



Adapting to climate change: Strategies for Brazilian agricultural and livestock systems



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CONSERVATION AND ADAPTIVE MANAGEMENT OF NATIVE PASTURES

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Native pastures occur all over the world and are extremely diverse, exhibiting spatial and temporal variability. In some regions of Brazil, such as the Pantanal wetlands, native pastures consist of the most valuable renewable natural resource, which has made these regions have a vocation for breeding cattle on pasture, the main production system in the region. In the region, the main determinant of the productivity of forage resources is precipitation and hydrology, which is governed by the flood pulse. There are long cycles of drought and flood that shape the landscapes and alter the botanical composition and the availability of forage, especially in the more humid areas, which in turn influence the pastures carrying capacity.

Objective: To understand the complexity and dynamics of native pastures in the face of climatic variations and to develop management strategies that ensure the sustainability of production systems.

The projects were outlined with a holistic view at the farm level of farms raising beef cattle in extensive systems in the Pantanal and plateau region (integrated to the Pantaneira plain). Associated with these studies, we seek the maintenance of germplasm banks of native forages, as well as domestic breeds locally adapted to forage resources and thermal stress for use on farm and future breeding programs.

To understand the ecosystems of native pastures, several methodologies have been used considering the spatiotemporal scales (Figure 1).

The evaluation of forage responses to different disturbances and climatic conditions has been made using the permanent plots methodology established by Biodiversity Research Program (Programa de Pesquisa em Biodiversidade – PPBio) and evaluated on the Fazenda Nhumirim since 2006, by using permanent grids. In Figure 2 there are pictures of the same area in years of extreme flood, extreme drought, and normal years. The data obtained is being evaluated by state and transition models, multivariate methods, development of decision-making systems (software) and precision technologies. Another methodology that has been used is the systemic evaluation of farms that use the FPS tool (Fazenda Pantaneira Sustentável),

based on sustainability indicators using fuzzy logic (SANTOS et al., 2017).

RESULTS

- Guide for identifying landscapes, pastures and forage species in the Pantanal;
- Tool to assess the sustainability of production systems on the Pantanal plains and on the plateau farms, including pasture aspect (SPF);
- Software to quantify ecosystem services of native pastures;
- Software to assess the quality of native pastures;
- Good management practices for native pastures;
- Determining flexible stocking rate for native pastures and multiple use in the Pantanal;
- Precision technologies for managing native pastures;
- Models that optimize using native and exotic forage resources to improve the efficiency of production systems; and
- Characterization of native forage species with potential for on farm management and future improvement.

NEXT STEPS AND RECOMMENDATIONS

With the implementation of the FPS program in the Pantanal, it will be possible to assess the degree of sustainability of pastures in the holistic context of the farm and to validate technologies and practices of adaptive management of native pastures. The Pantanal requires a diversity of forages that contribute to adaptive resilience, through the diversity of species and/or also functional diversity within species, that is, in some situations it is possible to work with a mixture of species/cultivars that meet the dynamics of facing current and future climatic variations. Therefore, farm conservation and management strategies will contribute to maintaining the variability of native forages, making evolution by natural selection (plasticity) possible in their natural environment. The maintenance of a key native forage germplasm bank in situ and ex situ (seeds) will also contribute to studying functional characteristics (phenotypic and agronomic

characteristics in response to environmental changes) and developing future breeding programs for the production of forages that are adapted to dynamic and complex environments such as the Pantanal.

DATA PUBLISHED IN:

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Figure 1: Temporal dynamics of pasture landscapes and ecosystems in the Pantanal wetland



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