

# *Final Report*

## *Production Environment Descriptors for Brazilian Domestic Animal Breeds*



*Brasília, June 2014*

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### *Production Environment Descriptors for Brazilian Domestic Animal Breeds*

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## Introduction

The use of Production Environment Descriptors (PED) for use in animal Genetic resources was discussed in an expert meeting in 2008 (<http://dad.fao.org/cgi-bin/getblob.cgi?sid=-1,593>) and their implementation within DAD-IS has been seen as a priority to be used throughout the world as a common framework for describing breeds' PEs.

Brazil was one of the countries selected to test the system through a Letter of Agreement signed on 12<sup>th</sup> February 2014 with the aim of identifying the PEDs for Brazilian Farm Animals except poultry. The decision was made to exclude poultry due to the lack of information and time available to collect the information.

All domestic animal breeds in Brazil, from the major species, have been imported since its colonization, which occurred from the year 1500. Today Brazil is one of the world's major exporter of livestock (both in the form of live animals and their products). While some information on the livestock species is available from individual sources or the Country Report (Mariante et al., 2003) in preparation for the State of the World in 2007 but this is the first comprehensive report on individual breeds. While some groups of animals are registered here as breeds (such as the Azul goat or Pantaneiro cattle) these are not yet officially recognised by the Ministry of Agriculture (due to bureaucracy or lack of a breeders association). Nevertheless they are referred to as breeds by those farmers that effectively use them and are included in the Brazilian conservation program headed by Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) Genetic Resources and Biotechnology and so are included in this report.

## Material

Data was collected from the following sources:

- i) Ministry of Agriculture, Livestock and Food Supply - MAPA
- ii) Herd Books and Breeders' Associations (telephone, emails, visits *in loco*) – Photos 1 and 2.
- iii) Scientific Papers (see [www.ciencianimal.unb.br](http://www.ciencianimal.unb.br) for diseases)
- iv) Homepages, internet, magazines etc
- v) Researchers and University Lecturers working with the breeds involved





Photo 1. Safe where original herd books are stored in Herd Book Collares

Charolais

NOME	NASCIMENTO			Tatua- gem	PAE	TAT. RE
	DIA	MES	ANO			
Fadette	25	Setembro	926	=23391-	Belge	
Fermose	28	Setembro	926	=23392-	Belge	
Fiole	15	Junho	925	=11045-	Bismant	
Etendard	17	Setembro	925	=11273-	Unzy	
Arara	20	Mai	928	=2-	Etendard	
Soropy	25	Julho	928	=1-	Bole	
Berauli	5	Abri	928	=16312-	Endosseur	
Ideal	3	Julho	919	=1121-	Blaurdi	
Serrano	30	Outubro	929	=3-	Etendard	
Imawera	15	Novembro	929	=8-	Etendard	

Photo 2. Original register of the first Charolais cow imported to Brazil.

## Results

Information was collected on the following breeds:

Species	Breeds	Number of Production Systems	Homepage of Breeder's Association
Buffaloes	Baio	1	
	Carabao	1	<a href="http://www.bufalo.com.br">www.bufalo.com.br</a>
	Murrah	2	<a href="http://www.bufalo.com.br">www.bufalo.com.br</a>
	Mediterranean	2	<a href="http://www.bufalo.com.br">www.bufalo.com.br</a>
	Jafarabadi	2	<a href="http://www.bufalo.com.br">www.bufalo.com.br</a>
Cattle	Canchim	1	<a href="http://www.abccan.com.br">www.abccan.com.br</a>
	Mocho Nacional	1	
	Santa Gertrudis	1	<a href="http://www.santagertrudis.com.br">www.santagertrudis.com.br</a>
	Junqueiro	1	
	Crioulo Lageano	1	<a href="http://www.abcccl.org.br">www.abcccl.org.br</a>
	Sahiwal	1	
	Mantiqueira	1	
	Beefmaster	1	
	Patuá	1	
	Marchigiana	2	<a href="http://www.marchigiana.org.br">www.marchigiana.org.br</a>
	Girolando	2	<a href="http://www.girolando.com.br">www.girolando.com.br</a>
	Lavinia	1	
	Caracu Caldeano	1	
	Caracu	3	<a href="http://www.abccaracu.com.br">www.abccaracu.com.br</a>
	Limousin	1	<a href="http://www.limousin.com.br">www.limousin.com.br</a>
	Brown Swiss	1	<a href="http://www.pardo-suico.com.br">www.pardo-suico.com.br</a>
	Jersey	1	<a href="http://www.gadojerseybr.com.br">www.gadojerseybr.com.br</a>
	Pantaneiro	1	<a href="http://www.bovinopantaneiro.com.br">www.bovinopantaneiro.com.br</a>
	Simmental	3	<a href="http://www.simentalsimbrasil.org.br">www.simentalsimbrasil.org.br</a>
	Chianina	1	-
Holstein	4	<a href="http://www.gadoholandes.com.br">www.gadoholandes.com.br</a>	
Curraleiro-Pé Duro	3	<a href="http://www.abcpd.com.br">www.abcpd.com.br</a>	
Tabapua	3	<a href="http://www.tabapua.org.br">www.tabapua.org.br</a>	
Red Sindhi	3	<a href="http://www.sindi.org.br">www.sindi.org.br</a>	
Nelore	3	<a href="http://www.nelore.org.br">www.nelore.org.br</a>	
Indubrasil	2	<a href="http://www.indubrasil.org.br">www.indubrasil.org.br</a>	
Guzera**	6	<a href="http://www.guzera.org.br">www.guzera.org.br</a>	

	Dairy Gyr	3	<a href="http://www.girleiteiro.org.br">www.girleiteiro.org.br</a>
	Gyr	3	<a href="http://www.abcz.org.br">www.abcz.org.br</a>
	Cangaian	1	<a href="http://www.abcz.org.br">www.abcz.org.br</a>
	Brahman	3	<a href="http://www.brahman.com.br">www.brahman.com.br</a>
	Aberden Angus	3	<a href="http://www.angus.org.br">www.angus.org.br</a>
	Ayrshire	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Blonde D' Aquitaine	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Blonel	1	<a href="http://www.blonel.org.br">www.blonel.org.br</a>
	Braford	1	<a href="http://www.hereford.com.br">www.hereford.com.br</a>
	Charolais	1	<a href="http://www.charoles.org.br">www.charoles.org.br</a>
	Devon	1	<a href="http://www.devon.org.br">www.devon.org.br</a>
	Red Danish	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Flemish	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Galloway	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Hereford	1	<a href="http://www.hereford.com.br">www.hereford.com.br</a>
	Herens	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Ibage	1	<a href="http://www.brangus.org.br">www.brangus.org.br</a>
	Lincoln Red	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Maine Anjou	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Normande	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Pinzgauer	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Red Poll	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Salers	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Shorthorn	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	South Devon	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Sussex	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Tarantaise	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Wagyu	1	<a href="http://www.wagyu.org.br">www.wagyu.org.br</a>
Donkeys	Nordestino	1	
	Paulista	1	
	Pêga	1	<a href="http://www.abcjpega.com.br">www.abcjpega.com.br</a>
Horses	Thoroughbred	1	
	Quarter Horse	1	<a href="http://www.portalabqm.com.br">www.portalabqm.com.br</a>
	Puruca	1	<a href="http://www.cbh.org.br">www.cbh.org.br</a>
	Purebred Spanish	1	
	Piquira Pônei	1	
	Pantaneiro	1	<a href="http://www.abccp.com.br">www.abccp.com.br</a>
	Paint	1	<a href="http://www.abcpaint.com.br">www.abcpaint.com.br</a>
	Marajoara	1	

	Mangalarga	1	<a href="http://www.cavalomangalarga.com.br">www.cavalomangalarga.com.br</a>
	Mangalarga Machador	1	<a href="http://www.abccm.org.br">www.abccm.org.br</a>
	Lusitano	1	<a href="http://www.associacaolusitano.com.br">www.associacaolusitano.com.br</a>
	Crioulo	1	<a href="http://www.racacrioula.com.br">www.racacrioula.com.br</a>
	Campolina	1	<a href="http://www.campolina.org.br">www.campolina.org.br</a>
	Campeiro	1	<a href="http://www.cavalocampeiro.com">www.cavalocampeiro.com</a>
	Brasileiro de Hipismo	1	<a href="http://www.brasileirodehipismo.com.br">www.brasileirodehipismo.com.br</a>
	Arabian	1	<a href="http://www.abcca.com.br">www.abcca.com.br</a>
	Appaloosa	1	<a href="http://www.appaloosa.com.br">www.appaloosa.com.br</a>
	Baixadeiro	1	
	Breton	2	<a href="http://www.cavalo-bretao.com.br">www.cavalo-bretao.com.br</a>
	Lavradeiro	1	
	Morgan	1	<a href="http://www.herdbook.org.br">www.herdbook.org.br</a>
	Nordestino	1	<a href="http://www.abccn.com.br">www.abccn.com.br</a>
	Percheron	1	
Goats	Alpine	2	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Savannah	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Repartida	1	
	Murciana	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Caninde	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Marota	1	<a href="http://www.accoba.com.br">www.accoba.com.br</a>
	Moxotó	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Angora	1	
	Saanen	2	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Kalahari	1	
	Grauna	1	
	Gurgeia	1	
	Boer	2	<a href="http://www.acbboer.com.br">www.acbboer.com.br</a>
	Bhuj	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Toggenburg	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Anglo-Nubian	1	<a href="http://www.ancoc.com.br/www.abcanglo.zip.net">www.ancoc.com.br/www.abcanglo.zip.net</a>
	Azul	1	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	Mambrina	2	
	Jamnapari	1	
	American Alpine	2	<a href="http://www.ancoc.com.br">www.ancoc.com.br</a>
	British Alpine	2	
Pigs	Landrace	3	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
	Large White	3	<a href="http://www.abcs.org.br">www.abcs.org.br</a>

	Pirapitinga	1	
	Moura	1	
	Pietran	1	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
	Nilo	1	
	Tatú	1	
	Caruncho	1	
	Canastra	1	
	Canastrão	1	
	Poland China	1	
	Wessex	1	
	Berkshire	1	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
	Sorocaba	1	
	Piau	1	
	Monteiro	1	
	Canstrinha	1	
	EMBRAPA MS 60	1	<a href="http://www.embrapa.br">www.embrapa.br</a>
	Hampshire	1	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
	Large Black*	1	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
	Tamworth*	1	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
	Duroc	3	<a href="http://www.abcs.org.br">www.abcs.org.br</a>
Sheep	Crioula	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Bergamasca	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Somalis Brasileiro	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Santa Inês	2	<a href="http://www.arcoovinos.com.br/">www.arcoovinos.com.br/</a> <a href="http://www.accoba.com.br">www.accoba.com.br</a>
	Morada Nova	1	<a href="http://www.arcoovinos.com.br/">www.arcoovinos.com.br/</a> <a href="http://www.abmova.zip.net">www.abmova.zip.net</a>
	Far Tail	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Cariri	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Suffolk	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Karakul	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Texel	2	<a href="http://www.arcoovinos.com.br/">www.arcoovinos.com.br/</a> <a href="http://www.brastexel.com.br">www.brastexel.com.br</a>
	Black Belly	1	
	Lacaune	1	<a href="http://www.arcoovinos.com.br/">www.arcoovinos.com.br/</a> <a href="http://www.">www.</a>
	Hampshire	1	<a href="http://www.hampshiredown.com.br">www.hampshiredown.com.br</a>
	Poll Dorset	1	<a href="http://www.arcoovinos.com.br">www.arcoovinos.com.br</a>
	Corriedale	1	<a href="http://www.arcoovinos.com.br/">www.arcoovinos.com.br/</a> <a href="http://www.abccorriedale.com.br">www.abccorriedale.com.br</a>
	Damara	1	

