



Short communication

The ovine variety “Merino de los Montes Universales” and its good adaptation to traditional transhumant breeding system

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ARTICLE INFO

Keywords:

Transhumance

“Merino de los Montes Universales” ovine variety

Adaptation to walking journeys

Stress reduction

ABSTRACT

The “Merino de los Montes Universales” (MMU) is a variety still involved in traditional long distance transhumance: these herds walk for 24 days to complete a 580 km journey, twice a year, between the summering province of Teruel (Aragón, Northern Spain) and Jaén (Andalucía, Southern Spain), where they spend the winter. MMU morphology is adapted to this breeding system: for instance, the mean weight is limited to 81.5 kg in rams and 56.62 kg in ewes while they present short longitudinal diameter (83.44 cm in rams and 68.81 cm in ewes) and large height at withers (80.55 cm and 65.21 cm for rams and ewes, respectively). In all, this morphology ensures MMU ability to carry out the long walking journeys. The walking transhumance allows MMU feeding by extensive grazing throughout the year, promotes natural lactation, protects the animals from extreme temperatures, and keeps the herds in close contact with the environment. It therefore promotes an existence similar to that of wild small ruminants in the Iberian Peninsula, while not requiring high annual replacement rates (15%, compared to 16–18% in stationary flocks in the same region). It also reduces stress by avoiding mechanical transport and by making claws trimming unnecessary, since claws growth and wastage cancel each other along the year. The changes in the claws associated to the walk have been directly measured in a set of 18 ewes: even if some modifications are statistically significant in the forelimb, they are not associated to lameness or discomfort in the animals.

1. Introduction

Transhumance is the most ancient sheep breeding system known in the Iberian Peninsula (Avieno, 2000). It consists in the alternation of wintering and summering grazing fields by practicing seasonal migrations. Herds spend the summertime in mountainous areas (mainly in the North) and they move to the warmer low altitude areas (mostly in the South) during the cold period. In this way, the animals have access to extensive grazing throughout the year: neither the warm south areas nor the cold northern regions could provide sufficient food sources unless they are used to complement each other (Ramo, 2017). The Spanish legislation protects the extensive network of routes used by the herds since the Middle Ages (Klein, 1920). The reduction in the feeding cost (mainly in the wintering season) is substantial in transhumant Merino de los Montes Universales (MMU) reaching 21 euros/ewe. Total expenses are minimized when transhumance is totally based on walking (Manzano and Casas, 2010).

Long distance transhumance is an essential part of the

environmental equilibrium too: its role is critical in the prevention of fires and avalanches, seed dispersal etc. These “ecological services” are beneficial for the whole community even if they have no direct economic value (Hoffmann et al., 2014; Manzano and Casas, 2010). This system also allows permanent human habitation in a semi-deserted high altitude mountainous area (1,400–1,900 m) where other economic activities (such as agriculture and industry) are deeply impaired (Ramo, 2017); a rich historical, cultural and social legacy is also preserved (Sierra, 1990).

As a result of social and economic changes in the last century, transhumance has declined substantially throughout Europe (Liechti and Biber, 2016). In Spain, the use of the railway (later of trucks) reduced the duration of most of the movements in the XXth century, although the financial costs increased. In the years preceding 2008, the MMU flocks only walked in the autumn journey. In the last decade, the increase in the costs (mainly of the concentrate food and of the transport) prompted most of the herdsmen to walk in the way towards the north too, following the traditional paths or “cañadas” (Casas and

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Manzano, 2010).

A variety of the Merino ovine breed denominated “Merino de los Montes Universales” (MMU) still persists in the Community of Albarracín (Teruel, Spain). As of 2016, a total of 8,925 MMU ewes grouped in 14 flocks (Ramo, 2017) undertook transhumance by walking for 24 days along the “Cañada Real Conquense”, a 580 km route between Guadalaviar (Teruel) and the areas of Vilches or La Carolina in the southern province of Jaén (Supplementary Fig. 1). These flocks travel south in November and spend six months in this location (December to May). In June they travel north and stay for four months in the “Montes Universales” mountains of the Community of Albarracín (July to October). In all cases the owners of the ewes act as shepherds. For the last ten years, direct veterinary services have been provided to both transhumant and stationary MMU producers by one of the authors of the present report (Ramo). This position ensures direct observation of the factors involved in this kind of breeding, as of the procedures applied in the day-to-day practice. Moreover, since 2010, MMU transhumance has been included in the teaching programme at the Faculty of Veterinary Sciences in Zaragoza (Spain) as an optative subject. Its main activity is the walk accompanying the herds in both ways. In one week turns, students and professors have the chance to observe the animals and to provide veterinary assistance in case of need. Any incidence is registered in a diary and a final report is produced in each season.

