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Selected meat quality parameters and nutritional profiles of *M. longissimus thoracis et lumborum* of Niang-Megha pigs

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ABSTRACT

Niang Megha is one of the 7 registered pig breeds of indigenous origin in India. The study was part of a programme to improve pig production in India and the information on carcass composition and meat quality are very much essential towards the development of a suitable breeding plan for this pig breed. Gilts (14) and barrows (20) from Niang Megha breed were slaughtered at the age of 10 months for evaluating the different parameters. Moisture: protein ratio varied from 3.38 to 3.64 and no significant difference was observed between gilts and barrows. The cholesterol content in *M. longissimus thoracis et lumborum* varied from 46.81 mg/100g to 68.15 mg/100g, with an average of 60.68 mg/100g. Instrumental colour measurement indicated that the coordinates were in the following range: lightness (L*), 55.83–74.18; redness (a*, red±green), 9.81–19.37; and yellowness (b*, yellow±blue), 19.97–39.38. The haem iron content was significantly higher in barrows compared to gilts. The mineral contents in the *M. longissimus thoracis et lumborum* were in the following range: potassium, 271–337 mg/100g; zinc, 0.54–0.97 mg/100g; copper, 0.03–0.09 mg/100g; manganese, 0.02–0.03 mg/100g, and magnesium, 4.37–7.22 mg/100g. Significant differences were not observed in the concentration of any of the estimated amino acids between the sexes. Fatty acid profiling of *M. longissimus thoracis et lumborum* indicated that saturated and unsaturated fatty acids were in the range of 32.75%–38.91% and 54.69%–69.28%, respectively.

Key words: Fatty acid profile, Indigenous pig, Meat quality, Mineral contents, Niang Megha, Nutritional profile

Niang-Megha is one among the 7 registered pig breeds of indigenous origin in India, with the following accession number - INDIA_PIG_1300_NIANGMEGHA_ 09002 (National Bureau of Animal Genetic Resources, http://www.nbagr.res.in/nbagr.html). The other registered pig breeds in the country are Ghungroo, Agonda Goan, Tenyi Vo, Nicobari, Doom and Zovawk. Its breeding tracts include East Garo Hills, East Khasi Hiss, Jaintia Hills, Ri-Bhoi, South Garo Hills, West Garo Hills and West Khasi Hills in Meghalaya. Pork being one of the cheapest sources of animal protein in the region, rearing of Niang-Megha pigs is an integral part of the socio-cultural life of the ethnic people in Meghalaya. It is a small size pig with small, erect ears. The colour is predominantly black with or without star shaped white patches on forehead. Snout is long and gradually tapering and has white patches in the nostril. This breed produces black colour bristles and the yield ranges from 50 to 80 g/adult animal. The bristle length varies from 7–10 cm while the diameter ranges from 20–24 microns. The production and reproduction traits of indigenous pig breeds, including Niang-Megha breed was studied in detail at ICAR-National Research Centre on Pig and well documented (Sahoo *et al.* 2012, Naskar *et al.* 2014, Barman *et al.* 2015, Gokuldas *et al.* 2015).

The objective of the present study was to investigate the detailed meat quality parameters and nutritional profiles of pork from *Niang-Megha* pigs. The present paper reports the yields of selected meat quality parameters, proximate composition, cholesterol content, profiles of colour, minerals, amino acids and fatty acids in the *M. longissimus thoracis et lumborum* of *Niang-Megha* pigs. The information is very much important towards the development of a suitable breeding plan for this pig breed, which is crucial for the development of the pig production sector in India.

