Matière
à débattre & décider

Livestock grazing systems and sustainable development in the Mediterranean and Tropical areas

Recent knowledge on their strenghts and weaknesses

Alexandre Ickowicz and Charles-Henri Moulin, editors

éditions Quæ

• innovation platforms for more environmentally friendly and inclusive local milk production and collection in sub-Saharan Africa.

Other cases deal with organisational innovation for concerted and sustainable management of territories incorporating livestock activities:
• the development of a local land charter to manage access to and use of agro-sylvo-pastoral resources on a communal territory in Burkina Faso;
• the contribution of rotational grazing to forest restoration in the Brazilian Amazon.

When we refer to inventions and innovations in our research on livestock grazing systems, what do we mean?

Éric Vall, Mélanie Blanchard, M'Hand Fares

Inventions, innovations and change processes

The term "innovation" has become a key element in the process of technical, organisational and social change, and is often synonymous with the word "progress", which it tends to replace, but it deserves to be clarified and placed in its rightful place in this process of change (Guellec, 2009). According to Schumpeter (1911, 1939), this change process comprises three stages. The first phase is invention, which consists in the production of new forms of information (ideas, theories, models, etc.). The second phase is innovation, defined as a new device (product, process, service or organisational mode) effectively sold or implemented, sometimes adapted and finally adopted by a community of stakeholders. The third phase is distribution, which consists in the adoption of this new device (innovation) by a large part of the population. Currently, innovation is perceived more as a process than as an object or a product.

In this process, research, whether fundamental (aiming to produce information) or applied (with a more operational objective), appears to be the primary source of innovation[13]. But it is not the only one, because the production of fundamental or applied knowledge can also come from learning by doing, imitation or the purchase of technologies by stakeholders in the field.

Moreover, the relationships between these three phases are not unequivocal. Admittedly, a new concept (invention) can give rise to new products or processes that can be marketed (innovations) and that will spread widely if they meet a demand. But a new process (innovation) can in turn give rise to a new idea (invention), just as the diffusion can encourage the development of new products and ideas.

13. Targeted research ranges from research sensitive to societal issues (policy relevant) to research directly aimed at solving practical problems, taking into account the main localised interactions that necessarily affect its definition and the implementation of solutions (policy oriented). In both cases, the objective is to generate information that can be used for action on reality and to obtain a practical, context-specific result (Sebillotte, 2004; Guillou, 2004).

In the change process described by Schumpeter, innovation plays a central pivotal role between invention and distribution. These three interacting components form a systemic continuum. To characterise these innovations, we can contrast radical innovations (which involve a major change, e.g. the mobile phone) with incremental innovations (which are adjustments to the product or process at the margin, e.g. the latest version of a mobile phone). We can also distinguish between product innovations and process or organisational innovations. So, innovations are not only technological, but they can also be organisational. Most often, they are a hybrid of both types, both technological and organisational, and often appear 'in clusters (Schumpeter, 1939).

In all invention and innovation, there are technical components (objects) and organisational components (subjects), but it is obvious that depending on the invention or innovation, the technical component may be more important than the organisational component (as in the case of the use of a new type of fodder in livestock farming) and vice versa (for example, in the case of the implementation of new rules for managing the grazing resources of a territory).

To simplify matters somewhat, research converts money into knowledge, and innovation converts knowledge into money" (Anandajayasekeram, 2011). In reality, this process is a complex pathway full of feedback and interactive relationships involving science, technology, learning, production, policy and demand. This reality of the innovation pathway means that the responsibility of agricultural research organisations in this area does not end with the production of new technologies or know-how, as the success of an invention and innovation can only be claimed when the inventions are distributed, adopted and used (Anandajayasekeram, 2011), i.e. when the innovation has gone through the whole innovation pathway described by Schumpeter.

Generally, an invention becomes a successful innovation when:
- it contributes something new for the user,
- it is considered to be better than the existing,
- it is economically viable and socially acceptable,
- it is distributed.