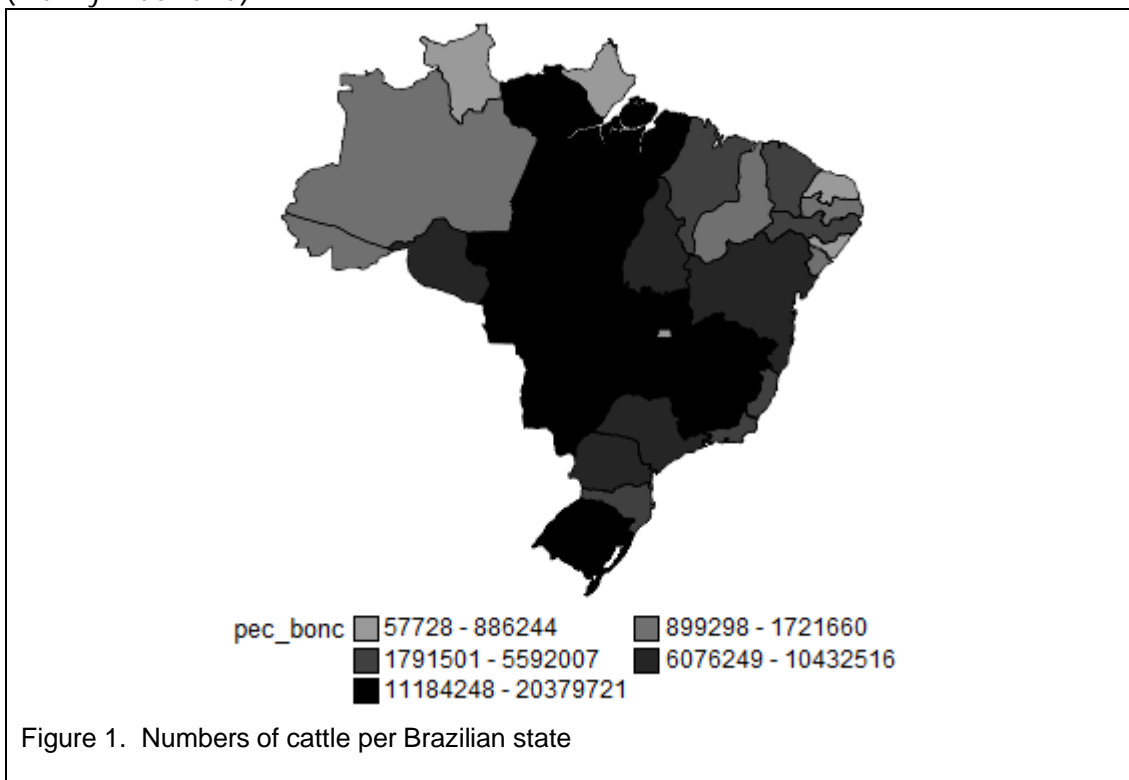


	Romney Marsh	1	www.arcoovinos.com.br
	Ile de France	2	www.arcoovinos.com.br/www.iledefrance.org.br
	Ideal	1	www.arcoovinos.com.br/www.abciideal.com.br
	Australian Merino	1	www.arcoovinos.com.br
	Border Leicester	1	www.arcoovinos.com.br
	PolyPay	1	www.arcoovinos.com.br
	Dorper	3	www.arcoovinos.com.br/www.abcdorper.org.br
	<b>Total</b>	<b>204</b>	

\*Extinct since 2003; \*\* Separated in Dairy and Beef Guzerat – therefore the total is greater than 100%. Information on Brazilian breeds can be found on [www.animal.unb.br](http://www.animal.unb.br) in Portuguese. The list of Brazilian breeds (international breeds are not included) is in Annex 1.

Two hundred and four production systems were originally estimated and 204 were effectively completed. The section on diseases and parasites was not included in the original estimation. All Excel forms provided were sent to FAO via e-mail and are available from the authors on request and on the site of INCT Pecuária ([inctpecuaria.com.br](http://inctpecuaria.com.br)).

Brazil has extensive cattle production for both milk and beef. While beef cattle (Figure 1) can be found country-wide, Zebu type cattle are concentrated mainly in the Centerwest and Southeast of the country, while European breeds are found in the Southeast and south. Most beef production is at pasture either natural or planted (mainly Brachiaria).



Dairy breeds are found more in the southeast, Midwest and south (Figure 2), with Minas Gerais, Goiás, Paraná and Rio Grande do Sul being the highest producers mainly European breeds or their crosses with Zebu (Gyr mainly). The systems are mainly on planted pasture.

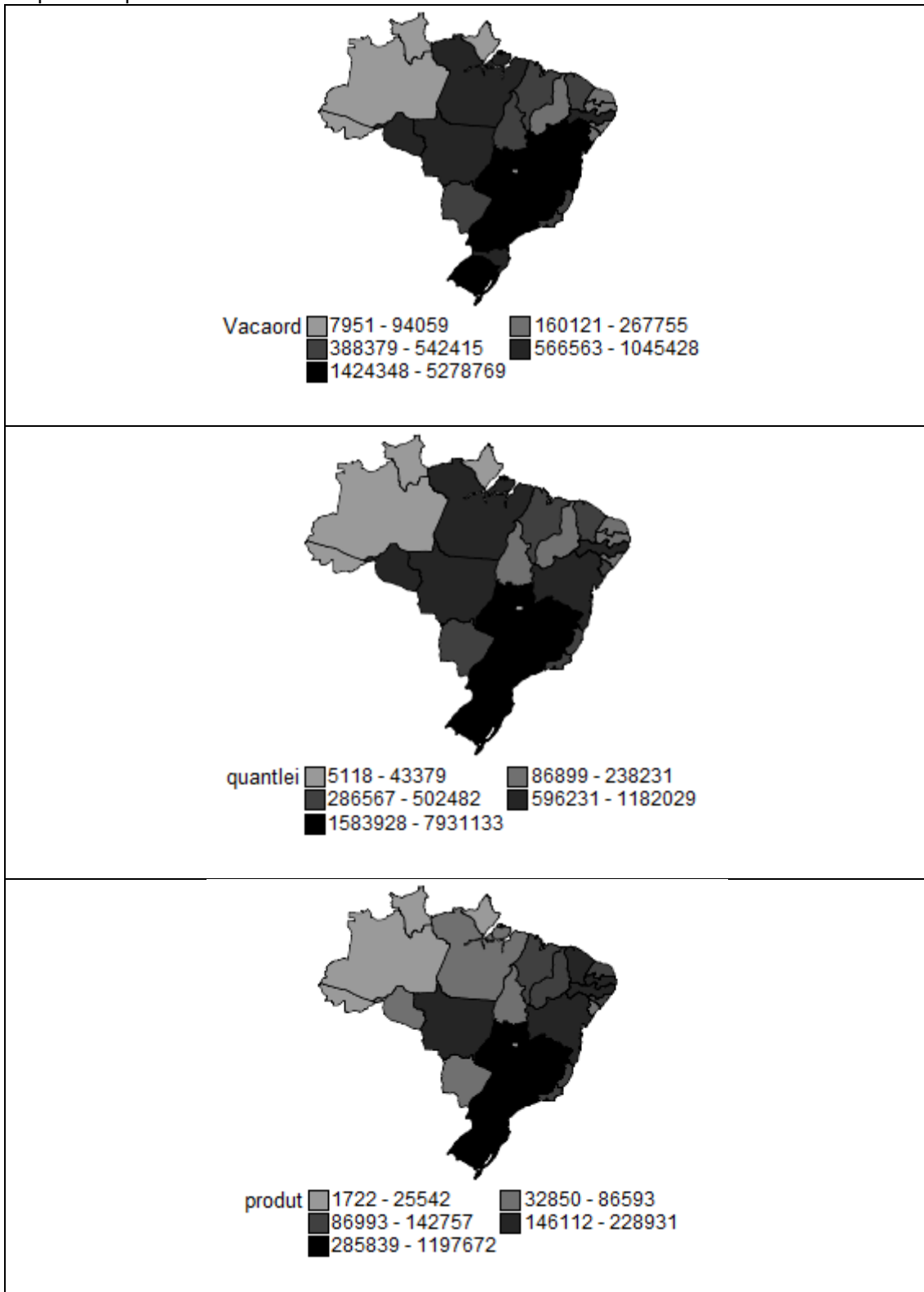


Figure 2. Milk Production and Productivity in Brazil (A – Number of cows milked; B quantity of milk produced; C: Productivity)

Goat production (Figure 3) is concentrated in the Northeast of the country, mainly in smallholder properties or subsistence. In this region, the locally adapted breeds predominate and are used for both milk and meat. Specialized milk breeds (such as Saanen, Toggenburg, Alpine) can be found in the southeast (States of Minas Gerais and Rio de Janeiro).

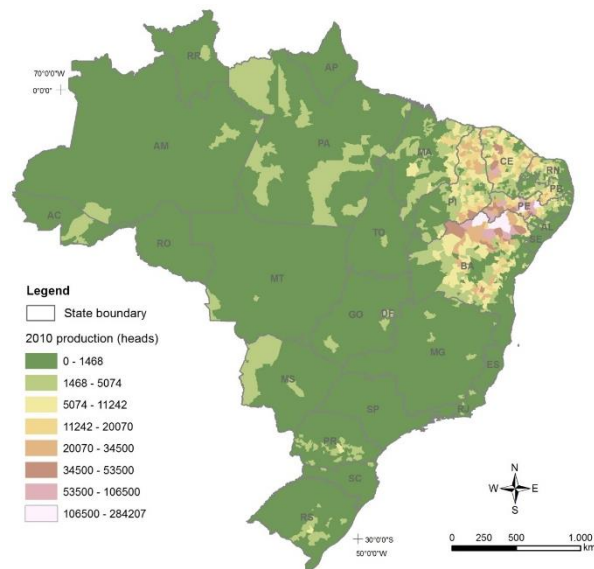


Figure 3. Map of goat production in Brazil.

