Comparative Analysis of Agri-Food Systems for Extensive Livestock in the High Pyrenees and Creation of a Multicriterian Tool for Its Evaluation

Laia Motos
Universitat Central de Catalunya, Spain

Federica Ravera
Universitat de Girona, Spain

The XXIV International Grassland Congress / XI International Rangeland Congress (Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods) takes place virtually from October 25 through October 29, 2021.

Proceedings edited by the National Organizing Committee of 2021 IGC/IRC Congress

Published by the Kenya Agricultural and Livestock Research Organization

Comparative analysis of agri-food systems for extensive livestock in the high pyrenees and creation of a multicriterian tool for its evaluation

Authors: *Laia Motos**; *Federica Ravera***
* Càtedra de Agroecologia i Sistemes Alimentaris, Universitat de Vic – Universitat Central de Catalunya
** Departament de Geografia, Universitat de Girona (Spain)

Abstract
The main objective of this study is to compare the different agri-food systems of extensive livestock (ecological and conventional) of big and small ruminants (cattle and sheep respectively) in high Pyrenees. This objective is formulated by looking at the general lack of knowledge of the population regarding the functionality of these systems, the changes of management that have been introduced in the recent years, especially in terms of commercialization, and the different capacity of response of extensive livestock systems to climate change and other socio-economic complementary changes. Attributes and indicators have been selected for the comparative evaluation of livestock systems, focusing on three political perspectives ecofeminism, adaptation to climate change and food sovereignty.

The methodology adopted is mixed, including secondary databases and interviews for the analysis of extensive livestock agri-food systems and a series of participatory workshops with scientists and women livestock operators to select indicators that allow to highlight different critical points along the chain to compare agri-food systems.
Four archetypes of each agri-food system studied were identified by following the product of meat from extensive livestock management of bovine and sheep. Although there are several differences between the organic and conventional beef and sheep meat systems, similarities have also been found. Sheep production, and in particular organic production, is the simplest, is the most traditional and shortest chain system. A set of 123 indicators have been identified by the dialogue between researchers and practitioners, grouped in 9 dimensions. When evaluating these systems, so far there have been many aspects that have not been valued or have been invisible, especially in the dimension of *Dignified life and Social equity.* There are also certain gaps of information, that should be filled in future research.

INTRODUCTION
The traditional profession of shepherds and ranchers is an activity linked to the territory that has adapted to environmental and socio-economic changes and it's closely connected with concepts such as land management, sustainability and landscape preservation (Costa Brava Tourism Board, 2020). Over the years, the profession of shepherd has been reshaped to diverge in different management typologies. In some areas there are still practices that, despite adapting to the mechanization that emerged from the 1960s, have also maintained the traditional knowledge, such as extensive livestock systems of transhumance or high mountain transmittance, mainly of autochthonous races of sheeps, cows, goats and horses, with movements of the animals in winter and summer in order to make the most of existing resources over long distances and at different altitudes (Fernández & Fillat, 2012). Extensive livestock farming is a system of agricultural production that uses efficiently and respectfully the resources of the territory with the appropriate species and breeds; it combines production and sustainability and provide multiple environmental and social services (Oteros et al., 2014). This type of livestock management shapes the landscape, helps in the control of forest fires, in the regulation of water cycles and soil quality, enhances biodiversity and also makes a contribution to the conservation of cultural heritage and territorial identity (Pauné, Gutiérrez, Trèmul & Gasol, 2020).
Within this livestock-based production, different agri-food systems are included, such as organic and conventional management. Organic livestock is a production system oriented to soil and environmental protection, animal welfare and the avoidance of the systematic use of synthetic chemicals throughout the process for the production of healthy food (CAECV, 2019). In contrast,

conventional livestock is mainly based on the use of both natural pasture and additional external food and the use of chemical inputs in pastures in order to increase the fertility of the land and to prevent pests and diseases (Raigón, 2014). This system has been for many years, the most common form of production.
This investigation is located in the high Pyrenees and it aims to describe the extensive livestock systems of large and small ruminants, both organic and conventional, with different chains of production, processing, distribution and marketing of the product of meat. It gathers information to determine exhaustively the differences at all levels of the chain and contribute to understand the benefits and harms of each system. To do this, the paper explores a set of descriptive indicators, chosen in a dialogue between scientific experts and women livestock operators, which include three political perspectives of evaluation that so far have not been sufficiently taken into account and are relevant to evaluate livestock agri-food systems: ecofeminism, climate change adaptation and food sovereignty.

