Buffalo farming in Greece: Present and future

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Abstract. Buffalo livestock farming (*Bubalus bubalis*) in Greece has been demonstrating a stable increase during the past 30 years, from only 312 animals in 1984 to 3,563 animals in 2014. This development occurred simultaneously with considerable developments in Greek markets with the emergence of modern enterprises with export orientation, increased demand for buffalo meat by Greeks – nonetheless not for dairy products – and public awareness concerning the two-fold environmental role played by buffalo farming: protection of indigenous genetic resources and development of wetland rangelands. This study presents the current situation in the sector, through the processing of reproduction and technical/economic data describing the operation of the system, provided by the Greek Buffalo Farmers' Cooperative. These farms operate under an extensive or semi-intensive pattern, with low investments in infrastructure and high use of rangelands, as concentrates and forage are provided only during harsh winter periods. It is estimated that a farm of an average size of 40-70 females is viable under the extensive and semi-intensive system respectively. Based on the data, a set of structural measures is proposed to favor the sector.

Keywords. Extensive livestock farming – Meadow management – Wetlands – Genetic diversity.

L'élevage du buffle d'eau en Grèce: Présent et avenir

Résumé. *L'élevage du buffle d'eau (*Bubalus bubalis*) en Grèce a montré une augmentation stable au cours des 30 dernières années, à partir de seulement 312 animaux en 1984 à 3.563 animaux en 2014. Cette évolution a eu lieu en même temps que des développements considérables dans les marchés grecs avec l'émergence d'entreprises modernes d'exportation, la demande accrue de viande de buffle par les Grecs - néanmoins pas pour les produits laitiers - et l'intérêt public concernant le rôle environnemental double joué par l'élevage de buffles: la protection des ressources génétiques et le développement des pâturages humides. Cette étude présente la situation actuelle dans le secteur, à travers la gestion de la reproduction des animaux et des données techniques/économiques décrivant le fonctionnement du système, fournies par la Coopérative des Éleveurs de Buffles d'Eau. Ces fermes fonctionnent sous un modèle extensif ou semi-intensif, basé sur de faibles investissements dans l'infrastructure et sur l'utilisation des pâturages humides; des concentrés et des fourrages sont fournis uniquement pendant les périodes hivernales rigoureuses. On estime qu'une ferme d'une taille moyenne de 40-70 buffles est viable sous le système extensif et semi-intensif, respectivement. Des mesures structurelles sont proposées pour le secteur.*

Mots-clés. *Production animale extensive – Gestion des prés – Terres humides – Diversité génétique.*

I – Introduction

Buffalo livestock farming (*Bubalus bubalis*) in Greece has been demonstrating a stable increase during the past 30 years, from only 312 animals in 1984 to 3,563 animals in 2014 (ELSTAT, 2015).This development occurred simultaneously with considerable developments in Greek markets. First, it was the emergence of modern enterprises with export orientation that boosted the sector; taking advantage of funding opportunities from the Common Agricultural Policy (CAP) and other EU funds, people from areas where buffaloes are traditionally raised in Greece invested on manufacturing, predominantly of meat and much less on milk. The development

from the supply/production side also came as an answer to the increasing demand for buffalo meat by Greeks – nonetheless not for dairy products. A recent study revealed that the addition of buffalo meat in sausages influences the quality and organoleptic characteristics of the products (Petridis *et al.,* 2015), thus creating additional opportunities for manufacturers. However, milk production is not as developed as meat processing; according to Borghese (2013) Greek buffalo farms lack the equipment, know-how and genetic improvement techniques (e.g. artificial insemination) to support this development. Also, there is evidence that the consumption of milk products from buffaloes is increasing, depending on the provision of knowledge and the high nutritional value of these products (Cazacu *et al.*, 2014).

Public awareness concerning the two-fold environmental role of buffalo farming was also an important driver in the development of the sector. First, water buffalo farming can be used for the management of meadows and was proven an important tool not only in controlling the expansion of reeds, but also in the formulation of habitats for wild species in a Greek wetland (Kazoglou, 2011). In general, buffalo is an integral component in the operation of silvo-pastoral systems in environmentally sensitive areas, such as wetlands. In Greece they are reared in RAMSAR sites (Prespes, Kerkini, Porto Lagos, Etoloakarnania) where they utilize in an efficient way the available vegetation, without pressuring the fragile ecosystems (Georgoudis *et al.,* 1999). In addition, the extensive and semi-extensive system has got an almost insignificant carbon footprint, contrary to more intensive systems such as the Italian one, which is more based on the provision of feedstuff and the production of milk and poses the same pressure as conventional dairy cattle production systems (Pirlo *et al.,* 2013). However, the protection and continuation of buffalo farming concerns the protection of indigenous genetic resources. Implementing EU legislation, buffalo farmers are eligible for financial support under the Measure 2.1.4 (Action 3.1) of the Rural Development Program of Greece 2007-2013, as a compensation for the protection of endangered animal genetic resources. Under the forthcoming Rural Development Program 2014-2020, income support will still be provided (Measure 10).

This study presents some aspects of the operation of the system, based on data provided by the Greek Buffalo Farmers' Cooperative. The implications of their managerial decisions are described by comparing them with the findings of relevant studies and based on such data, proposals regarding interventions which would improve the future prospects of buffalo farming in Greece are discussed.