Sheep (Figure 4) are concentrated in two regions the northeast where hair sheep (usually locally adapted breeds) predominate and the South where there are more wool breeds. The Santa Ines and Dorper can be found countrywide. Most systems are based on pasture, either subsistence (in the NE), smallholder or a few large companies.

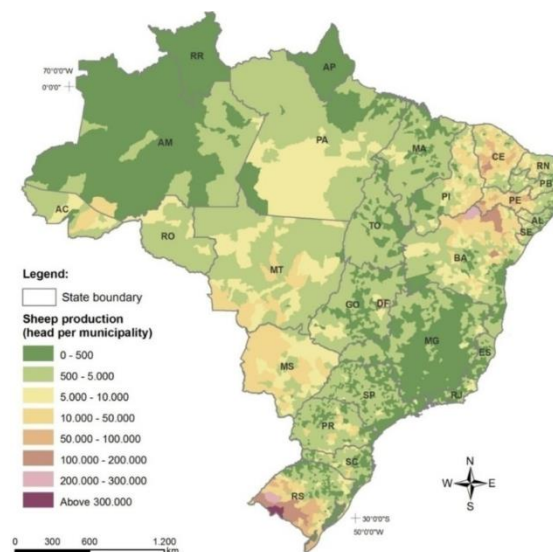


Figure 4 - Production of sheep in Brazil by municipality

There are two regions for buffalo (Figure 5) production in Brazil, the North (Marajo Island) based on native or planted pasture and the southeast which are more used for milk production.

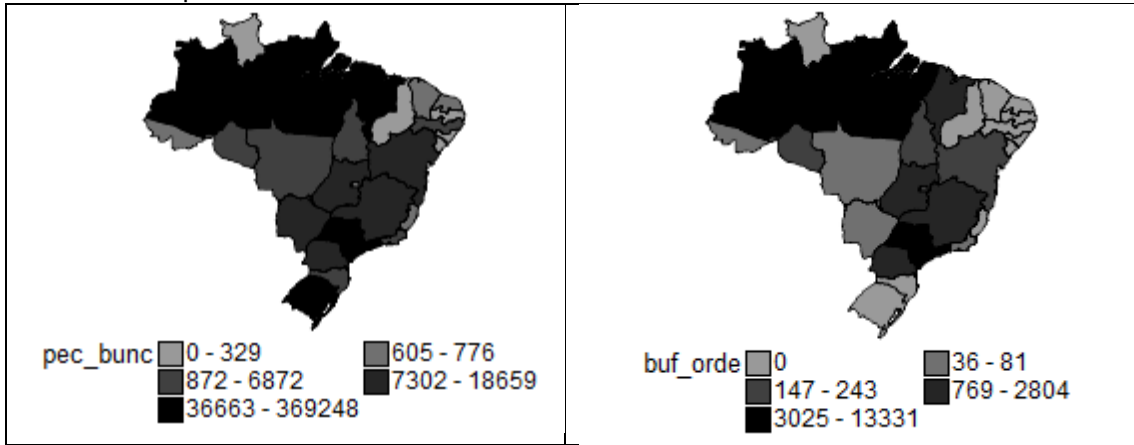
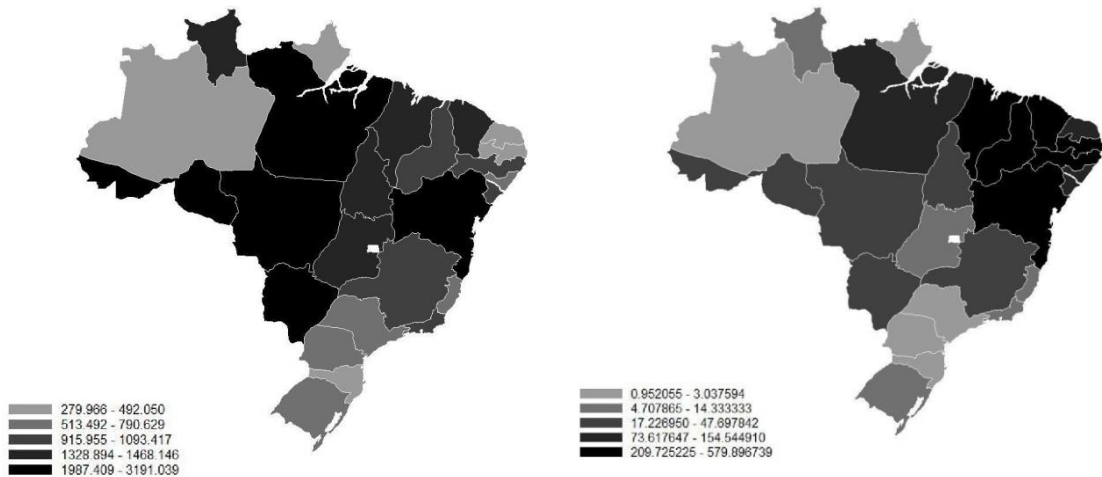


Figure 5. Number of Buffaloes (A) and number of buffaloes milked (B)

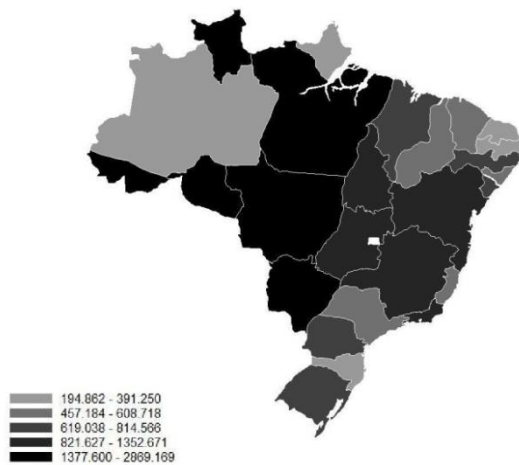
Donkeys (Figure 6) are used extensively for transport in the northeast region (where they are mainly used by subsistence farmers) and for mule production for use in farms in the Northeast, North and Centerwest. Larger breeds (Pega and Brasileira) can be found in the southeast with few found in the South.

A

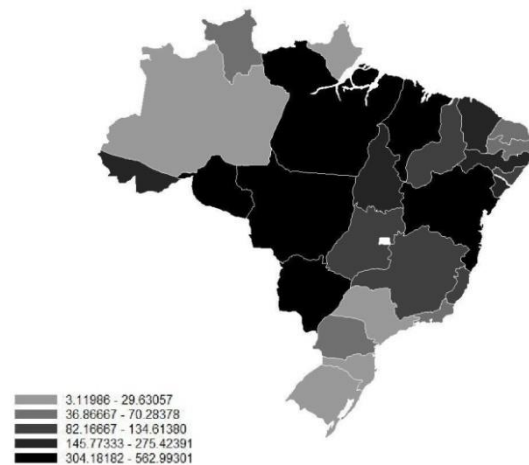
D



B



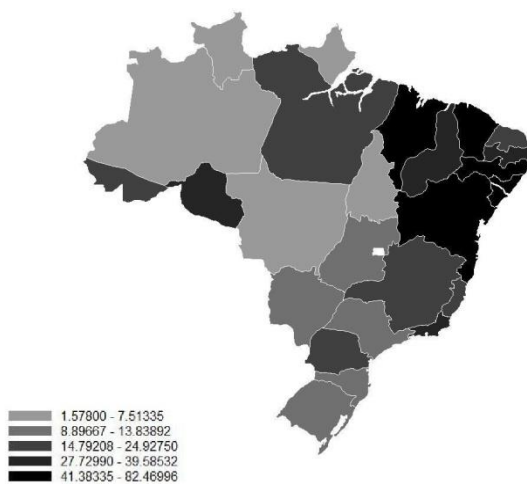
C



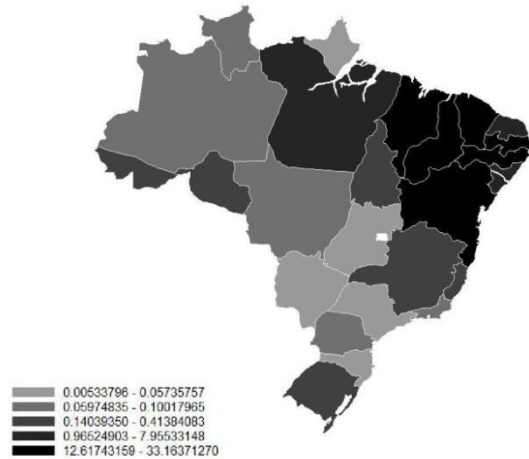
**Figure 6.** Maps of total numbers of equines (A), horses (B), mules (C) and donkeys (D) by state in Brazil.

Horses are used countrywide for sport, transport, farming cattle and riding. While some breeds are very regionalised (Pantaneiro, Nordestino, Campeiro), including the largest breed in Brazil (Crioula found mainly in the South), others can be found over more extensive areas (Mangalarga, Mangalaga Marcador and the international breeds). Production system largely depends on the use of the breed.

