the population of donkeys and mules, respectively, in Brazil.

Figure 2 highlights the main economic activities and demonstrates a shift between the 1985 and 1995 censuses over the kind of economic activity that most uses donkeys. With the mechanization of agricultural activities in the '90s

(Baer, 2003), the use of donkeys and mules to care for other livestock production became their main economic activity.

To further understand how the population of donkeys and mules is distributed within Brazil, we examined data from 1995 to 2017 by Brazilian regions verifying the location of the largest donkey and mule populations. Table 3 and Figure 3 show that the Northeastern region of Brazil has the largest number of donkeys and mules. In developing countries like Brazil, these animals are usually used to carry people, goods, and other items requiring transport (Burn et al., 2010; Pritchard et al., 2005).

Table 1 – The population of donkeys and mules (number of heads) between 1960 and 2017 in Brazil

Population	1960	1970	1975	1980	1985	1995	2006	2017
Donkeys	1214255	1420449	1228654	1185183	1121011	1105796	654714	376874
Mules	1648324	1619340	1419689	1341747	1269279	1077268	750529	615498

Table 2 – The population of donkeys and mules (number of heads) between 1970 and 2017, by established economic activity (agriculture, livestock, mixed production, other economic activities) in Brazil. Note: Mixed production (agriculture and livestock) was not measured separately in 2006 and 2017

	Economic activity	1970	1975	1980	1985	1995	2006	2017
Donkeys	Agriculture	939715	893088	624060	572954	348466	239843	106673
	Livestock	333102	247072	462803	456791	427198	375791	250340
	Mixed production	118430	68152	53557	41402	275805	-	-
	Others	29202	20342	44763	49864	54327	39080	19861
Mules	Agriculture	937483	853837	696560	635552	312529	196453	117528
	Livestock	479292	467126	551421	561171	564482	529326	482772
	Mixed production	170825	74838	60380	37194	177090	-	-
	Others	31740	23888	33386	35362	23167	24750	15198

Notes: *Agriculture* corresponds to permanent and temporary crops; and *Livestock* corresponds to production of other animals.