MATERIALS AND METHODS

The experiment was conducted with 34 Niang-Megha pigs (14 females and 20 castrated males) reared at the Research Farm of ICAR-National Research Centre on Pig. The pigs were taken for slaughter at their predetermined slaughter age of 10 months, as per the institute's slaughter policy for the indigenous breeds. Pigs were slaughtered in the R&D Pork Processing Plant of the institute (FSSAI licensed, HACCP and ISO 9001:2008 certified). Pigs were electrically stunned (head-only) by low voltage current, shackled on the left leg and exsanguinated in the vertical position on the over head rail. Thereafter, the pigs were

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scalded at 65°C, followed by hair removal on an automatic dehairing machine. Following slaughter, carcasses were scraped, washed, split, eviscerated and chilled according to standard commercial practices. After chilling for 18 h at 2±1°C, the left side of each carcass was ribbed between 10^{th} and 11^{th} rib positions. Loin eye area and fat depth measurements (three-quarters of the length of the transverse section of the exposed *M. longissimus thoracis et lumborum*) were taken between the 10^{th} and 11^{th} ribs. Carcass measurements were taken by the same individual throughout the trial. A block of loin comprising between ribs 8 and 11 was taken from the left side of each carcass, samples were identified and frozen at –20±1°C until analysis of other parameters. Before being measured, samples were thawed at room temperature overnight.

pH_{45} and pHu were measured at 45 min and 48 h post-mortem in the *M. longissimus thoracis et lumborum* between 13^{th} and 14^{th} rib on the intact carcasses. The moisture, crude protein (N × 6.25), fat, ash and crude fibre contents were determined by the AOAC (AOAC 2005). Water holding capacity (WHC) was determined at 24 h post mortem by the filter paper method (scoring and weighing; Kauffman *et al.* 1986). Drip loss of samples, taken approximately 30 h postmortem was measured according to the bag-method (Honikel 1998). Emulsifying capacity was determined at 24 h postmortem as per Swift *et al.* (1961), with minor modifications and expressed as the amount of oil (ml) emulsified by 1 g protein. Sarcomere length and muscle fibre diameter were determined on fresh *M. longissimus thoracis et lumborum* at 45 min postmortem as per Jermiah and Martin (1977) with minor modifications.

Cholesterol was extracted using the method of Maraschiello *et al.* (1996) and then quantified by HPLC. The color of the meat was measured at the 8^{th} and 9^{th} thoracic vertebra at 24 h postmortem using the *Easy Match* software of Hunter Lab (Model-Color Flex, Reston, Virginia, USA) with a 30 mm aperture set for illumination D 65/10° standard observer angle, after exposing the surface to the air for 30 min at 4°C. The concentration of heme iron was assayed from the total content of heme according to Hornsey (1956). Nonheme iron content was determined by the method of Rhee and Ziprin (1987). All the determinations were performed in triplicate.

To evaluate the mineral composition, meat samples from *M. longissimus thoracis et lumborum* were trimmed of visible adipose and connective tissue, chopped and dried in oven at 105°C to obtain a constant weight. After that, the samples were ashed in a covered crucible at 550°C in a furnace for 16 h to obtain a white residual ash. The ashes were subjected to an acid digestion process in an Erlen-flask, covered with a micro glass-ball to avoid projections, with 1 M hydrochloric acid and 1 M nitric acid solution heated on a hot plate (AOAC 2005). Determination of Cu, Zn, Mg, K and Mn were performed by flame atomic absorption spectrophotometer (Model: A 3846, GBC scientific equipments, Australia) following the analytical methods described by AOAC (2005). All the determinations were performed in duplicate.

M. longissimus thoracis et lumborum samples were minced using 3 mm hole plate of a meat mincer (Sirman, Italy) and the amino acid composition was measured as per Suzuki *et al.* (1991). For assessing the amino acid composition, 10 g of minced meat was suspended in 2.5 volumes (v/w) of deionized water by homogenizing for 60 sec. This suspension was centrifuged at 15,000 × g for 15 min, and the supernatant was collected through two layers of gauze. The soluble protein in the supernatant was sedimented by adding the same volume (v/v) of 3% sodium sulphosalicylate. Precipitated protein was removed through filter paper no. 5. The filtrate clarified through the membrane filter (pore size 0.45 pm) was subjected to amino acid analysis on a Shimadzu LC-6A high-performance liquid chromatograph (HPLC) with a system for amino acid analysis composed of a Shim-pack ISC-07/S1504 column (25 cm × 4.6 mm) and a RF-535 OPA detector (Shimadzu Co., Japan). All the determinations were performed in duplicate.

