EFFECT OF ANIMAL TYPE OR TREATMENT ON THE EFFICIENCY OF LEAN MEAT PRODUCTION AND THE FATTY ACID COMPOSITION OF MEAT

THESIS SUBMITTED FOR THE DEGREE OF

MASTER OF AGRICULTURAL SCIENCE

BY

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STATEMENT

I certify that this thesis contains no material which has been accepted for the award of any other degree or diploma in any University and that, to the best of my knowledge and belief, the thesis contains no material previously published or written by another person, except when due reference is made in the text.

DEDICATION

I WISH TO DEDICATE THIS WORK TO

A Mamam, a Papa, a Dene et a tous ceux qui me sont chers, je dedis ce modeste ouvrage

(To my Mother, Father, Dene and all those that are dear to me, I dedicate this modest work

SUMMARY

The consumption of saturated fat is known to be related to the incidence of coronary heart disease in humans. Part of the daily intake of fat by Australians arises from the consumption of red meat from sheep and cattle, but it could be reduced by producing leaner animals than those raised at present. In addition to the advantages of human health, there may be agricultural advantages also in terms of efficiency of production.

The study reported in the thesis examines:

(a) the effect of various breed types (x4) on the growth, body composition (fat content), feed intake and efficiency of conversion of feed to live weight and lean body of grazing sheep.

(b) the effect of androgenic and androgenic plus oestrogenic agents on the growth and body composition of sheep grazing or pen fed roughage or oil seed diets.

(c) the effect of the consumption of lean meat or meat with a modified fatty acid composition on the plasma lipids of other experimental animals.

It was necessary to employ and validate a number of methods and techniques in the study and to analyse a number of markers or metabolites in determining body pool, rates of digesta flow and tissue concentrations. These included:

(a) tritiated water space and calculation of body fat;
(b) azeotropic distillation of hydrogen isotopes;
(c) B-counting of isotopes;
(d) field use of chromic oxide slow release capsules (SRC);
(e) validation of use of SRCs in pen experiments;
(f) analysis of chromium by atomic absorption spectrometry;
(g) muscle biopsy of lambs by needle technique;
(h) thin layer and gas liquid chromatography of muscle lipids.

Following an introduction, the thesis presents a literature review which considers the background of the methods and findings of previous studies carried out on growth, body composition, feed intake of grazing animals, the use of anabolic agents, fatty acid composition of ruminants fats and the effect of saturated fat on human health. The

results are presented in three chapters, each with its own discussion. A general discussion follows.

The experiments carried out in the present study demonstrated a number of points. They were:

(i) The lamb breeds used showed differences in growth rate and body composition under field conditions.

(ii) The most common lamb used in meat production in Australia (Dorset cross breds) deposited fat at an earlier age than the other breeds, while Suffolk cross breds produced the most lean meat.

(iii) The practice of crossing British breeds with common wool producing Merinos lessens the amount of fat in the carcass by slowing down by body growth rate, not by lessening <u>per se</u> fat content at the same body weight.

(iv) Anabolic agents altered the natural composition of a particular breed; an oestrogenic agent implanted in wethers increased growth while an oestrogenic plus androgenic agent increased growth also but lessened fat deposition.

(v) Meat from animals of different fat content when incorporated into an omnivore diet, brought about cholesterol levels that were related to fat intake but were unaffected by meat intake.

(vi) When lambs were fed oil seed that altered their structural lipid to a different fatty acid type, an additional decrease in omnivore cholesterol occurred.

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