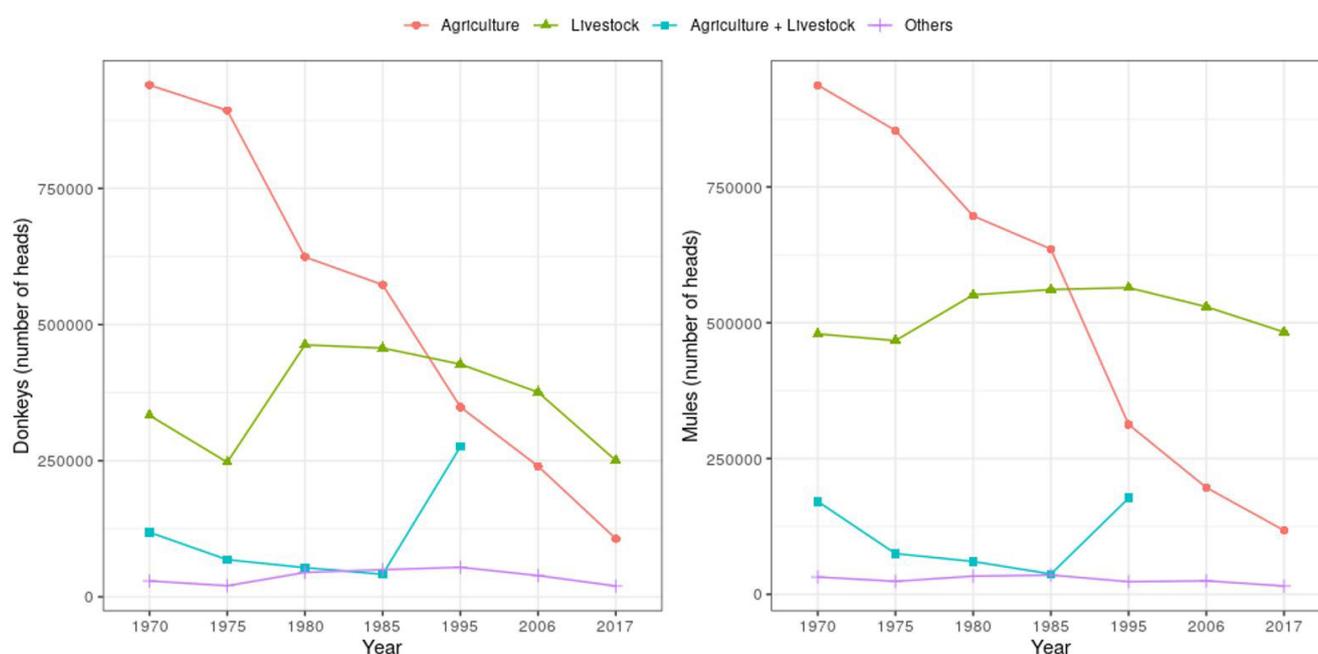


Figure 2 – Time series between 1970 and 2017 with a population of donkeys and mules, by established economic activity in Brazil. Notes: *Agriculture* corresponds to permanent and temporary crops, and *Livestock* corresponds to the production of other animals.

Figure 4 notes that mules are more employed in other Brazilian regions (North, Midwest, Southeast, and South). Furthermore, in 2017, the number of mules in the Northeastern region is close to the sum of the population of mules in the North and Midwest regions (Table 3). Investigating further, since the Northeastern region always had more donkeys and mules than the other regions (Figure 3), we found that Bahia is the state with more donkeys and mules in the country, as shown in Table 4 and Figures 5 and 6.

This paper examines the evolution of Brazilian official data regarding donkeys and mules from rural areas, although it did not contemplate feral donkeys and mules. Municipal

Livestock Production data were not used because the IBGE stopped collecting data on animals used for traction and transportation (Instituto Brasileiro de Geografia e Estatística, 2013a). This is especially true in the Northeast region since these animals were replaced by motorcycles and other vehicles in the rural area, implying a scenario of animals without owners, i.e. feral donkeys and mules wandering around (Instituto Brasileiro de Geografia e Estatística, 2013b). We hope this study can help decision-makers and stakeholders create actions to stop the decreasing numbers of these animals and to encourage further research with feral donkeys and mules.

