THE CARCASS COMPOSITION AND MEAT QUALITY OF MALE FALLOW DEER

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ABSTRACT

Fallow deer (Dama dama) are rapidly gaining in popularity in New Zealand as a farmed species for venison production. Subjective observations suggest that venison from fallow deer up to 2 years of age has the desirable 'leaness' characteristic. The main objective of this study was to investigate relationships between carcass weight (20-40 kg), age (13, 17 and 25 months), season of slaughter (summer vs. early winter) and aspects of carcass quality in male fallow deer.

Groups of male fallow deer raised on pasture near Te Puke (8 animals per group) were slaughtered at approximately 13 months (mid January), 17 months (late May), and 25 months of age (mid January). Average liveweights and carcass weights at slaughter were 43 and 25 kg at 13 months (M13), 47 and 28 kg at 17 months (M17), and 60 and 36 kg at 25 months of age (M25). Dressing-out percentage increased from 58.6 to 61.8% over the liveweight range of 41 to 66 kg.

The pattern of tissue growth with increasing liveweight was similar to that exhibited by other meat-producing ruminants. Allometric growth coefficients for the four dissected components relative to carcass weight were: muscle, 0.85; bone, 0.62; intermuscular fat, 1.61 and subcutaneous fat, 2.85.

Percentage total fat in the carcass was 7.8% in M13, 9.4% in M17 and 12.3% in M25 bucks. Low fat contents were accompanied by a high percentage of muscle in the carcass, 74.3% in M13, 71.5% in M17, 70.1% in M25, and hence high muscle to bone ratios (mean = 5.5).

The mean proportion of the carcass in each commercial cut was neck, 12.6%; flank, 15.4%; shoulder, 17.8%; saddle, 15.5% and haunch, 39.4%. Allometric growth coefficients for the 5 commercial

cuts relative to side weight were neck, 1.02; flap, 1.33; shoulder, 0.87; saddle, 1.04 and haunch, 0.91.

With increasing carcass weight minor relative redistribution of muscle, fat and bone across the carcass cuts was detected. The decrease in the relative proportion of the carcass in the primal haunch cut was due solely to a decrease in the proportion of bone in the cut. The allometric growth coefficient of bone in the haunch relative to total side bone was 0.76. The saddle was the major site for subcutaneous fat deposition with increasing carcass weight. The allometric growth coefficient of subcutaneous fat in the saddle relative to total side subcutaneous fat was 1.26. The flank was the major site for intermuscular fat deposition with an allometric growth coefficient of 1.29 relative to total side intermuscular fat.

There were no differences in the proportions of the total dissected tissues between group M17 (slaughtered in early winter) and groups M13 and M25 (slaughtered in summer) other than could be explained by differences in carcass weight. However, the proportion of total muscle weight in some individually weighed haunch and neck muscles were consistently lowest and highest respectively in the M17 group.

The chemical composition of the dissected tissues and some individual muscles was determined. The percentage water in the muscle tissue of the M17 group was lower and the percentage protein higher than in groups M13 and M25. The lipid percentage of the fat depots was low (subcutaneous, mean = 58%; intermuscular, mean = 47%).

Carcass weight explained 81% of the variation in carcass fat. Fat-depth 'C' and kidney fat weight explained a further 10.3 and 11.3% respectively, of the total carcass fat variation.

Meat quality characteristics measured were colour, ultimate pH, tenderness and water-holding capacity.

The major meat quality differences were between group M17, and groups M13 and M25. Meat colour was darker and water-holding capacity greater in Groups M13 and M25. This was attributed primarily to differences in conditions at slaughter.

Warner-Bratzler shear (tenderness) values averaged 3.73 kg and 4.68 kg for the mm. longissimus and semimembranosus respectively. These values were lower than those reported for sheep and cattle.

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INTRODUCTION

Exports of New Zealand feral venison began in 1958 as a by-product of culling operations to control noxious animals (Clouston, 1974). Deer farming was legalised between 1967 and 1969 and during the 1980's it has increased greatly.

Early venison exports were largely to West Germany where venison is a traditional game meat. More recently markets have also been established in Australia, Asia and the United States. Ante-mortem and post mortem inspection certification for farmed venison has given access to a number of these new markets.

Venison is known for its lean qualities and it compares very favourably in this regard with other farmed red-meat-producing species.

The fallow deer (Dama dama) is the second most numerous farmed deer species in New Zealand, following behind the red deer (Cervus elaphus). In 1984 approximately 14 000 fallow does and 7000 fallow bucks were being farmed (Agricultural Stats, 1984).

Several reasons exist for fallow deer being less popular than red deer. The first, and probably the most important reason, is that the fallow feral populations, from which all farmed stock were initially captured, are smaller and less widespread across the country than those of red deer. A second reason is that fallow velvet is of low value. Finally behavioural characteristics of the fallow deer can make them more difficult to manage under farming practice. A further more recently documented disadvantage of fallow has been their poorer

reproductive performance (Asher & Gregson, 1983). This may also have been a source of discrimination against the species. However, a number of farmers have chosen fallow deer in preference to red for reasons such as the lower cost per breeding stock unit and the convenience of nearby feral populations.

The Australian restaurant trade, a large export market for New Zealand venison, now buys largely fallow venison in preference to red on the grounds of its higher eating quality and the greater versatility of the smaller cuts. The smaller mature weight of fallow deer (about 35% that of red deer) may also be an advantage in certain farming environments, for example hill country or in wet environments where pasture damage readily occurs. This suggests considerable potential for the farming of the species.

Apart from the subjective assessments of consumers very little information is available on meat quality aspects of fallow deer. There is also little information on growth of the main carcass tissue components relative to age, liveweight or season of slaughter in fallow bucks. Such information would be useful to the industry in determining desirable carcass weight ranges and times for slaughter to achieve a high quality product with minimum carcass fat.

The main objective of this study was to investigate the effect of carcass weight (20-40 kg), age (13, 17 and 25 months) and season of slaughter (summer vs. early winter) on aspects of carcass and meat quality in male fallow deer.

The specific aspects of carcass and meat quality considered were:

(1) Dressing-out percentage, and tissue (muscle, fat, bone) and chemical (water, lipid, ash, protein) composition;

(2) Tissue distribution between the commercial venison cuts;

(3) Meat quality characteristics including tenderness, colour, water-holding capacity and pH of muscle tissue.

A secondary objective was to quantify the growth of other variables such as organ weights and m. longissimus areas in an attempt to provide some base data for the species. In addition the use of simple measurements to predict carcass composition was examined.