
8 ACCEPTABILITY OF CHEVON TO SOUTH AFRICAN CONSUMERS

8.1 INTRODUCTION

Most of the earlier sensory studies of chevon employed trained taste panels and generally showed that chevon and chevon products are of high quality (Breukink and Casey, 1989; Schönfeldt et al., 1993a and b; Tshabalala et al., 2003). These findings are in line with objective evaluations of the meat, which have consistently proved that it can be of satisfactory quality (e.g. Smith et al., 1978; McKeith et al., 1979; Swan et al., 1998; Kannan et al., 2001). Trained sensory panels function as laboratory instruments, and hence their deductions usually match results of instrumental evaluations of chevon quality. Notwithstanding these objective reports, acceptance of chevon to the ‘untrained’ consumer of the meat depends on more than just the technical quality and descriptive sensory analysis factors (Issachou, 1996). Therefore, while laboratory methods can provide precise and reliable information concerning technical and sensory attributes (intensity scores) only consumers can provide information about the acceptance of the meat (Muñoz and Chambers IV, 1993). Thus sensory evaluation of selected chevon samples by consumers was carried out in order to determine the acceptability of chevon to South African consumers in terms of the acceptance of the aroma, flavour and tenderness, intended frequency of consumption and preference for the meat in comparison to the more readily available mutton. The evaluation was carried out in two series. In series I, chevon from castrated and female goats and mutton, all from animals with 2-to-6 permanent incisors were compared. In series II, chevon from male kids (0 permanent incisors) and does (8 permanent incisors) and mutton from sheep with 2-to-6 permanent incisors were compared (§ 3.2.7 refers).

8.2 RESULTS

8.2.1 Meat quality characteristics of the chevon samples

In series I, the 2- to-6 teeth castrates were significantly heavier (ca.5.04kg) at slaughter ($P=0.017$) and yielded cold carcasses that were significantly (ca. 2.45kg) heavier ($P=0.047$) than the females (Table 8.1). During chilling, carcasses of the castrates lost about 0.57% less weight than those of the females ($P=0.038$). The two sex groups however did not significantly differ ($P>0.05$) in all other carcass characteristics, histological, histochemical, metabolic and proteolytic properties.

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Table 8.1 Slaughter weight, carcass, histological, histochemical, metabolic and proteolytic characteristics of the 2-to-6 teeth castrate and female South African indigenous goats that were used in sensory evaluations (Means \pm S.D.)

Characteristics	Castrates	Females	P-value
N	15	15	
<u>Carcass:</u>			
Slaughter weight (kg)	36.97 \pm 5.76	31.93 \pm 4.35	0.0169
Cold carcass weight (kg)	15.53 \pm 2.98	13.08 \pm 2.81	0.0465
Dressing out %	41.80 \pm 2.62	40.56 \pm 3.76	0.5069
Chilling losses %	2.52 \pm 0.75	3.09 \pm 0.84	0.0381
Total lean%	63.66 \pm 3.50	63.37 \pm 2.95	0.9669
Total bone %	20.75 \pm 2.09	21.58 \pm 2.59	0.4306
Total carcass fat %	14.78 \pm 4.95	14.26 \pm 4.17	0.4807
Kidney knob and channel fat (g)	474 \pm 243	410 \pm 242	0.5338
Intramuscular fat %	4.07 \pm 1.00	4.03 \pm 1.73	0.6833
Crude protein %	23.76 \pm 0.63	23.52 \pm 0.92	0.7237
<u>Histological and histochemical:</u>			
Sarcomere lengths (24hrs)	1.85 \pm 0.11	1.81 \pm 0.22	0.7716
Myofibrillar fragment lengths (24hrs)	17.24 \pm 2.06	18.28 \pm 2.23	0.1249
Myofibrillar fragment lengths (96hrs)	17.01 \pm 2.65	17.45 \pm 2.85	0.6783
Red myofibre area (μm^2)	1 658 \pm 417	1 905 \pm 834	0.9826
Intermediate myofibre area (μm^2)	2 253 \pm 432	2 392 \pm 635	0.5557
White myofibre area (μm^2)	3 005 \pm 554	3 318 \pm 977	0.4450
% Red myofibres	27.37 \pm 3.40	27.65 \pm 3.16	0.6784
% Intermediate myofibres	33.80 \pm 3.87	32.30 \pm 3.83	0.2136
% White myofibres	38.83 \pm 4.97	40.05 \pm 4.55	0.1979
<u>Metabolic and proteolytic:</u>			
pH ₃	6.18 \pm 0.25	6.29 \pm 0.21	0.3616
pH ₂₄	5.89 \pm 0.14	5.86 \pm 0.11	0.6777
Glycolytic potential ($\mu\text{mol/g}$)	110.89 \pm 26.08	97.97 \pm 16.55	0.1017
Glycogen ($\mu\text{mol/g}$)	31.42 \pm 12.02	29.88 \pm 8.49	0.6784
Lactate ($\mu\text{mol/g}$)	41.48 \pm 26.19	32.56 \pm 9.96	0.7767
Calpastatin activity (U/g sample)	2.98 \pm 1.08	3.14 \pm 0.87	0.7089
Calpastatin specific activity (U/mg protein)	0.057 \pm 0.025	0.055 \pm 0.018	0.9010

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In the second series (Table 8.2), the does were 34% heavier than the kids at slaughter ($P=0.007$). However, because the does dressed out 6.23% less than the kids ($P=0.002$) and lost 0.51% more during chilling ($P=0.029$), there were no significant differences ($P>0.05$) between the carcass weights of the two groups. The mean cold carcass weight was 16.13 ± 2.77 kg.

The separable tissue proportions of the does and kids were mostly similar ($P>0.05$), except that the does tended to have more KKCF ($P=0.052$). The younger goats had a significantly higher CP% ($P=0.037$) than the older ones.

In terms of myofibre characteristics, the kids and does differed significantly only in red and white myofibre percentages ($P<0.01$). The younger goats had a 15% higher proportion of red and a 17% lower proportion of the white myofibres in the LT. The intermediate myofibres tended to abound in the LT of kids than of the does ($P=0.052$).

Initial GP concentrations of the does and the kids did not significantly differ ($P>0.05$). The mean was 84.93 ± 20.99 µmol/g. However the initial glycogen and lactate concentrations tended to be lower ($P=0.068$) and higher ($P=0.068$), respectively, in LT of does than those of kids. Consequently the pH₃ of does was a significant 0.37 units lower than that of the kids ($P=0.016$). Ultimately, both groups had high pH₂₄ values (>5.8) but that of the does was a significant 0.21 units higher ($P=0.015$) compared to that of the kids.