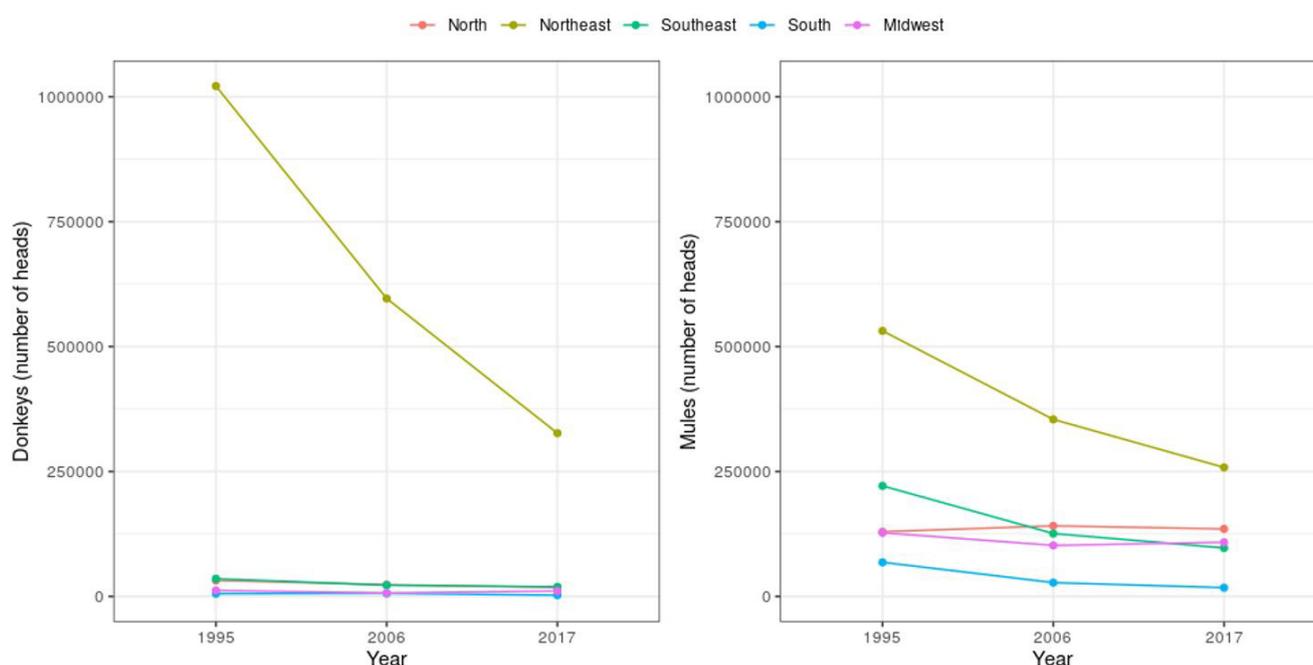


Figure 3 – The total population of donkeys and mules between 1995 and 2017, by Brazilian region.

Table 3 – The population of donkeys and mules (number of heads) between 1995 and 2017, by Brazilian region

Brazilian region	Donkeys			Mules		
	1995	2006	2017	1995	2006	2017
North	31911	23460	18068	129407	141094	135029
Northeast	1021384	596189	326569	531375	354184	258090
Southeast	35266	22309	19069	221114	125731	96845
South	5420	6076	2457	68119	27502	17382
Middle West	11815	6680	10711	127253	102018	108152

Table 4 – The population of donkeys and mules (number of heads) between 1995 and 2017, by the states of the Northeastern Brazilian region

Brazilian states	Donkeys			Mules		
	1995	2006	2017	1995	2006	2017
Maranhão	144026	71097	41147	118315	67372	56827
Piauí	194429	113251	50718	38099	28655	18679
Ceará	193176	106701	53233	77266	50678	37918
Rio Grande do Norte	49677	25834	14860	12017	9232	9633
Paraíba	64071	46573	30555	22056	15636	13755
Pernambuco	57158	47384	26546	38535	27850	18364
Alagoas	5791	7544	7873	13116	8732	7018
Sergipe	9666	8930	8483	13389	10942	8953
Bahia	303390	168875	93154	198582	135087	86943

