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Characterization of fine wool production systems: factors to be considered for the maintenance of ecosystem integrity

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1 – Introduction

The production of fine, super fine and ultrafine wool in Uruguay is a highly competitive alternative, that is developed mainly in mixed pastoral systems (cattle and sheep) whose forage base is the natural grasslands communities. The regional consortium of innovation of ultrafine wool (CRILU), looks for technologies that allow a sustainable development of production. In a research project, some methodology for valorizing the ovine ecosystems under wool production north of Uruguay is performed, evaluating the state of the ecosystem and its biodiversity. These productive systems are having intensification processes, normally associated with the replacement of natural grasslands by annual or perennial sown pastures, which could affect ecosystem integrity. The objective of this article is to analyze some farms as study cases, in order to determine the factors related to the production system that are affecting ecosystem integrity and also propose measures for improving management aspects.

2 – Materials and methods

The project involved six farms ranging from 492 to 5377 hectares, representing different scales and intensification levels. For these farms the Ecosystem Integrity Index-EII-(Blumetto et al, 2019) was applied. This tool allowed to evaluate the status of the ecosystems of each paddock in relation to a reference state with the best possible condition. The EII analyzes four dimensions: structure of the vegetation, species diversity of vegetal community, soil current erosion or potential of it and the state riparian zones. The scale goes from 0 (loss of all original ecosystem characteristics) to 5 (optimal condition).

For analyzing the influence of productive characteristics of the system, proportion of sown pastures, livestock stocking density, sheep to cow ratio, total area and meat and wool production was recorded. Table 1 display the main characteristics of farms involved in the study.

Table 1 – Main characteristics of farms involved in study				
Farm	Area	% of natural grasslands	Stocking density LU/ha	Sheep to cattle ratio
A	492	100	0,71	3.2
B	843	76.5	0,71	2.8
C	1448	79	0,93	2.1
D	4552	77	0,71	1.7
E	5320	86	0,85	4.1
F	1304	90	0,76	2.8

3 – **Results – Discussion**

Global EII value for each farm range from 3.4 to 4.1. Graphical representation of individual paddock qualification and global value are presented in fig 1.

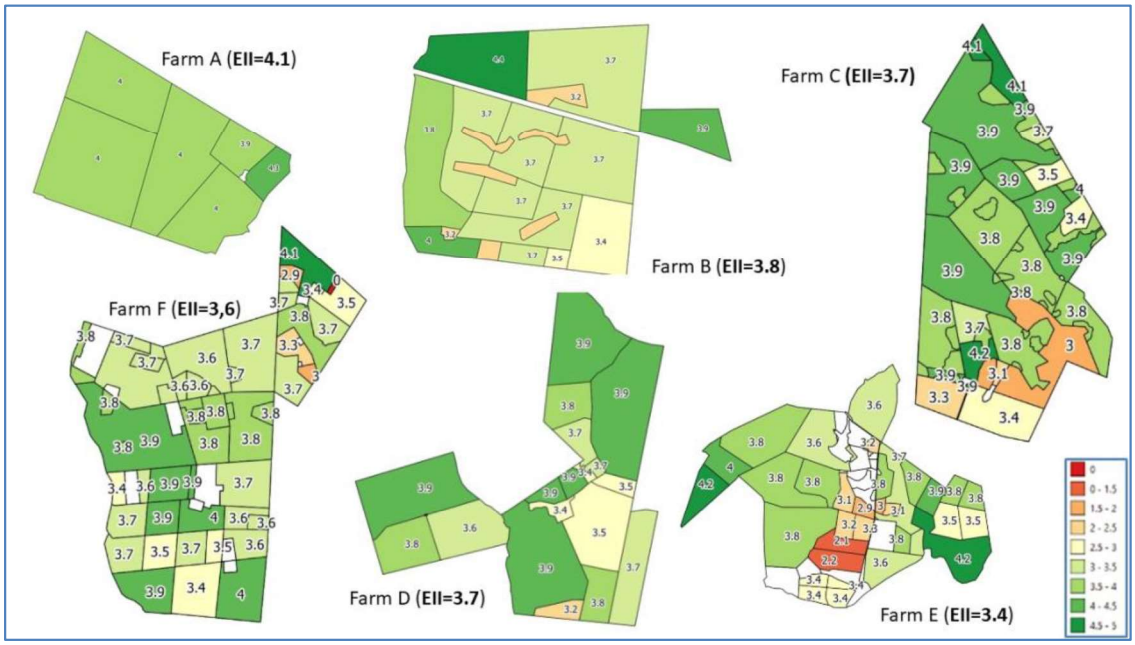

Figure 1 –Global values and spatial visualization of individual paddocks with individual values Ecosystem Integrity Index

When we analyze the general EII values of farms, in relation with productive characteristics of the farms, high and negative Spearman correlation coefficient was found for proportion of pastures in substitution of natural grassland (-0,82) and livestock stocking density (-0,80). Low correlation (-0,21) was found for EII and sheep to cattle ratio. Beyond the global values, a deeper analysis must be done at the paddock level, since there are differences of management inside each farm, in relation to livestock species, stocking density and productive animal categories. According to empirical experience, variables such as the structure of the vegetation could be affected by the composition of

the stock and the permanence of high proportion of sheep. However, provably it depends on some other factors as the own resilience of each community and lasting of grazing periods.

As was expected, the substitution of natural grassland by pastures, reduced values of EII. However, some area of sown pastures can play a strategic role in improving the ecosystem integrity of natural grasslands, contributing as a strategy to reduce overgrazing at certain times of the year. For improving general results, specific recommendation could emerge by analyzing the complex interaction between components of the system (eg. moments oh high animals demand and biomass availability). In this sense, if it is intended to maintain the ecosystem integrity and functions, a systematic planning of the production system should focus on the complementation of pastures and natural grasslands considering the critical moments of the year.

4 – Conclusions

In the actual state of studied system, substitution of natural grasslands by pastures and stocking density are the most important recorded variables that reduce ecosystem integrity. The complementary management between a small area of pasture and natural grasslands inside each farm should be the objective of redesign of systems for preserve agroecosystems with high integrity.

References

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