Calpastatin activity per gram and calpastatin specific activity were similar between the 2-to-6 teeth castrates and females ($P>0.05$). The averages were 3.73U/g and 0.074U/mg protein, respectively.

Cooking losses of each meat type are shown in Table 8.3. Mutton samples lost significantly more weight ($P=0.019$) during cooking than chevon samples from female goats of the first series (2-6 permanent incisors). Losses from samples in the second series did not significantly differ ($P>0.05$).

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Table 8.2 Slaughter weight, carcass, histological, histochemical, metabolic and proteolytic characteristics of South African indigenous goats kids and does that were used in the sensory evaluations (means \pm S.D.)

Characteristics	Kids	Does	P-value
N	6	9	
<u>Carcass:</u>			
Pre-slaughter weight (kg)	30.50 \pm 5.78	40.94 \pm 3.29	0.0066
Cold carcass weight (kg)	14.61 \pm 2.68	17.16 \pm 2.46	0.1115
Dressing out %	47.96 \pm 1.03	41.73 \pm 3016	0.0018
Chilling losses %	1.03 \pm 0.47	1.54 \pm 0.38	0.0291
Total lean%	58.22 \pm 6.13	56.37 \pm 3.43	0.5956
Total bone %	19.12 \pm 1.73	18.09 \pm 2.62	0.2155
Total carcass fat %	21.84 \pm 7.07	24.50 \pm 2.70	0.6797
Kidney knob and channel fat (g)	726 \pm 328	1 092 \pm 301	0.0516
Intramuscular fat %	4.38 \pm 1.61	6.74 \pm 2.97	0.1891
Crude protein %	23.58 \pm 1.01	21.76 \pm 1.36	0.0370
<u>Histological and histochemical:</u>			
Sarcomere lengths (24hrs)	1.84 \pm 0.24	1.87 \pm 0.15	0.8596
Myofibrillar fragment lengths (24hrs)	18.58 \pm 1.97	18.40 \pm 1.67	0.8596
Myofibrillar fragment lengths (96hrs)	15.98 \pm 1.19	16.09 \pm 1.69	0.9530
Red myofibre area (μm^2)	1 939 \pm 391	1 870 \pm 472	0.6797
Intermediate myofibre area (μm^2)	2 554 \pm 524	2 552 \pm 581	0.8596
White myofibre area (μm^2)	3 261 \pm 663	3 407 \pm 770	0.7691
% Red myofibres	28.27 \pm 1.78	24.65 \pm 1.86	0.0080
% Intermediate myofibres	36.09 \pm 2.99	32.03 \pm 2.49	0.0516
% White myofibres	35.64 \pm 3.55	43.03 \pm 2.83	0.0056
<u>Metabolic and proteolytic:</u>			
pH ₃	6.42 \pm 0.22	6.05 \pm 0.26	0.0155
pH ₂₄	5.92 \pm 0.10	6.13 \pm 0.15	0.0153
Glycolytic potential ($\mu\text{mol/g}$)	89.75 \pm 14.60	81.73 \pm 24.68	0.5956
Glycogen ($\mu\text{mol/g}$)	30.98 \pm 3.54	18.72 \pm 12.10	0.0675
Lactate ($\mu\text{mol/g}$)	22.30 \pm 9.19	39.56 \pm 20.99	0.0675
Calpastatin activity (U/g sample)	3.65 \pm 0.89	3.80 \pm 1.21	0.5165
Calpastatin specific activity (U/mg protein)	0.070 \pm 0.021	0.078 \pm 0.028	0.5956

Table 8.3 Cooking losses (%) from the chevon and mutton samples that were employed in the sensory evaluations

Meat type*	Series I*		Series II*	
	No of samples cooked	Cooking losses (%) (Mean ± S.D.)	No of samples cooked	Cooking losses (%) (Mean ± S.D.)
Female goats	15	16.23 ± 5.48 ^a	10	20.22 ± 5.02
Male goats	15	19.11 ± 4.98 ^{ab}	11	22.44 ± 6.21
Sheep	13	22.58 ± 4.94 ^b	9	26.15 ± 4.43
<i>P</i> - value		0.0186		0.0851

* In series I all animals had between 2 and 6 permanent incisors. The male goats were all castrates. In series II male kids had no permanent incisors and were a mixture of intact and castrated males. Female goats had 8 permanent incisors and sheep had 2 to 6 permanent incisors.
^{a, b} Means in the same column with different superscripts differ significantly ($P < 0.05$).

8.2.2 Profile of consumer panels and effects on acceptability ratings

The profiles of the consumer panels used in each series are described in Table 3.2 (§ 3.2.7.2 refers). The effects of consumer population category, gender, age and level of education on the acceptability of the sensory attributes are presented in Table 8.4 and Figure 8.1 for series I of the sensory evaluations. Black and white consumers in series I did not significantly differ in their acceptance of the sensory attributes ($P > 0.05$). The consumers rated the attributes as “acceptable”, with mean hedonic scores between 3.80 ± 0.749 and 3.95 ± 1.15 .

Female consumers awarded significantly higher scores ($P < 0.05$) than male consumers for the acceptability of tenderness, flavour and hence overall acceptability (Figure 8.1). Scores by female consumers were in the “extremely acceptable” range (between 4 and 5) while those by males were in the “acceptable” range (between 3 and 4).

Acceptance of aroma and overall acceptability by the 21 to 30 years old group were significantly lower ($P < 0.05$) compared to ratings by the older consumers by at least 0.4 units in each case.

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Table 8.4 *P*-values for the analysis of variance for the effects of consumer population category gender, age and level of education on ratings of aroma, flavour, tenderness and on overall acceptability in the first series of evaluations*

Sensory attribute	Series mean (± S.D.)	<i>P</i> -values			
		Population category	Gender	Age	Level of education
Aroma	3.82 ± 0.88	0.6294	0.0651	0.0005	<0.0001
Tenderness	3.90 ± 0.93	0.4684	<0.0001	0.2966	0.1227
Flavour	3.94 ± 0.97	0.8364	0.0282	0.1038	0.0054
Overall acceptability	3.88 ± 0.73	0.5591	0.0006	0.0136	0.0003

