Applied Biological Research 22(2): 191-194; (2020)
DOI: 10.5958/0974-4517.2020.00023.3 **SHORT COMMUNICATION**

EFFECT OF ANIMAL-FAT SUPPLEMENTATION TO THE DIET OF LARGE WHITE YORKSHIRE PIGS ON ENERGY UTILIZATION

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ABSTRACT

The study was conducted to assess the effect of animal-fat supplementation on energy utilization in Large White Yorkshire (LWY) pigs fed with corn soya-based ration as per the requirements of NRC (2012). Twenty weaned piglets were randomly divided into two groups and allotted to one of the two dietary treatments i.e. control ration (as per NRC, 1998) and ration supplemented with animal fat @ 5%. A digestibility trial was conducted following total collection method and gross energy was estimated using bomb calorimeter. The results revealed that gross energy of feed and faeces were 4144, 4410 and 4102, 4090 kcal kg^{-1}, respectively, for control and animal feed supplemented treatments. The gross energy converted as digestible energy was 85.8 and 87.3% and the calculated digestible energy of feed was 3558.1 and 3848.8 kcal kg^{-1} for the respective groups. The result showed that the animal-fat supplementation (5%) increased the efficiency of energy utilization in growing LWY pigs.

Keywords: Animal fat, energy utilization, feeding efficiency, pigs

INTRODUCTION

Animal fat is a byproduct of meat industry and can be included as a source of energy in swine ration. India annually produces 0.14 million tonnes of tallow and 0.02 million tonnes of lard (FAO, 2010). The use of fat as energy source for pigs reportedly enhances the nutrient digestibility, improves growth rate, reduces dustiness of feeds and increases palatability (Reis *et al.*, 2000). Improved dry matter and nitrogen digestibility and nitrogen and energy retention were found in pigs fed diet with tallow at 0.33 and 0.75% of body weight (Galloway and Ewan, 1989), with white choice grease at 10% (Li *et al.*, 1990) and with lard at 6% of the diet (Lawrence *et al.*, 1994). Overland *et al.* (1994) reported that the apparent ileal and overall digestibility of crude fat and total fatty acids, apparent digestibility of dry matter, nitrogen and calcium and retention of nitrogen and energy were increased in the pigs fed with diets having 6% of rendered fat. Reis *et al.* (2000) observed increased apparent digestibility of ether extract and energy in the pigs fed with diet having 8% of tallow as compared to 4% tallow. The present study was undertaken to find out the efficiency of energy utilization in pigs fed with animal fat replacing maize.

MATERIALS AND METHODS

Twenty weaned Large White Yorkshire (LYW) female piglets of age 116.65 ± 1.84 days with average body weight of 24.02 ± 0.53 kg belonging to the Centre for Pig Production and Research, Mannuthy, COVAS, KVASU, Thrissur, Kerala (India) were used as experimental animals. All the piglets were vaccinated against classical swine fever immediately after weaning and booster vaccine was given after three months. They were dewormed with albendazole suspension through feed before the start of experiment and repeated again before the booster vaccine. The piglets were randomly divided into two groups as uniformly as possible with regard to age and weight. Piglets of each group were allotted randomly into five pens with two piglets in each pen. All piglets were housed in the same shed and maintained under identical management conditions for 70 days. Clean drinking water was provided *ad libitum* in all the pens throughout the experimental period. Restricted feeding was followed by allowing the animals to consume as much as they could, within a period of one hour and the balance feed was collected and weighed after each feeding. Daily feed intake was recorded. The animals were fed with standard grower ration containing 18% of crude protein (CP) and 3265 kcal of metabolizable energy (ME) kg^{-1}of feed up to 50 kg body weight and finisher ration with 16% CP and 3265 kcal of ME kg^{-1} feed from 50 kg body weight as per NRC (1998). The two groups of piglets were randomly allotted to the two dietary treatments, i) control ration as per NRC (1998) and ii) ration supplemented with 5% animal fat. The ingredients and chemical composition of grower ration and finisher ration of pigs were as under:

Grower ration (control): Yellow maize 70%, wheat bran 1.5%, soybean meal 26.25%, animal fat 0%, salt 0.5%, DCP 0.9% and calcite 0.85%;

Finisher ration (control): Yellow maize 74%, wheat bran 3.6%, soybean meal 20.5%, animal fat 0%, salt 0.5%, DCP 0.65 and calcite 0.75%;

The ration used in this study had similar nutrients as per NRC (2012) recommendations. However, for treated group the basal grower and finisher rations were supplemented with 5% animal fat. The animal fat is a mixture of mainly beef fat (tallow) and pig fat (lard) and little of poultry fat.Fresh rendered animal fat was obtained from the Meat Technology Unit, Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala as and when the feed was prepared.

