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Use of Lemon Grass Oil as Feed Additive in Weanling Pig Diets

Wandee Tartrakoon[a], Kattika Wuthijaree[a], Therdchai Vearasilp[a], Udo ter Meulen[b]

a Department of Animal Science, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand. E-mail: agitvrsl@chiangmai.ac.th

b Institute for Animal Physiology and Animal Nutrition, Georg-August-University, Kellnerweg 6, 37077 Göttingen, Germany. E-mail: umeulen@uni-goettingen.de

Abstract

An experiment was conducted at Chiang Mai University to determine the use of lemon grass oil as additive in weanling pigs. 28 days old weaned piglets were randomly distributed into 5 groups of 6, 4, 5, 4 and 4 animals each in a completely randomised design (CRD). The piglets were housed in individual cages. Diet 1 (control diet) was a basal diet containing corn-soybean meal. Diet 2 was a basal diet supplemented with 0.75 g tetracycline /kg basal diet. diet 3, 4 and 5 were basal diets supplemented with lemon grass oil at 1, 2.5 and 5 ml/kg diet respectively.. Diets were formulated according to NRC (1998) requirements. The productive performance and faecal characteristics of the pigs were determined beginning at 7 ± 0.8 kg BW until 20 ± 0.8 kg BW. Average daily gain (ADG) and feed conversion ratio (FCR) of pigs fed diet 1 to 5 were 420, 390, 330, 320 and 380 g/d and 1.89, 1.88, 1.81, 1.87 and 1.73, respectively. There was no significant difference of ADG among treatments. The inclusion of lemon grass oil 5 ml/kg diet tended to improve FCR of piglets. The pigs fed control diet had higher average daily feed intake (ADFI) ($p<0.05$) than pigs fed diets containing 1 and 2.5 ml lemon grass oil /kg diet (diet 3 and 4). There were no differences ($p>0.05$) in ADFI of pigs fed diet containing lemon grass oils (diet 3, 4 and 5). The faecal score (shape and colour) of the pigs fed diet 4 and 5 was better than in pigs fed other diets ($p<0.05$). The results suggest that lemon grass oil can substitute tetracycline as feed additive.

Keywords: Lemon grass oil, pig production, feed additive

Introduction

Sub-therapeutic levels of antibiotics are used in pig feed to improve growth rate, feed conversion ratio, reproductive performance and survival of the animals (NRC, 1998). However, their use may cause drug residues in foods of animal origin. An alternative could be the use of natural herbal products such as essential oils abundant in many plant species. One such plant specie is lemon grass which can grow throughout the year under tropical conditions. In Thailand, the herb is locally cultivated and used in many recipes of the Thai kitchen. Its oil is commonly used as a lotion in order to prevent mosquito bites. Lemon grass oil is a volatile oil which can be extracted directly from fresh lemon grass using steam extraction. The grass contains 0.035 % essential oil (Malee *et al*., 2000). The objective of this study was to asses the effects of lemon grass oil, an essential oil, as a feed additive in weanling pigs using their productive performance and faecal scores. Faecal scoring is an indirect and qualitative method based on faecal characteristics especially color and shape that gives an indication of the conditions in the intestines.

Material and Method

The experiment was conducted at Chiang Mai University. In a completely randomised design, 28 days old weanling piglets of 7 ± 0.8 kg body weight were randomly distributed into groups of 6, 4, 5, 4 and 4 animals. Each piglet was housed in an individual cage and fed with only one of the 5 diets. Diet 1 (Table 1) formulated according to NRC standards (1998) was the basal diet in all groups. However, diet 2 had a supplement of 0.75 g tetracycline per kg basal diet, and diets 3, 4 and 5 had supplements of lemon grass oil at 1, 2.5 and 5 ml/kg basal diet, respectively. Weight measurements and scores of faecal colour and shape were determined until pigs were 20 ± 0.8 kg BW.

Result and Discussion

The results of the experiment are shown in Table 2. The pigs fed basal diet had significantly higher ($p<0.05$) average daily feed intake (ADFI) than pigs fed basal diets containing lemon grass oil at 1 and 2.5 ml/kg diet (diet 3 and 4). There was no difference ($p>0.05$) between ADFI of pigs fed basal diet alone and that of pigs fed diet 5 containing 5 ml/kg lemon grass oil. Average daily gain and feed conversion ratio (FCR) were not significantly different among the groups although the inclusion of lemon grass oil at 5 ml/kg of diet tended ($P>0.05$) to improve the FCR. However, Malee *et al*. (2000) found improvements in productive performance of weanling pigs fed diets supplemented with lemon grass oil. Essential oils improve the absorption and utilisation of nutrients in pigs (Onibala,1999), while some have been reported to enhance the activity of digestive enzymes and act as antimicrobial agents (Isamel and Pierson, 1990) to reduce the incidence of diarrhea.

The observation that pigs fed diets 4 and 5 had better faecal scores than pigs fed other diets ($p<0.05$) suggests that they had better gut conditions for digestion and absorption. Normally, a dark color and lump shape of faeces shows normal digestion and absorbtion. Conversely, a yellow color and loose shape of faeces show a comparably poorer feed digestion and lower nutrient absorption.

Conclusion

The results suggest that lemon grass oil can substitute tetracycline as feed additive. Further studies are necessary to confirm the results.

References

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Table 1. Composition of basal diet.

Ingredients	g/kg diet	Chemical Composition	g/kg diet
Corn	345.8	Crude protein	200.0
Soybean meal	327.2	ME, kcal/kg	3279.3
Broken rice	150.0	Crude fibre	44.3
Fine rice bran	100.0	Calcium	8.1
Skim milk powder	25.0	Phosphorus available	4.2
Limestone	8.0	Lysine	9.7
Dicalcium phosphate (P 18 %)	16.0	Methionine+ Cystine	6.5
Soybean oil	20.0	Tryptophan	2.4
Common Salt	3.0	Threonine	9.2
Vitamin-Mineral Mixes	5.0		

Table 2. Growth performances and faecal score of weanling pig fed with experimental diets.

Item	Control	Basal diet supplemented with			
		Tretracycin 0.75g/kg diet	Lemon grass oil 1 ml/kg diet	Lemon grass oil 2.5 ml/kg diet	Lemon grass oil 5 ml/kg diet
Number of pigs	6	4	5	4	4
Initial weight, kg	7.11	7.05	7.10	7.18	7.45
Final weight, kg	20.75	20.55	20.18	20.50	20.38
Weight gain (WG), kg	13.39	13.50	13.08	13.32	12.90
Running days, d	34	35	41	44	35
Average daily gain, kg/d	0.42	0.39	0.33	0.32	0.38
Total feed intake, kg	25.10	25.42	23.75	24.77	22.33
Average daily feed Intake, kg/d	0.75^{a}	0.74^{ab}	0.59^{c}	0.60^{bcd}	0.67^{abc}
Feed conversion Ratio (FCR)	1.89	1.88	1.81	1.87	1.73
Feed cost, Bht/kg of feed	9.08	9.15	10.08	11.58	14.08
Feed cost, Bht/kg of WG	17.16	17.21	17.34	19.32	20.03
Faecal score index[1/]					
Shape	2.99^{a}	2.52^{b}	2.64^{ab}	1.75^{c}	1.88^{c}
Color	2.96^{a}	3.42^{ab}	3.48^{b}	4.12^{c}	4.44^{c}

[a, b, c, d] Means within a row lacking a common superscript letter differ($p<0.05$)

[1] score index is an average of a degree of shape and color daily collected during feeding trial as follow: shape 1 = very lump and shape 5 = liquid; Color 1= yellow and color 5 = black.