Space and environment of inventions and innovations

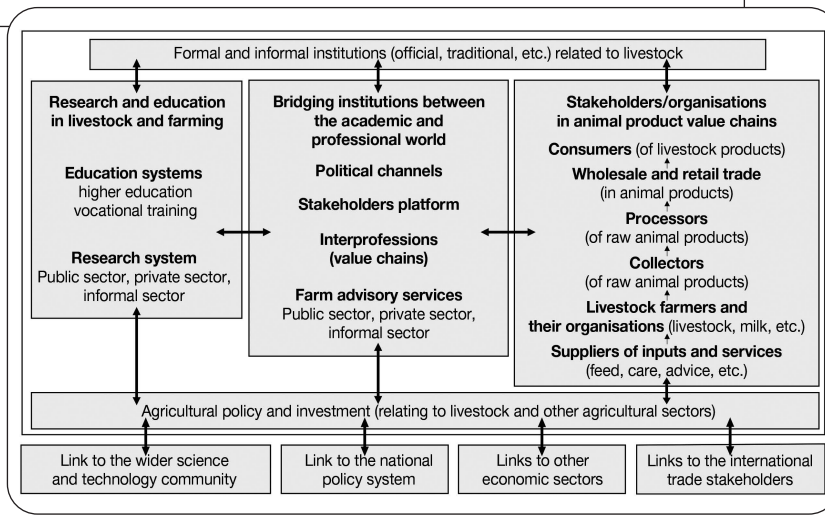
The process of change takes place in a space and an environment, described by its designers as an "innovation system" (Spielman, 2006.). In this approach, invention and innovation are defined as processes of production, access and implementation of new knowledge. The analysis focuses on strategic interactions that are complementary (positive, such as the emergence of innovation clusters) or substitutable (negative, such as lock-in phenomena in the face of change) and on the knowledge flows between the different stakeholders in the change process. In the innovation system, emphasis is also placed on the importance of the role of institutions in regulating the processes

of invention and innovation, in particular in the area of learning (through practices, education and training, etc.), which is essential for the dissemination of innovations (Anandajayasekeram, 2011).

In its simplest form, the innovation system was initially represented as three main interacting components (Anandajayasekeram, 2011):
• the organisations involved in the production, distribution, adaptation and use of new knowledge;
• the interactive learning processes that occur when organisations engage in these processes and how this leads to new products and processes (innovation);
• and the institutions - rules, standards and conventions, formal and informal - that govern how these interactions and processes take place.

The outline of the innovation system relevant to our field of livestock systems research has been depicted in Figure 4.1. It includes:
• the modern and traditional sources of invention and innovation (agricultural research and education institutions, local know-how of livestock farmers and stakeholders);
• stakeholders in livestock value chains (from producers to consumers, private stakeholders, lobbies, NGOs);
• official and unofficial institutions involved in the formulation and implementation of agricultural policies and regulations;
• and at the intersection, organisations involved in linking and sharing knowledge and know-how between practitioners, policy-makers, teachers and researchers.

Figure 4.1. Theoretical diagram of a country-level agricultural innovation system (adapted from the World Bank, 2006).



The case studies presented in this chapter are obviously part of such an innovation system, with positioning and levels of interaction with system stakeholders varying according to their degree of development and the intrinsic characteristics of the invention and innovation.

After a brief review of the terms of innovation and their conceptual framework, we now present practical examples of inventions and innovations specific to Mediterranean and Tropical livestock grazing systems that enhance their contribution to the agroecological transition of agriculture.

Inventions for better sharing information and integrating natural processes into the management of livestock grazing systems

Jean-Baptiste Ménassol, Denis Bastianelli, Nathalie Debus, Eliel González-García, Samantha Bazan, Thomas Le Bourgeois, Vincent Blanfort

The agroecological transition of livestock systems, by turning its back on the simplification and artificialisation of practices and by relying on natural processes that are more complex to manage, requires the integration of a more extensive range of information than in conventional management methods. Consequently, the agroecological transition of livestock systems requires the development of devices (equipment, platforms, etc.) that allow practitioners to be better informed to support decision-making. This section presents work on devices invented in laboratories and research stations, not all of which were a priori intended to become an innovation. This work focuses mainly on the first stages of the path from invention to innovation, from the design of prototypes and the definition of their use by end users to a finished product, sometimes accompanied by a patent application.

Promising invention ideas

A digital device dedicated to characterising the social behaviour of sheep to facilitate flock management

Understanding the behaviour of farm animals is an essential lever for the implementation of sustainable farming practices, notably in livestock grazing where the animals enjoy considerable freedom of movement. It provides an opportunity to shift the emphasis away from the production objective by taking into account this essential dimension of animal welfare when adapting husbandry practices. Most farm animals have a high level of sociability: the group is the unit of expression of individual behaviour, such as the choice of sexual partner, cooperating to access resources or learning.

The analysis of social networks suggests, by means of the construction of complex social structures from interrelations between individuals, to analyse how individual