M. longissimus thoracis et lumborum samples were homogenized and 1 g of the sample was extracted with chloroform methanol 2:1(v/v) according to Salvatori *et al.* (2008). Fatty acid methyl esters (FAMEs) were prepared by esterification using methanol in the presence of sulphuric acid (5% of sulphuric acid in methanol). FAMEs were analysed in a Hewlett–Packard model HP-5890A gas chromatograph, equipped with a flame ionization detector (FID). They were separated on a semi capillary column (Hewlett–Packard FFAP-TPA fused-silica column, 30 m length, 0.53 mm i.d., and 1.0 mm film thickness). The injector and detector temperatures were held at 230°C and the oven temperature, at 220°C. The carrier gas was nitrogen at a flow rate of 1.8 ml/min. Identification of FAMEs was based on retention times of reference compounds (Sigma, St Louis). Fatty acid composition was expressed as a percentage of the major FAMEs. To assess the nutritional implications, the SFA/unsaturated fatty acids (UFA) and the PUFA/SFA ratios were calculated. All the determinations were performed in duplicate.

The data collected for different carcass and meat quality parameters were subjected to statistical analysis using SPSS, version 14.0. Mean, standard error of mean (SEM), t-values, minimum (Min) and maximum (Max) values are reported.

RESULTS AND DISCUSSION

pH_{45} and pHu were in the range of 6.44 – 6.83 and 5.61 – 5.84, respectively (Table 1). Sex did not influence the pH of the meat as reported by Cisneros *et al.* (1996) and Leach *et al.* (1996). Water holding capacity varied from 62.13% to 83.67%, while the drip loss was in the range of 1.37% to 2.46%. However, differences in water holding capacity between sexes were not observed. Emulsifying capacity, expressed as the amount of oil (ml) emulsified by 1 g protein, was in the range of 106.9 – 137.5 with an average of 119. WB shear force and the work of shear, determined 24 h postmortem, were in the range of 44.93 N – 62.17 N

Table 1. Selected meat quality parameters of *Niang Megha* pigs

Parameter	Gilt (n_1) Mean ±SEM	Barrow (n_2) Mean ±SEM	t-value	Combined (n_3) Mean ±SEM	Min.	Max.
pH_{45}	6.69±0.01	6.65±0.01	5.16	6.67±0.01	6.44	6.83
pHu	5.70±0.01	5.67±0.01	5.85	5.69±0.01	5.61	5.84
Drip loss (%)	2.05±0.02	1.97±0.03	0.91	1.99±0.03	1.37	2.46
Water holding capacity (%)	72.32±0.21	71.17±0.16	6.96	71.67±0.15	62.13	83.67
Emulsifying capacity (ml of oil/g of protein)	123.4±1.58	115.7±1.43	27.81*	121.2±1.52	106.9	137.5
Sarcomere length (µ)	2.30±0.02	2.35±0.02	2.24	2.32±0.02	2.10	2.50
Muscle fibre diameter (µ)	12.70±0.12	12.77±0.16	7.60	12.75±0.15	10.00	14.50
WB shear force (N)	54.18±0.79	51.67±0.69	0.96	53.68±0.73	44.93	62.17
Work of shear (Ns)	296.17±3.16	285.92±2.83	118.62**	290.33±3.60	243.52	335.1
Moisture (%)	73.91±0.16	72.29±0.17	19.87*	73.22±0.16	71.74	75.49
Dry matter (%)	26.57±0.13	26.85±0.19	1.19	26.78±0.14	24.51	28.26
Crude protein (%)	21.37±0.17	21.25±0.13	4.26	20.83±0.15	20.14	22.37
Crude fat (%)	3.73±0.16	3.97±0.12	19.11*	3.89±0.14	2.27	5.08
Crude fibre (%)	1.18±0.13	1.15±0.16	1.68	1.17±0.15	0.98	1.29
Total ash (%)	0.91±0.03	0.86±0.03	3.71	0.89±0.03	0.73	1.14
Moisture: Protein ratio	3.55±0.02	3.52±0.03	1.29	3.53±0.02	3.38	3.64
Cholesterol (mg/100g)	59.07±0.79	61.72±0.91	52.85**	60.68±0.88	46.81	68.15

**P<0.01, *P<0.05; n_1=14; n_2=20; n_3=34.

and 243.52 Ns – 335.1 Ns, respectively. Gender did not affect Warner-Bratzler shear force, data which confirmed previous observations (Hamilton *et al.* 2000)**.** Among the sexes, meat from the gilts had significantly (P<0.01) higher emulsifying capacity and work of shear compared to barrows.

