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Promoting multidisciplinary research to improve goat production systems in Morocco

F. Nassif¹ and B. El Amiri

INRA-Maroc, Centre Régional de la Recherche Agronomique, Settat, BP 589, Settat 26000 (Morocco)
¹fatima.nassif@gmail.com

Abstract. In Morocco, goat keeping is one of the most ancient economic activities in communities of the High and Middle Atlas Mountains. Goats may be the main all year round source of income and contribute to the satisfaction of primary nutritional requirements of rural livelihoods. Studies on the technical, environmental, social, economic, and policy aspects of the goat sector are scanty. A case study analysis of the goat production systems in Aït Bazza community in the Middle Atlas has revealed interesting insights on goat farmers' management practices, their marketing behaviour and constraints. One of the lessons learned is the complexity of the goat production sector. Goat farmers' socio-economic conditions and perceptions are complicated by layers of environmental and market limitations. The study concludes by demonstrating the necessity for research along disciplinary lines as well as multidisciplinary research in major goat producing areas of Morocco. The latter can help with developing a better understanding of the multifaceted nature of sustainable goat production systems.

Key words. Aït Bazza – Goats – Multidisciplinary Research – Morocco.

La recherche multidisciplinaire pour l'amélioration des systèmes d'élevage caprin au Maroc

Résumé. Au Maroc, l'élevage caprin est l'une des plus anciennes activités économiques pratiquées dans les communautés montagneuses des Moyen et Haut Atlas. Les caprins sont parfois la principale, voire la seule source de revenus réguliers tout au long de l'année et contribuent d'une manière substantielle à la satisfaction des besoins nutritionnels essentiels des ménages ruraux en zones de montagne. Les études sur les aspects techniques, environnementaux, sociaux, économiques, et politiques du secteur caprin sont limitées. Une étude de cas du caprin d'Aït Bazza dans le Moyen Atlas a été menée et a révélé d'intéressants enseignements sur les pratiques de gestion des éleveurs de caprins, leur comportement de commercialisation et les contraintes auxquelles ils sont confrontés. L'une des leçons apprises est la complexité des systèmes d'élevage caprin et leur caractère multidimensionnel. Les conditions environnementales de production sont superposées par des contraintes socio-économiques et des éléments de marché et de politique. Ainsi, l'étude pointe la nécessité de mener des recherches multidisciplinaires dans les principales zones productrices de caprins au Maroc. De telles recherches peuvent être un outil pour une meilleure compréhension de la nature complexe des systèmes d'élevage caprin et des voies de leur amélioration.

Mots-clés. Aït Bazza – Caprins – Recherche Multidisciplinaire – Maroc.

I – Introduction

Sound science and relevant applied research are capital to the development of food sectors. The goat sector is no exception. The world over, goats have been a less attractive research subject than other livestock species, particularly sheep, cattle and poultry in spite of the long history of goats and their multifunctional roles accompanying mankind for over 7000 years. In Morocco, the two goat production systems that have benefited from permanently consistent, cumulative, and collective research efforts are the small scale dairy goat systems in the North, namely in Chefchaouen region (Raki, 1996; Outmani, 2000; Riachi, 2000; Chentouf, 2004; ICRA, 2005; Chentouf *et al.*, 2009) and the goats raised under argan tree systems (El Assouli, 2001; Bas *et al.* 2005; El Aich *et al.*, 2005; El Aich *et al.*, 2007a; El Aich *et al.*, 2007b; El Aich *et*

al., 2008). The remaining goat production systems in the country especially in the Middle Atlas Mountains are at best described in rather broad terms. Research on the technical, environmental, social, economic, and policy aspects of the goat sector is scarce. Prevailing studies are often designed and implemented either within the framework of short term development projects or as education degree theses with limited geographic coverage and scope. The tendency of technical research to focus on the animals almost independently from local production conditions and little if any consideration for the producers' characteristics and capacities can be counterproductive. Therefore, there is a need for multidisciplinary research to apprehend the different facets of the systems and their complex interactions. As nicely stated by Alexandre and Mondonnet (2005), "Increasing reproductive performances, reducing mortality rate, accelerating growth rate and improving carcass merit are multiple and interdependent objectives. Thus, characterization of animals and systems – together with their different combined factors of variation – must be carried out for the different interrelated animal traits contributing to meat production. This means that a multidisciplinary approach is necessary".

