



Influence of climatic factors on the development of pneumonia in lambs

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ABSTRACT

Pneumonia is responsible for important economical losses in the sheep industry in Spain and many other sheep-rearing countries, being the main cause of lamb death, and of losses due to condemnations in abattoirs and of drug costs. This respiratory syndrome is a complex disease involving the relationship between host and environment. The present study analyses the influence of environmental factors on the development of pneumonia in lambs. Statistically significant correlations were found between pneumonia as a cause of lamb death and climatic factors such as rainfall, humidity and intensity and direction of wind. The type of farm building was also an important factor to take into account in order to improve the prevention of pneumonia in lambs. Moreover, the age of the lambs was seen to be a significant item in the study of pneumonia. Respiratory pathology increased from 23 days of age. This fact permits the implementation of measures from birth to 23 days with a view to reducing pneumonia and its negative influence on lamb production. The paper discusses the practical implications of these findings for sheep production.

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1. Introduction

Respiratory problems are common and relevant diseases of sheep in all the major sheep-rearing countries. They cause mortality in lambs, reduced growth and an important economic impact in drug costs and condemnations in abattoirs (Jones et al., 1982; Moreno, 1994; Cano et al., 1995; Goodwin et al., 2004). Lamb pneumonia is regarded as a complex disease, involving interaction among host, (immunological and physiological), multiple agents, (bacterial, viral, mycoplasma) and environmental factors (Brodgen et al., 1998). There is a lack of epidemiological surveys, although, in some studies, the abattoir pathology data have been used to evaluate the influence of environmental

factors on the pneumonia (McIlroy et al., 1989; Moreno, 1994; Luzon, 1999). How the design of the animal installations impact the economy of the sheep flocks is one of the questions farmers frequently ask. In this report, we summarise an investigation into mortality rates in lambs with special reference to the influence of the climate factor in the development of pneumonia in lambs on four farms in Aragon, a traditional lamb producing area located in the northeast of Spain.

2. Materials and methods

This study was performed on four farms producing young lambs for meat. In this area, lambs are slaughtered when their live weight is between 21 and 25 kg (2–3 months old). The farmers follow a traditional husbandry system, housing sheep in the farm buildings towards the end of pregnancy, just 1 month before birth. Most of them were managed under accelerated lambing, such as the Cornell

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STAR system. In this husbandry system they carry out 3–5 lambing periods per year and 1.5–1.9 lambs are sold per ewe each year. After birth, ewes are kept inside the barn during the lactation period with their lambs and, after weaning (45 days), the lambs are grouped and fattened in separate units within the same barn. The rest of the time, the sheep are managed outdoors. Farm A had 825 ewes and 2857 lambs were delivered in all the period analyzed. Farm B had an average of 472 ewes over the 3 years, and 1961 lambs were delivered. Farm C had an average of 785 ewes with 4155 lambs delivered. Finally, farm D had 365 ewes and 1713 lambs were delivered. The mortality rates in each farm over the 3 years were 7.21%, 7.70%, 4.74% and 5.02% on farms A, B, C and D, respectively. Within this traditional husbandry system, we chose these farms because they had different housing designs. Farms A–C facilities were built recently (in the last 10 years), but farm D facility was an old structure more than 50 years old. Building C has the best ventilation system, the barn was well orientated, transversal to the main northwest wind, which permitted the elimination of contaminated air. Buildings A and B were well constructed but the orientation was at an angle of approximately 45° to the main winds, therefore, when the northwest wind blew, it created draughts inside the barn. In addition, the buildings on farms A and B had large doors and windows on the northwest side facing the predominantly cold winds in this area. Every morning, the farmer opens these doors to feed the ewes and lambs. This fact produced dramatic changes in the barn environment with the generation of draughts at certain moments of the day. Farms C and D had no doors on the northwest side, but were completely open on the southeast side. The humid and warm southeast wind produced draughts in these barns. Moreover, the old structure of farm D had a very bad ventilation system without any windows in the northwest side to remove the contaminated air. In addition, the ceiling was very low, keeping the less heavy, hot-contaminated air nearer the animals.

