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Livestock farming systems in the eastern Italian Alps: Ecosystem services and product quality

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Abstract. This paper analysed the trends of the livestock sector in the eastern Italian Alps, and then examined different case studies focusing on the possible strategies to generate added-value for local products and on the ecosystems services provided by mountain farms. In the last twenty years the number of livestock farms has decreased (-38%), while the average herd size has increased. Alpine summer farms decreased less, but showed a radical change in livestock and especially pasture management. Since only the maintenance of a territorial network of traditional cattle farms is able to contrast the abandoning of grasslands, this evolution resulted into an important reforestation of permanent meadows and pastures (–18%), which host a rich plant and animal biodiversity. In many areas, extensive farms have to deal with constraints and opportunities of the Natura 2000 network, and are increasingly exposed to conflicts with wildlife. An important role for the valorization of traditional and low input livestock farms is played by recognition of products quality [e.g. Protected Designation of Origin (PDO) label, and Slow Food presidia]. In addition, the evaluation of livestock farms sustainability in mountainous areas should also take into account their ecosystem services, for which specific indexes are needed.

Keywords. Livestock farms – Eastern Italian Alps – Products quality – Ecosystems services.

Les systèmes d'élevage dans la partie orientale des Alpes italiennes: services écosystémiques et qualité des produits

Résumé. *Cet article analyse les tendances du secteur de l'élevage dans les Alpes italiennes orientales et examine différentes études d'une part, sur les stratégies possibles pour générer une valeur ajoutée pour les produits locaux et d'autre part, sur les services d'écosystèmes fournis par les exploitations de montagne. Au cours des vingt dernières années, le nombre de fermes d'élevage a diminué (-38%), tandis que la taille moyenne des troupeaux a augmenté. Le nombre de fermes Alpines d'été a moins diminué, mais elles ont connu un changement radical dans l'élevage du bétail et en particulier dans la gestion des pâturages. Étant donné que seul le maintien d'un réseau territorial de fermes bovines traditionnelles semble en mesure de ralentir l'abandon des prairies, cette évolution a conduit à un important reboisement permanent des prés et des pâturages (-18%), qui sont les habitats préférés des nombreuses espèces de haute valeur naturelle. Un rôle important pour la valorisation des fermes d'élevage traditionnelles est joué par la reconnaissance et la valorisation économique de la qualité des produits (par exemple par l'étiquette appellation d'origine protégée AOP et le Convivium Slow Food). En outre, l'évaluation de la durabilité des fermes d'élevage dans les zones montagneuses devrait prendre en considération leur production de services écosystémiques, pour lesquels il est nécessaire d'identifier indicateurs spécifiques.*

Mots-clés. *Fermes d'élevage – Alpes italiennes orientales – Produits de qualité – Services écosystémiques.*

I – Introduction

Livestock farming systems in Alpine regions have experienced a dramatic decline in the last decades, with important structural and management changes. The first aim of this paper is to analyse trends of the livestock sector in the eastern Italian Alps. We then discuss the ecosystems services provided by mountain farms and the different possible strategies to generate added-value for local products by examining literature case studies.

II – Evolution of livestock systems in the eastern Italian Alps

Eastern Italian Alps cover the provinces of Trento, Bolzano, Belluno, and the mountainous municipalities of the provinces of Verona, Vicenza, Pordenone and Udine, bordering with Austria and Slovenia. As a result of the abandoning and intensification processes that affected all the Alpine agriculture, in the eastern Italian Alps cattle farms decreased by 45% from 1990 to 2010; the number of animals decreased much less (-18%), and hence herd size increased by 49% (Table 1). These trends were much stronger in the 1990-2000 decade than in the following one. In addition, they differed greatly within the area: in Trentino-Alto Adige traditional farms based on local forage systems were abandoned much less than in Friuli Venezia Giulia (data not shown in the Table). Sheep and goat farms changed with similar patterns, with the exception of the number of heads, which increased for both species. Cattle farming is now largely predominant over sheep and goat farming. The cattle farms that have survived can now be classified into a variety of systems (Table 2), which represent different steps in the shift from the original, seasonally transhumant system based on the use of local forage resources with autochthonous breeds to a modern, intensive system with highly specialized breeds fed total mixed rations and concentrates.