The experiment was conducted in a completely randomized design and each treatment replicated five times. The pigs were weighed at the beginning of the experiment and subsequently at fortnight intervals. Digestibility trial was conducted at the end of experiment following total collection method. Gross energy of feed and faeces were estimated using bomb calorimeter (plain jacket calorimeter, model: 1341, Parr Instruments Co., USA) to determine the energy utilization of pigs fed two experimental rations. Data collected were statistically analyzed and means were compared by Duncan Multiple Range Test (DMRT) using Statistical Package for Social Studies (SPSS. 17.0.1v) software.

RESULTS AND DISCUSSION

The chemical constituents present in control ration and fat supplemented ration is given in Table 1. The gross energy of feed and faeces were 4144, 4410 and 4102, 4090 kcal kg^{-1}, respectively, in control and fat supplemented groups (Table 2). The gross energy converted as digestible energy was 85.8 and 87.3% and the calculated digestible energy of feed was 3558 and 38489 kcal kg^{-1} for control and fat supplemented groups, respectively. The fat supplement group had higher ($P<0.01$) digestible energy as compared to the control ration group. The supplementation of 5% animal fat contributed

Table 1: Chemical composition of grower and finisher rations (on dry matter basis)

Chemical constituents (%)	Grower ration		Finisher ration	
	Control ration	Fat supplemented ration	Control ration	Fat supplemented ration
Dry matter	89.20 ± 0.12	89.10 ± 0.13	89.11 ± 0.12	89.10 ± 0.06
Crude protein	18.25 ± 0.11	17.88 ± 0.17	16.39 ± 0.10	15.76 ± 0.12
Ether extract	3.10 ± 0.05	7.75 ± 0.06	3.28 ± 0.06	8.05 ± 0.04
Crude fibre	3.72 ± 0.11	3.41 ± 0.07	3.73 ± 0.07	3.52 ± 0.13
Total ash	5.64 ± 0.17	5.45 ± 0.24	5.54 ± 0.15	5.23 ± 0.10
Nitrogen free extract	69.29 ± 0.16	65.51 ± 0.31	71.06 ± 0.20	67.44 ± 0.12
Acid insoluble ash	1.10 ± 0.02	1.05 ± 0.05	1.04 ± 0.06	0.93 ± 0.06
GE (kcal kg^{-1})	4132.2 ± 22.9	4436.30 ± 10.6	4165.2 ± 22.2	4390.60 ± 31.3
Calcium	0.59 ± 0.01	0.58 ± 0.01	0.62 ± 0.02	0.60 ± 0.007
Phosphorus	0.58 ± 0.01	0.64 ± 0.06	0.55 ± 0.02	0.54 ± 0.02
Magnesium	0.14 ± 0.01	0.14 ± 0.004	0.13 ± 0.008	0.13 ± 0.01
Manganese (ppm)	16.78 ± 0.38	15.92 ± 0.25	16.59 ± 0.45	15.91 ± 0.01
Copper (ppm)	6.35 ± 0.08	6.30 ± 0.10	6.15 ± 0.15	6.10 ± 0.20
Zinc (ppm)	71.52 ± 1.29	65.56 ± 0.91	71.39 ± 1.36	67.45 ± 2.18

Table 2: Energy utilization of LWY pigs maintained on the four experimental rations

Parameters	Control ration	Fat supplemented ration
Average dry matter intake (kg)	2.3208 ± 0.07^{b}	2.2016 ± 0.03^{a}
Gross energy of feed (kcal kg^{-1})	414468	4410.07
Gross energy intake (kcal)	9618.84 ± 310	9708.81 ± 118
Dry matter voided (kg)	0.3304 ± 0.007^{b}	0.3008 ± 0.01^{a}
Gross energy of faeces (kcal kg^{-1})	4102.04 ± 132	4090.08 ± 141
Gross energy voided (kcal)	1357.35 ± 65^{b}	1233.27 ± 83^{a}
Gross energy-digested (kcal)	8216.48 ± 304^{a}	8475.55 ± 168^{b}
Gross energy (%) as digestible energy	85.85 ± 0.76^{a}	87.27 ± 0.92^{b}
Digestible energy of feed (kcal kg^{-1})	3558.12 ± 31.47^{a}	3848.81 ± 40.69^{b}

^{a,b} Means of different superscripts within the same row differ significantly (P<0.05)

higher energy level in fat supplemented group as compared to the control ration group. Significant ($p<0.05$) improvement in digestibility of energy as a result of fat supplementation in the diet of pigs has also been reported by Li *et al.* (1990) (white choice grease supplemented at 10%), Overland *et al.* (1994) (6% of rendered fat) and Reis *et al.* (2000) (8% tallow). However no significant difference in energy digestibility in pigs by supplementation of tallow at 5% in diet was observed by Garry *et al.* (2007) and Huang *et al.* (2010). Lawrence and Maxwell (1983) found that efficiency of use of digestible energy tended to decrease with added fat. Galloway and Ewan (1989) stated that when additional metabolizable energy was supplied by tallow, tallow was not efficiently utilized for growth. The result revealed that supplementation of animal fat at 5% level increased the efficiency of energy utilization in growing LWY pigs.

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Ethical statement: The experimental protocols were approved by the Institutional animal ethics

Conflict of interest: The authors report no conflicts of interest.

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