Proximate composition and cholesterol content in *M. longissimus thoracis et lumborum* of Niang-Megha pigs are mentioned in Table 1. Different proximate principles were in the following range: moisture 71.74%–75.49%; crude protein 20.14%–22.37%; crude fat 2.27%–5.08%; crude fibre 0.98%–1.29%; and total ash 0.73%–1.14%. Among the sexes, meat from the gilts had significantly (P<0.05) higher moisture content, while that from the barrows had significantly (P<0.05) higher fat content. The trend of higher rate of fat deposition in the muscles of castrated male pigs was consistent with the reports of other workers. Huff-Lonergan *et al.* (2002) found higher intramuscular fat in hogs than boars at 91 kg body weight, while Essien (1988) reported significantly higher per cent fat in the muscles of barrows over those of gilts. Cholesterol content in the muscle was in the range of 46.81 mg/100g -68.15 mg/100g, with an average of 60.68 mg/100g. Moisture: protein ratio varied from 3.38 to 3.64 with an average of 3.53 and no significant (P>0.05) difference was observed between gilts and barrows.

Instrumental colour values and mineral composition of *M. longissimus thoracis et lumborum* of *Niang Megha* pigs are mentioned in Table 2. Instrumental colour measurement indicated that the coordinates were in the following range: lightness (L*), 55.83 – 74.18; redness (a*, red±green), 9.81 – 19.37; and yellowness (b*, yellow±blue), 19.97 – 39.38. Similarly, hue angle, which describes the hue as well as the saturation index and chroma (C*), which describes the brightness or vividness of colour, were in the range of 54.93 – 67.3 and 27.88 – 36.71, respectively. Among the sexes, gilts had significantly (P<0.01) higher lightness values, while barrows had significantly (P<0.01) higher a* and chroma values. The differences in redness in the *M. longissimus thoracis et lumborum* show that barrows had a higher concentration of haem pigments. The average iron content in the muscle was 2.74 mg/100g, of which the contribution of heme iron was 1.83 mg/100g while that of non-heme iron was 0.91 mg/100g (Table 2). It was also found that haem iron content was significantly (P<0.01) higher in barrows compared to gilts, while non-haem iron content was identical for both gilts and barrows. However, Cross *et al.* (2012), who analyzed iron content in different muscles of pork, showed that neither nonhaem iron content nor total haem pigment concentration in muscle tissue was significantly affected by sex. Breed and sex differences between the early maturing Niang-Megha pigs used in this study and the Large White castrated male pigs used by those workers could have accounted for the difference in the iron content. Estimated mineral contents in the *M. longissimus thoracis et lumborum* were in the following range: potassium, 271–337 mg/100 g; zinc, 0.54–0.97 mg/100g; copper, 0.03 – 0.09 mg/100g; manganese, 0.02–0.03 mg/100 g; and magnesium, 4.37–7.22 mg/100 g. Also, no significant (P>0.05) difference was found for these minerals among gilts and barrows.

The details of amino acid composition in *M. longissimus thoracis et lumborum* of Niang-Megha pigs are mentioned in Table 3. The estimated average values for different amino acids were in the following descending order: glutamic acid, 3.28 g/100 g; arginine, 2.83 g/100 g; histidine, 2.16 g/100 g; aspartic acid, 1.91 g/100 g; lysine, 1.82 g/100 g; proline, 1.44 g/100 g; leucine, 1.64 g/100 g; threonine, 0.98 g/100 g, serine, 0.91 g/100 g; valine, 0.85 g/100 g; phenylalanine, 0.85 g/100 g; tyrosine, 0.80 g/100 g; isoleucine, 0.76 g/

Table 2. Instrumental colour values and mineral composition of *M. longissimus thoracis et lumborum* of Niang-Megha pigs