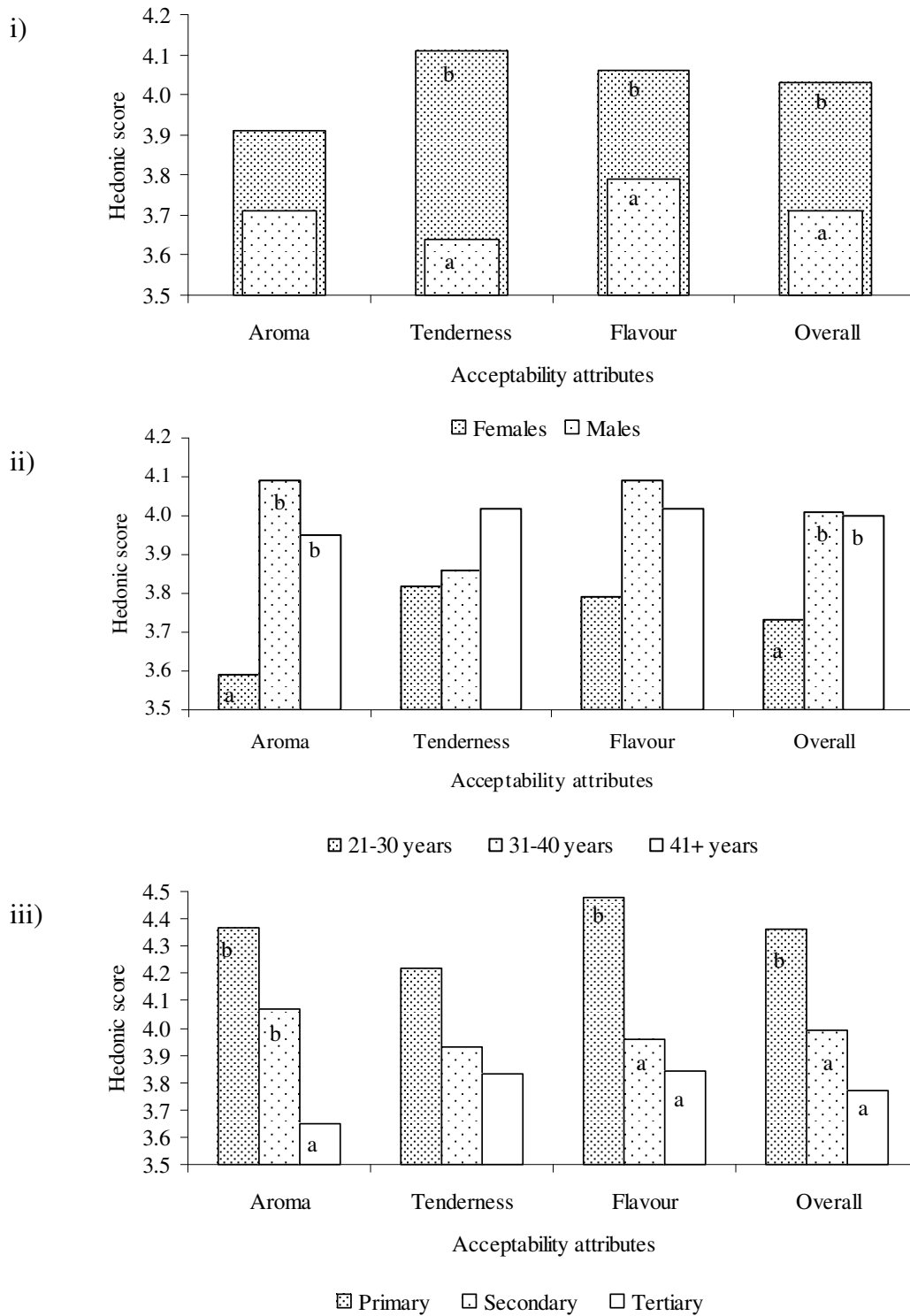
NB In series I meat samples were from castrated and female goats, and sheep with between 2 and 6 permanent incisors.

Mean scores for tenderness and flavour were not significantly affected by the age of the consumers ($P>0.05$). Mean scores for flavour ranged from 3.9 ± 0.94 to 4.09 ± 1.11 and tenderness scores varied between 3.82 ± 0.97 to 4.02 ± 0.76 .

Consumers with up to primary level of education generally awarded high scores for sensory attribute acceptability. The mean scores ranged from 4.22 ± 0.85 for tenderness, 4.37 ± 0.78 for aroma to 4.48 ± 0.85 for flavour, and hence 4.36 ± 0.78 for overall acceptability. The scores were significantly higher ($P<0.001$) than those awarded by consumers with a tertiary level of education for aroma (3.64 ± 0.80), flavour (3.83 ± 0.92) and overall acceptability (3.77 ± 0.66). The group with a primary level of education only differed significantly from that with a secondary level of education in the rating of flavour acceptability and the overall acceptability. Mean acceptance of flavour and overall acceptability by the latter group were 3.99 ± 0.82 and 3.77 ± 0.66 , respectively.

The majority of consumers (60.7%) in series I indicated that they would eat any of the meats as frequently as once a week or more (Table 8.5). The median for the distribution of the scores was 4.00 and the 25 to 75 percentile range 3.00 to 5.00.

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NB Bars within a graph with different letters ‘a’ or ‘b’ differ significantly ($P < 0.05$)

Figure 8.1 The effect of consumer i) gender, ii) age and iii) level of education on the ratings of sensory attributes of meat samples employed in series I of sensory evaluations

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Table 8.5 Distribution of ratings for intended frequency of consumption with consumer population groups, gender, age and level of education for series I of sensory evaluations

Main effect	% of consumers per intended frequency of consumption					P-value
	Never	When no other food is available	Occasionally	Once a week	Daily	
Mean	3.6	7.5	28.2	29.4	31.3	
Population group						
Black	5.8	11.7	20.0	26.7	35.8	0.0740
White	1.5	3.5	35.6	31.8	27.3	
Gender						
Females	2.2	6.5	27.5	29.0	34.0	0.1263
Males	5.3	8.8	28.9	29.8	27.2	
Age (years)						
21-30	5.4	9.0	34.2	26.1	25.2	0.0278
31-40	3.5	10.5	17.5	26.3	42.1	
>40	1.2	3.6	27.4	35.7	32.1	
Level of education						
Primary	7.4	-	11.1	18.5	63.0	0.0001
Secondary	1.8	8.8	15.8	31.6	42.1	
Tertiary	3.6	8.5	35.1	30.4	22.6	

Ratings for the intended frequency of consumption were affected by age ($P=0.028$) and level of education of the consumers ($P=0.0001$). A smaller proportion (51.3%) of consumers between 21 and 30 years of age would consume any of the meats at least once a week compared to 68.4% of the 31 to 40 year olds and 67.8% of the consumers over 40 years of age. However, the medians (4.00) and 25 to 75 percentile ranges (3.00 to 5.00) were the same for the three age groups.

