



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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1988

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 breeds) deposited fat at an earlier age than the other breeds, while Suffolk cross breeds 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 per se 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.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to Dr B.D. Siebert for his guidance and support in the carrying out of the experimental work and preparation of the thesis. Also I wish to thank Dr J.R. Sabine for his interest in the work.

In addition I wish to thank Beth Howard for her continuous support and training in the estimation of body water in animals.

Dr Phil Hynd kindly gave friendly advice and helped with surgical procedures. My thanks are extended to Misses B. Applebee and D. Cox on Dr Hynd's staff, for being so helpful and pleasant. I also wish to acknowledge Mr B. Cowan for his assistance in the field with special thanks to his sheep dog "Chester".

I must thank David Bohlen also for helping me with the gas chromatography.

Dr Ray Correll of the CSIRO Division of Mathematics and Statistics kindly assisted me. His friendly guidance was of great help. To John Dighton of the CSIRO Division of Soils go my thanks for introducing me to the azeotropic distillation.

Mr G. Lewis kindly provided skillful technical assistance in a lipid laboratory. I wish to thank Ms C. Ween for helping with the care of the animals.

I also wish to acknowledge the general assistance given by Rex Connolly, Tony Weatherly, Henrik Bozik of the Department of Animal Sciences for their continual support and friendship. Mr Ray Norton and the farm staff of the Waite Agricultural Research Institute are gratefully acknowledged for their help.

I also wish to acknowledge the assistance of the Department of Agricultural Biochemistry who assisted me in the completion of my thesis. In this regard the support and friendship of Peter and Ursula Langdrige and Sally Smith is gratefully acknowledged.

I would like to express my deepest gratitude to the Squires family (Vic, Shirley, Courtney and Logan) for acting as my Australian family and supporting me in my absence from my original homeland. Frank Seppelt also supported me in this regard.

I wish to thank Peter Hawryszkiewicz for his help with the printing and Patricia Young for her competent typing.

Finally my special thanks go to my family in Algeria and to

my husband, Dene, for being so supportive and understanding.

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