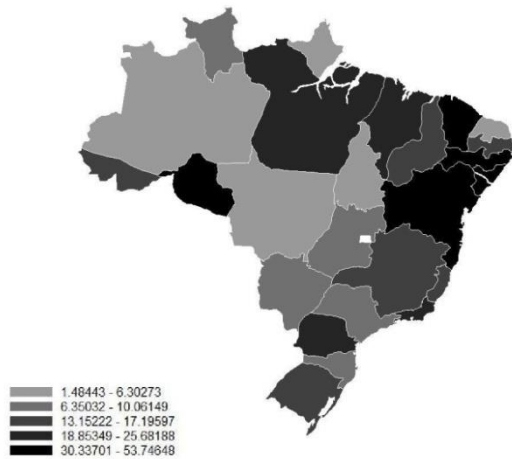
A



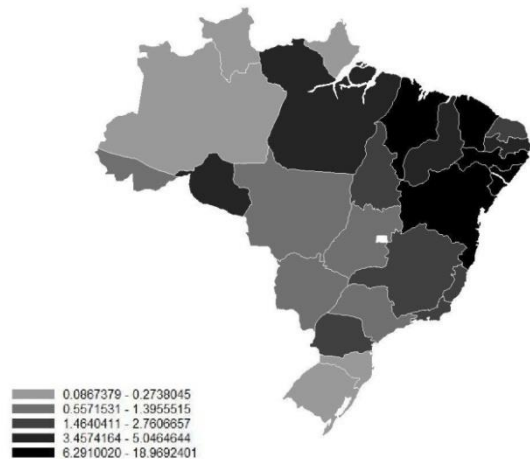
D



B

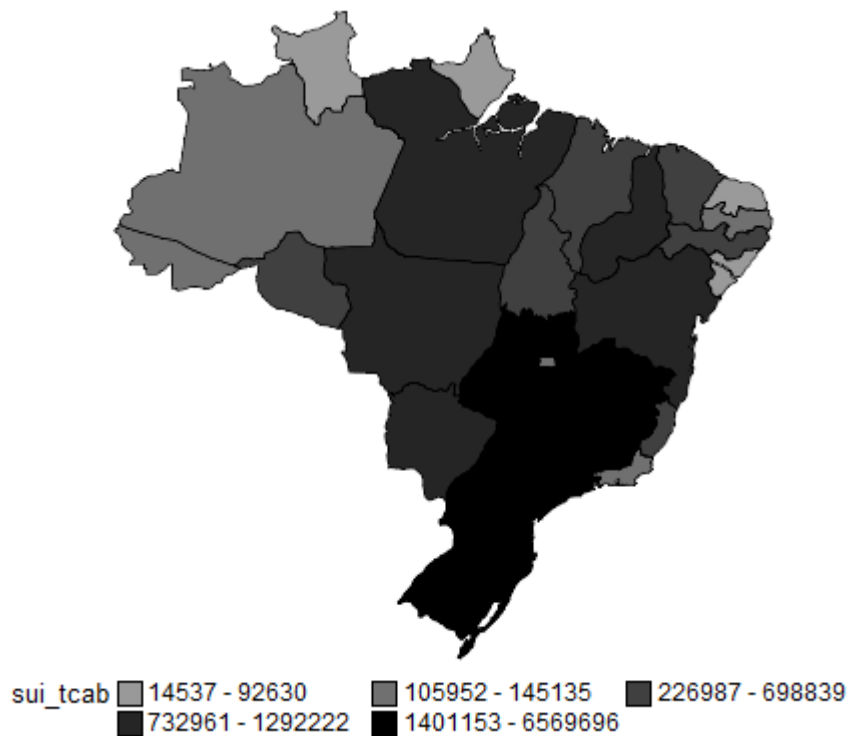


C



**Figure 7.** Maps of densities (animals per km<sup>2</sup>) of equines (A), horses (B), mules (C) and donkeys (D) by state in Brazil.

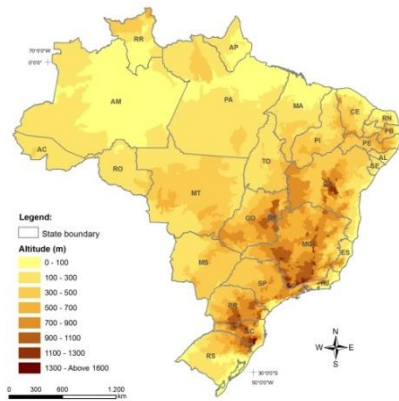
Brazil is one of the major pig producers worldwide, and most pigs are of international breeds (Largewhite, Duroc, Landrace etc) reared in intensive landless systems. Small herds of locally adapted breeds can be found in several locations nationwide mainly as scavengers.



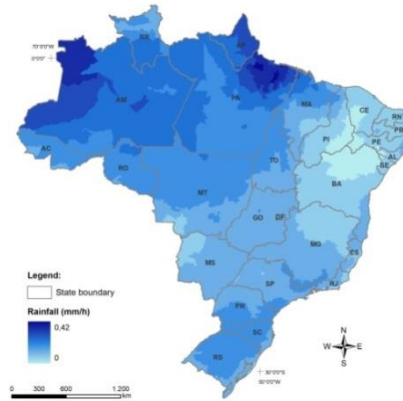
**Figure 8.** Pig numbers per state in Brazil



(a)



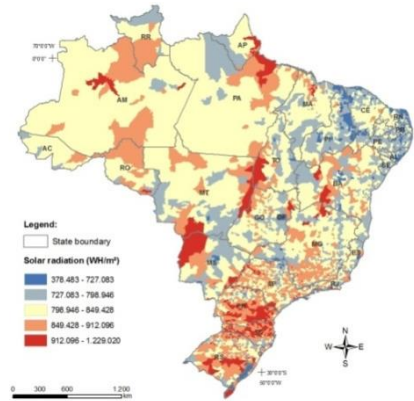
(b)



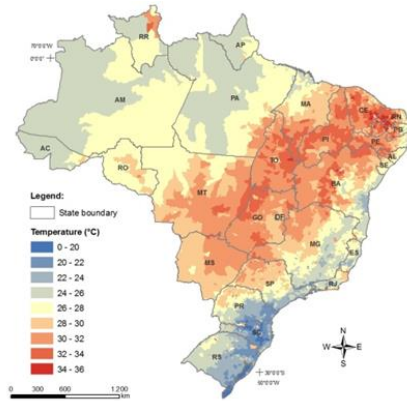
(c)



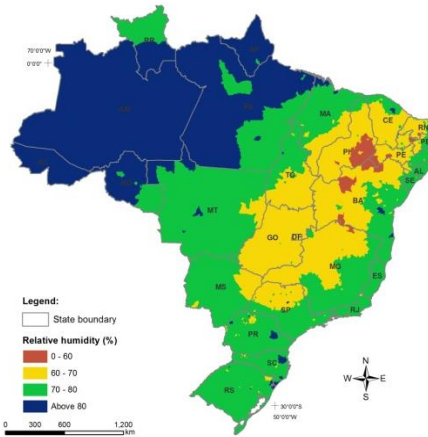
(d)



(e)



(f)



(g)

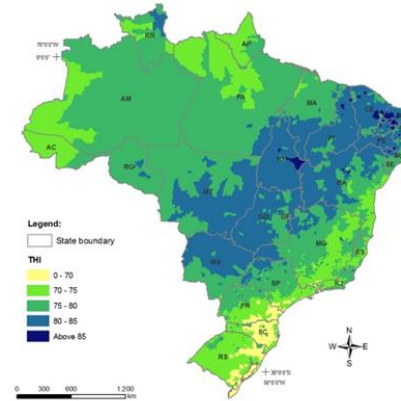
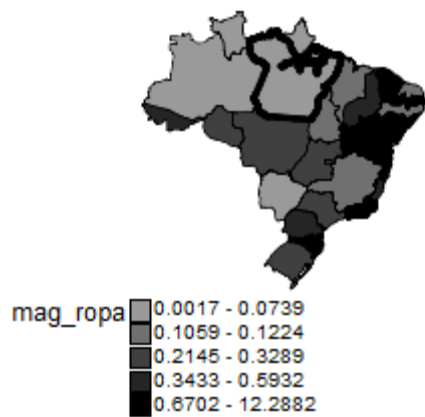
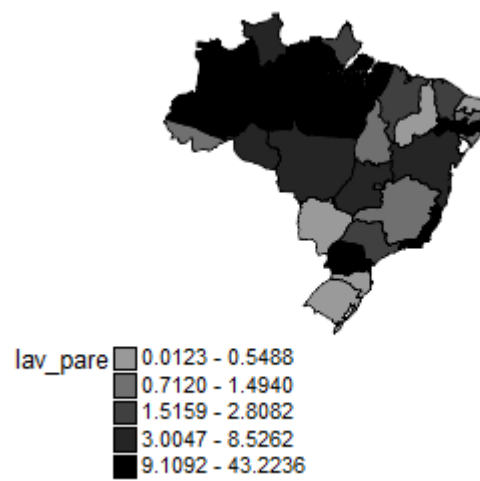


Figure 9 – Maps of Altitude (a), precipitation (b), NDVI (c), solar radiation (d), temperature (e), relative humidity (f) and THI (g)

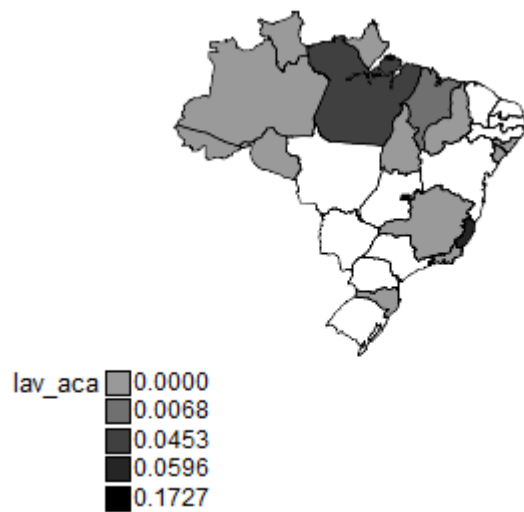
*Production Systems in Brazil (values are in percentage of total area)*



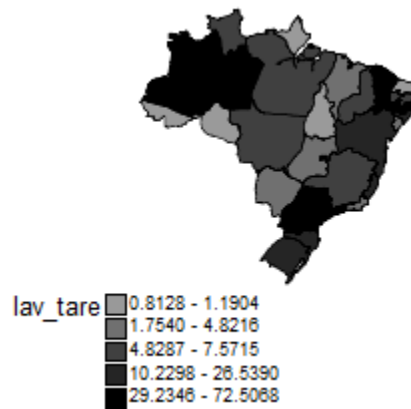
Pasture Rotation



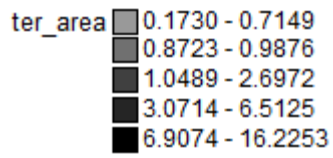
Area of permanent tillage



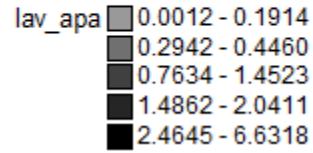
Area for crops



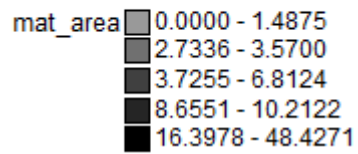
Area temporary tillage



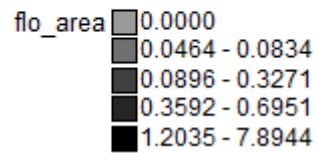
Land not suitable for agriculture



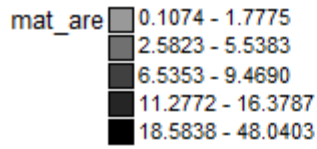
Area planted with forage for harvesting



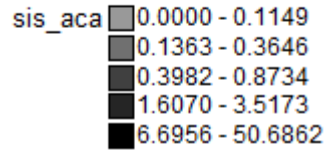
Shrub or natural forest (excluding preservation)



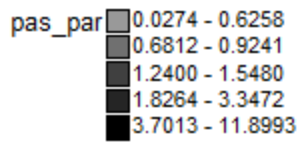
Planted forests



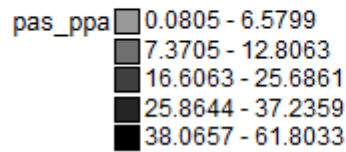
Shrub or natural forest for preservation