A high proportion of consumers with a primary level of education (81.5%) would consume meat at least once a week. This proportion declined with an increasing level of education to 73.7% of those with secondary and 53.0% of those with a tertiary education. A sizeable proportion of those with tertiary education (35.1%) would consume meat occasionally (about once a month). The medians and 25 to 75 percentile ranges for the food action ratings by consumers with primary, secondary and tertiary level of education were, respectively 5.00 and 4.00-5.00; 4.00 and 3.00-5.00, and 4.00 and 3.00- 4.00.

In series II, rating of sensory attributes significantly varied with population category of the consumers (Table 8.6, Figure 8.2). Black consumers awarded significantly higher scores for all the sensory attributes than white consumers ($P<0.05$). The difference was large (+0.44) and highly significant ($P=0.0002$) between the mean tenderness scores and smaller between mean flavour (+0.26) and mean aroma (+0.22) scores. Mean overall acceptability scores between the two groups significantly differed by 0.3 ($P=0.004$).

Unlike in series I, tenderness scores by male consumers in series II were significantly ($P=0.020$) higher than those by female (+0.26) consumers. There were however no significant differences in ratings for aroma, flavour and in the overall acceptability score ($P>0.05$). As in series I, consumers who were between 21 and 30 years old generally rated acceptability of the sensory attributes lower than the older groups. The younger group's ratings for aroma and overall acceptability were at least 0.3 units lower ($P<0.001$) than the ratings by the groups above 30 years old. Ratings for tenderness significantly differed between the 21 to 30 years old and over 40 years groups only by 0.5 units. There were no significant consumer age effects ($P>0.05$) on the ratings for flavour acceptability.

Level of education was highly significant in the ratings of sensory attributes in series II ($P<0.0001$). Consumers with tertiary education awarded the lowest scores for each attribute (3.64 ± 0.80 for aroma, 3.57 ± 0.94 for tenderness, 3.83 ± 0.90 for flavour and overall acceptability of 3.68 ± 0.71). These means were 0.3 to 0.45 lower than the ratings by consumers with secondary level of education, whose scores were in turn 0.5 to 0.7 lower than those of consumers with primary level of education.

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Table 8.6 *P*-values for the analysis of variance for the effects of consumer population category gender, age and level of education on ratings of aroma, flavour, tenderness and overall acceptability in the second series of samples*

Sensory attribute	Series mean (± S.D.)	<i>P</i> -values			
		Population category	Gender	Age	Level of education
Aroma	4.02 ± 0.95	0.0339	0.3390	<0.0001	<0.0001
Tenderness	4.05 ± 0.97	0.0002	0.0197	0.0006	<0.0001
Flavour	4.27 ± 0.90	0.0115	0.2215	0.0564	<0.0001
Overall acceptability	4.11 ± 0.80	0.0004	0.0826	0.0002	<0.0001

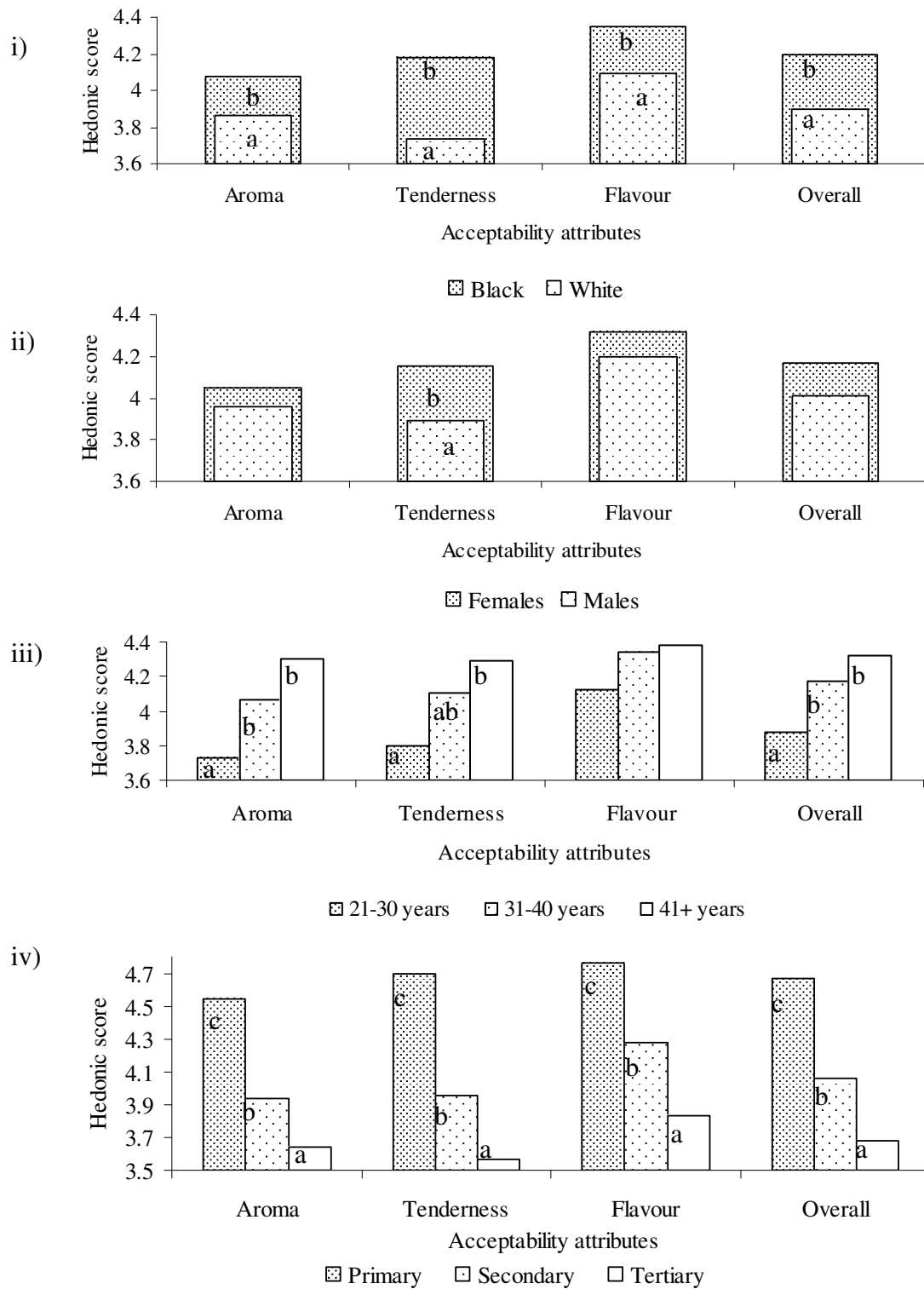
NB. In series II male goats had no permanent incisors and were a mixture of intact and castrated males. Female goats had 8 permanent incisors and sheep had 2 to 6 permanent incisors.