Detailed records were collected during the lambing periods from the four farms and necropsy was performed on every lamb found dead for 3 years, from January 2000 until December 2003. At the end of the study, 551 necropsies had been performed, detailing the lesions and, according to these findings, the suspected cause of death. According to the major lesions found in the animals the

following groups were established: respiratory diseases, digestive diseases, starvation, accidents and other causes and they were categorized for different effects for the chi-square analysis. Respiratory disorders were observed in more detail and samples from pneumonic lesions were collected and sent to a microbiology laboratory.

We were interested in the study of the influence of the climatic factor on the respiratory pathology of the lambs reared in different types of buildings. Therefore, several climatic factors were obtained from the Meteorological Station of Tardienta, situated within the geographic area of study. Data of rain, temperature, presence of snow, fog, hail, dew or frost, and the direction and speed of wind were collected every day during the period of study. All these climatic factors were analysed statistically to determine if they had any influence on the presence of pneumonic lesions in lambs. Qualitative variables were analysed by means of logistic regression and the chi-square test. Quantitative variables were analysed with the single factor ANOVA test. The statistical program SPSS 12.0 was used to perform these tests.

3. Results

The evaluation of the causes of death in this study showed pneumonia to be the second most frequent cause (28.7%), preceded by deaths due to digestive disorders (29.2%). These two causes were followed by starvation (22.9%). Respiratory and digestive processes varied according to the year and the flock studied, but, on all the farms, there was a remarkable increase of pneumonic pathology in the year 2003. Dramatic climatic differences were recorded in 2003 compared to the two previous years. 2003 was warmer and wetter than usual in this geographic area ($p \leq 0.05$) and pneumonic processes caused 40% of total lamb death in this year ($p \leq 0.05$).

The highest mortality of lambs was detected during the first 15 days of life, but respiratory processes became the main cause of death in our flocks as from the 23rd day of age, representing more than 60% in the feedlots (Fig. 1). After necropsy, 199 lambs showed one or more types of pneumonic lesions. The predominant respiratory lesion was acute fibrinous bronchopneumonia (66%), but in 2003, septicaemic processes originating in the respiratory

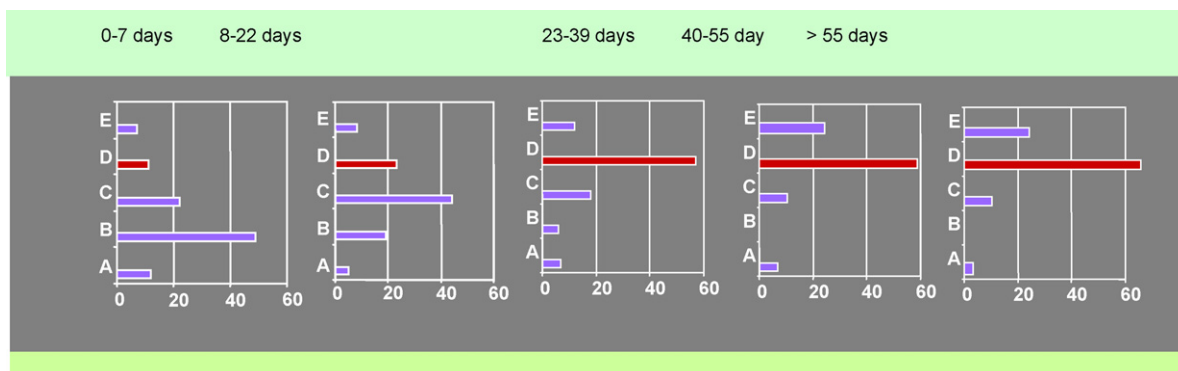


Fig. 1. Mortality rates according to age and cause of the death in lambs: (A) accidents; (B) starvation; (C) digestive disorders; (D) respiratory disorders; (E) others.

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