METHODOLOGY

The methodology used to perform this work has been mixed. Different study methods and tools have been used, including bibliographic resources and secondary databases, interviews and participatory workshops (virtual and presential).
The study was developed in 4 phases: After an initial bibliographic search (phase 1), secondary databases and a series of interviews allowed to "follow the thing" (i.e., the cartography of the journey made by the meat from a cow and a calf or a lamb through the food chain - resources used to production, transformation, marketing activities) and characterize the agri-food system (phase 2) (Santos - Fraile & Massó, 2017). Phase 3 was then carried out based on participatory workshops with scientists and women livestock operators for the selection of indicators around three perspectives (i.e. food sovereignty, climate change adaptation and ecofeminism) applied to the extensive livestock of small and large ruminants. Finally, in phase 4, the information was analyzed and structured. This social multicriteria approach has been designed as an iterative learning process between researchers and practitioners involved in the study in order to characterize and comparatively assess the agri-food systems identified (Munda, G., 2004).

RESULTS AND DISCUSSION

Archetypes of extensive livestock systems

Our findings show the different journeys of each system. Four archetypes of agri-food systems (2 for bovine and 2 for sheep extensive livestock management) were identified with their respective chains.
The first archetype shows the circuit of ecological bovine system (Figure 1a). It is important to emphasize on the nodes of fattening. There are 2 options: the organic fattening or the transfer of the calf to the conventional fattening following the conventional chain. The main commercialization is done by the same livestock operator who realizes a proximity sale. The second archetype (Figure 1b) shows the circuit of the conventional bovine system. The main difference is the possibility to use external food and inputs for pastures, as well as the adoption of a conventional fattening. The commercialization is mainly done by more than one intermediary and it's a long-distance chain, mainly destined to large scale distribution. The third archetype (Figure 2a) shows the circuit of ecological ovine system. It is really simple. The commercialization is normally done by one intermediary and the products follows a short chain. The fourth archetype (Figure 2b) shows the circuit of a conventional sheep system, with external inputs. It is more difficult to identificate exactly which is the real path of the system along the chain. In this case a merchant is in charge of exporting the animals when they are alive. However, there is also a second option of following a short chain, similar to the ecological system.

From the archetypes obtained, it can be seen how there are clearly visible differences between the bovine and sheep systems above all. The schemes of sheep's systems are visually simpler, involving fewer linkages than the bovine's systems. However, there are more similar than differentiating features between the archetypes. These similarities also give important information. The node that creates the most complexity in bovine schemes is the activity of fattening, while fattening does not appear as a node in sheep production chains.