In the first line of his seminal work, Broom (1986) defines the welfare of an individual as “its state as it regards its attempts to cope with its environment”. Besides this definition, the one proposed by perfectionism (Appleby and Sandøe, 2002) can be easily accepted for transhumant MMU herds: welfare defined as natural living or physical fitness.

Moreover, public interest in the livestock life conditions is growing among different sectors of society in the last decades. In general, illness and pain associated with production procedures were among the greatest concerns. Lameness was perceived as one of the most worrying causes of ovine discomfort (a mean of 3.57 on a scale of 1–5) in a recent survey among four groups of stakeholders (Doughty et al., 2017): general public (3.9 in the same scale), sheep producers (3.05), service providers (3.46) and sheep industry related scientists (3.49).

Current MMU animals are the result of centuries of genetic improvement in order to adapt them to outdoor natural environment and to the preservation of the ability to walk during the above described seasonal migrations. The goal of the present study is to analyse the adaptation of MMU sheep to the transhumance in Spain. For this purpose, different aspects will be described, including body morphology (body weight, longitudinal diameter, height and body indices), the effects of walking along the transhumance routes on the hooves and other aspects of management of the herds and their possible implications.

Overall, and in agreement with the two welfare definitions explained above, the transhumant MMU herds walking thought the “cañadas” are allowed to live in harmony with natural environment and to live a life comparable in many aspects to that of wild small ruminants in the Iberian Peninsula. Together with the ecological benefits provided by transhumant herds, this may be the base for a differentiated commercialization of products leading to the survival of this ancestral production system.

2. Material and methods

2.1. Animal material

The total stock of transhumant MMU ewes have been submitted to veterinary control in the last ten years by the one of the authors (Ramo) and, therefore, direct observation data on their conditions and on flock management are available.

2.2. Body measurements

As for body conformation analysis, 67 adult females (totally healthy according to visual inspection, from two different herds, two to three years old, not pregnant and at least having had one parturition) and 9 males (totally healthy, two years old, from two different herds) have been weighted and measured in the last week of October, prior to the autumn journey, according to the procedures proposed by Herrera and Luque (2009) to describe body morphology. Besides weight (W), the longitudinal diameter (LD, measured horizontally from the cranial-lateral extreme of the scapula-humerus articulation to the most caudal point of the ischial tuberosity), the height at withers (HW, measured vertically from the floor to the highest point of the withers) and the dorsal-sternal diameter (SD, measured vertically from the lowest point of the withers to the ventral border of the sternum, just behind the elbow) were recorded.

2.3. Hooves measurements

A set of 18 adult ewes was randomly chosen in a single herd maintained according to the general procedures. The inclusion conditions were these: two years old, not pregnant, maintained under transhumant management, submitted to the ordinary veterinary control procedures and having no previous pathology. Podal pathology has not been recorded in any animal in the herd in the previous wintering season. Measurements were carried out the day immediately before and immediately after the transhumant walk along the “Cañada Real Conquense” in the 2016 spring moving towards the north. The measurements, following Ferrer and Ramos (2009), are denominated A (from the coronary band to the frontal extreme of the toe tip), B (height of the heels, from the coronary band to the floor) and C (horizontal length from the toe tip to the heels), as seen in the Supplementary Fig. 2.

2.4. Statistical procedures

SPSS software version 24.0 was used to analyse data obtained from the corporal measurements. It was also applied to the Analysis of Variance (ANOVA) with repeated hoof measurements. For ANOVA, three factors were analysed. The first was the exact moment of the measurement (before or after the transhumant walk); the second was the position of the claw (lateral or medial); finally the position of the claw in either the forelimb or the hindlimb. As the three factors were considered simultaneously, the Bonferroni correction was applied to prevent increasing the risk of the alpha error (acceptation of an existent statistically significant effect).

3. Results and discussion

3.1. Corporal measurements and adaptation to transhumance

Table 1 presents a summarised description of the weight (W), the longitudinal diameter (LD), the height at withers (HW), and the dorsal-sternal diameter (SD) in MMU. As expected from sexual dimorphism, all these values were significantly higher in rams than in ewes ($p < 0.001$). Even if relatively wide ranges are observed for the four measurements, the 95% intervals are narrow, especially in the ewes: most females are in the range of 55.15–58.08 kg (77.88–85.12 kg in rams). For HW, the 95% interval is 64.62–65.80 cm in ewes and 78.25–82.84 cm in males. The intervals for LD and DSD are 67.62–69.39 cm and 29.62–31.71 cm in ewes and 80.79–86.08 cm and 35.4–39.70 cm in rams.

The mean value of the LD/HW index is low in MMU: 1.05 in ewes and 1.03 in rams. Highly prize carcasses are traditionally described to be broad and long and to show short and muscled legs (Hirzel, 1941). Nowadays, the general aspect of MMU does not comply with this

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