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Influence of sex, slaughter weight and carcass weight on "non-carcass" and carcass quality in segureña lambs

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Abstract

The effects of sex, slaughter weight and carcass weight on carcass characteristics and meat quality traits were evaluated using 100 Segureña lambs. The management of all lambs was similar prior to slaughter at 19–25 kg. Slaughtered animals with a hot carcass weight below 20 kg were assigned to class B, and those greater than 22 kg to class C. Carcass weight had a significant influence on "non-carcass" components, dressing percentage, subjective carcass conformation, fat deposits, carcass fatness, bone and most carcass measurements. Sex had a significant effect on age at slaughter, "non-carcass" components, rib measurements, dressing percentage, fat deposits, and neck and shoulder percentage. As the weight increased, the carcass measurements also increased. Concurrently, while improving the conformation indices of the carcass, leg and dressing percentages, neither the commercial cuts of the animal nor tissue composition was significantly affected. Sex primarily affected the quantity of all types of fat deposits.

Keywords: Lamb; Carcass; Non-carcass components; Sex; Slaughter weight

1. Introduction

The increasing demand for meat and meat products has led to studies on the carcass and meat characteristics of sheep breeds and the influence of age and weight at slaughter (Field et al., 1990). Criteria for the European carcass classification system in lambs (European Union, 1994) are based on carcass weight, meat colour and degree of subcutaneous fat in carcasses under 13 kg. The classification is also established by comparing photographic patterns. Furthermore, three classes of cold-carcass weight (CCW)

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(≤7, 7.1–10 and 10.1–13 kg) reflect the market price of lambs. Environmental conditions in Spain and the consumer preferences for lamb meat favour the precocious sheep breeds, slaughtered at an early age of 75–90 days (19–26 kg of live weight). The light carcass (9–12.5 kg) includes classes B and C of the European carcass classification system. The Segureña, with 1,275,000 animals raised in the Southeast of Spain, is a rustic-type breed, typical of the Mediterranean region which excel as light lambs. These animals have short wool and ewes weigh 50–65 kg at maturity. The carcass weight of Segureña lamb, in relation to the requirements of both producer and consumer, and influence of sex, were evaluated.

2. Materials and methods

In this study 100 Segureña lambs weaned at 40–50 days of age were fed a creep ration consisting of 88.3% dry matter, 19.2% crude protein, 2.9% crude fat and 5.7% ash, from 15 days. After weaning, the lambs were fed a commercial ration, based on concentrate (88.2% dry matter, 17.5% crude protein, 3.5% crude fat, 8.0% ash) and cereal straw, until slaughter.

All lambs slaughtered at 19–25 kg live weight, were classified (European Union, 1994) and processed according to the methodology of Colomer-Rocher et al. (1988). The digestive contents and offal were weighed. The "non-carcass" body components were grouped into "caidos" (head, skin and feet), "red offal" (lung, trachea, heart, thymus, liver and spleen), "white offal" (empty digestive tract) and "fat depots" (pericardic fat, mesenteric fat and omental fat). The empty live weight (ELW) was estimated by subtracting the digestive content from the slaughter weight (SW). Hot carcasses were weighed (HCW) and graded for conformation (1: poor to 5: excellent), fatness (1: low to 5: very high) and kidney fatness (1: without fat to 5: completely covered with great thickness of fat) using the EUROP system for light lambs (Colomer-Rocher et al., 1988). After chilling at 4 °C for 24 h, carcasses were again weighed to determine the cold-carcass weight.

The objective carcass conformation measurements and indices, as described by Palsson (1939) and Boccard et al. (1958), were as follows: internal carcass length (*L*), hind limb length (*F*), buttock width (*G*), buttock perimeter (BG), thoracic perimeter (PT), thoracic depth (Th), carcass compactness (CCW/L), *G*/*F*, Th/*L*, Th/*G*, *L*/*G*, *L*/PT and hind limb compactness (leg weight/*F*). The carcasses were split along the spine and measured at the cross-section of the 13th rib for maximum width (A) and depth (B) of the *m. longissimus thoracis*, subcutaneous fat thickness (C) along the prolonged line of the measurement B and over the *m. serratus dorsalis caudalis* (J). The subjective evaluation of meat colour (1: pale, to 5: red dark) for *m. rectus abdominis* (Sierra, 1974) was based on chilled carcass (24 h post-mortem). At 24 h post-mortem, the left side was separated into commercial joints (shoulder, neck, ribs, loin, leg, breast and tail) and dissected into muscle, bone, subcutaneous fat, intermuscular fat and tissues (Colomer-Rocher et al., 1988; Fisher and de Boer, 1994). At the same time, the muscle/bone (M/B) and muscle/fat (M/F) indices were determined.

The mathematical model for the analysis of non-carcass and carcass quality included a fixed effect due to sex, body weight class (7–10 and 10.1–13 kg) and residual error. Data were analysed using the Statgraphic four statistical package for Windows. The interaction was not significant and, therefore, excluded.

3. Results

The distribution of the carcasses according to carcass weight and sex is presented in Table 1. Class B included 30% of the slaughtered lambs and the remaining 70% were in class C. Slaughtered lambs weighing under 20 kg were mostly class B carcasses; those over 22 kg were class C and those with 20–22 kg in both classes. Lambs slaughtered at an average of 79 days weighed 21.4 kg (Table 2). There were no significant effect of sex on weight at slaughter, nevertheless, females took 6 days longer to reach slaughter weight.

There were no significant effect of sex on slaughter weight, empty live weight and hot carcass weight, but weight class B and C were different ($P < 0.05$). The average dressing percentage, 48% (CCW/SW) and 55% (HCW/ELW), was greater in females than males and there was a significant and positive effect of slaughter weight. The non-carcass components were 35% of the empty body weight. With increased carcass weight, the non-carcass components/ELW decreased significantly. There were significant effects of sex on the non-carcass components.