Table 1. Evolution of livestock systems in eastern Italian Alps (ISTAT, 2013)

	Year of census			Variation (%)		
	1990	2000	2010	1990-2000	2000-2010	1990-2010
Cattle						
Heads	301,178	268,302	247,242	-10.9	-7.8	-17.9
Farms	21,702	14,556	11,934	-32.9	-18.0	-45.0
Heads/farm	13.9	18.4	20.7	32.4	12.5	48.9
Sheep						
Heads	53,989	70,073	84,889	29.8	21.1	57.2
Farms	2,819	2,877	2,175	2.1	-24.4	-22.8
Heads/farm	19.2	24.4	39.0	27.1	59.8	103.1
Goat						
Heads	19,566	26,633	23,264	36.1	-12.6	18.9
Farms	2,128	2,318	1,472	8.9	-36.5	-30.8
Heads/farm	9.2	11.5	15.8	25.0	37.4	71.7

Many farms now move only dry and replacement cattle to summer pastures, and cheese production in summer farms is much less frequent than in the past. Summer farms with facilities for housing dairy cows and cheese making are highly demanded, but many units have not been renovated to meet these requirements (Sturaro *et al*., 2013b). Beef fattening farms are rare, but in certain areas mixed beef farms, often conducted part-time and resulting form the abandoning of milk production, are present (Table 2).

III – Quality of the dairy products in the eastern Italian Alps

The quality and the value of the traditional mountain dairy products is linked to many factors including production area, forages utilized, animal characteristics, farming practices, and milk manufacturing. Cheeses produced in eastern Italian Alps often have better organoleptic and nutritional properties than lowland products (Cozzi *et al*., 2009). The Protected Designation of Origin (PDO) label covers the products of a given geographical area that comply with a detailed specification of the

Table 2. Cattle farming systems in the eastern Italian Alps. Adapted from Bovolenta *et al.* (2011), Sturaro *et al.* (2013a)

	Traditional dairy			
	Original	**Stationary**	**Modern dairy**	**Beef**
Herd size (n)	<20	20-30	>40	<40
Breeds[(1)]	L, DP, B	DP, L, B, HF	HF, B	SB, M
Seasonality[(2)]	Yes	No	No	Yes
Milk yield (kg/d)	< 20	20-25	>25	–
Housing	Tie Stall	Tie Stall	Loose	Loose, Tie Stall
Use of TMR/silages[(3)]	No	In part	Yes	No
PDO[(4)] cheese	yes	In part	No	–
Summer pastures	All cows	Replacement(R)	No or R	In part

[(1)]: listed in order of frequency for each system. L = Local; DP = Dual Purpose; B = Brown; HF = Holstein Friesian; SB = specialized beef; M = mixed. [(2)]: avoidance of calvings before and during the use of summer pastures. [(3)]: TMR= Total Mixed Rations. [(4)]: PDO= Protected Designation of Origin.

production chain and of the product quality. The PDO cheeses produced in the eastern Italian Alps are listed in Table 3. Some of them are partially or mainly produced also in lowland areas. Hence, the PDO specifications are unable to protect the mountain productions, and additional labels are needed. The Grana Padano produced in Trento province (entirely alpine) has obtained a specific geographic indication “Trentingrana”. Asiago and Montasio produced in the homonymous, original upland areas are labeled as “Mountain product” (MP), an optional quality term, for products with PDO labels, established by a national law (L. 289/02, Art. 85, Mipaf 30/12/03). This option has also been recently provided by Reg. UE n. 1151/2012. Recently, PDO Montasio produced with the milk of the local and most frequent breed has received the additional label ‘Only Italian Simmental breed’ (Romanzin *et al*., 2013). For various, but not all, PDO cheeses feeding restrictions require a predominant use of local forages and exclude silages, especially maize silage.

