FUTURE AGRICULTURAL SCENARIOS FOR PASTURES IN BRAZIL

Patrícia Menezes Santos[1]; José Ricardo Macedo Pezzopane[1]; Cristiam Bosi[2]; Luis Gustavo Barioni[3]; Mariely Lopes dos Santos[2]; Tibério Sousa Feitosa[2]; Lucas Fillietaz Balcão[2]; Silvio Roberto Medeiros Evangelista[3]; Moacyr Bernardino Dias-Filho[4]; Carlos Augusto Miranda Gomide[5]; Ana Clara Rodrigues Cavalcante[6]; Tadeu Vinhas Voltolini[7]; Magna Soelma Beserra de Moura[7]; Andréa Milttelmann[5]; Giampaolo Queiroz Pellegrino[3]

1 Empresa Brasileira de Pesquisa Agropecuária - Pecuária Sudeste. 2 Escola Superior de Agricultura Luiz de Queiroz/ Universidade de São Paulo. 3 Empresa Brasileira de Pesquisa Agropecuária – Informática Agropecuária. 4 Empresa Brasileira de Pesquisa Agropecuária – Amazônia Oriental. 5 Empresa Brasileira de Pesquisa Agropecuária – Gado de Leite. 6 Empresa Brasileira de Pesquisa Agropecuária – Caprinos. 7 Empresa Brasileira de Pesquisa Agropecuária – Semiárido

Livestock production plays an important environmental, economic and social role in Brazilian regions. Global climate change, environmental pressures, the expansion of agriculture and the need to produce energy from alternative sources indicate that there will continue to be a reduction in pasture areas in some regions, forcing their displacement to marginal areas, where there may be limitations of soil and climate to production.

The construction and analysis of future scenarios is strategic for Brazil, as it helps investors and public policy makers to makes decisions and constitutes an important subsidy for livestock production planning, at the national, regional and local levels. The objective of the project was to generate and analyze future scenarios for livestock across the national territory, based on scenarios of global climate change and some of the main species used as cultivated pastures.

Cultivation scenarios for Urochloa pastures (*syn. brachiaria*) brizantha cv. Marandu (*brachiarão grass, cv. Marandu*) and cv. BRS Piatã (*BRS-Piatã- grass*), Megathyrsus maximus (syn. Panicum maximum) cv. Tanzania (*tanzania grass*) , *Cenchrus ciliaris* (buffel grass), *Opuntia sp.* (forage palm) and *Lolium multiflorum* (annual ryegrass), used as cultivated pastures in Brazil, were generated with the help of simulation models and geographic information systems (Figure 1).

The project was financed by Embrapa and counted with postgraduate scholarships sponsored by FAPESP, CNPq and Capes.

RESULTS

The scenarios obtained suggest that climate change predicted by the regional climate models ETA-CPTEC and PRECIS for the different emission scenarios will have positive impacts on the total annual forage production from pastures made up of *Megathyrsus maximus* and *Urochloa brizantha* in the North, Midwest and Southeast. The area where such grasses can be grown is expected to increase. However, production seasonality

and the variability of annual production will also increase, causing climate risks.

Production systems must be adapted and new technologies must be generated to guarantee the competitiveness of the activity in an environment of greater climatic risk. The development of new cultivars and using adapted cultivars, supplementary feeding, forage conservation, the adequacy of pasture and soil management, the adoption of integrated production systems and using irrigation are some alternatives for adapting the production systems in the North, Midwest and Southeast regions.

In the Northeast region, especially in the semiarid area, pasture production is expected to be more vulnerable, and there may be a reduction in the area suitable for cultivating buffel grass. For the forage palm, the models used indicate an increase in the areas suitable for their cultivation for the scenarios of 2025 and 2055, with the emergence of suitable municipalities in regions beyond the Northeast of Brazil. On the other hand, areas that are currently suitable may become unfit, with the possibility of strong negative economic, social and environmental impacts on developing livestock in the region.

New genotypes of forage plants that are more tolerant to the intensification of drought conditions, associated with recommendations of management practices that reduce the effects of production seasonality, may contribute to alleviate the problems predicted by the results of this work. The large-scale breeding of small animals is also an alternative for adapting production systems in the region. In places where irrigation is possible, the cultivation of tropical grasses with high productive potential can be recommended as an alternative for adapting production systems.