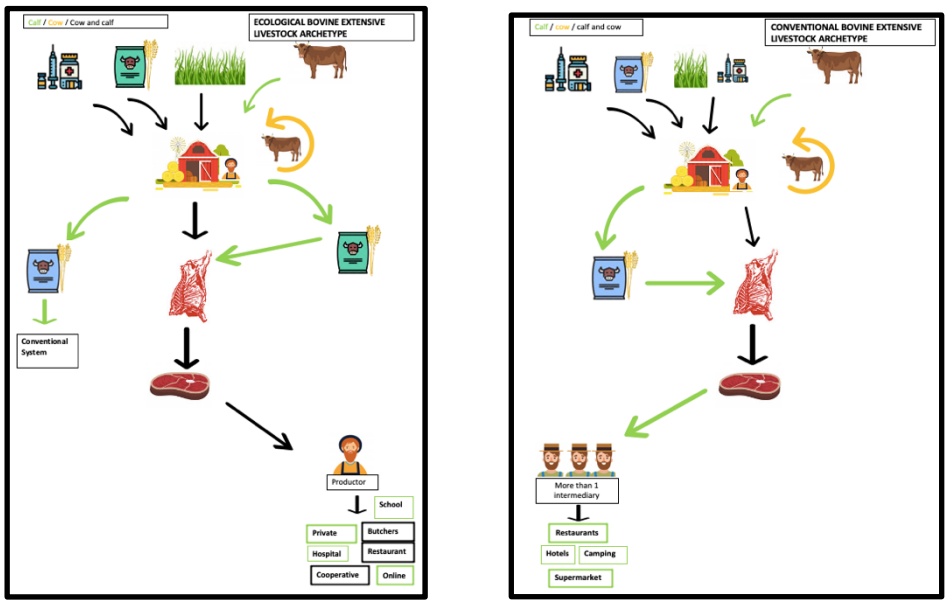

Figure 1: A) Ecological bovine extensive livestock archetype B) Conventional bovine extensive livestock archetype

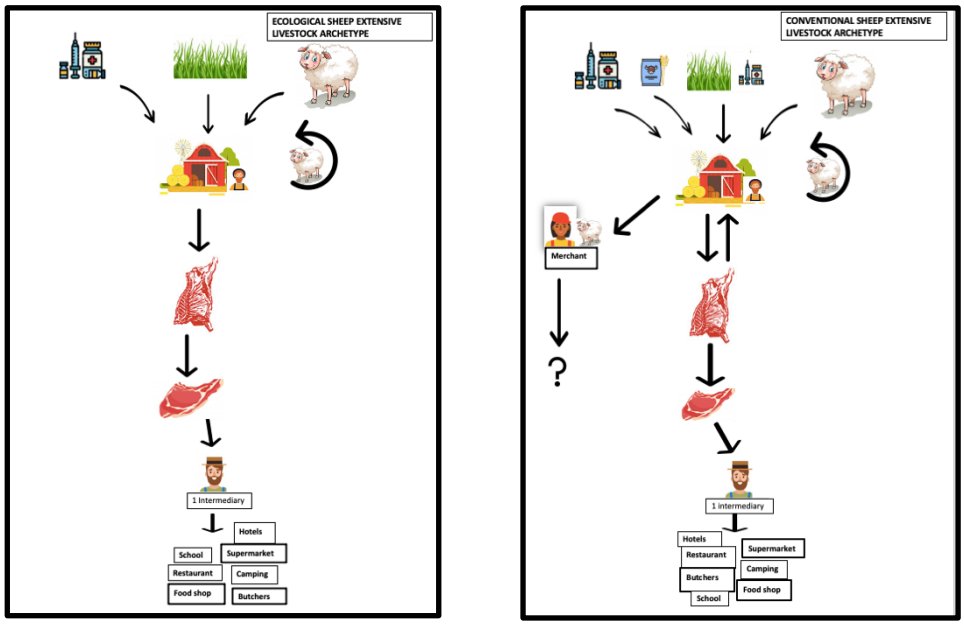

Figure 2: A) Ecological ovine extensive livestock archetype B) Conventional ovine extensive livestock archetype

Evaluation tool

The participatory workshops with scientific experts and practitioners selected a series of indicators and we created a tool for livestock-based agri-food system assessment. From the workshops it was possible to establish 9 dimensions to work on, each of which included a series of attributes. Dimension 1: Right to food (3 attributes); Dimension 2: Autonomy (6 attributes); Dimension 3: Mitigation and adaptation to climate change (5 attributes); Dimension 4: Dignified life - Social equity (7 attributes); Dimension 5: Conservation of natural resources (4 attributes); Dimension 6: Polycentric and sovereign governance system (4 attributes); Dimension 7:

Territorialization and scale (3 attributes); Dimension 8: Animal welfare (3 attributes) and finally, Dimension 9: Sociocultural functions (5 attributes). This tool allows, visually, to make an impact on the strengths and weaknesses of the systems. These weaknesses need to be addressed in order to improve the way the system is organized. Due to the wide gap in statistical information and a lack of information records and controls in various areas of livestock, it was not possible to assess the systems

