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# Towards a pan-European typology of sheep and goat farms: A meta-analysis

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**Abstract.** The objective of this work was to develop a single pan-European typology of sheep and goat farming systems. Initially a thorough review of all the available literature was undertaken and a total of 45 typological studies were identified. A meta-analysis of these typologies led to the formation of a “broad typology” that specified 13 types of sheep farms and 5 types of goat farms. This typology included types described by their prevailing characteristics such as the level of grazing and intensification, production aims, their environmental impact and awareness and the level of technology uptake at farm level. These types were not discrete and mutually exclusive to all countries, so in a second step they were refined using inputs and knowledge of industry representatives of the sheep/goat sectors across several European countries and Turkey. This process led to the production of the final typology that consisted of five types for sheep farms and five four types for goat farms. Farms of cross-cutting characteristics such as organic, PDO, PGI, pluriactivity etc. were included under these farm types when appropriate.

**Keywords.** Sheep and goat farming – Production systems – Typology – Meta-analysis.

## *Vers une typologie pan-européenne des fermes ovines et caprines: une méta-analyse*

**Résumé.** L'objectif de cette étude était de développer une typologie pan-européenne unique des systèmes d'élevage ovines et caprines. En premier lieu, la littérature associée avec les typologies a été analysée et en total 45 études typologiques ont été identifiées. Une méta-analyse de ces typologies a conduit à la formation d'une "typologie étendue" qui spécifiait 13 types de fermes ovines et 5 types de fermes caprines. Cette typologie comprenait des types décrits par leurs caractéristiques actuelles telles que le niveau d'utilisation de pâtures et d'intensification, les objectifs de production, leur impact et sensibilisation environnementaux et leur niveau d'adoption de technologie. Ces types n'étaient pas discrets et mutuellement exclusifs pour tous les pays. Dans l'étape suivante, ces 18 types ont été raffinés à l'aide de connaissances des représentants des secteurs ovins et caprins dans six pays européens et en Turquie. Cette méthodologie a conduit à la formation de la typologie finale qui comprenait cinq types pour les élevages de moutons et cinq types pour les élevages de chèvres. Les caractéristiques telles que la production organique, l'AOP, l'IGP, la pluriactivité, etc. ont été incluses dans ces types comme de caractéristiques transversales.

**Mots-clés.** Production ovine et caprine – Systèmes de production – Typologie – Méta-analyse.

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## I – Introduction

Uniform policies, interventions and strategies are not appropriate for farmers and production systems, which are characterised by a high level of heterogeneity (Mađry *et al.*, 2013). The detection and grouping of homogeneous fractions within these systems can serve as a useful tool to propose better targeted policy measures and strategies (Barrantes *et al.*, 2009), achieve improved management practices and higher economic performance (Gelasakis *et al.*, 2012) and delve into the interrelations among factors that govern their operation (Milán *et al.*, 2011; Riveiro *et al.*, 2013).

Typology refers to an established methodology that groups farms with similar features and leads to the formation of clusters (farm types) comprised of relatively homogeneous production units. In livestock production systems, structural and technical characteristics, management and flock size, intensification level, feeding management, socio-economic and environmental attributes, productivity and workforce constitute the main criteria of the typification task (Girard *et al.*, 2001).

The objective here was to develop a new common typology for sheep and goat farming systems in seven countries (Greece, UK, Spain, Italy, France, Finland and Turkey) that will represent the diversity of the small ruminant sector across the European Union and Turkey. This typology will allow for consistent farm assessments and comprehensive policy recommendations. It will also help sustainable innovations to be identified and introduced in the existing diverse farm production systems in view of their different challenges and production aims.

## II – Methodological approach

The identification of the farm types was based on a meta-analysis that included an extended review of the relevant literature on typologies and information collected through an industry survey. Initially, the profile of the sector in each participating country was described to obtain a general understanding of the sector in each country. The next step involved a review of the existing typological surveys such as scientific papers, studies, reports and official typologies as recognised in each country by Ministries, Institutions, organisations, etc. An on-line survey was also addressed to 17 sheep and/or goat industry organizations in the EU and Turkey with the aim to deduce additional information about existing farm types of sheep and goat systems that prevail in each country, ensuring a bottom-up approach in the identification of farm types. A meta-analysis of the existing typological surveys resulted in a tentative list of farm types (i.e. a “broad” typology), which was presented for further discussion at a workshop in the Mediterranean Agronomic Institute of Zaragoza, Spain. The workshop was attended by delegates from research and industry organizations and following group discussions, participants agreed on a final typology, where the number of the proposed farm types was further reduced and specific and mutually exclusive farm types were established.

## III – Results and discussion

### 1. Tentative list of farm types: “Broad Typology”

The identification of farm types in this extended and tentative “broad” typology was mainly based on indicators frequently used in the literature or those identified through the online survey. These indicators were: i) intensification of the production system, ii) farm location iii) farm size, iv) grazing management practices, v) dependency on external feed inputs, vi) milk or meat production and vii) on-farm processing. Indicators of national/regional importance, such as product characteristics (PDO and PGI products; organic production), active environmental role or farm pluriactivity were also taken into consideration.

#### A. Description of sheep production systems

**1. Farms with confined kept sheep and great dependence on purchased feed:** Intensive dairy sheep farms that feed exclusively on purchased concentrates and forage (no arable land) and in which animals have zero or very limited access to pasture. Relatively large farms with modern infrastructure and high investments, often applying technologically advanced production practices.

