Can LEAP-FAO biodiversity assessment guidelines contribute to the spatial design of operational production systems with high biodiversity?

Fernanda De Santiago and Oscar Blumetto

Instituto Nacional de Investigación Agropecuaria (INIA), Uruguay.

1 – Introduction

LEAP is a multi-stakeholder partnership including the private sector, governments and civil society. It addresses the need for a coordinated approach to developing clear guidelines for environmental performance assessment based on international best practices. Biodiversity guidelines cover the range of positive and negative links between livestock production and biodiversity, adopt a life cycle perspective at large scale and pressure, state and response indicators (PSR) at farm and local level. Indicators and methods described in these guidelines are relevant to a range of assessment objectives, geographical regions, scales and production systems. In the PSR approach, the state indicators clearly assess the situation of a specific moment, but pressures and responses are the base for generate positive effects and then critical for designing biodiverse and functional systems at farm and local scale.

2 – Materials and methods

A strategic partnership between the National Agricultural Research Institute (INIA), the National Meat Institute (INAC) and Uruguayan Federation of CREA groups (FUCREA) developed a pilot project for applying the guidelines in six farms with ruminant pastoral production, ranging from 2038 to 4854 ha, three of them with 100% natural grasslands and the other three with 30% substitution by seeded pastures.

The application of guidelines involves a scoping analysis, which consists of a preliminary assessment of the scope and dimension of the study, mapping key concepts and issues. A set of 25 recommended indicators should be used for assessment of biodiversity in the PSR framework. In the present work we stablished a baseline of state of ecosystem through the application of the Ecosystem Integrity Index -EII- (Blumetto *et al,* 2019) analyzing for the study cases, the possible application to spatial design aspects, through the following response indicators: a) wildlife habitats are inventoried and protected; b) management plans are implemented for the control of invasive species, application of ecotoxic agrochemicals, nutrient management and rationalize fertilizer application; c) length/proportion of protected waterways; d) measures to promote connectivity.

3 – **Results – Discussion**

The application the EII resulted in higher values for farms with only natural grasslands 4,0±0,1 in relation with those with 30% of pastures 3,3±0,5 (figure 1).

Figure 1 – IIE global values and per paddock for farms based on natural grasslands (A, B and C) and with 30 % of pastures (D, E and F)

3-1 Habitats inventory

This component showed the dominance of natural low grasslands in all farms, and depending on cases, the second dominant was tall grasslands or forests. The only exception is these farms that have seeded pastures, where was the second habitat in area. It is considered that the conservation of original habitats is very relevant in all farms. The substitution of low natural grasslands for pastures in the more intensive systems, reduced the diversity of vegetal community in this specific area and could affect some communities of fauna, but natural communities are still dominant and then the remaining habitat is relevant. The rest of the habitat remains with high representativeness, although tall grasslands extension depends on livestock management.

3.2 Management plans

The evaluation of study cases showed that there are plans for nutrient management and rationalize fertilizer application in the case of use corresponding to seeded pastures, which the amount and time of fertilization responds to a technical plan according to the levels of nutrient content in soil and crop requirement. Only punctual experience in the past added fertilizers to natural grasslands. In the case of invasive species, a few of them were found. In the case of forest habitat, the only important exotic invasive species recorded was *Gleditsia triacanthos* L. and no management plan has been developed for this species because is not yet recognized for farmers as a problem. In the case of exotic herbaceous plants with invasive risk, two species were recorded *Cynodon dactylon* L. and *Eragrostis plana* Nees. *C. dactylon* is a species present in the country for more than a

century, commonly mixed with natural communities and pastures, was recorded in four farms. No management plan is applied in this case because there are not clear management measures developed in the country for this species management. In the case of *E. plana*, have been recognized as an important invasion risk species in the last decade and exist clear recommendation for the management. A few individuals were detected in one farm and localized chemical control was applied immediately.

The only agrochemical used regularly in the case of pastures seedings is glyphosate (nonselective herbicide) following technical agronomical recommendation of doses but does not exist any report about environmental precaution management. National regulation for application and final disposal of packaging are fulfilled, but it does not consider especial measures for biodiversity impacts of application.

3.3 Protection of waterways

The situation of brooks, streams, rivers and other waterways for the six farms revealed that natural vegetation of riparian zone is maintained in all the cases. However, in some cases some affectation of the course such as livestock trampling, have been recorded. In most of cases the state of waterways is good (above 4 in EII) but does not exist infrastructure for avoiding access of livestock to riparian zone.

3.4 Connectivity

None of the major environments surveyed present connectivity problems, since in cases where pastures have been planted they appeared as separate plots inserted in the natural matrix with very similar vegetation structure and always remained connection between low grasslands areas. Some minor ecosystems appeared in the form of patches, but that is considered normal in the occurrence of these environments.

4 – **Conclusions**

We conclude that is possible to use the guidelines analysis for proposing a progressive spatial re-design of production system. The response indicators consider important aspects of management, land use, habitat prevalence and connectivity that are central in biodiversity conservation, which can guide the good practices of livestock production. The state indicators of the LEAP guidelines offer a reference framework for measuring the success of the planification of biodiversity healthy production systems.

References

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