

## Meat quality and carcass characteristics of the vondo, *Thryonomys swinderianus*

A. van Zyl,\* M. van der Merwe

Department of Zoology and Entomology, University of Pretoria, Pretoria, 0001 South Africa

A.S. Blignaut

Department of Home Economics, University of Pretoria, Pretoria, 0001 South Africa

*Received May 1998 accepted May 1999*

Animals, maintained from birth on a higher and lower fibre diet, were slaughtered when postnatal growth curves flattened off. Males tended to be larger than females. The meat of females tended to have higher lipid (9.2 g/100 g fresh mass) and energy (767 J/100 g fresh mass) contents than that of males. The cholesterol content of vondo meat was low (48.5–53.4 mg/100 g fresh mass) compared to values for beef and goat. The two diets did not affect carcass characteristics and meat quality significantly.

Diere wat van geboorte op 'n hoër en laer vesel dieet gevoer is, is geslag nadat postnatale groeikrommes afgeplat het. Mannetjies was groter as wyfies. Effens hoër lipied (9.2 g/100 g nat massa) en energie (767 J/100 g nat massa) waardes is verkry vir die vleis van wyfies. Die cholesterol-inhoud van vondo vleis was laag (48.5–53.4 mg/100 g nat massa) in vergelyking met waardes vir bees- en bokvleis. Die diëte het nie 'n beduidende effek op karkaseienskappe of vleiskwaliteit gehad nie.

**Keywords:** meat quality, carcass characteristics, *Thryonomys*

\* To whom correspondence should be addressed: 244 Carinus Street, Meyerspark 0184, South Africa.

Humans catch vondo's mostly in the wild to obtain their meat. Few attempts were made to domesticate these animals e.g. 300 vondo's were kept for breeding purposes till 1994 by the late Anne Alexander (Biology Department, University of Natal). However, Malaisse & Parent (1982) concluded that although the F.A.O. food balance sheets never include wild animals, they make a significant difference in the quantity and quality of diets eaten by communities in rural areas.

Consumer acceptance trials done by Blignaut *et al.* (1996) indicated that vondo meat was accepted by an urbanised South African group of 20 respondents in terms of appearance, taste and general acceptability. The consumer preference ( $n = 149$ ) was 49.7% for vondo meat compared to 28.9% and 21.5% for beef and goat, respectively (Blignaut & Van der Merwe M, 1997, unpublished).

The meat quality and carcass characteristics of vondo meat was determined for animals in Ghana, Nigeria and Zambia, but no such values are available in the South African context. The present study was a preliminary attempt to determine the meat quality and carcass characteristics of animals reared on two diets in the Gauteng area.

Animals were housed at the University of Pretoria, Gauteng, 25°45' E, 28°16' S, in 135 × 40 × 45 cm<sup>3</sup> wire bottom cages. Animals were offered one of two experimental diets from their birth until

they were slaughtered (Table 1). The grass species (mainly buffalo grass (*Panicum maximum* var. *trichoglume*) and kikuyu, *Pennisetum clandestinum*) offered, differed over the experimental period, but animals on both diets were always offered the same species.

**Table 1** Composition of the experimental diets fed to *Thryonomys swinderianus*

	Higher fibre diet	Lower fibre diet
Quantity fed <sup>1</sup> (g dry mass/kg animal/day)		
Grass	55.4 <sup>a</sup> ± 25.2	34.5 <sup>b</sup> ± 16.1
Maize kernels	13.8 <sup>a</sup> ± 1.4	37.0 <sup>b</sup> ± 5.0
Rabbit pellets	15.1 <sup>a</sup> ± 4.2	11.1 <sup>b</sup> ± 5.9
Chemical analysis <sup>2</sup> (g/100 g dry mass food)		
Neutral detergent fibre	47.6–52.7	37.3–40.4
Energy (KJ/100 g)	2114–1594	1897–1575
Protein	4.6–8.8	5.7–8.9
Lipid	1.3–1.7	1.7–1.9

1. Values indicated means ± standard deviation. Means in each horizontal row followed by different letters differ significantly at  $P < 0.05$  according to Mann-Whitney tests

2. Range of values given for wet and dry seasons respectively

Animals were humanely slaughtered with CO<sub>2</sub> at an inspected abattoir in January and April 1996 at an age (Table 2) when their postnatal growth curves flattened off. The meat was deboned, vacuum packed and stored at -25°C.

