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EFFECT OF GHEE RESIDUE INCLUSION ON CARCASS CHARACTERISTICS OF LARGE WHITE YORKSHIRE PIGS

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ABSTRACT

India produces about 2.36 million tons of pig meat (pork). There is a need for encouraging pig production because of increasing protein demand to cater to the needs of the growing human population. Ghee residue could be used as a potential alternate unconventional feed ingredient in pig rations which is a good source of energy, protein and minerals. The study has been designed to expose the effect of different inclusion levels *viz.*, 5%, 10% and 15% of ghee residue feeding on pigs carcass characteristics. Carcass evaluation studies did not show any variation in terms of dressing percentage, carcass length, back fat thickness, loin eye area, meat bone ratio and organ weight among the treatment groups. Thus inclusion of ghee residue in swine diets did not influence carcass traits, meat fat, bone per cent and organs weight.

Key words: Ghee residue, Carcass characteristics, Large White Yorkshire

INTRODUCTION

Among livestock species, pigs have a high production potential next to chicken. The large litter size, increased weight gain with high feed conversion efficiency makes pig forming a profitable venture. Earlier, pigs were reared only by socio-economically poorer sections of society to get profit with low/no input, i.e. scavenging system of feeding with no intensive system of concentrate feeding. As per the 19th livestock census (2012), the total population of swine in India is 35,24,014. Tamil Nadu state possesses 1,83,983 heads of pigs and ranks 15th in India in pig population. Almost 28 per cent of country‘s total pig population exists in North-Eastern region.India produces about 2.36 million

tons of pig meat (pork). The per capita availability of meat in India is about 5.2 kg per annum in which pork share is 0.4 kg. During 2012-13, pork production in India was 0.45 million tons with an average meat yield of about 39 kg / animal, which is lower than the world average (79 kg/ animal). The share of pork is around 8 per cent of total meat production (DARE, 2014).There is a need for encouraging pig production because of increasing protein demand to cater to the needs of the growing human population which can be met only by supplying pork in addition to chicken, mutton, and beef. Pork products are most popular throughout the world in meeting global food requirements and nutritional adequacy (FAO, 2012).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 could be used as a potential alternate unconventional feed ingredient in pig rations. Ghee residue is available at a cheap cost throughout the year. 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 carcass characteristics. Carcass evaluation studies did not show any variation in terms of dressing percentage, carcass length, back fat thickness and loin eye area among the treatment groups.

MATERIALS AND METHODS

The carcass studies were conducted at the slaughter unit, Post Graduate Research Institute in Animal Sciences, Kattupakkam. 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.

Carcass weight

After halving, the weight of dressed carcass after the removal of head and shanks were recorded immediately. The carcass was weighed as hot carcass and carcass characteristics were determined as per the procedure followed by Singh *et al.* (1983).

Dressing percentage

The dressing percentage was calculated by using the formula

$$\text{Dressing percentage} = \frac{\text{Dressed hot carcass weight (kg)}}{\text{Pre-slaughter live weight (kg)}} \times 100$$

Carcass length

Carcass length was measured from the middle of the anterior edge of first rib to the anterior edge of the aitch bone (pubis). The mean carcass length was expressed in cm (Bereskin and Steele, 1988).

Back fat thickness

Back fat thickness was measured along with vertebral column at the first rib, last rib and last lumbar vertebrae using the back fat thickness gauge. The averages of three values were expressed as back fat thickness of the carcass. The thickness of the skin was also included in the measurement and expressed in inches (Ziegler, 1968).

Loin eye area

Loin eye area is the cross sectional area of the *longissimus dorsi* muscle between the 10^{th} and 11^{th} intercostal space. 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 square (Lefaucheur*et al.*, 1991)

Meat, fat and bone per cent

After physically separating the carcass into fat free muscle, bone and fat, the weight of each of them were recorded to calculate the meat, bone and fat per cent. The percentage of fat free muscle, bone and fat were also calculated (Neely *et al.*, 1979).

Organ weight

Following exsanguination, kidneys, heart, lungs, liver excluding gall bladder, spleen were removed and weighed to document organ weights.

RESULTS

Carcass characteristics

The carcass characteristics of Large White Yorkshire pigs at the end of growth studies fed with control and experimental rations is presented in Table 1.

The dressing percentage (per cent), carcass length (cm), back fat thickness (cm) and loin eye area (cm^2) were 70.04, 69.30, 70.33 and 67.48; 82.97, 82.55, 81.55 and 81.80; 3.70, 3.83, 3.80 and 3.83; 33.42, 32.92, 31.65 and 30.15, respectively. Carcass evaluation studies did not show any variation in terms of dressing percentage, carcass length, back fat thickness and loin eye area among the treatment groups.