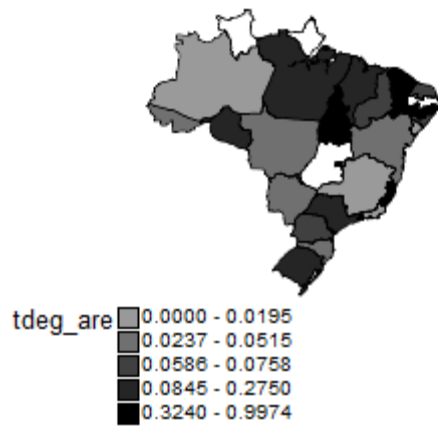
Agrosilvopastoril



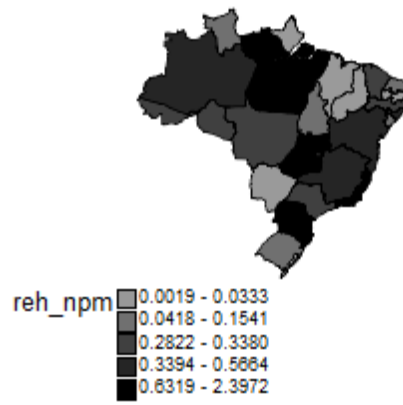
Degraded planted pastures



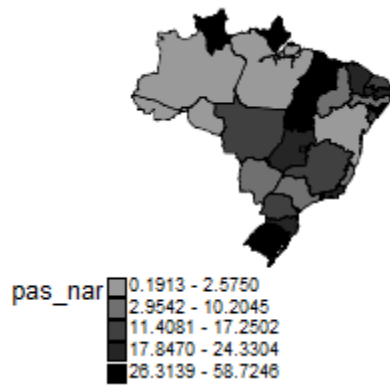
Planted pastures in good conditions



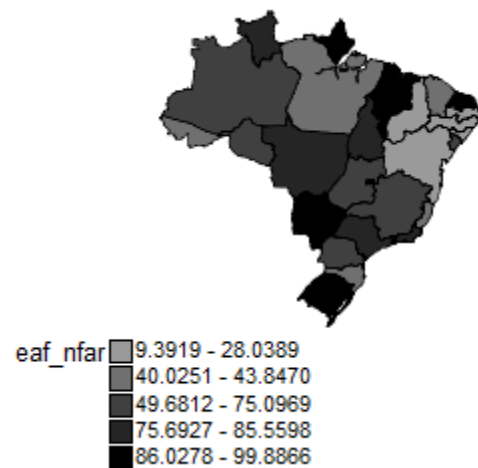
Degraded areas (deserted, eroded, salinated)



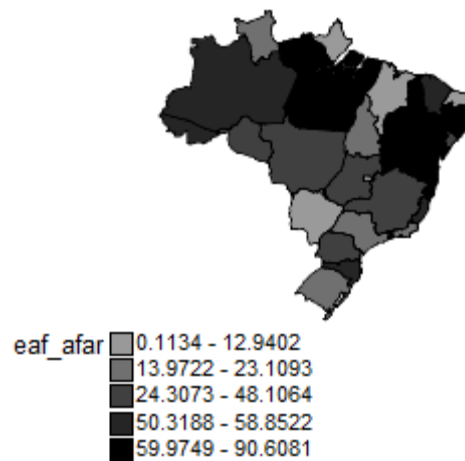
Springs protected by shrublands



Natural pastures



Non-family farming



Family farming

## Conclusion and Suggestions

The following points were noticed by those filling out the forms and while may not be a problem with the definitions given with the form, the students found that some points may lead to errors.

### *For FAO*

When carrying out this action in other countries the form needs to be on-line so that:

- a. National Coordinators (NC) can update list of breeds currently in the country
- b. It would be impossible for FAO manually/individually update the Excel form for all countries/breeds when data begins to arrive at FAO
- c. The form tends to crash frequently, and when different operating systems are used (p.ex MAC/Windows/versions of Windows)

### *About the form provided*

- i) When possible, the same units should be maintained for example: days, months, years or kg, g;
- ii) Identification of Production System  
"End Year" – in this case the herd book may be closed but individual or small herds may remain. For example – we consulted the Ministry of Agriculture and others on some breeds that previously had a herd book but none now exists. They stated that there might be some herds of these breeds still in the country but it would be an individual farm with very few animals, but with no indication where these might be. In addition, breeds may be in reconstruction phase. Therefore, a field for observations may be interesting.
- iii) Controlled mating – include In-vitro fertilization (IVF) which is very common in developed countries or those with intensive livestock farming systems such as Brazil.
- iv) There is a question as to whether there is a need for minimum and maximum with the production system.
- v) Some traits are confusing or overlapping – such as age of breeding animals, length of productive life,
- vi) Length of productive life is in the section on slaughter animals which may lead the person filling the form to think that it is the slaughter age (although in the explanation it says "culling" and not "slaughter" but this may be confusing for non-English speakers). This caused confusion as this was in the section on carcass weight or maybe moving it to somewhere else would help.
- vii) Age of maturity is sexual maturity but some may think it is when they reach adult weight
- viii) Main uses – limit this to three (1 to 3 and not 1 to 6) as it subjective and may vary according to the person filling the form.
- ix) Maybe a section on special production traits would be interesting. For example, we have several ecosystems in Brazil that are unique such as the Pantanal or



Marajó Island with animals that are well adapted to these regions. While these will show up as breeds with a low distribution the features of the landscape to which these breeds have adapted is not apparent. For example, resistance to flooding, tolerant to drought, high temperatures, endo or ectoparasites etc.

- x) While filling out the forms we had an active discussion on the question of the questions of production systems in the country relative to production systems in different ecosystems. For example, Nelore reared on native pasture in the Northeast is a very different situation from Nelore reared on native pasture in the Pantanal region in the Centerwest. In these cases the production system is the same but for example grass species, annual rainfall etc are vastly different. We understand that this may be a consequence of the size of Brazil and

#### *For the Ministry of Agriculture*

- i) Many herd books/ associations do not keep an easily accessible register of farm localization, number of animals per municipality or state. In some cases, breeding programs for a breed may include animals that are not registered by breeders' association.
- ii) The ministry needs to have up to date information on addresses, telephone numbers, and presidents/secretaries of herd books/associations. Several of these do not respond emails or answer telephones. Some telephones registered in the Ministry of Agriculture do not correspond to the Association in question or were deactivated.
- iii) Information on disease occurrence/location/frequency/severity is not maintained by the Ministry, which may constitute a national risk.

#### *Diseases and parasites*

The question of disease distribution frequently has a national security factor built in. Therefore while there may be a report in a paper about a disease occurring in the country, if this has not been officially collected and examined by one of the official laboratories this information will not be available.

OIE use the following classifications that would be interesting for FAO to use too:

#### Legend

0	Continuing previous outbreak (s)
...	No information available for this disease
0	Disease absent
?	Disease suspected but not confirmed
+?	Confirmed infection/infestation without clinical signs
+..	Disease present but without quantitative data
+	Disease present with quantitative data but with an unknown number of outbreaks

+()	Disease limited to one or more zones
+?()	Infection/Infestation in one or more zones
?()	Disease suspected but not confirmed limited to one or more zones
XXX	Illness or parasitic agent noted in a scientific paper (local)

XXX – this is suggested by the Brazilian group;

[http://www.oie.int/wahis\\_2/public/wahid.php/Diseaseinformation/statusdetail](http://www.oie.int/wahis_2/public/wahid.php/Diseaseinformation/statusdetail) .

As we have information on diseases and some parasites taken from scientific papers (All Registers – Map 1), the maps of these by Brazilian Federal Unit (State) are included in Annex 2 and references on [www.animal.unb.br](http://www.animal.unb.br). It should be noted that these might be biased due to the distribution of studies, veterinarians, and/or universities in certain regions of the country.



Map 1. Map of diseases registered in Brazil in scientific papers.

*As to the list of diseases and parasites:*

This list is updated annually but the OIE and so FAO should also use the latest list. Some other changes should be made:

- i) remove hookworm (*Iarva migrans*) and insert *Ancylostoma caninum* and *A. braziliensis*;
- ii) Remove liver fluke (*Asciola hepatica* and *F. gigantica* are already in the list);
- iii) remove Ascariasis;
- iv) remove gastro-intestinal nematodes;
- v) Bacterial and viral diseases - remove "Adenoviral diseases" and insert the adenoviral diseases below:

- Hydropericardium syndrome - HPS (avian)
- Turkey haemorrhagic enteritis (avian)
- Marble spleen disease (avian)

Inclusion Body hepatitis - IBH (avian)  
Infectious Canine Hepatitis  
Bovine adenoviruses  
Equine adenoviruses (EADv)

- vi) remove "infection bronchitis" and leave "avian infectious bronchitis";
- vi) remove "Haemorrhagic septicaemia" leave Pasteurellosis (*Pasteurella multocida*);
- vii) remove "Hemophilosis" and leave *Haemophilus somnus* infection.

## Future Plans

Given the short period available for data collection, it was not possible analyse the data in any form. Our intention is to map the occurrence of breeds and relate their occurrence and densities with environmental, socioeconomic and production factors such as those found in McManus et al (2014). As these become available, we will send them to FAO.

While the report registers the number of breeds, it does not give an idea of the number of animals or trends in herd numbers. These are available for some breeds in terms of genetic analysis of herd registers that have been published in recent years by our group (Carneiro et al., 2014; Maciel et al., 2014; McManus et al., 2013; Piccoli et al. 2014; Brito et al., 2013; Paiva et al., 2011) and others (Faria et al., 2009; Oliveira et al. 2012; Marcondes et al., 2014; Barros et al., 2011; Teixeira Neto et al., 2013; Santana Jr et al., 2011; Reis Filho et al., 2010). Original data from our papers can be made available to FAO on request. It would be interesting that the maximum number of these should be made available.

## Acknowledgements








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Annex 1.








