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Carcass and meat quality in possums (*Trichosurus vulpecula*)

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ABSTRACT

Fifty-eight possums (28 male, 30 female) were captured from the wild. Animals were grouped into ages of 1, 2-4 and 5+ years. Males were always heavier than females of the same age, while carcass weight increased significantly with age up to 5+ years. Age had a more pronounced effect on carcass composition and meat quality than sex. At all ages, and in both sexes, possums produced carcasses which were high in dissected lean (78-80%) and low in fat (0.8-2.6%). Their meat was very high in protein (24-26%) and low in fat (1.4-2.0%). Tenderometer results showed that all age groups produced meat which would be rated as acceptably tender.

Keywords Possum, carcass, meat quality, age.

INTRODUCTION

Possums (*Trichosurus vulpecula*) were introduced into New Zealand from Australia in about 1840 (Pracy, 1974). Since that time a fur industry based on trapped possums has developed, although currently it is in decline as a result of changing attitudes in Europe towards fur products. Possums have not been widely used as a source of meat in New Zealand. However, markets do exist for possum carcasses in Asia where it has been test marketed under the name New Zealand Gouzili. While the aim is to produce possum carcasses as an end-product from a farmed-fur operation, initially carcasses would be derived from trapped wild possums. This work reports on some aspects of carcass composition and meat quality of possums, captured and then slaughtered from the wild.

MATERIALS AND METHODS

Animals

A total of 58 possums were used with 8 to 10 in each sex and age group. All animals were trapped in forest country surrounding Lake Taupo during October and November. Only those considered to be in good health were included in the study.

Slaughter and Post-slaughter Handling

Animals were electrically stunned, bled and placed in cold water (ca. 10°C) for 10 minutes prior to skinning in order to avoid fur loss on skinning. The internal organs and fat were removed and the fore and hind limbs removed at the extremities. Hot carcass weight included the head and tail. Carcasses were held at 4°C for 24h and prior to freezing, the ultimate pH (pHu) of *M.adductor* was recorded using a spear electrode.

Animal age was determined at the time of slaughter from teeth wear patterns, as described by Winter (1980). Animals were grouped into age groups; 1, 2-4, 5+ years.

Dissection Studies

Five half-carcasses from each age x sex group (30 in total) were dissected by scalpel into muscle, fat and bone. The muscle plus fat component was then minced and proximate chemical composition determined for duplicate 50g samples.

Meat Studies

The half-carcasses of all animals were cooked, in plastic bags, in a water bath, to an internal temperature of

70°C. Shear force measurements were made, on a MIRINZ tenderometer, for the *M. longissimus thoracis et lumborum*, *M. semitendinosus* and *M.semimembranosus* and the results combined because of the limited numbers of observations possible. The proximate chemical composition of the cooked, minced muscle was then determined on duplicate 50g samples.

RESULTS

There were few effects of sex, but females had lighter carcass weights than males. Males contained more dissected lean and less bone but none of the differences were statistically significant. Muscle from males had a lower pHu than females (not significant) but in both sexes pHu values were very high (ca. 6.3-6.4) compared with that of traditional red meat animals (5.5; Lawrie, 1979). Force scores on the meat were lower ($P<0.1$) in males, but both sexes had values which indicated that the meat would be rated as acceptably tender.

In contrast to sex, age had a significant effect on most parameters measured. With increasing age carcass weight increased ($P<0.001$) (Table 1) as did the percent dissected lean ($P<0.05$) (Table 2) with the major difference being between the one year olds and the rest. There were no significant changes in the chemical composition of raw muscle with changing age (Table 2). In the cooked meat there were increases in protein ($P<0.01$), and decreases in water ($P<0.05$) (Table 3) with increasing age. Fat content varied with age. Muscle force scores also increased with age ($P<0.05$) (Table 4); indicating a decrease in tenderness.

TABLE 1 Carcass weights (g) of each sex and age group.