Parameter	Gilts (n_1) Mean ±SEM	Barrows (n_2) Mean ±SEM	t-value	Combined (n_3) Mean ±SEM	Min.	Max.
Instrumental colour values						
L*	68.97±0.39	61.15±0.52	127.16**	64.57±0.46	55.83	74.18
a*	13.87±0.22	17.81±0.28	81.38**	15.30±0.26	9.81	19.37
b*	26.72±0.21	31.37±0.30	3.40	28.18±0.25	19.97	39.38
Chroma	29.17±0.13	37.39±0.20	267.11**	31.91±0.16	27.88	36.71
Hue	60.86±0.19	61.88±0.26	1.43	61.35±0.24	54.93	67.30
Mineral composition						
Total iron (mg/100g)	2.46±0.25	2.96±0.16	52.37**	2.74±0.20	1.88	3.62
Haem iron (mg/100g)	1.64±0.16	1.95±0.24	108.16**	1.83±0.21	0.96	2.77
Non-haem iron (mg/100g)	0.87±0.12	0.96±0.16	4.89	0.91±0.13	0.43	1.16
Potassium (mg/100g)	309±1.30	321±1.22	3.18	317±1.26	271	337
Zinc (mg/100g)	0.68±0.20	0.77±0.26	1.87	0.72±0.24	0.54	0.97
Copper (mg/100g)	0.15±0.19	0.14±0.25	2.16	0.15±0.23	0.03	0.09
Manganese (mg/100g)	0.02±0.06	0.02±0.09	4.77	0.02±0.07	0.02	0.03
Magnesium (mg/100g)	6.17±0.19	6.32±0.16	3.38	6.24±0.17	4.37	7.22

**P<0.01, *P<0.05; n_1=14; n_2=20; n_3=34.

Table 3. Amino acid composition (g/100g) of *M. longissimus thoracis et lumborum* of Niang-Megha pigs

Parameter	Gilts (n_1) Mean ±SEM	Barrows (n_2) Mean ±SEM	t-value	Combined (n_3) Mean ±SEM	Min.	Max.
Aspartic acid	2.08±0.07	1.89±0.10	3.87	1.91±0.08	0.93	2.74
Serine	0.88±0.02	0.96±0.02	0.91	0.91±0.02	0.38	1.41
Glutamic acid	3.37±0.11	3.20±0.19	2.29	3.28±0.16	1.74	5.09
Glysine	0.11±0.01	0.07±0.01	1.10	0.09±0.01	0.02	0.12
Histidine	2.32±0.03	2.09±0.06	0.81	2.16±0.05	1.41	3.17
Arginine	2.79±0.10	2.96±0.06	1.00	2.83±0.07	1.78	3.97
Threonine	0.89±0.05	1.03±0.06	3.34	0.98±0.05	0.33	1.83
Alanine	0.62±0.03	0.73±0.03	1.97	0.67±0.03	0.22	1.03
Proline	1.57±0.05	1.39±0.08	5.97	1.45±0.07	0.47	2.17
Cystine	0.17±0.01	0.17±0.01	0.65	0.29±0.01	0.09	0.47
Tyrosine	0.41±0.02	0.46±0.02	7.65	0.80±0.02	0.38	1.22
Valine	0.82±0.03	0.87±0.04	9.68	0.85±0.03	0.63	1.39
Methionine	0.51±0.02	0.64±0.02	4.69	0.56±0.02	0.13	0.98
Lysine	1.97±0.05	1.73±0.04	2.53	1.82±0.05	0.93	2.37
Isoleucine	0.68±0.03	0.80±0.03	4.17	0.76±0.03	0.26	1.12
Leucine	1.71±0.05	1.55±0.07	6.88	1.64±0.05	0.61	2.27
Phenylalanine	0.82±0.02	0.91±0.04	3.82	0.85±0.03	0.22	1.17
Tryptophan	0.33±0.01	0.29 ±0.01	1.76	0.31±0.01	0.17	0.53

n_1=14; n_2=20; n_3=34.