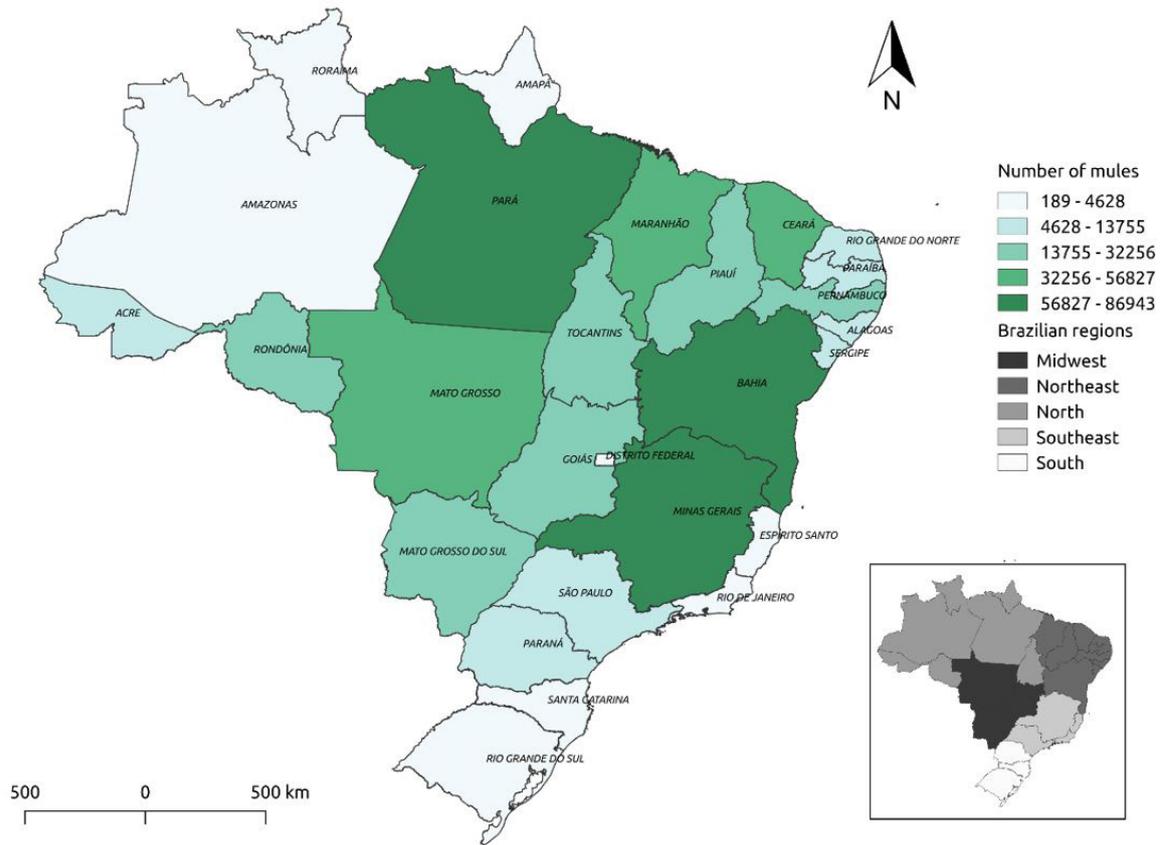


Figure 4 – Thematic map of the population of mules in each state and the Federal District in Brazil, according to the 2017 Brazilian agricultural census.