All consumer attributes significantly affected the food action ratings for frequency of consumption in series II (Table 8.7). Generally more black (82.2%) than white consumers (62.5%) would eat meat at least once a week ($P=0.0001$). The medians of the scores were 4.00 for each group and the 25 to 75 percentile ranges were 4.00 to 5.00 for the black and 3.00 to 5.00 for the white consumers.

A higher proportion of male consumers (80.9%) would eat meat as frequently as weekly or more compared to females (69.1%). The medians for the food action ratings were 4.00 in each case and the 25 to 75 percentiles 4.00 to 5.00 for male and 3.00 to 4.00 for female consumers.

The older the consumers, the higher the intended frequency of consumption ($P<0.0001$) was. The frequencies for once a week or more were 70.8%, 73.6% and 85.7% respectively for 21-30 years, 30- 40 years older than 40 years old consumers. The medians were 4.00 for each age group but the percentiles were 3.00 to 4.00, 3.00 to 5.00 and 4.00 to 5.00 for the 21-30, 31-40 and over 40 year old groups, respectively.

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NB Bars within a graph with different letters ‘a’, ‘b’ or ‘c’ differ significantly ($P<0.05$)

Figure 8.2 The effect of consumer i) population category, ii) gender, iii) age and iv) level of education on the ratings of sensory attributes of meat samples employed in series II

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Table 8.7 Distribution of ratings for intended frequency of consumption with consumer population groups, gender, age and level of education for series I of sensory evaluations

Main effect	% of consumers per intended frequency of consumption					P-value
	Never	When no other food is available	Occasionally	Once a week	Daily	
Mean	0.6	2.4	20.5	38.8	37.6	
Population group						
Black	0.4	1.7	15.6	39.8	42.4	0.0002
White	1.0	4.2	32.3	36.5	26.0	
Gender						
Females	0.8	2.4	27.6	46.3	22.8	<0.0001
Males	0.5	2.5	16.2	34.3	46.6	
Age (years)						
21-30	0.8	1.0	25.0	45.	25.8	0.001
31-40	1.0	3.9	21.6	32.4	41.2	
>40	-	-	14.3	38.1	47.6	
Level of education						
Primary	1.0	1.0	3.1	39.6	55.2	<0.0001
Secondary	-	-	21.1	41.5	37.4	
Tertiary	0.9	6.5	35.2	35.2	22.2	

Conversely, the higher the level of education, the lower the intended frequency of consumption for the meats ($P < 0.0001$) was. Virtually all consumers with primary level of education (94.8%) would consume meat at least once a week. The median food action rating for this group was 5.00 and the 25 to 75 percentile range was 4.00 to 5.00. Amongst consumers with secondary and tertiary level of education, respectively 78.9 % and 57.4% of them would consume meat at least

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once a week. In the latter case 35.2% of consumers would eat meat occasionally. The median food ratings by consumers with secondary and tertiary level of education were 4.00 each, while the 25 to 75 percentile ranges were 4.00 to 5.00 and 3.00 to 5.00, respectively.

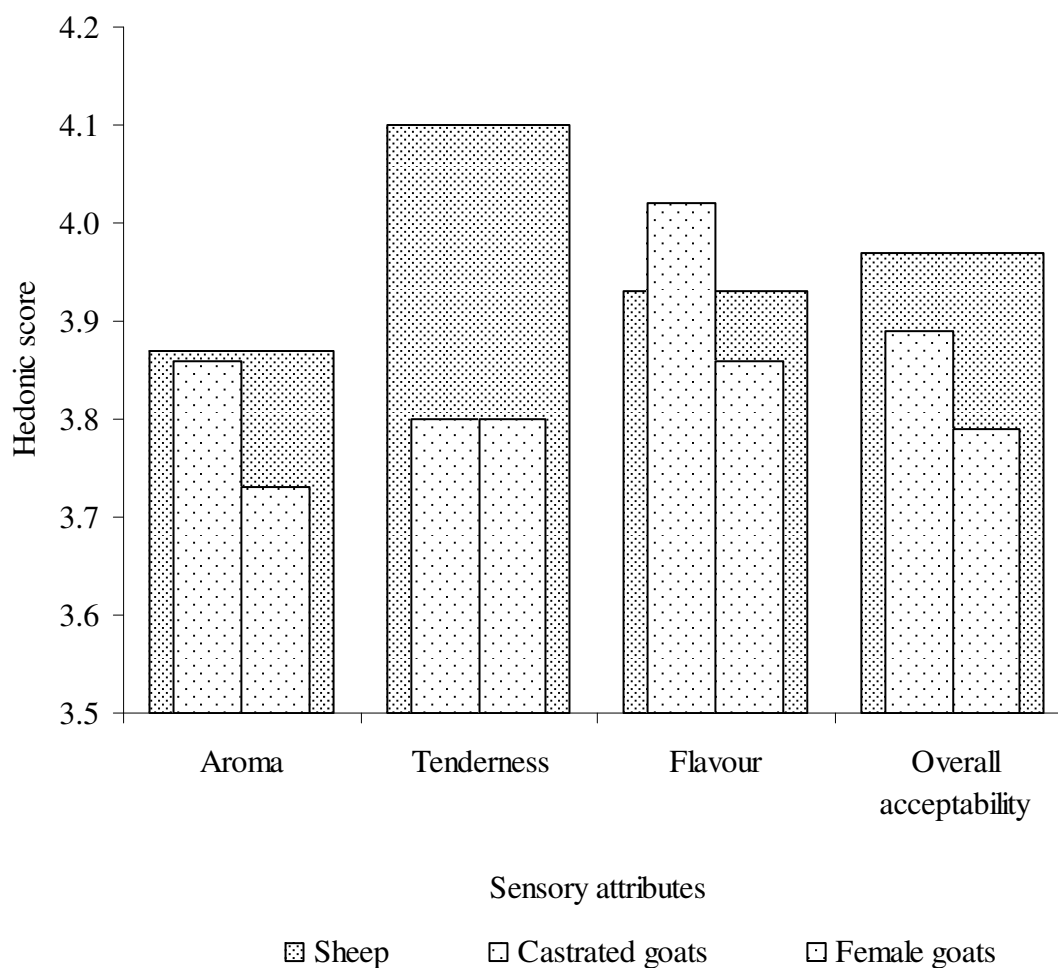
There were no significant effects of consumer gender, age, population group and level of education ($P>0.05$) on preference for any of the three types of meat presented to consumers in each series. The P -values of the maximum likelihood analysis of variance for the two series are shown in Table 8.8.