100 g; alanine, 0.67 g/100 g; methionine, 0.56 g/100 g; tryptophan, 0.31 g/100 g; cystine, 0.29 g/100 g; and glysine, 0.09 g/100 g. However, significant (P>0.05) differences were not observed in the concentration of any of the estimated amino acids between the sexes, and the present findings were in accordance with the data given by Suzuki *et al.* (1991) and Thomas *et al.* (2016a). Also, as it is the first study of this kind in Niang-Megha pig, detailed studies involving muscles other than *M. longissimus thoracis et lumborum* need to be carried out for further validation of the current findings.

Estimation of fatty acid profiles of *M. longissimus thoracis et lumborum* indicated that saturated fatty acids (SFA) and unsaturated fatty acids (UFA) were in the range of 32.75%–38.91% and 54.69%–69.28%, respectively, while the UFA: SFA ratio varied from 1.72 to 1.89 (Table 4). Palmitic acid (range, 19.18%–24.19%) and stearic acid (range, 9.71%–14.28%) constituted the major part of saturated fatty acids. Similarly, in unsaturated fatty acids, mono-unsaturated fatty acids (MUFA) constituted about 40.82% (range, 36.44%–40.17%) while poly-unsaturated fatty acids (PUFA) were accounted for 24.80% (range, 23.87%–27.39%). Among MUFA, oleic acid alone contributed for 34.62% (range, 28.58%–40.73%), while the major contributors in PUFA were linoleic acid (19.24%) and arachidonic acid (3.79%). The quantity and chemical properties of lipids in meat are regarded as important factors affecting carcass quality and it has been generally accepted

Table 4. Fatty acid profile (% of total fatty acids) of *M. longissimus thoracis et lumborum* of Niang-Megha pigs

Parameter	Gilts (n_1) Mean ±SEM	Barrows (n_2) Mean ±SEM	t-value	Combined (n_3) Mean ±SEM	Min.	Max.
Myristic acid, C 14:0	1.09±0.09	1.34±0.04	19.86*	1.23±0.07	0.83	1.52
Palmitic acid, C 16:0	20.33±0.25	22.39±0.31	4.25	21.78±0.28	19.18	24.19
Palmitoleic acid, C 16:1	2.71±0.05	2.55±0.07	8.17	2.62±0.06	1.83	3.68
Heptadecanoic acid, C17:0	0.23±0.01	0.23±0.01	0.51	0.23±0.01	0.16	0.33
Stearic acid, C 18:0	11.03±0.41	11.94±0.22	14.16*	11.58±0.31	9.71	14.28
Oleic acid, C 18:1	35.87±0.88	32.41±0.56	121.18**	34.62±0.67	28.58	40.73
trans Vaccenic acid, C 18:1, t11	3.53±0.24	3.62±0.30	4.82	3.58±0.27	2.67	4.28
Linoleic acid, C 18:2	19.66±0.49	18.37±0.42	16.39*	19.24±0.47	13.25	26.49
Alpha-linolenic acid, C 18:3	0.52±0.01	0.41±0.02	15.10*	0.47±0.02	0.28	0.71
Gamma-linolenic acid, C 18:3	0.18±0.01	0.13±0.01	1.78	0.15±0.01	0.06	0.23
Arachidic acid, C 20:0	0.51±0.03	0.39±0.02	3.29	0.43±0.03	0.11	0.87
Arachidonic acid, C 20:4	3.97±0.21	3.41±0.28	13.68*	3.79±0.25	1.89	5.76
Eicosa pentanoic acid, C 20:5	0.67±0.04	0.52±0.05	4.05	0.56±0.05	0.05	1.11
Behenic acid, C 22:0	0.27±0.02	0.37±0.03	7.14	0.33±0.02	0.18	0.39
Docosa pentanoic acid, C 22:5	0.38±0.03	0.30±0.05	3.09	0.33±0.03	0.07	0.61
Docosa hexanoic acid, C 22:6	0.31±0.02	0.21±0.05	3.83	0.26±0.04	0.13	0.47
Saturated fatty acids, SFA (%)	34.18±0.35	37.05±0.44	19.58*	35.61±0.37	32.75	38.91
Unsaturated fatty acids, UFA (%)	66.38±0.60	63.46±0.52	43.92**	65.62±0.55	54.69	69.28
UFA/SFA	1.93±0.04	1.77±0.03	6.88	1.84±0.04	1.72	1.89
Mono-unsaturated fatty acids, MUFA (%)	41.69±0.40	38.82±0.52	17.19*	40.82±0.46	36.44	40.17
Poly-unsaturated fatty acids, PUFA (%)	25.64±0.30	24.19±0.23	8.13	24.80±0.27	23.87	27.39
MUFA/SFA	1.19±0.02	1.05±0.02	17.82*	1.15±0.02	1.11	1.18
PUFA/SFA	0.75±0.02	0.65±0.03	5.10	0.70±0.03	0.66	0.75
PUFA n-6	23.93±0.54	22.14±0.43	113.81**	23.18±0.47	18.92	26.20
PUFA n-3	1.36±0.07	1.21±0.05	7.82	1.29±0.07	0.95	1.52
PUFA n-6/n-3	18.66±0.16	17.19±0.24	8.52	17.97±0.21	17.52	18.33
Essential fatty acids, EFA (%)	19.98±0.43	18.43±0.27	35.24**	19.61±0.35	16.18	23.25

