

Carcass and meat quality characteristics in young red deer stags of different growth rates



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Introduction

The New Zealand deer industry aims to supply market demand for deer meat (venison) by slaughtering deer in early spring, generally when animals are 9-11 months old. The seasonality of deer, with a winter depression in growth rates and feed consumption, makes this a challenging target to achieve. The meat quality of animals slaughtered prior to winter is unknown, but based on the changes in animal metabolism (e.g. protein turnover in muscle) during winter and spring it is possible that there are significant differences in meat quality.

The purpose of this pilot study was to compare quality attributes in meat from fast growing young red deer stags slaughtered prior to winter with that of slower growing young red deer stags slaughtered in early summer.

Material and Methods

§ Fourteen male red deer yearlings from the same cohort and deer farm (Wairuna, South Otago, New Zealand) were included in the study. Seven animals reached slaughter weight in late June, while the second group of deer ($n=7$) did not reach slaughter weight until early December.

§ All animals were transported the day prior to slaughter (125 km, 1.5 h) to the same slaughter plant (Otago Venison, Mosgiel, New Zealand) and slaughtered according to standard protocol.

§ Carcass composition was measured using Computed Tomography (CT) scanning. Cross sectioned images were recorded on a Siemen Somatom AR.C X-ray CT scanner (Siemens Medical Systems, Erlangen, Germany).

§ One day post slaughter carcasses were split in two halves and frozen at -20°C . The frozen carcasses halves were further sawed into forequarter, midsection and hindquarter. The striploin (*M. longissimus*, LD) was used to determine water-holding capacity (thaw loss, purge and cooking loss), meat pH and tenderness at 1 day post slaughter and after 3 weeks of refrigerated storage at -1.5°C .

§ Consumer preference tests ($n=221$ participants) were carried out where meat samples from the two types of venison were cooked to a core temperature of 69°C and presented to the consumers together with a questionnaire. Samples were coded with randomized three digit numbers.



Results

Carcass characteristics and meat quality attributes in the loin (*M. longissimus*) from two groups of young red deer stags; fast growing ($n=7$) and slower growing ($n=7$) animals (mean values and standard errors of difference)

Trait	Fast growing	Slower growing	SED
Live weight, kg	95.4 ^{a*}	97.9 ^b	0.90
Carcass weight, kg	49.6	52.3	1.40
Dressing %	52.0	53.4	1.29
Sarcomere length, μm	1.8 ^a	1.5 ^b	0.07
1 day post mortem			
Meat pH	5.49 ^a	5.68 ^b	0.04
Shear force, kg	3.2	5.8	1.29
Thaw loss, %	3.4	2.6	0.64
Cooking loss, %	22.1 ^a	26.0 ^b	1.63
3 weeks post mortem			
Meat pH	5.70 ^a	5.87 ^b	0.06
Shear force, kg	2.4	2.8	0.17
Purge, %	4.9	5.0	0.47
Cooking loss, %	22.1	22.1	1.94

*Mean values with a different letter (within row) are significantly different ($p \leq 0.05$).

Carcass composition of young red deer stags; fast growing ($n=7$) and slower growing ($n=7$) animals (mean values and standard errors of difference)

	Fast growing	Slower growing	SED
Hind leg			
Lean, kg	8.0	7.9	0.16
Fat, kg	0.3	0.4	0.03
Bone, kg	1.3	1.3	0.07
Loin			
Lean, kg	1.9	2.0	0.18
Fat, kg	0.1 ^{a*}	0.2 ^b	0.02
Bone, kg	0.3	0.4	0.10
Oyster shoulder			
Lean, kg	3.4	3.4	0.22
Fat, kg	0.4 ^a	0.8 ^b	0.12
Bone, kg	1.1 ^a	0.8 ^b	0.09
Square shoulder			
Lean, kg	5.3	4.9	0.39
Fat, kg	0.7 ^a	1.3 ^b	0.14
Bone, kg	1.6	1.4	0.13

*Mean values with a different letter (within row) are significantly different ($p \leq 0.05$).

Conclusions

§ This pilot study has highlighted relatively minor differences in quality attributes of venison from fast and slow growing red deer stags, indicating that as the deer farming industry heads towards more efficient venison production systems there are unlikely to be any major negative impacts on product quality.

§ However, further studies of the impact of growth rate on venison processing, packaging and storage techniques should be conducted before making recommendations to the venison industry.