II – Materials and methods

The data presented in this paper were gathered by the Greek Buffalo Farmers' Cooperative (GBFC).These data cover a period of 17 months (January 2014 - May 2015) and include the whole population of buffaloes in country, as members of the GBFC are all the Greek buffalo farmers eligible for financial support under the CAP. The GBFC operates under the supervision of the Centre for Livestock Genetic Improvement (CLGI), a governmental body in charge of the conservation of genetic resources and biodiversity. The CLGI verifies that all the requirements of the Measure 2.1.4 are kept in order for farmers to receive the income support. The two Organizations (CLGI and GBFC) collaborate in keeping herd books and genetic records of all buffaloes protected under EU legislation. Drawing from these data, we present quantitative indicators concerning the reproduction management of buffalo farms and their basic operational and economic profile.

III – Results and discussion

Table 1 presents basic reproduction parameters of the buffalo population. The average duration of the reproductive life of females is 12.2 $\pm$ 4.09 years. During this period a female gives birth 4.8 $\pm$ 1.92 times on average. The first calving takes place at the age of 3.4- 4.0 years (40.3 $\pm$ 8.69 months) and the average duration of pregnancy was calculated to 310-320 days. Borghese

(2013) reported similar results for the age of first calving (36-48 months). These indicators are important for dairy farms, as it was found that the environmental temperature in each lactation period influences milk quality (Zotos and Bampidis, 2014). The calving interval is 18.4 ± 8 months, while the number of calves dying during the weaning period does not exceed 3% and only 2% of calves do not make it to adult age. The annual replacement rate is considerably low (only 6%), which partly explains the expansion of the buffalo population in the country.

Table 1. Reproduction parameters of the population of Greek buffaloes

Parameters	Results
Age at first calving (months)	40.3 ± 8.69
Number of calving during productive life	4.8 ± 1.92
Duration of pregnancy (days)	310-320
Average age at the end of reproductive live (years)	12.2 ± 4.09
Calving Interval (months)	18.4±8
Percentage of buffalo calves dead before weaning	3.23%
Percentage of buffalo calves dead before adult age	2%
Percentage of annual replacement of buffaloes	6%

Table 2 presents technical and economic indicators describing the operation of buffalo farms. The findings indicate the extensive or semi-extensive pattern of production, which confirms that the water buffalo has got very low treatment requirements (Georgoudis *et al.,* 1999). The semi-extensive system mainly differs from the extensive one concerning animal nutrition, as extensive farms do not provide any concentrates to animals, while the former resort to concentrates and forages during winter. Ligda *et al.* (2015) argued against this type of intensification, because it is more costly for farmers, and emphasize that intensification is a result of inadequate management of meadows, which reduces the availability of natural forage for buffaloes. Nonetheless, both systems play important environmental roles in the management of meadows. Females kept under the semi-extensive system gain more weight because of the different nutritional management, thus often reaching 400 kg of weight. Furthermore, additional feedstuff results in higher carcass weights for heifers (60 kg on average) at the age of 24 months. Borghese (2013) reported animal slaughter at a younger age (15-17 months) but almost the same live weight for females (350-400 kg).

Table 2. Basic technical and economic data of Greek buffalo farms

	Farming system	
	Extensive	**Semi-extensive**
Average live weight (female) (kg)	250-300	350-400
Carcass weight (2 y.o.) (kg)	150-180	220-240
Price of barn establishment (€)	10,000-20,000	30,000-50,000
Meat price (€/kg)	4.5	4.5
Average milk yield (kg)*	-	700-1000
Milk price (€/kg)*	-	1.4-1.5
Income payment (€/cow)	312-335	

A major advantage of buffalo farming lies in its low cost of initial establishment, as presented in Table 2. Even under the semi-extensive pattern the value of buildings do not exceed 50,000€, while intensive livestock farming systems require much more costly infrastructure; these buildings are makeshift, constructed with wood and iron plates. Also, no machinery is needed

for extensive farms which do not produce milk and even in cases where milk is produced, milking is performed by hand. Meat prices are higher than the prices of bovine meat, while milk prices are 3-4 times higher than the price of cow milk prevailing in the country; nonetheless, there are not enough data to make comparisons, since milk production is an unorganized and not systematic activity. Note that apart from meat and milk production, the income payment constitutes a vital element of the income of these farms (312-335€/cow).

IV – Conclusions

Buffalo farming, as depicted in this study, constitutes an example of an environmentally and economically sustainable livestock production sector. Especially its economic element of sustainability has become evident during the past few years, as the sector has reacted positively to the increased market demand and started to develop after a long period of decline. The income support is a very important motive for extensive and semi-extensive buffalo farms, however it generates a false image of economic prosperity, which disorients interest from the true economic performance of these farms. The extensive ones profit from the income payment, as their productivity is low and their earnings are based entirely on meat sales and on the availability natural vegetation. On the other hand, the income of semi-extensive farms is more diversified, but their operational costs are burdened by the provision of feedstuff, so the income payment constitutes a tool for covering these expenses and becoming more market-oriented. Both types of farms perform environmental and social functions, but their roles are different when it comes to the future of the sector. Extensive farms will keep on playing an important role in the management of meadows, safeguarding environmental benefits. Nonetheless, the semi-extensive ones will be able to support the systematic development of milk production, through genetic improvement programs. Despite the inevitable intensification of their production pattern, they will be able to expand their market orientation, become less dependent on EU funds and support the overall development of the sector in the following years.

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