Locally Adapted Brazilian Breeds








Species	Breed	
Cattle	Canchim	 <a href="http://canchimboiturama.com.br/">http://canchimboiturama.com.br/</a>
	Mocho Nacional	
	Junqueira	
	Crioulo Lageano	
	Pitangueiras	 <a href="http://es.quebarato.com.br">es.quebarato.com.br</a>
	Mantiqueira	
	Patuá	









	Girolando	 <p data-bbox="995 387 1166 407">www.girbrasil.com.br</p>
	Lavinia	 <p data-bbox="727 616 1436 660"><a href="http://stravaganzastravaganza.blogspot.com.br/2011/05/leopoldo-costa-martim-afonso-de-souza.html">http://stravaganzastravaganza.blogspot.com.br/2011/05/leopoldo-costa-martim-afonso-de-souza.html</a></p>
	Caracu Caldeano	
	Caracu	 <p data-bbox="991 1117 1169 1137">www.beefpoint.com.br</p>
	Pantaneiro	
	Curraleiro-Pé Duro	
	Tabapua	 <p data-bbox="991 1906 1169 1924">www.abspecpal.com.br</p>



	Indubrasil	 <p><a href="http://www.semenbovino.com.br">www.semenbovino.com.br</a></p>
Asinine	Nordestino	 <p><a href="http://www.campograndern.com.br">www.campograndern.com.br</a></p>
	Paulista	 <p><a href="http://www.jumentobrasileiro.blogspot.com">www.jumentobrasileiro.blogspot.com</a></p>
	Pêga	 <p><a href="https://pt-br.facebook.com/photo.php?fbid=322571421220871&amp;set=pb.132446160233399.-2207520000.1402417267.&amp;type=1&amp;theater">https://pt-br.facebook.com/photo.php?fbid=322571421220871&amp;set=pb.132446160233399.-2207520000.1402417267.&amp;type=1&amp;theater</a></p>
Equines		
	Puruca	 <p><a href="http://portalcavaloonline.com.br/?p=527">http://portalcavaloonline.com.br/?p=527</a></p>
	Piquira Pônei	 <p><a href="http://www.fazendabomdestino.com.br/wp-content/gallery/cavalos-piquira/femeas-pampa-de-baixo.jpg">http://www.fazendabomdestino.com.br/wp-content/gallery/cavalos-piquira/femeas-pampa-de-baixo.jpg</a></p>







	Pantaneiro	
	Marajoara	 <a href="http://www.marciolisa.com">www.marciolisa.com</a>
	Mangalarga	 <a href="http://olhares.uol.com.br">olhares.uol.com.br</a>
	Mangalarga Machador	 <a href="http://animais.culturamix.com">animais.culturamix.com</a>
	Crioulo	 <a href="http://cavalo-crioulo.com">cavalo-crioulo.com</a>
	Campolina	 <a href="http://www.racasdecavalos.net/fotos-raca-de-cavalo-campolina/">http://www.racasdecavalos.net/fotos-raca-de-cavalo-campolina/</a>
	Campeiro	 <a href="http://cavalocampeiro.com/">http://cavalocampeiro.com/</a>

	Brasileiro de Hipismo		<a href="http://www.racasdecavalos.net/fotos-raca-cavalo-brasileiro-de-hipismo/">http://www.racasdecavalos.net/fotos-raca-cavalo-brasileiro-de-hipismo/</a>
	Baixadeiro		<a href="http://www.imagui.com">www.imagui.com</a>
	Lavradeiro		<a href="http://somosloucosporcavalos.blogspot.com">somosloucosporcavalos.blogspot.com</a>
	Nordestino		<a href="http://cavalonordestino.blogspot.com">cavalonordestino.blogspot.com</a>
Goats			
	Repartida		<a href="http://www.farmpoint.com.br">www.farmpoint.com.br</a>
	Caninde		<a href="http://www.grupovoa.com">www.grupovoa.com</a>
	Marota		<a href="http://www.anda.jor.br">www.anda.jor.br</a>

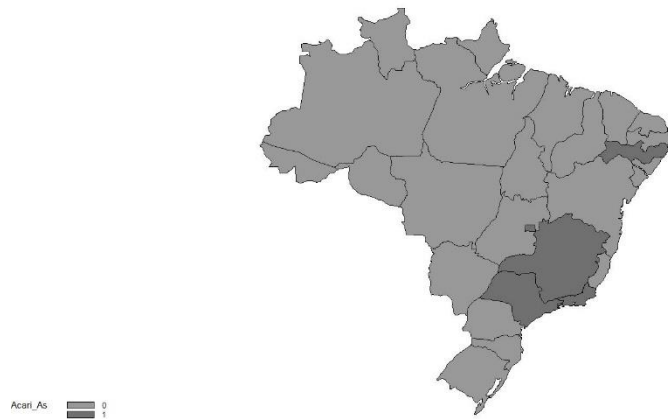
	Moxotó		<a href="http://luizdoberroverdades.blogspot.com.br/2013_02_01_archive.html">http://luizdoberroverdades.blogspot.com.br/2013_02_01_archive.html</a>
	Azul		<a href="http://www.revistaberro.com.br">www.revistaberro.com.br</a>
Pigs			
	Pirapitinga		
	Moura		<a href="http://ruralcentro.uol.com.br/noticias/historia-da-raca-suino-moura-53807">http://ruralcentro.uol.com.br/noticias/historia-da-raca-suino-moura-53807</a>
	Nilo		<a href="http://cesszootec.blogspot.com.br/2011/02/suino-raca-nilo-femea.html">http://cesszootec.blogspot.com.br/2011/02/suino-raca-nilo-femea.html</a>
	Tatú		<a href="http://www.sossuinos.com.br/consultas/racatatu.htm">http://www.sossuinos.com.br/consultas/racatatu.htm</a>
	Canastra/ Canastrinha		<a href="http://stravaganzastravaganza.blogspot.com">stravaganzastravaganza.blogspot.com</a>
	Canastrão		<a href="http://www.tecnologiaetreinamento.com.br/abelhas-suinos/suinos/racas-brasileiras-de-suinos/">http://www.tecnologiaetreinamento.com.br/abelhas-suinos/suinos/racas-brasileiras-de-suinos/</a>



	Sorocaba	 <a href="http://www.gdnews.com.br">www.gdnews.com.br</a>
	Piau	 <a href="http://wapedia.mobi/pt/Suinoicultura">http://wapedia.mobi/pt/Suinoicultura</a>
	Monteiro	 <a href="http://www.pantanalsulmatogrossense.com.br/animal.php?cod=20">http://www.pantanalsulmatogrossense.com.br/animal.php?cod=20</a>
	Caruncho	
	Pereira	 <small>Leitos da Raca Pereira</small> <a href="http://stravaganzastravaganza.blogspot.com.br/2011/02/criacao-de-suinos-no-brasil-as-racas.html">http://stravaganzastravaganza.blogspot.com.br/2011/02/criacao-de-suinos-no-brasil-as-racas.html</a>
	EMBRAPA MS 60	 <a href="http://www.cnpsa.embrapa.br">www.cnpsa.embrapa.br</a>
Sheep	Crioula	 <a href="http://revistagloborural.globo.com">revistagloborural.globo.com</a>

	Bergamasca	 <a href="http://www.farmpoint.com.br">www.farmpoint.com.br</a>
	Somalis Brasileiro	
	Santa Inês	
	Morada Nova	 <a href="http://www.cnpc.embrapa.br/redemoradanova">www.cnpc.embrapa.br/redemoradanova</a>
	Rabo Largo	 <a href="http://www.acco-sc.com.br">www.acco-sc.com.br</a>
	Cariri	 <a href="http://www.manera.feis.unesp.br">www.manera.feis.unesp.br</a>

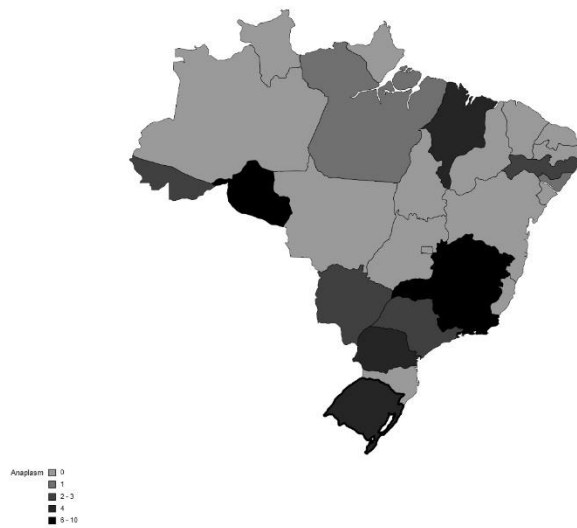
Annex 2. Maps of Disease and Parasite Occurrence in Brazil from Scientific Papers



