

EFFECTS OF FEEDING SYSTEMS,
SLAUGHTER WEIGHT AND SEX ON LAMB
CARCASS CHARACTERISTICS, PALATABILITY,
HISTOLOGY AND FATTY ACID COMPOSITION

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CARCASS CHARACTERISTICS, PALATABILITY, HISTOLOGY AND FATTY
ACID COMPOSITION

ABSTRACT OF DISSERTATION

An abstract of a dissertation submitted in partial fulfillment
of the requirements for the degree of Doctor of Philosophy at
the University of Kentucky

by

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1976

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ABSTRACT OF DISSERTATION

EFFECTS OF FEEDING SYSTEMS, SLAUGHTER WEIGHT AND SEX ON LAMB CARCASS CHARACTERISTICS, PALATABILITY, MEAT YIELD AND FATTY ACID COMPOSITION.

The experiments involving 154 crossbred lambs were undertaken to study the effects of postweaning feeding regime, slaughter weight and sex on carcass characteristics, palatability of meat as well as histology and fatty acid composition of lamb carcasses and adipose tissue.

Mohamed Mahyuddin

Thirty-six ewes and 30 wethers (Experiment 1) and 41 wethers and 41 rams (Experiment 2), were reared at 18 kg and grazed on bluegrass pasture until they reached 11.5 kg at which time 4 (Experiment 1) or 5 (Experiment 2) lambs of each sex were slaughtered. The remaining lambs were randomly assigned (equal sex distribution) to either 13 or 16% crude protein or pasture with or without creep. In Experiment 2, the drying 60% crude protein treatment was omitted. The lambs were slaughtered at their target slaughter weights (41 or 30 kg), chilled at 4°C for 48 hours, graded and carcass data obtained. Carcass moisture, protein, ether extract and ash were determined on ground samples from the right side of the carcass. Samples from the left

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1976

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ABSTRACT OF DISSERTATION

EFFECTS OF FEEDING SYSTEMS, SLAUGHTER WEIGHT AND SEX ON LAMB CARCASS CHARACTERISTICS, PALATABILITY, HISTOLOGY AND FATTY ACID COMPOSITION.

Two experiments involving 154 crossbred lambs were undertaken to study the effects of postweaning feeding regime, slaughter weight and sex on carcass characteristics, palatability of meat as well as histology and fatty acid composition of longissimus muscle and adipose tissue. Thirty-six wethers and 36 ewes (Experiment 1) and 41 wethers and 41 rams (Experiment 2), were weaned at 18 kg and grazed on bluegrass pasture until they reached 31.8 kg at which time 4 (Experiment 1) or 5 (Experiment 2) lambs of each sex were slaughtered. The remaining lambs were randomly assigned (equal sex distribution) to drylot (13 or 16% crude protein) or pasture (with or without creep). In Experiment 2, the drylot 16% crude protein treatment was omitted. The lambs were slaughtered at their predesignated slaughter weights (41 or 50 kg), chilled at 3C for 48 hours, graded and carcass data obtained. Carcass moisture, protein, ether extract and ash were determined on ground samples from the right side of the carcass. Samples from the left longissimus muscle were stained (DPNH-TR, alkaline ATPase and Sudan Black B), and fiber population, fat cell and fiber size were measured.

ABSTRACT OF DISSERTATION (CONTINUED)

Perinephric, subcutaneous and longissimus muscle fat were extracted, methylated and analyzed for fatty acids by gas-liquid chromatography. A rib roast from each lamb was roasted and cooking losses, palatability and shear values were determined. The data were analyzed by regression procedures and simple correlations were determined. Increased slaughter weight caused an increase in dressing percent, quality grade, minimum width behind the scapula, ribeye area, perinephric fat, fat measurements over the longissimus, spine and rib, carcass ether extract percent drip and total cooking loss, but a decrease in percent carcass moisture, protein, shank, neck, kidney and waste bone. Heavier carcasses yielded a lower percent of muscular cuts such as the leg and shank but a higher percent rack, loin, breast and flank. With increased weight β R muscle fiber diameter increased but α R and α W fiber diameters were similar. However, in the second experiment all fiber types increased in size with increased weight. The α R and α W fiber population increased but β R fiber population and perinephric myristic acid level decreased with increased weight. Wethers had a higher dressing percent and quality grade, higher fat measurements over the longissimus, spine and rib, more perinephric fat and more carcass ether extract than either ewes or rams. Wethers had a higher percent

ABSTRACT OF DISSERTATION (CONTINUED)

of loin but a lower percent of neck, and higher carcass moisture than rams. Wethers had a higher α R fiber population but a lower β R population, higher level of subcutaneous stearic acid and lower level of subcutaneous palmitoleic and total unsaturated fatty acids than rams. Intramuscular stearic, subcutaneous oleic and total unsaturated fatty acids were higher in ewes than in wethers. Lambs on pasture without creep had less fat over the longissimus, spine and rib, lower carcass ether extract, perinephric fat and lower panel flavor score but higher carcass moisture than lambs on pasture with creep or fed in the drylot. A 16% crude protein diet in the drylot reduced the amount of perinephric fat and carcass ether extract but tended to increase fat cell size and improve juiciness and shear values. The α R fiber population increased and α W fiber population decreased with increased energy content of the diet. Feeding regime generally affected the long chain (> 18) fatty acids. Lambs fed pasture with creep had less palmitic and linolenic acid but more oleic and total unsaturated fatty acids in their perinephric fat than lambs on pasture without creep.