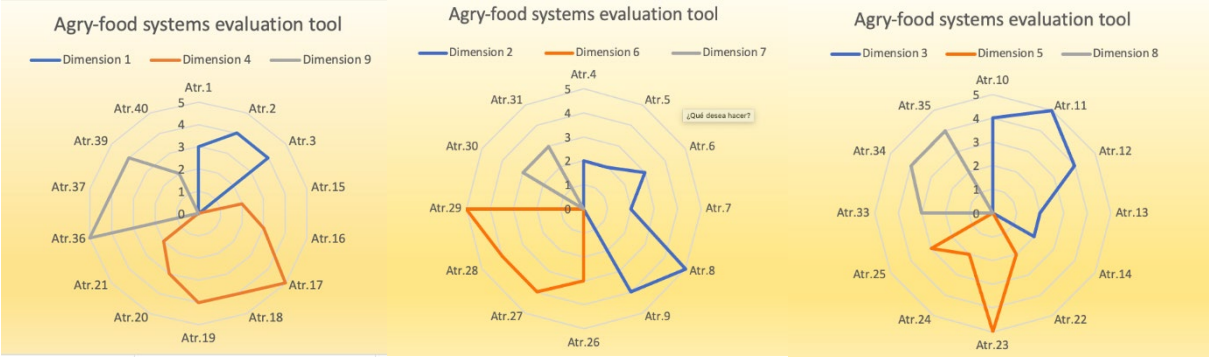

Figure 3: Simulation of the evaluation tool created with all the attributes

CONCLUSIONS

In conclusion, our findings show that it is equally necessary to highlight the differences as well as the similarities between the extensive agri-food systems studied. The differentiation between ecological and conventional livestock management is guided by ecological regulations, but especially in sheep extensive management in terms of actions and links there are very few differences. The main differences are in the bovine systems in terms of fattening, done out of the farm with ecological or conventional products, and the long or short chain of commercialization. In the case of sheep, the most successful trading option is the short chain. From the graphical representations it has been observed that the extensive system of sheep is simpler than that of cattle.

In reference to the assessment of the attributes applied in livestock, a large number of aspects forgotten in the evaluation of agri-food systems have been detected, especially with reference to the dimension of "Dignified life - Social equity" which include gender-sensitive indicators. At the same time, a large information gap has been detected. At scientific level, the integration of different approaches, such as the frameworks of climate change adaptation, food sovereignty and ecofeminism to evaluate agri-food systems, is an important contribution for future studies. The evaluation tool has been suggested for the evaluation of extensive agri-food systems but is highly adaptable to different types of existing agri-food systems and useful at policy level.

BIBLIOGRAPHY

Galan, J. (2017). *La ramaderia de boví de carn a la Terreta, Prepirineu Català: anàlisi i proposta de futur* (Treball de Fi de Grau*)*. Universitat Politècnica de Catalunya, Catalunya.

Fernández-Giménez, M. E., & Estaque, F. F. (2012). *Pyrenean pastoralists' ecological knowledge: Documentation and application to natural resource management and adaptation*. *Human Ecology*, *40*(2), 287–300. Recuperat de: https://doi.org/10.1007/s10745-012-9463-x

Pauné, F., Gutiérrez, C., Trèmul, B., & Gasol, N. (2020). *Ramaderia extensiva*. Recuperat de: https://www.pascuum.cat/ramaderia-extensiva

Oteros-Rozas, E., Martín-López, B., González, J. A., Plieninger, T., López, C. A., & Montes, C. (2014). *Socio-cultural valuation of ecosystem services in a transhumance social-ecological network*. *Regional Environmental Change*, *14*(4), 1269–1289. Recuperat de: https://link.springer.com/article/10.1007/s10113-013-0571-y

SANTOS-FRAILE, S., & MASSÓ GUIJARRO, E. (2017). INTRODUCCIÓN. Etnografías multisituadas y transnacionales. *Antropología Experimental*, *17*, 1–8. https://doi.org/10.17561/rae.v17i0.3751

Soler, M., Rivera, M., & García, I. (2019). *Agroecología feminista para la soberanía alimentaria: ¿de qué estamos hablando? Soberanía Alimentaria, Biodiversidad Y Culturas*. Recuperat de: https://www.pikaramagazine.com/2019/05/agroecologia-feminista-soberania-alimentaria/

Raigón, M. (2014). *"Els aliments ecològics tenen un major valor nutritiu"*

Munda, G. (2004). *Métodos y Procesos Multicriterio para la Evaluación Social de las Políticas Públicas*, *1*(1983), 31–45.