GMAP Acari: Astigmata



GMAP Afto virus



Anaplasma marginale





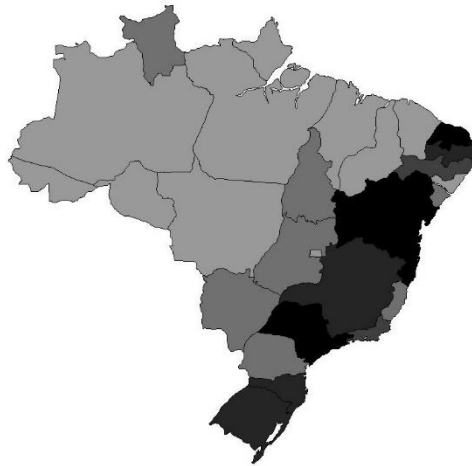
Amblyomma  
0  
1

GMAP *Amblyomma\_spp*



Boophilus  
0  
1

GMAP *Boophilus\_spp*



Brucella  
0-0  
1-1  
2-2  
3-6  
9-17

GMAP *Brucella ovis*



<sup>GMAP</sup> *Burkholderia mallei*



<sup>GMAP</sup> *Campilobacter fetus*



<sup>GMAP</sup> *Clostridium spp*



<sup>GMAP</sup> *Cochliomyia homini\_vorax*



Cowdriar   
 0   
 1

GMAP *Cowdriar ruminantium*



Coxiella   
 0   
 1   
 6

GMAP *Coxiella burnetii*



Cryptosp   
 0   
 1

GMAP *Cryptosp*



Cysticerc  0  
1

GMAP *Cysticercus\_spp*



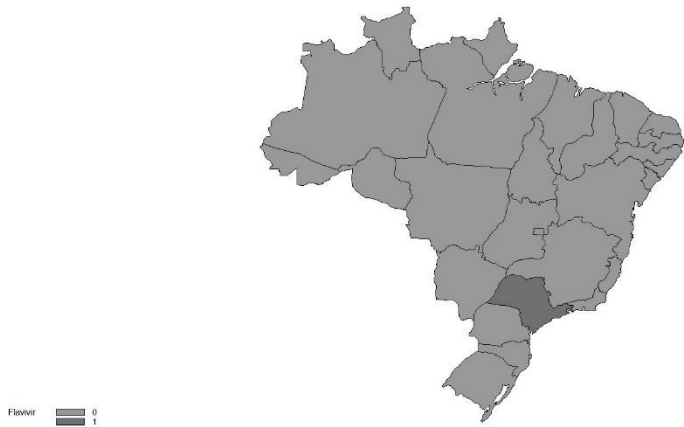
Demodex  0  
1

GMAP *Demodex\_spp*



Dermacent  0  
1

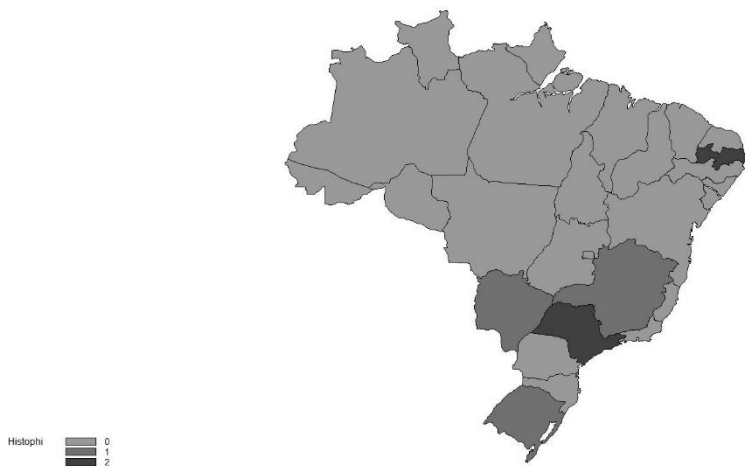
GMAP *Dermacentor\_spp*



GMAP  
*Flavi\_virus*



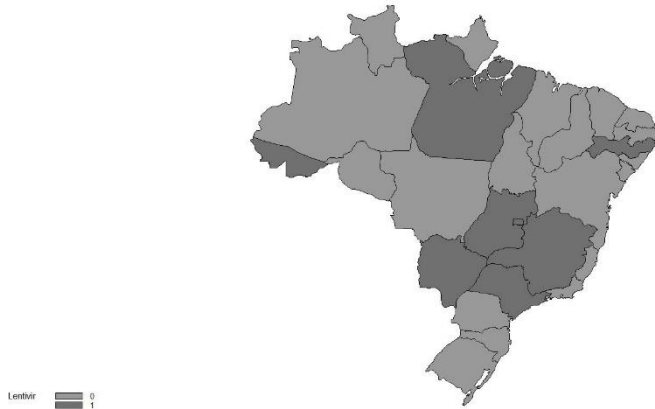
GMAP  
*Fusobacterium\_necrophorum*



GMAP  
*Histophilussomni*



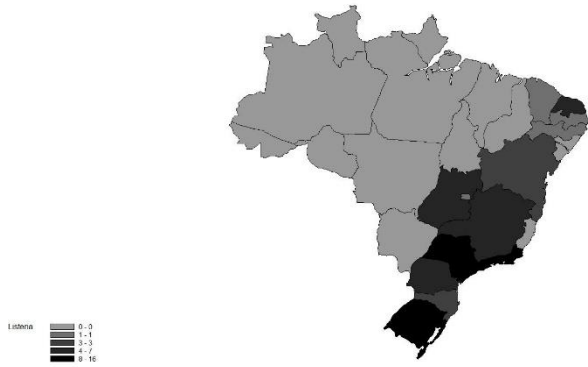
GMAP *Ixodes\_ssp*



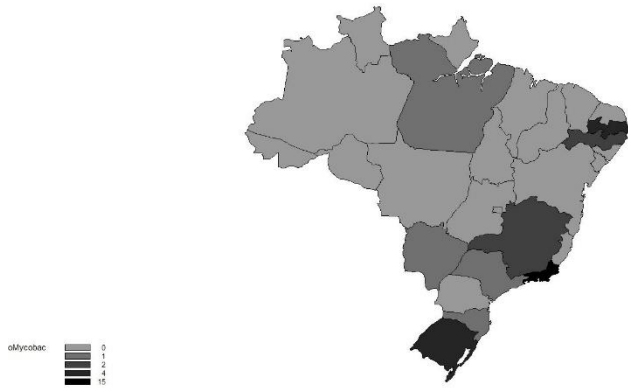
GMAP *Lenti\_virus*



GMAP *Leptospira\_spp*



<sup>GMAP</sup> *Listeria monocytogenes*



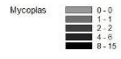
*oMycobacterium subsp. Paratuberculosis*

<sup>GMAP</sup>



<sup>GMAP</sup> *Mycobacterium bovis*





GMAP *Mycoplasma\_spp*



GMAP *Neoplasia*



GMAP *Orbivirus*

Papillom



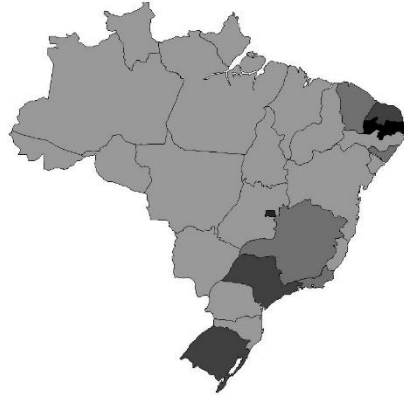
GMAP *Papilloma\_virus*

Pestivir



GMAP *Pestivirus*

Prion



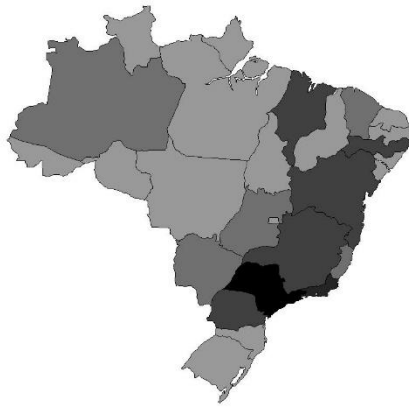
GMAP *Prion*

Rabdovir



GMAP  
*Rabdo\_virus*

Toxoplas



GMAP  
*Toxoplasma\_gondii*

Tritrich



GMAP  
*Tritrichonona\_spp*



GMAP Varicello\_virus



GMAP Vesiculo\_virus

### Annex 3. Maps of Distributions of Sheep Breeds in Brazil

SAMM



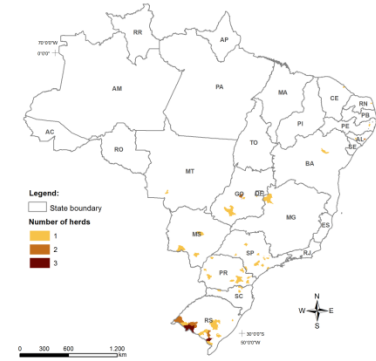
Romney Marsh



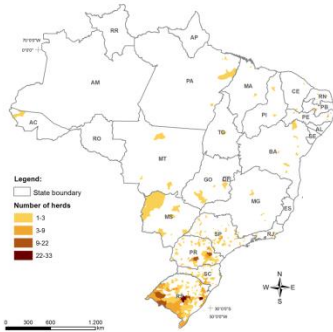
Polypay



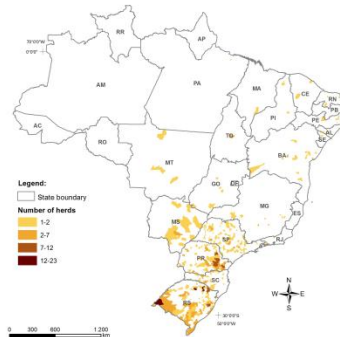
Poll Dorset



Texel



Suffolk



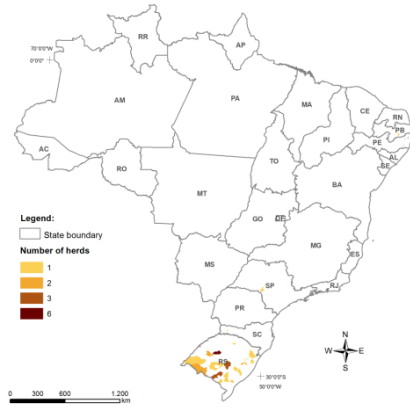
Australian Merino



Lacaune



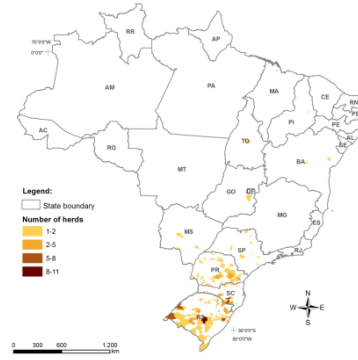
Karakul



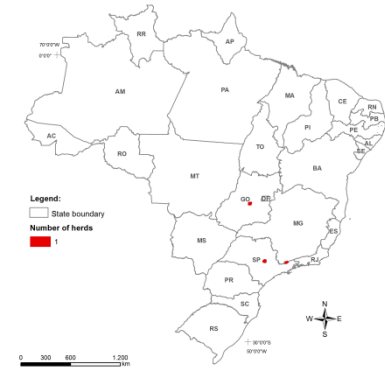
Ideal



Hampshire Down



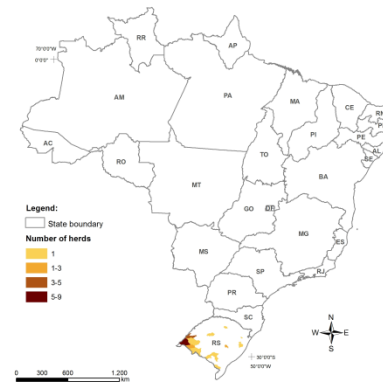
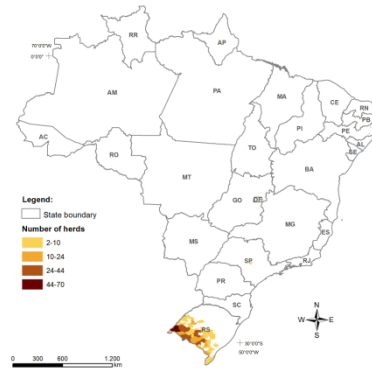
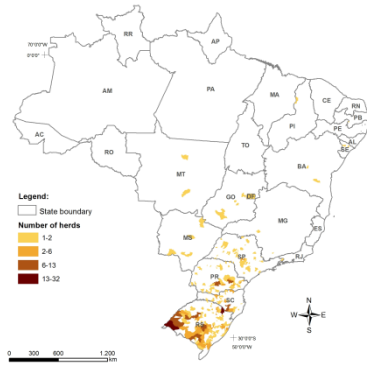
East Friesian



Ile de France

Corriedale

Border Leicester

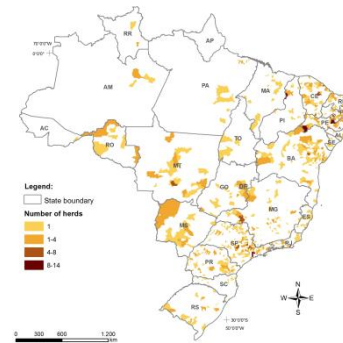
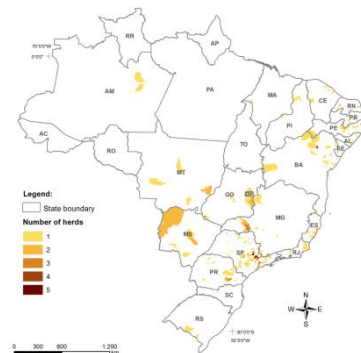
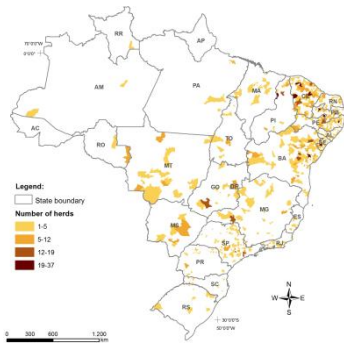