Table 3. PDO cheeses produced in the eastern Italian Alps (Bovolenta *et al*., 2011)

	Alpine production		
PDO Cheese	**Total/partial**	**Amount (,000 T)**	**Feeding restrictions[(1)]**
Asiago	P	418	None for PDO; No silages for PDO-MP
Montasio	P	450	None
Monte Veronese	P	N.A.	None
Piave	T	2,356	≥ 70% of forage and 50% total diet DM from PDO area
Puzzone di Moena	T	396	No TMR or silages; ≥ 60% of forage from PDO area
Spressa delle Giudicarie	T	150	Hay from permanent meadows ≥ 50%; No silages
Stelvio	T	1,112	≤ 15 kg/d grass silage, no maize silage Trentingrana
(Grana Padano)	T(P)	3,515	≥ 75% feeds from PDO area; ≤ 50% concentrates

No silages for Trentingrana [(1)]: certain PDO exclude specific and uncommon by-products or supplements, not mentioned here.

The price of milk processed for PDO and MP cheeses, but also for many unlabeled local, traditional cheeses, is higher than that processed into other cheeses. This is important for the traditional farms that, in contrast with modern ones, do not use maize silage and can have therefore access to these production chains (Sturaro *et al*., 2013a). In addition to these labels, also "Slow Food Foundation" Presidia sustain local productions (e.g. the Monte Veronese cheese) or traditional processing methods (e.g. *Latteria Turnaria*, a kind of dairy managed directly in turn by farmers), and local breeds (e.g. Grigio Alpina cow).

IV – Ecosystems Services of livestock farming: case studies

Non-productive functions of livestock farming in Alpine regions include grassland maintenance, protection of natural and domestic biodiversity, maintenance of landscape attractiveness, and custody of cultural heritage, which can be classified as "ecosystem services" (MEA, 2005). In eastern Italian Alps, meadows and pastures declined by 17% during 1990-2010. The natural re-afforestation of abandoned meadows has been particularly massive in steeper areas and in the valleys slopes (Cocca *et al.,* 2012), where grasslands host a richer biodiversity (Marini *et al*., 2011). Along the bottoms of the main valleys re-afforestation has been less pronounced, but many meadows have been converted into arable crops by modern farms, which may also incur in the risk of excessive nutrients output per unit of land (Sturaro *et al*., 2013a). Both these processes have also been detrimental to landscape attractiveness. For livestock farms located in Nature 2000 areas, the implementation of management plans will introduce regulations or limitations to management practices. Incentives will depend on agricultural policies, and hence on their link, which presently is uncertain, with the environmental policies. Following re-afforestation, wild ungulate populations have largely increased, and damages to meadows and pastures by wild herbivores are an emerging problem (Marchiori *et al*., 2012). The recent return of the wolf (*Canis lupus*) will increase, in the next future, the conflicts between wildlife and livestock farming.

V – Conclusions

Livestock farming in eastern Italian Alps suffered a strong abandonment in the last 20 years, although with a lower rate in the last decade than in the previous one. Farming systems are now heterogeneous, with a strong prevalence of dairy cattle farms. The link between traditional dairy farms and PDO and other traditional cheeses contributes to reducing the economic handicap with respect to the intensive farms, and in some cases the guidelines for PDO cheeses production help guarantee the supply of ecosystem services. In fact, only the traditional farms are able to use autochthonous breeds, to maintain grasslands and their biodiversity with extensive practices, to make full use of summer pastures, and conserve the traditional landscape. In addition, these farms are more often subjected to Natura 2000 regulations and exposed to increasing conflicts with wildlife. Therefore, the future of grassland-based systems will depend not only on remuneration from high added-value products but also on regulation and compensation of ecosystem services (EEA, 2010). A comprehensive evaluation of livestock farms sustainability in mountainous areas should also take into account their ecosystem services, for which specific indexes, to be implemented in LCA methods, are needed.

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