PORK QUALITY OF PIGS RAISED IN SMALLHOLDER URBAN FARMS IN SOUTH AFRICA

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I. INTRODUCTION

Smallholder urban pig production plays a vital role in low-income households as a source of nutrition, income, and employment. However, pork quality in smallholder urban farming areas remain a concern as most farmers handle and slaughter pigs inhumanely and market pork informally without following appropriate hygiene and safety practices [1]. Such pigs tend to experience high levels of stress prior to slaughter, which compromises pork quality post-mortem [2]. In South Africa, quality of pork from pigs raised in smallholder urban farming areas is not known. Therefore, the aim of this study was to evaluate the quality of pork from pigs raised in the Cape Metropole District, South Africa.

II. MATERIALS AND METHODS

Thirty Landrace grower barrows aged six months (49.5 ± 11.83 kg) were sourced from five low-income, high-density suburbs (i.e., Mfuleni, IthembaLab, Penhill, Khayelitsha and Strand) in the Cape Metropole District, South Africa. In each suburb, six pigs from one farm were slaughtered on-farm by the farmer following his/her usual slaughter practices. The carcasses were transported to Stellenbosch University Meat Science Lab in a mobile cold room (± 4 °C). After 24 h post-mortem, the left *longissimus thoracis et lumborum* (LTL) muscle of each barrow was sampled for meat quality analyses. For the control, six left LTL muscle samples of Landrace grower barrows (six-months-old, 70.3 ± 0.52 kg) raised on the same farm were sourced from a commercial abattoir in Cape Town 24 h post-mortem for meat quality analyses. Data on meat quality attributes were subjected to analysis of variance in a completely randomized design using SAS 9.4 with source of meat as the fixed factor. Differences were separated at $P \leq 0.05$.

III. RESULTS AND DISCUSSION

Meat physicochemical attributes of pigs raised in the Cape Metropole are presented in Table 1. Pork from Strand pigs had the highest pH_{24} while that from the commercial abattoir had the lowest ($P \leq 0.05$). Khayelitsha and Strand pork had the highest temperature at 24 h while Mfuleni pork had the lowest values. Variation in pork pH and temperature across suburbs could be largely attributed to differences in animal handling and slaughter practices used by farmers, which influence pig stress and glycogen levels [3]. Pork from the commercial abattoir, Khayelitsha and Mfuleni had higher ($P \leq 0.05$) subcutaneous and intramuscular fat contents than that from the other suburbs which could be related to the differences in pig nutrition and management across the suburbs. Khayelitsha, Mfuleni and Penhill pork had higher ($P \leq 0.05$) moisture content than the other suburbs. Protein content was highest for the abattoir pork and lowest for Khayelitsha and Penhill ($P \leq 0.05$). The differences in proximate composition across suburbs could be explained by interrelationships of water, protein, and fat in muscles [4]. Relative to the other suburbs, Mfuleni and Strand had the highest lightness values ($P \leq 0.05$) which could be attributed to their differences in fat and moisture contents. The lightness values

of pork from all the suburbs except for the IthembaLab were above the acceptable range (52 – 58) for normal meat and suggest minor incidences of pale, soft and exudative pork. Mfuleni and Penhill respectively had the lowest and the highest redness values ($P \leq 0.05$) that is influenced by many factors including myoglobin content, nutrition, and post-mortem changes in muscle [5] which were not evaluated in the current study. Pork from Khayelitsha had the lowest drip loss while that from Strand had the highest values ($P \leq 0.05$), and the opposite was true for cooking loss. This may be ascribed to the reported differences in fat and protein contents, which affect the hydrophobicity of the myosin isoforms in different muscle fibre types and consequently influence water-holding capacity [6]. The lowest and highest Warner-Bratzler shear force (WBSF) values for abattoir and Strand pork ($P \leq 0.05$) are related to their fat contents.

Table 1 Least square means of selected meat quality attributes of the pigs in the Cape Metropole District

Variables	Commercial abattoir	IthembaLab	Khayelitsha	Mfuleni	Penhill	Strand	RSD	P value
pH_{24}	5.52^{d}	5.70^{b}	5.75^{b}	5.68^{bc}	5.55^{cd}	5.98^{a}	0.144	<.0001
Temperature (24 h)	9.90^{ab}	9.60^{bc}	7.50^{d}	10.3^{a}	9.30^{c}	7.30^{d}	0.548	<.0001
Subcutaneous fat (mm)	12.0^{b}	19.0^{a}	13.8^{b}	14.3^{b}	18.0^{a}	20.0^{a}	3.377	0.0010
Moisture (%)	73.8^{b}	72.7^{b}	76.3^{a}	75.3^{a}	75.4^{a}	73.6^{b}	1.384	<.0001
Ash (%)	1.33^{c}	3.84^{a}	2.66^{ab}	2.44^{ab}	3.38^{a}	2.64^{ab}	1.168	<.0001
Crude protein (%)	23.4^{a}	20.6^{c}	19.0^{d}	21.3^{bc}	19.1^{d}	22.0^{b}	1.125	<.0001
Intramuscular fat (%)	2.15^{b}	3.68^{a}	2.69^{b}	2.61^{b}	3.44^{a}	3.54^{a}	0.480	<.0001
Lightness (L*)	55.8^{c}	57.2^{bc}	59.8^{b}	63.7^{a}	60.1^{b}	64.7^{a}	3.360	<.0001
Redness (a*)	3.52^{d}	6.11^{bc}	5.18^{c}	4.03^{d}	7.79^{a}	6.42^{b}	1.132	<.0001
Drip loss (%)	6.52^{b}	6.22^{b}	3.25^{c}	7.08^{b}	8.33^{ab}	10.5^{a}	1.899	<.0001
Cooking loss (%)	35.1^{cd}	38.9^{b}	42.8^{a}	37.9^{bc}	39.6^{b}	34.3^{d}	2.564	<.0001
WBSF (N)[1]	44.5^{a}	35.7^{b}	34.9^{b}	34.9^{b}	32.3^{b}	24.2^{c}	6.114	<.0001

RSD: Residual standard deviation; $^{a, b, c, d}$: Least square means in the same row not sharing a common superscript are significantly different ($P \leq 0.05$); [1]WBSF: Warner-Bratzler shear force expressed in Newtons (N)

IV. CONCLUSION

Quality attributes of pork from the smallholder urban farms varied across suburbs but were within the consumer acceptable ranges except for lightness which exhibited PSE attributes.

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