Table 8.8 Maximum likelihood analysis for effect of consumer gender, age, population category and level of education on meat preferences.

	Degrees of freedom	Series I		Series II	
		χ^2	P -value	χ^2	P -value
Gender	3	7.18	0.0664	0.81	0.8471
Age	6	2.89	0.8224	6.62	0.7282
Population group	3	2.42	0.4902	2.91	0.4058
Level of education	3	1.51	0.6791	5.49	0.1395

8.2.3 Acceptability of sensory attributes and consumption intent for the different meat types

In the first series there was a tendency for mutton to be rated as more tender ($P=0.055$) than chevon from either the castrates or female goats (Figure 8.3). However, there were no differences in the acceptability of flavour and aroma of chevon and mutton to consumers ($P>0.05$). Consequently there were no significant differences in the overall acceptability of the three meat types ($P>0.05$). Neither were there any differences in the intended frequency of consumption ($P>0.05$). Mean ratings for the acceptability of each of the sensory attributes and medians for consumption intent were high. The ratings averaged between 3.73-3.88, 3.80-4.10, 3.86-4.02 and 3.79-3.97 for aroma, tenderness, flavour and overall acceptability, respectively. The medians for consumption intent were 4.00 and the 25 to 75 percentile between 3.00 and 5.00 for each meat type. The ratings imply that the consumers found each of the three meat types ‘acceptable’ and would eat any of them as often as once a week.



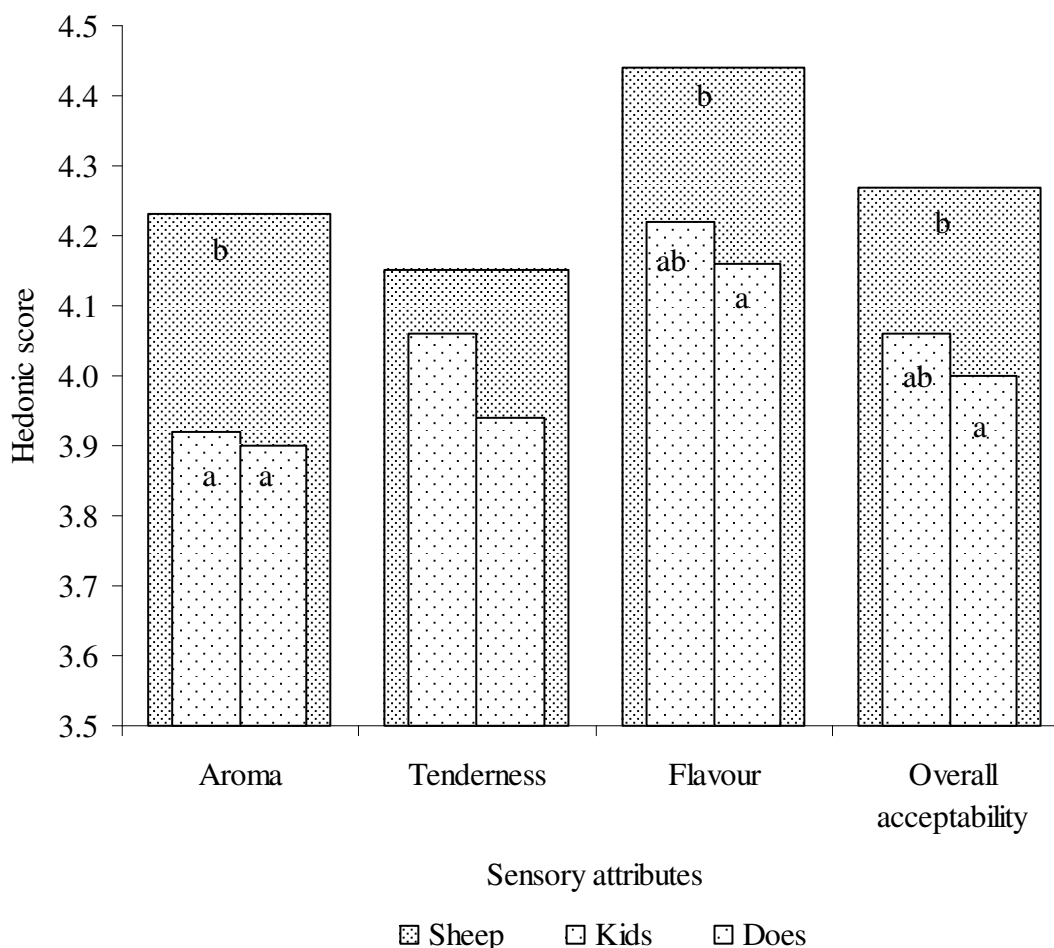
NB Hedonic scores for aroma, tenderness, flavour and overall acceptability range from 5 (extremely acceptable) to 1 (extremely unacceptable).

Figure 8.3 Acceptability of chevon from 2-to 6 teethed castrates and female goats compared to mutton from sheep of similar age

For the second series of samples (Figure 8.4), consumers rated aroma of mutton significantly more acceptable than that of chevon from the old does and kids ($P=0.013$). Aroma of mutton was rated “extremely acceptable” (4.23 ± 0.89) while that of chevon from the kids (3.92 ± 0.98) and does (3.90 ± 0.96) were “acceptable”. There was a tendency ($P=0.050$) for the flavour of mutton to be more acceptable than that of chevon from the does. Acceptability ratings for the flavour of mutton, chevon from kids and does were, respectively 4.44 ± 0.77 , 4.22 ± 0.99 and 4.16 ± 0.91 . There were however no significant differences ($P>0.05$) between the samples for the acceptability of tenderness. The average ratings were between 3.94 ± 0.98 and 4.15 ± 0.90 . Overall, mutton was more acceptable than chevon from old does but not that from kids ($P=0.039$). The

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overall acceptability scores were 4.27 ± 0.71 , 4.06 ± 0.87 and 4.00 ± 0.80 for mutton, chevon from kids and chevon from does, respectively. Ratings of the acceptability of all the sensory attributes did not differ significantly between the does and kids ($P > 0.05$).



NB Means of the same attribute with different letters 'a' or 'b' differ significantly ($P < 0.05$)

Hedonic scores for aroma, tenderness, flavour and overall acceptability range from 5 (extremely acceptable) to 1 (extremely unacceptable).

