

Effect of Ghee Residue on Loin Eye Muscle Fatty Acids of Large White Yorkshire Pigs

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Abstract

Objective: To expose the effect of ghee residue on loin eye muscle fatty acids of large white Yorkshire pigs. **Methods/Analysis:** A biological trial was conducted for 140 days in 24 weaned Large White Yorkshire piglets and randomly allotted into four different treatments with 6 animals in each group from 61 to 200 days of age. Four Large White Yorkshire pigs from each group in the growth trial were selected randomly and were kept off feed for a period of 12 hours prior to slaughter but given ad libitum access to water. They were stunned with electrical stunner and then dressed as per standard procedure. The loin eye muscle was collected and estimated for fatty acids. **Findings:** Fatty acid profile in loin eye muscle in Large White Yorkshire pigs by incorporation of graded levels (0, 5, 10 and 15 per cent) suggested that oleic acid was significantly ($p < 0.05$) higher in ghee residue supplemented diets compared to control diet. The other essential fatty acids like linoleic and linolenic acids were not influenced by addition of ghee residue in pig diets.

Keywords: Ghee Residue, Fatty Acid profile, Loin Eye Muscle

1. Introduction

Ghee residue, the charred light to dark brown residue is a by-product of ghee industry and is obtained on the cloth strainer after the ghee is filtered and is available at cheaper cost. It is not only a good source of protein and energy, it is rich in source of minerals especially calcium and phosphorus. Ghee residue is available at a cheap cost throughout the year. Ghee residue could be used as a potential alternate unconventional feed ingredient in pig rations. However, studies on utilizing ghee residue as a feed ingredient in pigs are scanty. Hence, this study has been proposed to study the effect of ghee residue feeding on pigs fatty acid profile of loin eye muscle.

2. Materials and Methods

The study was conducted at the slaughter unit, Post Graduate Research Institute in Animal Sciences, Kattupakkam, in Tamil Nadu, India. Four Large White Yorkshire pigs from each group in the growth trial were selected randomly and were kept off feed for a period of 12 hours prior to slaughter but given ad libitum access to water. They were stunned with electrical stunner and then dressed as per standard procedure.

3. Loin Eye Area

Loin eye area is the cross sectional area of the longissimus dorsi muscle between the 10th and 11th intercostal space.

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The area was traced on the butter paper by pressing the paper against the cut surface of the loin eye muscle. The traced muscle area was measured with compensation polar planimeter and expressed in centimetre square¹.

4. Estimation of Loin Eye Muscle in Fatty Acid Profile

The fatty acid composition of loin eye muscle was analyzed in the Animal Feed Analytical and Quality Assurance Laboratory, Namakkal.

Fatty acid composition of loin eye muscle was analyzed using Gas Chromatography (GC). The standardization of fatty acid profile was done with egg yolk lipid as per the procedure described by². The fatty acids analyzed include Myristic acid, Palmitic acid, Palmitoleic acid, Stearic acid, Oleic acid, Linoleic acid, Linolenic acid, Arachidic acid, Behenic acid, Ecosapentaenoic acid, Docosahexaenoic acid and other fatty acids, the values of which were expressed as per cent dry matter basis.

5. Results and Discussion

The results of the effect of ghee residue on loin eye muscle fatty acid composition of large white yorkshire pigs were presented and discussed as follows: The fatty acid profile in loin eye muscle in Large White Yorkshire pigs fed control and experimental rations incorporated with ghee residue at graded levels is presented in Table 1. It is evident from the findings that no significance was found in the levels of stearic acid, linolenic acid and linoleic acid at increasing levels of inclusion of ghee residue in loin eye muscle. Only very few authors have reported fatty acid profile in loin eye muscle by feeding different fat sources. The results are in agreement with the findings of³ who reported no difference in stearic and linolenic acid levels in spite of supplementing higher levels of fat rich oils in pigs. However, the higher levels of stearic acid in the present study are in contrast to the lower levels of 3.20 per cent reported by⁴ in loin eye muscle at 5 per cent supplementation of vegetable oils.

