

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

Recent knowledge on their strenghts and weaknesses

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Conclusion

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Several insights into livestock adaptation can be derived from the work outlined in this chapter.

First of all, even if this is a trivial result for any careful observer of livestock practices and the livestock world, grazing systems are continually adapting and transforming. In this respect, they are far from the archaic and unchanging character that they are sometimes portrayed as. Faced with changes in climate, variations in forage availability, the presence of disease, changes in price conditions, the arrival of a predator, the emergence of a demand for new animal products, or a major political upheaval, adaptation processes are in fact observed on these farms, which appear to be closer to permanent movement than to stagnation. This suggests that taking an interest in the adaptive capacities of animals, farms or value chains, for example, is just as important as evaluating their productivity.

Furthermore, it is clear that these adaptations are based on a variety of levers. These levers are of varying natures (physiological, genetic, technical, organisational, social, etc.) and operate at different scales (animal, farm, landscape, group of farmers, etc.) and on different time scales (short, medium or long term). Many of these levers are also interdependent, which renders the adaptation processes highly complex. It is crucial to take into account this diversity of levers in research and in the support of livestock development, which calls for the generation of information on each of these levers and for their integration through multidisciplinary and systemic approaches. This work highlights key elements that preserve or even increase the adaptive capacities of livestock, such as genetic diversity or livestock farmer groups, which are discussed in the subchapters on genetic diversity and adaptation of local breeds to their environment, on mechanisms of adaptation analysed at the level of families and local communities, and on the adaptation trajectories of livestock in the territories.

The fact that adaptation is not always synonymous with sustainable development constitutes a third lesson in this chapter. In fact, adaptation is sometimes associated with the exclusion, undermining or disappearance of certain entities that previously constituted the livestock sector of a region. The animals, landscapes, practices and forms of livestock production selected as a result of these multiple and intertwined adaptation processes are not necessarily those that best meet the objectives of sustainable development. This observation indicates that, in addition to including adaptation in research and support for livestock development, there is a key challenge in steering and managing these adaptation processes in the direction of more sustainable development. The production of integrated (multidisciplinary and multi-stakeholder) and situated knowledge, as well as public and collective action are key elements in meeting this challenge.

Finally, by taking the concept of adaptation a step further, we can question the capacity of these adaptations in livestock farming, however numerous and articulated they may be, to respond to contemporary social and environmental issues. As pointed out by authors working on the history of energy and biomass use by societies (sociometabolic regimes), does the transition to an agroecological agriculture that so many institutions are now calling for not require more profound changes, on the same scale as the Neolithic agricultural revolution or the industrial revolution (Haberl *et al.*, 2011)? Alongside the study of livestock adaptations and their management, work on the analysis, design and support of innovations and breakthroughs in agricultural practices, societies and policies appears necessary.