Figure 8.4 Acceptability of chevon from milk-teethed male kids and old does compared to mutton from 2-to-6 teethed females

Intended frequency of consumption was affected by meat type in series II ($P = 0.017$). Consumers would eat mutton more often than chevon from old does but not significantly more often than chevon from kids. Consumption intent for chevon from kids and that from does did not differ ($P > 0.05$). The medians for the food action ratings for consumption intent were 4.00 for each meat type. The 25 to 75 percentile ranges were 3 to 5 for both goat meat types and 4 to 5 for mutton.

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Ratings of sensory attributes indicated that all the meats were “acceptable” (hedonic scores between 3 and 4) to “extremely acceptable” (hedonic between 4 and 5). Most consumers eat each of the meat types as often as once a week.

Acceptance of all sensory attributes significantly correlated with consumption intent ($P < 0.001$). The Spearman’s correlation coefficients for aroma, tenderness, flavour and overall acceptability with consumption intent were, respectively 0.41, 0.44, 0.48 and 0.55 in the first series and 0.52, 0.51, 0.56 and 0.62 in the second series of sensory analyses. In both series the acceptance of flavour had a stronger correlation with consumption intent than either tenderness or aroma.

8.2.4 Consumer preferences for the different meat types

In series I, there were no significant differences ($P > 0.05$) in the preference for any of the meat types (Figure 8.5). In the second series preference for mutton and chevon from kids did not differ significantly ($P > 0.05$) but consumers preferred mutton above chevon from old does ($P < 0.05$, Figure 8.6).

Stepwise discriminant analysis to determine in order of importance the variables that influence preference was highly significant ($P < 0.0001$) in both series and validity of back classification for these attributes was also good. In series I, tenderness of chevon from the female goats was the most discriminating variable along with flavour of both chevon types and the aroma of mutton. Using the four variables 61.4% of the samples could be correctly classified (Table 8.9).

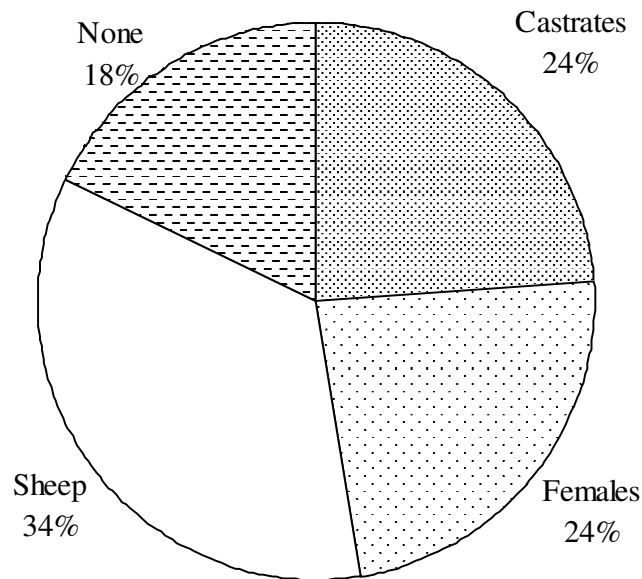
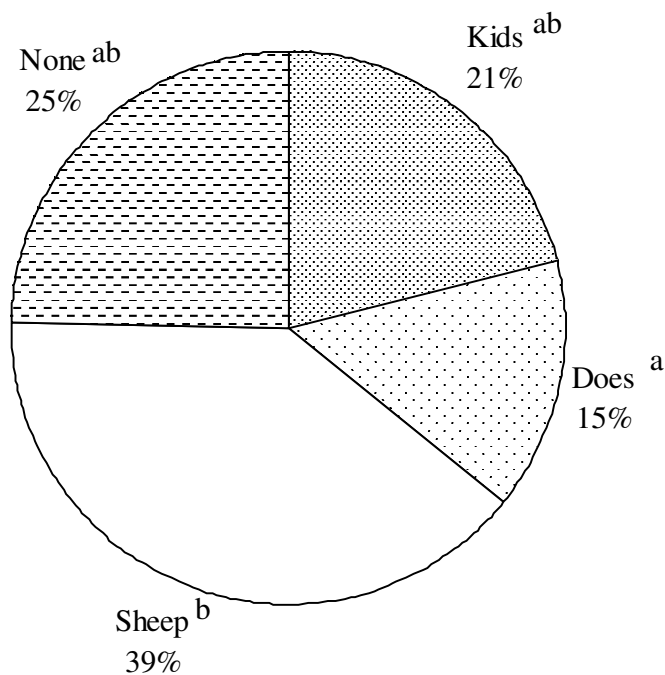


Figure 8.5 Consumer preference for chevon from 2-to-6 teathed female and castrated goats compared to mutton from sheep of similar age



NB Preferred meat types with different letters 'a' or 'b' differ significantly

Figure 8.6 Consumer preference for chevon from milk teathed male kids and old does compared to mutton from 2-to-6 teathed sheep

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Table 8.9 Classification of preferences for chevon from 2-to-teethed castrated and female goats and mutton from sheep of similar age using discriminant variables

Group	% correctly classified	Number of preferred samples correctly classified			
		Castrates goats	Females goats	Sheep	None
Castrates goats	55.0	11	3	2	4
Females goats	70.0	0	14	2	4
Sheep	64.3	3	2	18	5
None	53.3	3	3	1	8

In the second series, aroma of chevon from kids was the most discriminating factor along with aroma of chevon from does, tenderness of the does and mutton and flavour of mutton. The five variables could be used to correctly classify 67% of the samples (Table 8.10).

Table 8.10 Classification of preferences for chevon from milk teethed male kids and old does and mutton from 2-to-6 teethed sheep using discriminant variables

Group	% correctly classified	Number of preferred samples correctly classified			
		Kids	Does	Sheep	None
Kids	52.2	13	4	3	4
Does	62.5	2	10	0	4
Sheep	65.1	7	2	30	5
None	74.1	3	2	2	20

In both series, no single attribute was identified as influencing preference for any of the samples. This could be due to the fact that all the sensory attributes of all the samples were rated as highly acceptable on the scale and that the differences between the samples were very small.

8.3 DISCUSSION

Consumer level of education was clearly the most influential factor on consumer acceptance of the sensory attributes and consumption intent in the present study. This factor may be equated to level of income to some extent (Dawkin, Mcmillin, Phelps, Gebrelul, Beyer and Howard, 2000) and possibly to the degree of experience with various types of foods. The findings imply that

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highly educated consumers are more particular about accepting sensory attributes than groups with a lower level of education. Age and gender were statistically quite important but population category was relevant only in the second series of analysis where the meat types were markedly different in quality.

Generally all sensory attributes were highly acceptable, with mean acceptability scores that ranged between 3 and 4. Consumption intent was considerably high too, with all groups registering a median food action rating of 4.00, which denoted that consumers in either series would eat any of the meat types at least once a week.