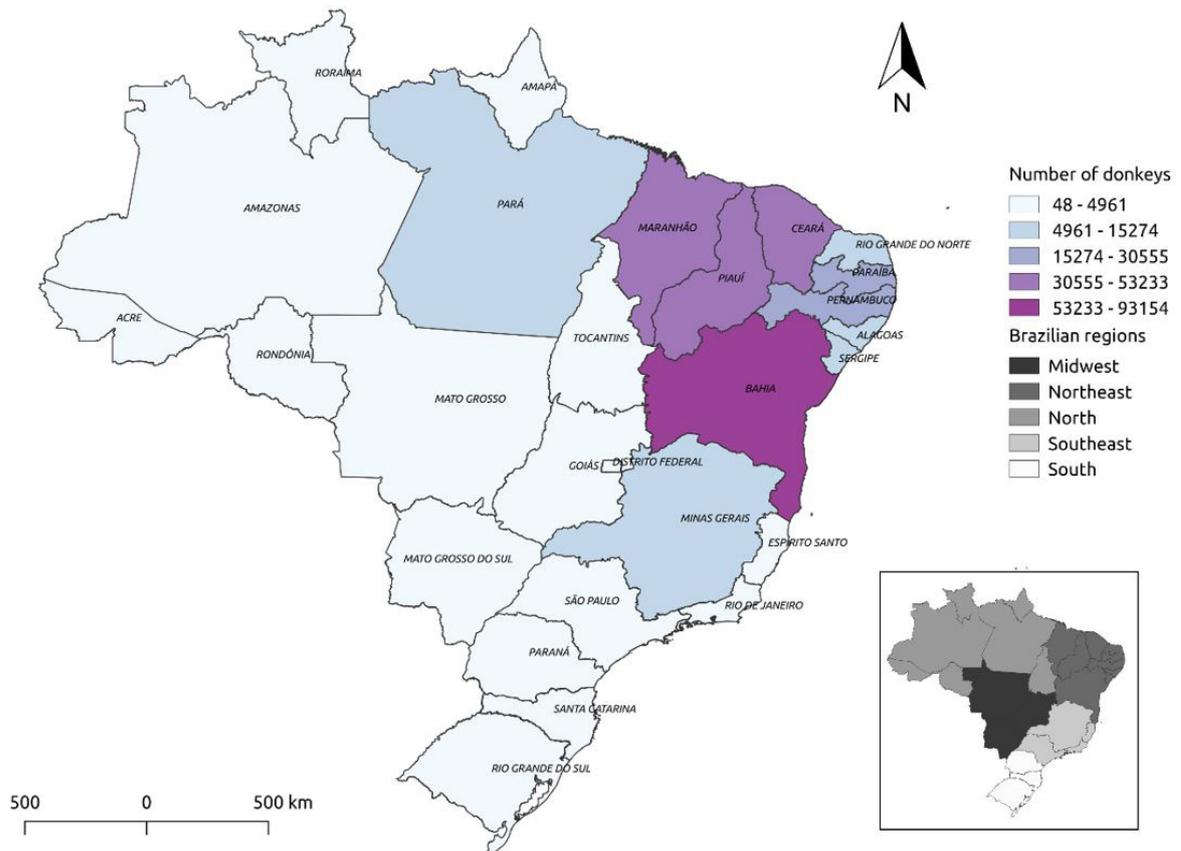


Figure 5 – Thematic map of the population of donkeys at each state and the Federal District in Brazil, according to the 2017 Brazilian agricultural census.

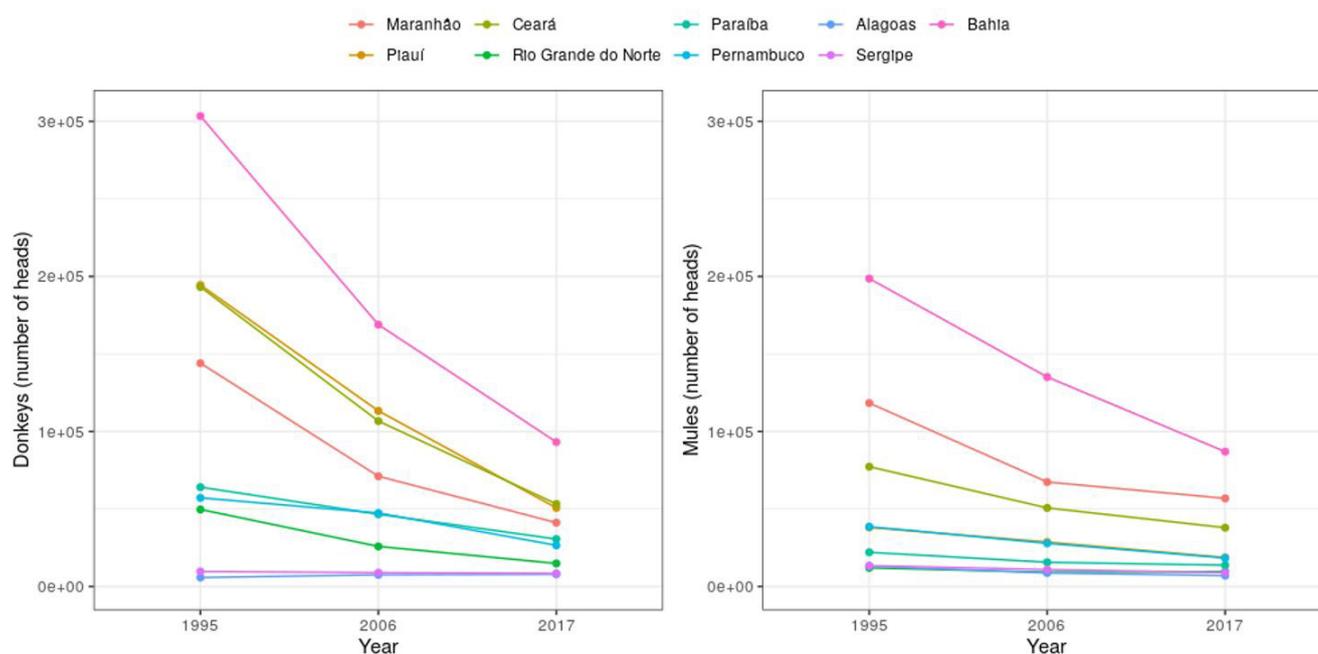


Figure 6 – The total population of donkeys and mules between 1995 and 2017, in the states of the Northeastern Brazilian region.

Conclusion

Although this data does not concern feral donkeys and mules, the historical official numbers of the population size help to describe their population decrease changes throughout Brazil and contribute to the enhancement of actions from stakeholders, researchers, and decision-makers concerned with donkeys and mules.

Conflict of Interest

The authors declare that they have no competing interests.

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Ethics Statement

This article does not contain any studies with animals performed by any of the authors.

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