Areas for cultivating temperate forage crops are expected to decrease in the South Region due to the forecast of increases in temperature. On the other hand, areas that are favorable to the cultivation of tropical forages are expected to increase, reducing the

vulnerability of regional animal production systems to global climate change. The production systems can be adapted both by replacing genetic resources with tropical forages and by developing temperate forage cultivars that are better adapted to future climate scenarios. There may be a major impact on native pastures that currently prevail in the Pampas region. The replacement of temperate native grassland areas with tropical grassland may increase. However, there are shallow soils in the Region, possibly resulting in drainage problems, to which many species of tropical grasses are not very tolerant.

NEXT STEPS AND RECOMMENDATIONS

Future pasture scenarios have been frequently updated. In the ongoing stage, in addition to improving the production models of forage plants, tools are being incorporated to estimate pasture support capacity and yield gap, in addition to assessing adaptation alternatives.

DATA PUBLISHED IN:

ANDRADE. A. S.; SANTOS. P. M.; PEZZOPANE. J. R. M.; ARAUJO. L. C.; PEDREIRA. B. C.; PEDREIRA. C. G. S.; MARIN. F. R.; LARA. M. A. S. Simulating tropical forage growth and biomass accumulation: an overview of model development and application. Grass and Forage Science. v. 71. n. 1. p. 54-65. June 2015.

ANDRADE. A. S.; SANTOS. P. M.; PEZZOPANE. J. R. M.; BETTIOL. G. M.; EVANGELISTA. S. R. M. Climate change and future scenarios for palisade grass production in the state of São Paulo. Brazil. Pesquisa Agropecuária Brasileira. Brasília. v. 49. n. 10. p. 745-753. Oct. 2014.

ARAUJO. L. C.; SANTOS. P. M.; RODRIGUEZ. D.; PEZZOPANE. J. R. M.; OLIVEIRA. P. P. A.; CRUZ. P. G. Simulating guinea grass production: empirical and mechanistic approaches. Agronomy Journal. v. 105. n. 1. p. 61-69. Jan. 2013.

Continued in Annex

PROJECT COORDINATORS

Dr. José Ricardo Pezzopane

Empresa Brasileira de Pesquisa Agropecuária – Pecuária Sudeste

e-mail: jose.pezzopane@embrapa.br

Dra. Patrícia Menezes Santos

Empresa Brasileira de Pesquisa Agropecuária – Pecuária Sudeste

e-mail: patrícia.santos@embrapa.br.

Figure 1: Variation in annual production of B. brizantha cv. Marandu in B2 climate change scenarios of the PRECIS model compared to the current scenario for the years 2055 for medium textured soils
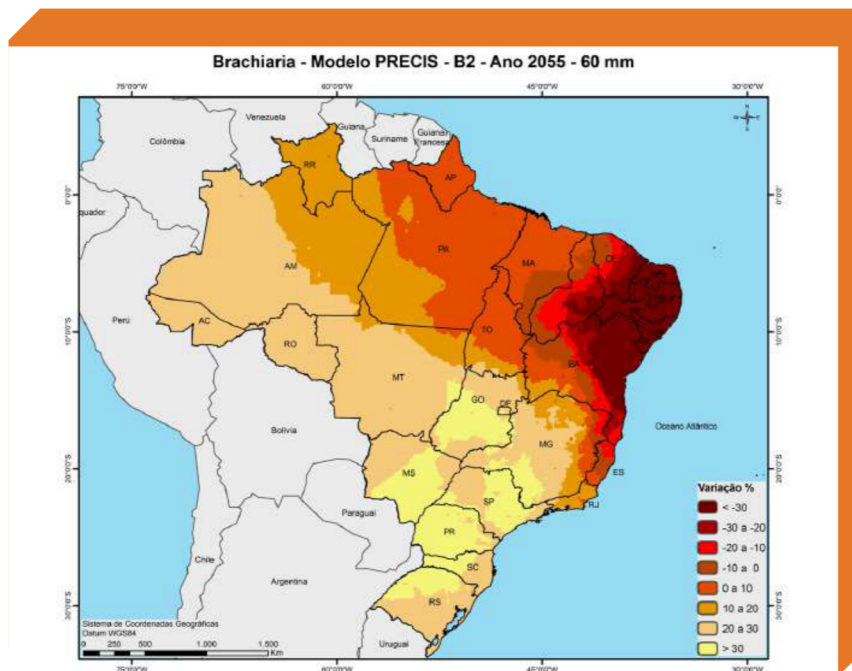
Source: Giovana Maranhão Bettiol.