The 2-to-6 teeth castrated male and female goats had similar carcass and meat quality attributes. In line with that, consumers found meat samples from either sex group equally acceptable to the extent that preferences for the chevon from the two sources were equal.

Except for a slight tendency for mutton to be rated more tender than chevon from castrates, chevon of the 2-6 teeth goats compared very well to mutton in terms of acceptability of the sensory attributes, consumption intent and preference by the consumers. Differences between mutton and chevon in tenderness are often reported (e.g. Pike et al., 1973a; Griffin et al., 1992; Schönfeldt et al., 1993a; Tshabalala et al., 2003). The differences have been ascribed to that caprine muscles tend to have a coarser structure with thicker myofibres than ovine muscles (Gaili et al., 1972; Gaili and Ali, 1985). Secondly, because the meat is much leaner, the sensation of tenderness due to intramuscular fat content is limited with chevon (Schönfeldt et al., 1993a; Lawrie, 1998). However, aside from the slight difference in tenderness between mutton and chevon in the present study, both meat types were equally acceptable to consumers when sheep and goats of similar age were compared.

The second series comparison was designed to include goats that should be used in the chevon market and those that commonly dominate the market. All the goats that were used in the second series of sensory evaluation were conditioned on the University Farm prior to slaughter and hence were in good body condition. This is reflected in the high body weights of the kids despite the fact that they were only between 6 and 9 months old, and the high fat content of the two groups. The differences in the myofibre type percentages were typical of differences that occur with the age of the animal (Ashmore et al., 1972; Brandstetter et al., 1998a).

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Some of the old female goats (5 out of 9) were electrical stimulated for another trial (Chapter 6 refers) and hence the low pH₃ and tendency for high lactate and low glycogen content soon after slaughter. High pH_u values seem typical of chevon, particularly that from old goats (§ 5.3.1 refers).

The comparative sensory evaluation of chevon from kids and does and mutton clearly indicated that chevon from old does was less acceptable to the consumers than mutton. The findings corroborate studies which employed trained sensory panels and showed that chevon from older goats is not of high quality overall (e.g. Pike et al., 1973b; Smith et al., 1978). These findings most likely expound the negative perceptions that prevailed on the quality of chevon produced under commercial slaughter conditions in Zimbabwe during the 1990s.

Most of the chevon supplied to the urban markets of Zimbabwe was slaughtered through large commercial abattoirs and sold through retail outlets. Slaughter stocks supplied to the abattoirs were dominated by old does (Hatendi, 1993; Simela, 1996; Simela *et al.*, 2000c). For example, in a survey of the 1995 to 1996 slaughter records of a major commercial abattoir, 58% were females, consisting mainly of old does. At the abattoirs, all goat carcasses were graded according to a government gazetted schedule with four grades; Super, Choice, Standard and Inferior (Government of Zimbabwe, 1995). Super and Choice grades were reserved for well-finished young goats but most of the old females tended to grade Standard or Inferior. In fact in the 1995/96 survey female goats constituted only 33% of the top two grades. All in all less than 20% of the slaughtered population fell in the top two grades. A survey of the retail outlets indicated that the retailers preferred to receive and sell chevon from carcasses of the top two grades because they felt that the carcasses kept well and were less prone to dehydration. Low grade carcasses were said to dry and darken quickly. However, because the market was dominated by the less desirable old goats, some retailers viewed goats as yielding small, low grade carcasses and the meat as smelly. Therefore they would not sell chevon. Chevon production in Zimbabwe was thus a classic example of how the supply of inappropriate animals in the goat market affects consumer perceptions. It is probably for the same reason that some South African consumers describe chevon as stringy, smelly and tough (USAID/South Africa and ARC-ANAPI, 1998a; Figure 2.1i).

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Other cases where chevon has been found unacceptable is when it came from very young/small animals. Examples are the studies Smith et al. (1978) where 3 to 5 month old kids yielded meat that was perceived to be tougher, less juicy and less flavourful than chevon from yearling goats. Tshabalala (2000) found that patties from indigenous goat kids (11kg cold carcass weight) were less tender and less juicy (sensory scores of less than 4.4 on a 1 to 9 hedonic scale) than patties from the heavier boar goat kids (13.5kg cold carcass weight) and lamb (20kg cold carcass weight).

It is noteworthy that in both series in the present study, differences only occurred between chevon and mutton and not between the two types of chevon (Figures 8.3 to 8.6). This highlights the uniqueness of chevon and emphasises previous reports that it is not interchangeable with mutton on sensory attributes (Pike et al., 1973a; Schönfeldt et al. 1993a, b; Swan et al., 1998). Despite the differences most consumers would eat either chevon or mutton as often as once a week at least.

Within the goat species, sex and age seem to have little impact of the meat quality (see also Chapters 5 and 6), and hence the lack of differentiation between the sex and age groups in the sensory evaluations in the present study. Gaili et al (1972) reported findings similar to this study when comparing sensory attributes of chevon from milk teether kids and older goats. The lack of differences could be attributed to that indigenous goats have not been especially selected for meat production. As such, most of the changes with age during their growth and development are geared towards survival rather than meat production. Maximum saleable portions are reached at a very early stage in growth and development in goats whereas similar differentiation may continue to the two teeth stage in sheep (Norman, 1991).

From the current findings, it is evident that chevon is an acceptable meat in the South African market and can be as acceptable as mutton if the meat is from young goats of about a year to two years old. (milk teeth to 6 permanent incisors). One aspect that may undermine the acceptance of chevon to South African consumers is their general lack of exposure to the meat, which was demonstrated by the USAID-ARC survey of 1998 (Figure 2.2). However given the positive results of the current study and of the trained-panel sensory evaluations (Schönfeldt et al., 1993a, b; Breukink and Casey, 1989; Tshabalala et al., 2003) as well as the fact that the USAID-ARC study showed that a large proportion of the sampled population were willing to try out chevon

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once it had been drawn to their attention, there is a potential to develop a market for chevon in South Africa.

8.4 SUMMARY

Amongst the consumer characteristics, the level of education was most important in terms of consumer acceptance of the sensory attributes as well as on the intended frequency of consumption for the meats. Consumer age and gender were important factors in some cases but population group was a significant factor in the judgement of meats of more diverse acceptability.

The sensory evaluations indicate that all meat types were highly acceptable to the consumers and they were willing to eat any of the meats at least once a week. The study indicated that chevon is acceptable to South African consumers and may be as acceptable as mutton if the meat is from goats of about two years old or younger.