This paper discusses the complex character of prevailing extensive grazing meat goat production systems in Morocco and implications for research approaches on one hand and the goat sector development on the other. The paper is based on a field experience of the authors in Aït Bazza of the Boulemane province where a research & development work on the role of goats as a vector for community development has been carried over 2007-2010 period.

II – Selected facts about goats in Morocco

Unlike the trend observed in most developing countries where goat populations have experienced significant increases, the goat population in Morocco revealed a 41.5% decrease during the past four decades. In 2008, the goat population counted 5,177,900 heads whereas in 1969 it was 8,750,000 heads (FAOSTAT). The reasons for this trend include the increased sedentarization of pastoral nomads, the decrease in family labor availability due to schooling of children and migration of the young, severe droughts and the decrease in rangeland feed resources.

The geographic distribution of goats in the country indicates that goats are primarily raised in mountain areas with 40%, 25% and 20% in the High Atlas, the Rif and the Middle Atlas respectively (Benlekhal, 2005). In fact, goat keeping is one of the most ancient economic activities in mountainous communities where other livestock species are hard to raise. Goats may be the main all year round source of income. They contribute to the satisfaction of primary nutritional requirements of rural livelihoods and provide a number of vital services. Goats are reared under extensive grazing systems with the bulk of feedstuffs grazed directly from forest and non forest grazing areas and pasture lands. Most of the goat production is meat oriented although some seasonal milking activity is practiced during the spring season. The 2004-08 five year average of goat meat is 22,300 tons (FAOSTAT). According to the Livestock Directorate, national goat meat production is estimated at 23,000 tons which represent about 8% of the total red meat production (Benlekhal, 2005). The 2006-2008 annual average of goat milk production is 37,000 tons from an average of 1,150,000 producing heads, representing 2.3% of national milk production (FAOSTAT).

III – Raising goats under grazing conditions is not a simple affair

One of the main lessons learned from the implemented study in Aït Bazza community is the complexity of the goat production systems. In Aït Bazza, local goats are basically raised under extensive grazing conditions with forest and pasture forages as main sources of feed. Key husbandry practices include uncontrolled mating, little supplementation during the cold season, and limited curative veterinary treatments for diseased animals. Destined primarily to meat production, goats are sold all year round at weekly local markets. The summation of the

production systems in the above terms is misleading and suggests that raising goats is a simple matter. Moreover, the assumption that extensive means low or no management at all is also misleading. In reality, raising goats under extensive conditions implies that environmental factors and their interactions (relief and altitude, climate parameters and climate change) are of central importance. Not only do they determine the levels of performance and productivity but they also represent high levels of risks and uncertainty because of their unpredictable character and their escape to producers' control. The genetics of reared goat populations is inherently complex and objectively unknown. The agency dimension of production exemplified in farmers' characteristics, husbandry practices and constraints embodies complexities of its own. The fact that change affects structures, people and processes adds a layer of intangible complexity in the production systems. The ever-lasting issues of reproduction, nutrition and feeding, as well as health control are increasingly becoming intertwined with emerging issues pertaining to product quality and consumers' preferences. Nowadays, the local and regional conditions are no longer exempt from national and even international forces. All the above factors are so interrelated that it becomes difficult to adequately single out their individual influences. Thus, extensive grazing systems, like any other production systems, are built around several inextricably related elements. Moreover, existing relations and interactions tend to create features and processes that need to be reckoned with in order to grasp the wholeness of these systems.

VI – Multifaceted systems require holistic multidisciplinary research

Goat production systems are very complex. At least three sets of complex factors can be dissected. The first most important set of factors pertains to the physical environment. In practical terms, goats in Morocco are raised in medium to high elevation areas with altitude ranging from 1500 m to over 3000 m. Temporal and spatial rainfall variations are structural components of the arid and semi arid conditions prevailing in most goat producing areas. Grazing systems are also highly variable. In Ait Bazza for example, there are three predominant grazing systems of which the productivity is ineluctably determined by altitude and climate conditions. These include the forest system with oak trees, the mountain system with thorn cushion plants and the steppe system with alfa and associated plant species. While it is well established that forages availability varies considerably in relation to climatic conditions, the effects of current climate changes are unclear except for the observed increase in the intensity and frequency of extreme events in the study area and elsewhere in Morocco. These climatic changes are not without direct and indirect effects on goats' health status and overall animal performance. The issue of water availability for watering animals is crucial with less rainfall and less snow and droughts becoming more acute and more frequent. Goat keepers are permanently faced with decisions where to take their herds based on the quantity and quality of the vegetation cover and water availability within each system. The access to these grazing systems is regulated by traditional community and villages rights to particular areas. In fact, some villages have access to all three grazing systems, others to two of the three while there are villages with access to one system only.