**P<0.01, *P<0.05; n_1=14; n_2=20; n_3=34.

that many factors, such as sex and anatomical location, produce changes in the amount and composition of meat lipids. The intramuscular fat has some effect on the organoleptic qualities of meat (Maw *et al.* 2003, Thomas *et al.* 2016b). Knowledge of the fat content in the carcass musculature and its composition is important, both for a better understanding of the growth processes and for the nutritional value of meat and its associated quality. It was also observed that the fatty acid profile of the polar lipids was more polyunsaturated in gilts compared to barrows. Even though we did not develop evidence to explain these results, it is reasonable to speculate that the level of intramuscular fat depot could account for the majority of the variations in the percentage of different fatty acid components among the sexes examined in this study. Numerous authors (Fortin *et al.* 2005, Wood *et al.* 2008) have stated that sex may play an important role in meat fatty acid profiles.

The percentage of C 18:1, C 18:2, C 18:3 and C 20:4 were significantly (P<0.05) higher in gilts, while barrows had significantly (P<0.05) higher percentage of C 14:0 and C 18:0 (Table 4). It was also observed that gilts had significantly (P<0.01) higher content of unsaturated fatty acids including essential fatty acids, while barrows had significantly (P<0.05) higher saturated fatty acid contents. The changes in the fatty acid composition of intramuscular lipids are related to the relative changes in concentration among the lipid classes and this is an important factor in the alterations in specific fatty acid concentrations. The higher concentrations of C 18:2 and lower concentrations of C 18:0 in gilts were expected, as several studies have reported similar results (Wood *et al.* 2008, Thomas *et al.* 2016b). Similar results were also reported in other studies in which the level of C18:2 was higher in the meat from female pigs (Leskanich 1999). We must also consider that the amounts of 18:2 accumulated in the animal tissues depend on the diet because its synthesis in the mammalian body is not possible and, for this reason, the accumulation of 18:2 in the muscle might be related to the amount of dietary linoleic acid (Wood *et al.* 2008). In conclusion, sex influenced fatty acid composition of *M. longissimus thoracis et lumborum* in this study. However, more research is needed to establish whether this difference exists among the other muscles in Niang-Megha pigs. The MUFA: SFA ratio was in the range of 1.11–1.18, while PUFA: SFA ratio varied from 0.66 to 0.75. Results further indicated that the concentration of omega-3 (n-3) fatty acids in the *M. longissimus thoracis et lumborum* of Niang-Megha pig was in the range of 0.95–1.52% (average, 1.29%), while the omega-6 (n-6) fatty acids were accountable for about 23.18% (range, 18.92–26.20%), whereas the n-6/n-3 ratio was 17.96. It was also found that *M. longissimus thoracis*

et lumborum of Niang-Megha pig contains 19.71% (range, 16.18–21.25%) essential fatty acids.

In conclusion, our results help to understand the meat quality and nutritional profiles with respect to the meat from gilts and barrows among Niang-Megha pigs. The extent of differences in some of the observed parameters among the sexes in Niang-Megha pigs and its implications for physical characteristics and carcass composition merits further investigation.

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