Literature on carcass characteristics in pigs by feeding ghee residue is rare. However, few studies have been conducted by authors supplementing with other unconventional protein and fat rich feed sources in pigs. The results agree with the values of Le DucNgoan *et al.* (2001) and Cherryl *et al.* (2014) who reported that slaughter characteristics were not influenced by feeding ensiled shrimp by-product and azolla in pigs at various inclusion levels. In contrast, Gyo Moon Chu *et al.* (2011) supplemented fermented agro by-products at graded levels in pigs and reported lower dressing percentage and back fat thickness. Grela *et al.* (2012) also reported reduced back fat thickness and higher loin eye area in pigs while supplementing fish meal diets at various levels. Elanchezhian*et al.* (2014) reported higher back fat thickness, in contrast to the present study, while supplementing animal fat at 5 per cent level in pigs. The results are in variance with the earlier report where they reported reduced back fat thickness up to 50 per cent and increased back fat thickness at 75 and 100 per cent replacement with mixture of coconut meal and catfish residue in pigs.

Table 1: Carcass characteristics in Large White Yorkshire pigs fed control and experimental rations containing graded level of ghee residue

Carcass traits	Ghee Residue			
	0% (T1)	**5% (T2)**	**10% (T3)**	**15% (T4)**
Live weight (kg) ^{NS}	83.87 ± 2.15	82.75 ± 1.20	81.75 ± 2.08	79.65 ± 1.69
Hot carcass (kg) ^{NS}	58.75 ± 1.80	57.37 ± 0.86	57.50 ± 2.08	53.75 ± 0.88
Dressing percentage (%) ^{NS}	70.04 ± 0.19	69.30 ± 0.91	70.33 ± 1.26	67.48 ± 1.87
Carcass length (cm) ^{NS}	82.97 ± 1.19	82.55 ± 1.37	81.55 ± 0.36	81.80 ± 1.12
Back fat thickness (cm) ^{NS}	3.70 ± 0.24	3.83 ± 0.16	3.80 ± 0.08	3.83 ± 0.19
Loin eye area (cm^2) ^{NS}	33.42 ± 1.32	32.92 ± 1.25	31.65 ± 0.79	30.15 ± 0.51

Each value is a mean of four observations, NS-not significant

Meat, Fat and Bone per cent in Large Weight Yorkshire pigs in control and experimental rations are reported in Table 2. No significance was observed in the meat, fat and bone percentage among the treatment groups. Similar non variation among the treatment groups was reported by Cherryl *et al.* (2014) while supplementing azolla in Large White Yorkshire pigs at graded levels

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Table 2: **Meat, Fat and Bone (%) in Large White Yorkshire pigs fed control and experimental rations containing graded levels of ghee residue (Mean ± SE)**

	Ghee Residue			
	0% (T1)	**5% (T2)**	**10% (T3)**	**15% (T4)**
Meat (%) ^{NS}	42.35 ± 1.06	39.65 ± 0.67	39.98 ± 0.96	41.07 ± 0.12
Fat (%) ^{NS}	35.34 ± 0.90	38.09 ± 1.17	36.77 ± 0.91	37.49 ± 0.93
Bone (%) ^{NS}	18.53 ± 0.65	17.76 ± 0.74	19.18 ± 0.28	17.88 ± 0.70

Each value is a mean of four observations ,NS-not significant

The organ weight *viz.*, liver, lungs, heart, kidney and spleen in Large White Yorkshire pigs in control and experimental rations is presented in Table 3. The values reported for various organs were not statistically significant. Elanchezhian *et al.* (2014) also reported no variation in the organ weights of heart, liver and spleen by supplementing animal fat in pigs.

Table 3: **Organs weight in Large White Yorkshire pigs fed control and experimental rations containing graded levels of ghee residue (Mean ± SE)**

Organ	Ghee Residue			
	0% (T1)	5% (T2)	10% (T3)	15% (T4)
Liver (%) NS	1.74 ± 0.01	1.69 ± 0.10	1.53 ± 0.07	1.79 ± 0.04
Lungs (%) NS	1.19 ± 0.06	1.18 ± 0.12	1.13 ± 0.04	1.29 ± 0.02
Heart (%) NS	0.29 ± 0.01	0.31 ± 0.02	0.31 ± 0.04	0.28 ± 0.01
Kidney(%) NS	0.31 ± 0.01	0.35 ± 0.02	0.36 ± 0.02	0.36 ± 0.01
Spleen (%) NS	0.32 ± 0.02	0.27 ± 0.02	0.28 ± 0.04	0.30 ± 0.02

Each value is a mean of four observations, NS-not significant

DISCUSSION

Carcass characteristics

The non- significant difference in carcass characteristics observed in the four treatment groups reveals that inclusion of ghee residue does not apparently influence the dressing percentage, carcass length, back fat thickness and loin eye area even when ghee residue is included up to 15 per cent levels in pigs. Similar trend is observed in meat, fat and bone percentage and organ weight corroborating the evidence observed in carcass traits. Based on the results of the above study, it could be inferred that the inclusion of ghee residue optimizes body weight gain up to 10 per cent inclusion level of ghee residue without affecting the carcass traits.

CONCLUSION

Inclusion of ghee residue up to 10 per cent in swine diets did not influence carcass traits, meat fat, bone per cent and organs weight and sensory parameters. Hence the nutrient rich ghee residue can be used as potential alternative feed ingredient in pig ration.

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