Commercial Wool Breeds

Santa Inês

White Dorper

Dorper

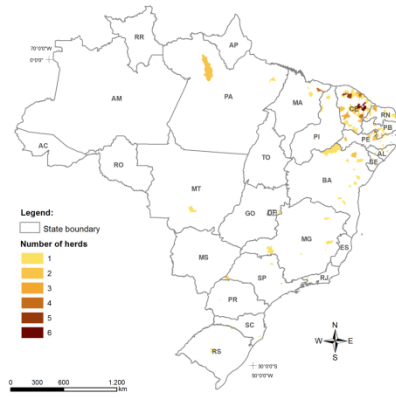


Commercial Hair breeds

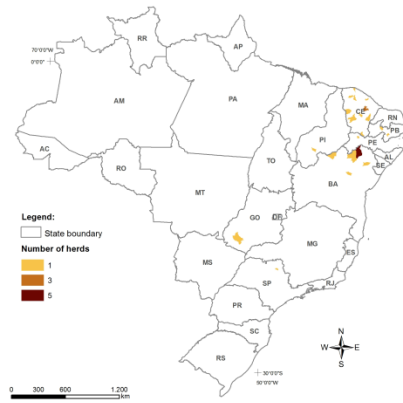




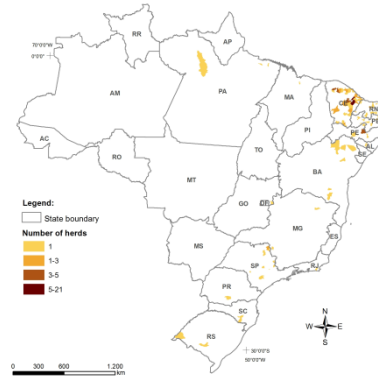
Somalis Brasileira



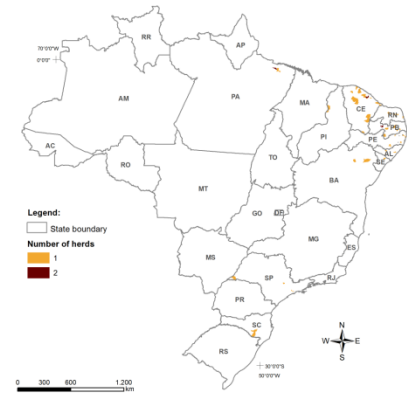
Rabo Largo



Morada Nova

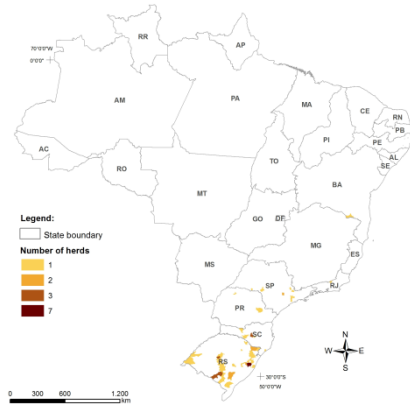


Cariri

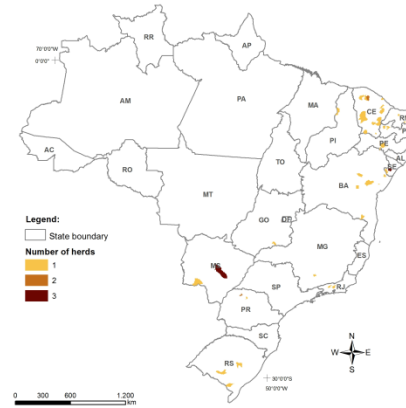


Locally adapted Hair breeds

## Crioula

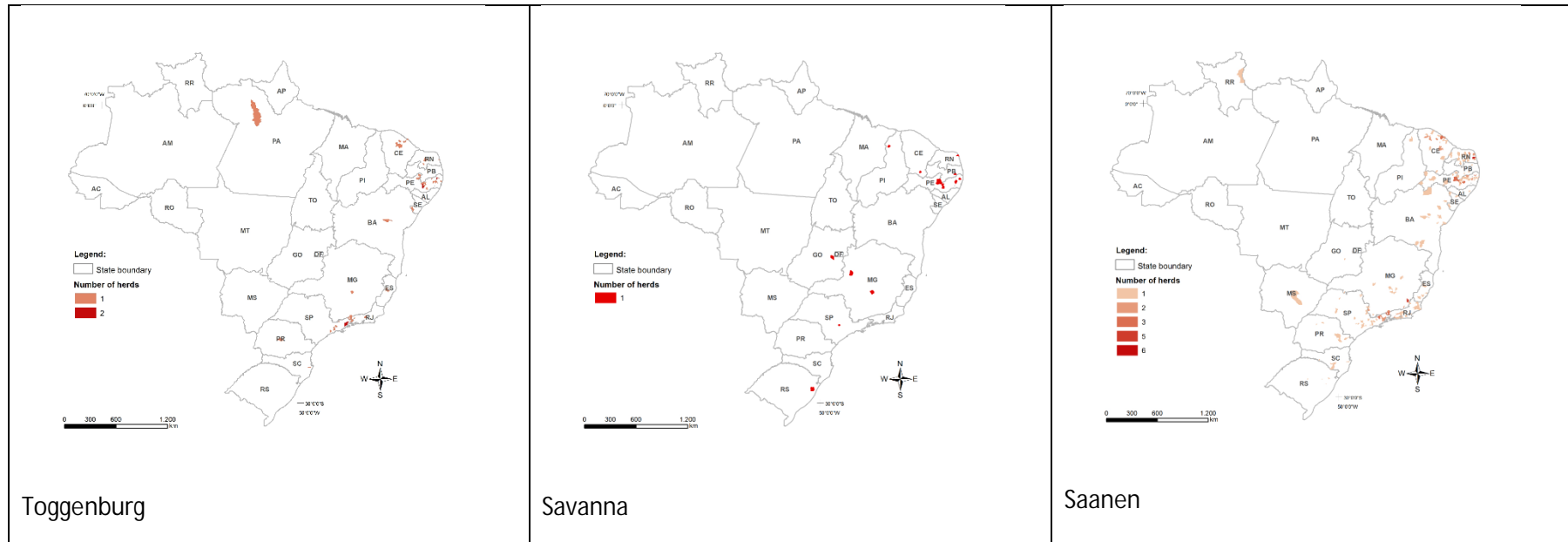


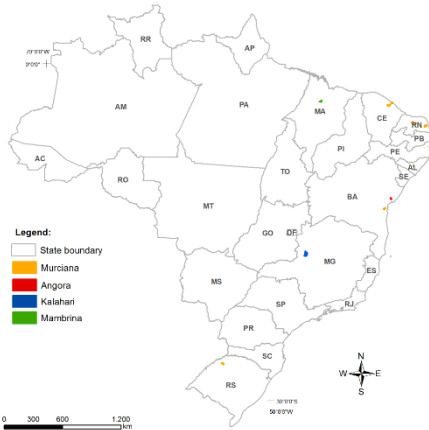
## Bergamácia



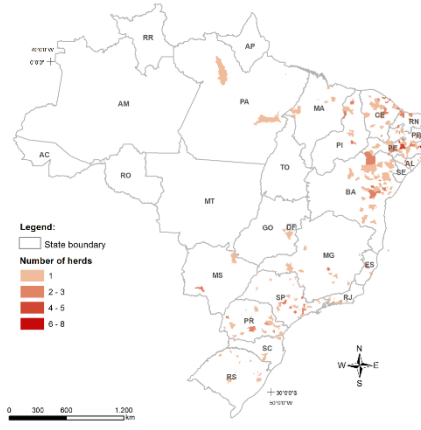
Locally Adapted wool breeds

Annex 4 – Goat breeds

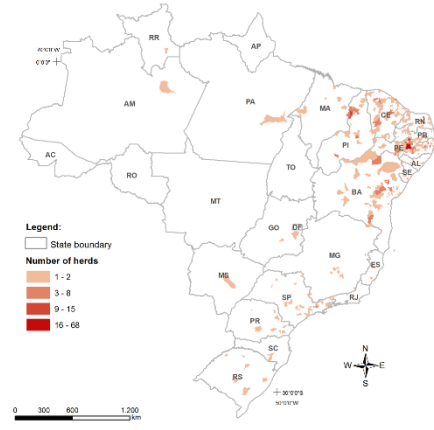




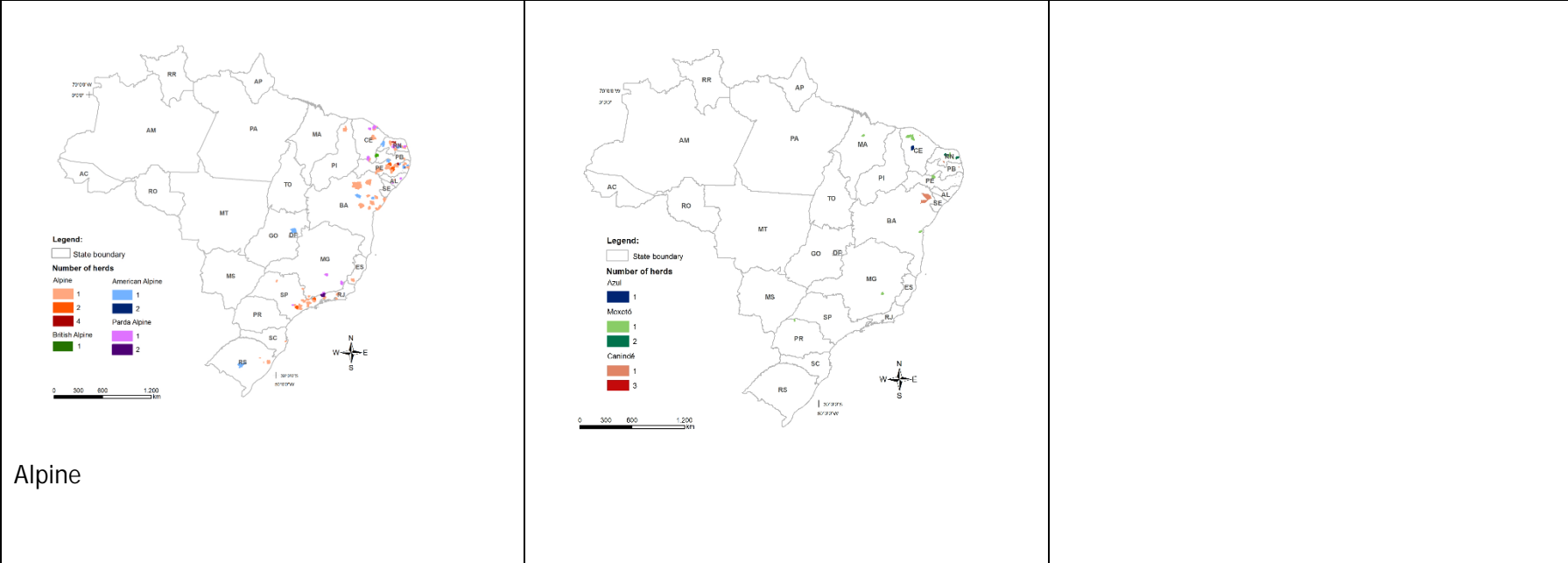
Outros



Boer



Anglonubian



Alpine

Figure 2. Localization of purebred goat herds in Brazil by breed