Table 1. Fatty acid profile in Loin eye muscle in Large White Yorkshire pigs fed control and experimental rations containing graded levels of ghee residue (Mean \pm SE)

Fatty acids	Ghee Residue			
	0% (T1)	5% (T2)	10% (T3)	15% (T4)
Myristic acid (%) [*]	1.81 ^{ab} \pm 0.17	1.60 ^a \pm 0.03	1.81 ^{ab} \pm 0.11	2.13 ^b \pm 0.13
Palmitic acid (%) [*]	25.5 ^b \pm 1.00	22.92 ^a \pm 0.50	24.56 ^{ab} \pm 0.62	24.27 ^{ab} \pm 0.53
Palmitoleic acid (%) [*]	3.62 ^a \pm 0.62	3.14 ^a \pm 0.79	4.34 ^{ab} \pm 0.49	5.62 ^b \pm 0.29
Stearic acid(%) ^{NS}	9.15 \pm 0.54	9.11 \pm 1.64	7.82 \pm 0.68	7.08 \pm 0.14
Oleic acid (%) [*]	42.99 ^a \pm 2.10	48.70 ^b \pm 1.16	45.30 ^{ab} \pm 1.47	46.16 ^{ab} \pm 0.94
Linoleic acid(%) ^{NS}	12.00 \pm 1.03	12.13 \pm 0.47	13.12 \pm 0.92	12.83 \pm 0.10
Linolenic acid(%) ^{NS}	0.57 \pm 0.13	0.60 \pm 0.07	0.47 \pm 0.04	0.44 \pm 0.07
Arachidic acid (%) [*]	0.36 ^b \pm 0.12	0.20 ^{ab} \pm 0.06	0.13 ^{ab} \pm 0.01	0.10 ^a \pm 0.01
Behenic acid(%) ^{NS}	0.86 \pm 0.19	0.39 \pm 0.16	1.15 \pm 0.39	0.26 \pm 0.21
Ecosapentaenoic acid (%) [*]	1.05 ^b \pm 0.44	0.20 ^a \pm 0.02	0.32 ^{ab} \pm 0.14	0.21 ^a \pm 0.04
Docosahexaenoic acid(%) ^{NS}	0.78 \pm 0.41	0.57 \pm 0.16	0.56 \pm 0.11	0.45 \pm 0.05
Other fatty acids (%) [*]	0.80 ^b \pm 0.30	0.35 ^{ab} \pm 0.08	0.23 ^a \pm 0.03	0.19 ^a \pm 0.02

Each value is mean of four observations

*Mean values bearing different superscripts in a row differ significantly (p<0.05)

NS-non significant

The levels of oleic acid, which is an unsaturated fatty acid, were 42.99, 48.70, 45.30 and 46.16 per cent, respectively. It is evident from the present study that oleic acid in loin eye muscle is statistically at higher levels ($p < 0.05$) in ghee residue fed groups than in the control group and is in agreement with the findings of³ who reported higher levels of oleic acid in loin eye muscle by supplementing fat rich oils in pigs. In contrast,⁴ reported lower level of oleic acid (22.30 per cent) by supplementing vegetable oil at five per cent level.

The saturated fatty acids like myristic acid and palmitoleic acid levels in loin eye muscle obtained in the present study were significantly higher ($p < 0.05$) at maximum inclusion levels of 15 per cent ghee residue than at lower levels. These results are in variance with the findings of³ who reported no difference in myristic and palmitoleic acid by supplementing fat rich oils in pigs.

The Palmitic acid levels in loin eye muscle were significantly higher ($p < 0.05$) in pigs fed five per cent inclusion levels of ghee residue compared to that in control group. Similar increase in palmitic acid levels were reported by⁴ when pigs were supplemented with vegetable oil at five per cent level in pigs. However,³ reported no difference in the levels of palmitic acid when he supplemented fat rich oils in pigs. No statistical significance was observed in arachidic acid levels in loin eye muscle in 0, 5 and 10 per cent ghee residue fed group. However, at 15 per cent inclusion levels of ghee residue, arachidic acid is significantly lower ($p < 0.05$) than in other groups which is in agreement with the findings of⁵ when he fed fat rich sources in pigs.

As evidenced from the studies of fatty acid profile in loin eye muscle, it is evident that the unsaturated fatty acid, oleic acid is present in higher concentration at all levels of ghee residue supplementation in pigs indicating the beneficial effects of supplementing ghee residue in pig diets. The data however indicate that the concentration of linoleic acid and linolenic acid in loin eye muscle is not

influenced in spite of adding ghee residue in the experimental diets even up to 15 per cent diets.

The data also suggests that the saturated fatty acids like myristic acid, palmitic acid and palmitoleic acid are present in higher concentration in the loin eye muscle at higher level of inclusion of ghee residue in pig diets.

6. Conclusion

The results obtained in the current study indicate that the supplementation up to 15% Ghee residue using pig diets, unsaturated fatty acids are higher concentration level it indicating in the diets of pigs has the potential to improve pork quality.

7. References

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