Chemical analysis was done on deboned lean meat of the left side of the carcasses. The combined meat was minced with a Kenwood mixer through a 4 mm mesh. A subsample was freeze-dried and grounded in a Buchi Mixer BL-400 to 1 mm particle size. AOAC (1980) methods were used to quantify moisture, protein (macro-Kjeldahl), lipids (ether extract) and ash. Energy was determined using a bomb CP-500 calorimeter.

Cholesterol was determined by extracting subsamples with the dole extraction method (using hexane) which were analysed with gas liquid chromatography at the Animal Nutrition and Products Institute, Irene, Pretoria.

The Mann-Whitney test (Zar, 1984) was used for comparisons.

The carcass characteristics of males and females on the high fibre diet did not differ significantly (Table 2). This may be ascribed to the small sample sizes used. When the growth curves of these animals were considered, males had a significant higher asymptotic body mass than females (Van der Merwe & Van Zyl, 1999, in prep.). Males had a 23% higher average live and carcass mass than females (Table 2). The flesh to bone ratio and dressing out percentage between males and females were similar (Table 2). This dressing out percentage was lower than the  $63.8 \pm 2.43\%$  ( $n = 6$ ) obtained by Ajayi & Tewe (1980).

**Table 2** Slaughter traits obtained for *Thryonomys swinderianus* male and female groups maintained on a higher (HF) or lower fibre (LF) diets from birth. Means  $\pm$  SD are indicated

Sex	Males	Females	Females
Diet	HF	HF	LF
No	5	4	5
Age of animals (days)	459–513	459–513	424–697
Live mass (g)	3630 <sup>a</sup> $\pm$ 756	2785 <sup>a</sup> $\pm$ 451	2494 <sup>a</sup> $\pm$ 338
Carcass mass (g) <sup>1</sup>	2116 <sup>a</sup> $\pm$ 468	1615 <sup>a</sup> $\pm$ 230	1408 <sup>a</sup> $\pm$ 140
Chilling loss (%) <sup>2</sup>	0.9 $\pm$ 0.3	1.1 $\pm$ 0.7	2.1 $\pm$ 1.3
Flesh: bone	4.49 <sup>a</sup> $\pm$ 0.6	4.67 <sup>a</sup> $\pm$ 0.6	4.34 <sup>a</sup> $\pm$ 0.5
Dressing out (%) <sup>3</sup>	57.9 <sup>a</sup> $\pm$ 1.3	57.2 <sup>a</sup> $\pm$ 0.9	56.8 <sup>a</sup> $\pm$ 1.9
External offal (%) <sup>4</sup>	22.5 <sup>a</sup> $\pm$ 2.7	21.4 <sup>a</sup> $\pm$ 2.2	22.0 <sup>a</sup> $\pm$ 1.3
Internal offal (%) <sup>4</sup>	15.6 <sup>a</sup> $\pm$ 0.6	14.8 <sup>a</sup> $\pm$ 2.6	12.0 <sup>a</sup> $\pm$ 3.3

1. Dressed carcass cold mass

2. Determined according to Fisher *et al.* (1994)

3. Dressed carcass mass expressed as % of live body mass

4. External offal and internal offal expressed as % of preslaughter body mass; External offal: head, skin, feet (tail excluded); Internal offal: heart, lungs, trachea, gut, spleen, lipid, kidneys, liver (reproductive organs excluded)

a: Means of males and females on the higher fibre diet and between females on the two diets did not differ at  $P < 0.05$

The chemical composition of the meat of males and females on the higher fibre diet did not differ significantly (Table 3). The meat of females tended, however, to have a higher (29%) lipid and higher (12%) energy content than that of males (Table 3). The protein content of the meat seemed to remain fairly constant between males and females (Table 3).

The two diets did not have a large effect on the carcass characteristics or meat quality and no significant differences were obtained (Tables 1 & 2). The asymptotic body mass of females on the two diets was also not significantly different (Van der Merwe & Van Zyl, 1999, in prep.). Ajayi & Tewe (1980) reported meat quality values of vondo's (age unknown) that were in the range of the values of the present study. In contrast to the present study, Asibey (1974) reported high protein (23%) and low lipid (4.2%) contents for vondo meat in Nigeria. In Zambia, Malaisse & Parent (1982) reported that raw vondo muscle consisted of 28% protein and 16.8% lipid content that was associated with a low moisture content of 52%.

