



Evaluation of renewable support area for beef cattle ranching in the Pantanal using emergy

Sandra A. Santos*¹, Fábio Takahashi², Marcelo Augusto Nogueira³, Emanuel Salgado⁴

¹Embrapa, São Carlos, SP; ²Universidade Federal de Viçosa, MG; ³ SENAR, MT; ⁴IMEA, MT

*Researcher – sandra.santos@embrapa.br

Beef cattle's ranching is the main productive aptitude of the Pantanal due to extensive areas of open grassland with native forage. Many of these pastures are seasonally flooded and dynamic while, others are located in sandy and low fertility soil, no chemical fertilized with low external inputs. Thus, the productive capacity of each ranch depends of the landscape's composition that varies over space and time. Renewable carrying capacity is the ability of a local environment to support economic activity based only on its renewable resources. Emergy analysis is a method of environmental accounting that expresses all the process inputs and outputs in solar energy equivalents. The objective of this study was to evaluate the renewable support area of a ranch of the Pantanal in the Poconé sub-region, MT. The ranch is characterized by presence of forest, savanna, and seasonally flooded open grassland. It has 4843 ha (3,376 ha with pastures) with 2,177 animal units (AU) or 0.45AU/ha or 0.64AU/ha of pasture area (productive area). A general diagram for a production system of the ranch was defined. The ranch production system inputs were classified as renewable (R) and non-renewable (N) resources from nature and external from economy or resources purchased (F). Emergy analysis was carried out in the ranch obtaining the emergy indicators: environmental loading ratio (ELR) and renewability (%R) and the renewable support area (SA). ELR is the relationship between the sum of F and N divided by R. It index was used to indicate the pressures on the environment from the production system. %R is the ratio of R to total emergy use (Y). The SA (ha) was calculated by dividing the total N and F (seJ yr⁻¹) by the average renewable empower density (seJ m⁻² yr⁻¹) of the region. The results obtained were: ELR, 0.37; %R, 73%; and SA, 1,336.42 ha. The ELR value was very low being similar to other extensive grassland-based systems because the local renewable contribution is higher than local nonrenewable resources, indicated by high %R. In practical terms, the SA value of 1,334.42 ha means that for every ha of the ranch area are required 0.28 ha of natural equivalent area. This value is usually lower than those obtained in the agricultural areas. Thus, as the production system intensifies, SA increases and %R decreases. The results showed that the production system evaluated has low pressure on the environment. The SA provides enough carrying capacity for existing animal units of the ranch evaluated. Therefore, it is concluded that the emergy methodology can contribute to assessing the sustainability of cattle ranching systems of the Pantanal on a systemic approach.

Keywords: carrying capacity, beef cattle, rangeland, sustainable systems.