The second set of interrelated factors resides in the genetics of goat populations in Morocco. Goats are generally known for their resilience, adaptive traits and drought tolerance compared with other animal species. They are considered suitable producers of meat under extensive grazing systems (Alexandre and Mondonnet, 2005). From the field experience in Ait Bazza and according to phenotypic traits (especially color and height) of prevailing goat herds, the degree of diversity is relatively high. The literature on goats in Morocco affirms the hardiness and adaptability of local goats to harsh environments. However, with the exception of few goat genotypes, namely the Draa, Barcha, Atlas Black and Ghazzalya (Fagouri, 2008; Boujenane, 2008), the rest of Morocco's goat genetic resources is still unidentified and uncharacterized. This situation is not unique to Morocco but found in many goat producing regions of the

developing world. As explained by Galal, 2005, "Many goat breeds are not characterized because most goats and breeds are in developing countries and / or under extensive systems where characterization becomes more demanding". In Morocco the predominant propensity favors the use of imported goat breeds as the sole means of improving productivity. Therefore the genetic potential of the local goats remains an untapped source of improvement. Local goats' genetics is necessary not only for the assessment of the genetic potential but also for the determination of appropriate *in situ* and *ex situ* conservation measures of genetic resources.

The third set refers to the cultural, social and economic determinants of goat production systems. This includes producers' resources endowments, level of education and knowledge, organizational behavior, perceptions and attitudes, as well as access to market and market opportunities. These factors play a vital role in shaping the goat production context and adopted practices and thus need to be investigated and understood. Furthermore, society is changing and is demanding changes. Social change associated processes occurring at different levels are not without implications for the current situation and the future prospects of the goat sector in Morocco. Examples of such processes include increasing urbanization and concomitant demand for meat, cholesterol and diabetes concerns, dietary changes, and consumers' demand for high quality meat products. Goat research needs to be attentive to these changes and work towards the consolidation of the positive image of goats as symbols of ecological farming, healthy, natural and low fat products as a substitute for the more negative image of the species as an environmental predator.

Although the producers' survey was restricted to the community of Aït Bazza community, efforts were deployed to understand the market opportunities for meat goats from a broader perspective. One of the important issues is the local character of the goat market. With the exception of few cases, surveyed goat producers regularly sell in the nearby livestock weekly market held on Mondays in Imouzzer Marmoucha. Categories of animals brought to the souk indicate the type of the market and the nature of the demand on goats and not necessarily the reality of goat herds. The economics of meat goats in Morocco is necessary in order to demonstrate that goats are and will make profitable enterprises keeping in mind all other production and post production facets.

V – Conclusion

In Morocco, goat production systems cannot be improved and the goat sector cannot be adequately developed without effective consolidated research efforts (investments, priority setting, adaptive and applied research initiatives, conventional and new methodologies, local-regional and nationwide coverage). Multidisciplinary research initiatives in major goat producing areas of the country are necessary. This type of research can be instrumental in pinpointing most limiting factors and ways of overcoming them from different perspectives. The real challenge is to conduct research that is respectful of scientific disciplinary requirements yet reaches out to other disciplines. The ultimate goal of the research should be the improvement of production, post production handling and market opportunities. However, research results and recommendations need to be supported by informed policies and exploited by the goat sector development projects. Paradoxically, no multidisciplinary research can be fruitful without goat farmers' participation and commitment. As adequately stated by Morand-Fehr *et al.*, 2004 "The two main improvements to bring into goat farming in the 21st century concern research organisations, which must encounter the needs of goat farmers and be well adapted to different production systems in order to lower the research deficit in the goat sector, and investments for better supplies particularly to the poor goat farmers".

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