**2. Farms with confined kept sheep and provision of home-grown feed:** Intensive dairy sheep farms that depend mostly on concentrates and forage produced on-farm, but in which animals have

very limited access to pasture. Those are usually large farms with modern infrastructure and high investments that cultivate relatively large areas of arable land.

**3. Semi-extensive dairy farms:** Semi-extensive dairy sheep farms with traditional infrastructure and low investments. Feeding is mainly based on grazing, which is supplemented with forage and concentrates produced on-farm.

**4. Dual purpose farms:** Dual-purpose refers to intensive or semi-intensive sheep farms, where milk is more important economically than meat (e.g. 70:30 in most Greek farms) or another product, such as wool in the UK. They use relatively new technology but with low levels of innovation.

**5. Traditionally managed farms:** Traditional both in terms of management and organisation with sheep mostly grazing on natural grasslands. Although they can be found in many areas, they are more typical of mountainous areas and less favoured areas (LFAs).

**6. Low input meat farms:** Semi-extensive meat producing sheep farms with low stocking rates. Found in mountainous areas and LFAs, or lowlands with low quality of rangelands. One of their basic characteristics is the low level of organisation in reproduction practices.

**7. Medium input meat farms:** Semi-intensive specialised fattening sheep farms. Management focuses on intensifying lamb meat or on heavy carcass sales.

**8. High input meat farms:** Intensive fattening sheep farms with high stocking rates and large flocks. Mostly located in lowland areas (most commonly in France and Finland) with low grazing and high reliance on, usually home-grown, forage and concentrates. These farms use heavy breeds bred for meat traits, focusing on heavy carcasses rather than prolificacy.

**9. Cheese producing farms:** Semi-intensive farms manufacturing cheese on-farm. They graze good quality feed, covering their nutritional needs by more than 50%. Mostly situated in highland areas or LFAs. More common in France (local breeds utilising mountain pastures).

**10. Pluriactive farms:** Sheep farms engaging in at least one economic activity other than sheep production. Their other key characteristic is their family character, with labour being predominantly supplied by family members, including for other off-farm incomes and on-farm activities. They are found all over Europe.

**11. PDO specialist farms:** Small farms with low competitiveness in “industrial” markets but with important environmental, social, economic and cultural roles. These farms usually produce location-specific products that they rely on for survival and are managed according to the standards of their PDO products.

**12. Organic/eco farms:** Environment-friendly and/or organic small/medium sheep farms. Commonly, these farms rear local breeds (e.g. in Turkey).

**13. Intensive organic/eco farms:** Large organic sheep farms with an entrepreneurial orientation. Farms specialise mostly in milk production, or are dual-purpose.

## ***B. Description of goat production systems***

**1. Traditional meat production farms:** Extensive and semi-extensive systems, situated mainly in LFAs and featuring local breeds, which usually achieve low milk yields. Farms are characterised by low investment in facilities and machinery and use family labour. In most cases these farms survive because of their important environmental role in specific regions.

**2. Pastoral dual purpose farms:** Low-input farms where animals mainly graze throughout the year. These low-input farms generally have poor facilities, although most of them have adopted mechanical milking and supplemental feeding. These farms can be transhumant.

**3. Pastoral dairy farms:** Semi-extensive farms that rear local breeds specialized in dairy production. Supplementary feeding contributes more than grazing. Milk yields are higher than in dual purpose systems and the farms are characterised by high investments.

**4. Confined dairy farms:** Large intensive farms applying advanced technology. Characterised by high milk yields and require high inputs. Mostly depend on concentrates and forage and less on grazing.

**5. Cheese making farms:** These are intensive and semi-intensive farms located in France. These specialised small farms depend heavily on grazing.

## 2. Final Typology

This initial list of farm types (the 'Broad' typology) was elaborated with the participation of research and industry organizations from all countries involved. It was apparent that a consistent definition on the terms "intensive" and "extensive" was necessary to be used across all countries. Based both on farm practices and literature, the distinction between "extensive" and "intensive" farm types was based on the level of input of purchased feedstuffs, complemented with information about stocking rate and/or grazing duration if needed. The outcome of this process, which represents the final 'narrow' typology, included ten farm types in total (5 for sheep and 4 for goats; the third farm type does not exist for goats) that are mutually exclusive and of importance in analysing the European sheep and goat sector:

- i) Intensive dairy farms (e.g. high input of purchased feedstuff)
- ii) Semi-intensive or extensive dairy farms (e.g. normally pasture fed animals)
- iii) Intensive meat farms (e.g. high input of purchased feedstuff)
- iv) Semi-intensive or extensive meat farms (e.g. normally pasture fed animals)
- v) Dual-purpose farms (farms where the farmer sees value in 2 or more different products e.g. meat and wool, meat and dairy).

## IV – Conclusions

The most common approach for the classification of diverse farming systems is the statistical (quantitative) method, which, however, requires large quantities of farm-level data and it is a complicated and time-consuming exercise. In this study, a qualitative approach was developed to define a pan-European typology of sheep and goat farms based on a meta-analysis of typological surveys. This approach produced 9 final farm types and each one of these types also accounted for a broad range of sub-types of farms, with differences in their size, economic and environmental role, production systems, farming practices and local/regional/national and intra-national importance. In addition, these types vary as to their relevance in innovation adoption, but also as to their needs in specific types of innovation. This final typology constitutes a basis for the description of the multiple sheep and goat systems in the continent and may serve as an important tool in addressing common problems and challenges without adversely affecting the uniqueness of European production systems.

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