Sex	Age (years) 1	2-4	5+
Male	1471 (10)*	2048 (10)	2263 (8)
Female	1360 (10)	1983 (10)	1915 (8)

Age,***; Sex, ns; SED, 94.5; RSD, 285
* Number of animals in group

TABLE 2 The percentage of dissected lean, fat and bone in the carcass, and the proximate composition (protein, fat, ash and water) of the dissected lean plus fat component in each age group.

Component	Age 1	2-4	5+	SED	RSD	Sig of Age
Dissected						
lean	77.7	80.0	80.3	0.92	2.06	*
fat	0.79	1.25	2.57	0.43	0.96	***
bone	21.5	18.7	17.2	0.83	1.86	*
Chemical						
protein	20.5	20.9	20.6	0.27	0.60	ns
fat	1.72	2.44	3.09	0.62	1.39	ns
ash	0.95	0.97	0.94	0.02	0.05	ns
water	76.9	75.7	75.3	0.68	1.52	+

TABLE 3 The percentage of protein, fat, ash and water in cooked meat for each age group.

Component	Age (years) 1	2-4	5+	SED	RSD	Sig of Age
Protein	24.8	25.5	26.0	0.38	1.12	**
Fat	1.44	2.35	1.97	0.23	1.84	*
Ash	0.85	0.86	0.90	0.04	0.13	ns
Water	72.1	70.5	70.0	0.73	2.16	*

TABLE 4 Force scores and pHu for each age group.

Component	Sex	Age (years) 1	2-4	5+	RSD
Force score†					
	Male	6.2	6.0	7.3	1.18
	Female	6.7	6.8	7.4	1.18
pHu*					
	Both	6.44	6.32	6.33	0.21

† Sig of sex, 0.1; age, 0.05: SED; sex, 0.70; age, 0.71
* NSD sex or age

DISCUSSION

Male possums were always heavier than females at each age, although the difference, of 7%, is less than expected compared with traditionally farmed species. These results show that when captured straight from the wild, a carcass weight range of 1.3 to 2.3 kg could be expected. Evidence from Bamford (1970) would suggest that during the winter months possums would be lighter than expected for their age or size due to depletion of fat reserves.

As animals grow, and increase in age and weight their ability to lay down bone and muscle declines and the propensity to lay down fat increases. While this is true for possums, the levels of fatness, even in the 5+ years age group was extremely low when compared with our traditional livestock. Dellow *et al.* (1985) recorded a figure of 10% "carcass" fat (the carcass included the empty digestive tract and its associated fat) in farmed possums. Fitzgerald *et al.* (1981) found a carcass fat content of around 4-5% in mature possums which had maintained weight for 3 months prior to slaughter. For the adult (5+) group in this study a comparable figure is 3.6% total carcass fat.

The major feature of possum carcass composition is the very high lean content, even in mature animals. The only other species of farmed livestock which approaches this figure are Fallow (Gregson and Purchas, 1985) and Red Deer (Drew, 1985), at around 70-74% dissected lean. The biggest change in composition occurred between 1 and 2-4 years, when the muscle content of the carcass increased by over 2% units. From 2-4 years onwards there was little further change, suggesting that muscle growth is complete by around 2-3 years of age.

Possum meat would be considered "healthy" from a consumer point of view because of its extremely low intramuscular fat content (Naughton, *et al.*, 1986). While the fat content of the cooked meat was higher than that of the raw muscle (as a consequence of moisture loss on cooking), actual levels are similar or lower than chicken breast meat, depending on age (AMLC, 1989).

The very high ultimate muscle pH indicates that considerable care would be required in the dressing and packaging of possum carcasses. Such a high pH implies that the carcass might have a short shelf life, and this could be a major consideration in developing an effective market.

Tenderometer studies suggest that the cooked meat from all age groups and both sexes would be rated as highly acceptable for tenderness. The decreasing tenderness with age is consistent with increasing proportions of heat-stable cross-links in the collagen matrix of the muscle of older animals (Lawrie, 1979).

These results show that possums of all ages, captured from the wild, have carcasses which are extremely low in dissectible fat, and high in muscle. The meat from these animals is high in protein, extremely low in fat and tender when cooked to 70°C.

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