The animals in the present study were slaughtered when their postnatal growth curves flattened off. In practise it would be more economical to slaughter vondo's at an earlier age (300 days of age)

**Table 3** Chemical composition of the meat (expressed per fresh mass) of male and female groups of *Thryonomys swinderianus* maintained on higher fibre and lower fibre diets. Means  $\pm$  SD are indicated

Group	Males	Females	Females	Total
Diet	Higher fibre	Higher fibre	Lower fibre	Males & Females
No of animals	3	2	2	7
Moisture (g/100 g)	71.2 <sup>a</sup> $\pm$ 1.7	69.3 <sup>a</sup> $\pm$ 1.1	67.0 <sup>a</sup> $\pm$ 0.3	69.4 <sup>a</sup> $\pm$ 2.1
Energy (J/100 g)	678 <sup>a</sup> $\pm$ 72	767 <sup>a</sup> $\pm$ 49	804 <sup>a</sup> $\pm$ 0.0	739 <sup>a</sup> $\pm$ 77
Protein (g/100 g)	18.2 <sup>a</sup> $\pm$ 0.3	17.8 <sup>a</sup> $\pm$ 0.8	18.3 <sup>a</sup> $\pm$ 0.1	18.1 <sup>a</sup> $\pm$ 0.5
Lipids (g/100 g)	6.5 <sup>a</sup> $\pm$ 2.0	9.2 <sup>a</sup> $\pm$ 1.9	10.1 <sup>a</sup> $\pm$ 0.0	8.3 <sup>a</sup> $\pm$ 2.3
Ash (g/100 g)	1.4 <sup>a</sup> $\pm$ 0.1	1.3 <sup>a</sup> $\pm$ 0.2	1.3 <sup>a</sup> $\pm$ 0.1	1.3 <sup>a</sup> $\pm$ 0.1

a: Means of males and females on the higher fibre diet and between females on the two diets did not differ at  $P < 0.05$

when their food conversion ratios (10.8–13.5) are still reasonably low (Van der Merwe & Van Zyl, 1999, in prep.), as these ratios increased drastically at an age of 420 days. It is therefore suggested that at an earlier age, vondo meat would have a lower lipid and higher protein content, than the values obtained in the present study.

The cholesterol content of vondo meat was 48.5–53.4 mg/100 g fresh mass or 161.8–168.4 mg/100 g dry mass, respectively. This was low compared to beef (58.9–68.6 mg/100 g fresh mass, Bohac *et al.*, 1988) and goat meat (94.0–100.3 mg/100 g fresh mass, Johnson *et al.*, 1995). It compares favourable with rabbit meat (44.2  $\pm$  3.1 mg/100 g fresh mass; Lukefahr *et al.*, 1989).

## References

- A.O.A.C., 1980. Official methods of analysis. Association of Official Analytical Chemists, Washington, D.C.
- AJAYI, S.S. & TEWE, O.O., 1980. Food preference and carcass composition of the grass cutter (*Thryonomys swinderianus*) in captivity. *Afr. J. Ecol.* 18, 133–140.
- ASIBEY, E.O.A., 1974. The grasscutter, *Thryonomys swinderianus* Temminck, in Ghana. *Symp. Zool. Soc. Lond.* 34, 161–170.
- BLIGNAUT, S., SCHOEMAN, P. & VAN ZYL, A. 1996. Verbruikersaanvaarding en eetkwaliteit van die vleis van die inheemse spesie, *Thryonomys swinderianus*. *J. Diet. Home Econ.* 24, 21–26.
- BOHAC, C.E., RHEE, K.S., CROSS, H.R. & ONO, K., 1988. Assessment of methodologies for colorimetric cholesterol assay of meats. *J. Food Sci.* 53, 1642–1644.
- FISHER, P., PURVES, L., RUBENSTEIN, R. & MELLETT, F.D., 1994. The effect of the malignant hyperthermia gene on carcass characteristics of commercial crossbred pigs in the Western Cape. *S. Afr. J. Anim. Sci.* 24, 111–112.
- JOHNSON, D.D., EASTRIDGE, J.S., NEUBAUER, D.R. & MCGOWAN, C.H., 1995. Effect of sex class on nutrient content of meat from young goat. *J. Anim. Sci.* 73, 296–301.
- LUKEFAHR, S.D., NWOSU, C.V. & RAO, D.R., 1989. Cholesterol level of rabbit meat and trait relationships among growth, carcass and lean yield performances. *J. Anim. Sci.* 67, 2009–2017.
- MALAISSSE, F. & PARENT, G., 1982. Rodents of the Miombo woodland area: a nutritional and ecological approach. *Ecol. Food Nutr.* 11, 211–216.
- ZAR, J.H., 1984. Biostatistical Analysis. Prentice-Hall Inc., Englewood Cliffs, New Jersey.