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Short Communication

Effects of using herbal lysine as an alternative to l-lysine HCL on growth performance of growing pigs

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ABSTRACT

The objective of the study was to evaluate the effect of using herbal lysine as a replacement for synthetic lysine (L-lysine HCl) on the growth performance of pigs. Sixty (60) pigs were randomly allotted to two treatments: control (L-lysine HCl) and herbal lysine group using a completely randomized design. Data were analyzed using the Student's T-test using the SAS software. The α-level used to determine significance and tendencies between means were 0.05 and 0.10, respectively. The results revealed that no significant differences (*P<0.05*) were observed on the ADG and FCR of pigs supplemented with L-lysine HCl and herbal lysine. However, a better ADFI was observed (*P<0.05*) in pigs fed diets supplemented with herbal lysine. It is therefore, concluded that herbal lysine can be utilized by the farmers as an alternative for synthetic lysine.

Keywords: herbal lysine, herbal, lysine, growing pigs, growth performance

INTRODUCTION

Aside Amino acids from being the building blocks of protein are also the key regulators of fluxes through major metabolic pathways (Meijer, 2003; Jobgen et al., 2006). In pigs fed corn-soybean meal based diets, lysine is the first limiting amino acid. Lysine, one of the indispensable amino acids, is directly absorbed by the intestine for protein synthesis and other metabolic processes, such as the regulation of nitric oxide (NO) synthesis, antiviral activity, protein methylation, acetylation, ubiquitination, and O-linked glycosylation (Liao, 2015). Due to its important functions, dietary supplementation of lysine has become necessary to prevent negative effect of its deficiency. According to Chang (2005), supplemented lysine added to low protein rations of corn-soybean meal diets improves daily gain and feed utilization efficiency of pigs. Typically, dietary supplementation of lysine is done using crystalline L-lysine HCl (Jackson, 2001).

With increasing interest on products of natural origin, various feed additives are now being evaluated to replace the conventionally used synthetic products like crystalline amino acids (i.e. L-lysine HCl). Various herbal products

are now available in the market and claim to effectively replace lysine in the diets of both swine and poultry. These products are a concoction of different herbs like *Silybum marianum, Androphagis paniculata, Glycine max, Azadirachta indica* and *Helianthus annus*. Others also include *Mucuna pruriens, Allium sativum* and *Trigonella foenum graecum* (Kanduri et al., 2013).

Herbal lysine can possibly replace synthetic L-lysine HCl in the animal's diet due to its hepato-protective property. And because the liver filters the blood, it might possibly take up potentially damaging substances like bacterial products or drugs delivered by the portal blood or microorganisms which reach the circulation (Ramadori et al., 2008). Thus, protecting the liver from these damaging substances is of prime importance in order to maintain its various functions including amino acid metabolism. A study on the effect of herbal lysine on pigs is limited and most of the studies are done on poultry. The findings will serve as useful guide to government agents, students, future researchers in undertaking and implementing the operation to enhance a better production on pigs. Therefore, the objective of this study was to evaluate the effects of using herbal lysine as a replacement for L-lysine HCl on the growth performance of growing pigs.

MATERIALS AND METHOD

Animals and experimental design

A total of 60 crossbred pigs (Duroc x Large White x Landrace) of approximately 90± 5 days of age were used. Pigs were randomly distributed to two treatments: control (L-lysine HCl) and herbal lysine (lysintas) group using a completely randomized design. Each group had a feeder and a drinker to provide *ad libitum* access to feed.

Experimental diets

The herbal lysine (Lysintas of Intas Pharmaceuticals Ltd.) is composed of *Silybum marianum* (20%)*, Androphagis paniculata* (25%), *Glycine max* (20%)*, Azadirachta indica* (15%) and *Helianthus annuus* (20%) and was used as 100% direct replacement of L-lysine HCl in the feed formulation (Table 1 below). All experimental diets were in meal form.

Data collection

Daily feed allotments and individual pig body weight were recorded at weekly bases. At the conclusion of the experiment, data were summarized and average daily gain (ADG), average daily feed intake (ADFI) and feed conversion ratio (FCR) were calculated for each treatment and for the overall period.

Chemical analyses

The herbal lysine samples were analyzed in triplicates for DM (method 930.15; AOAC, 2007), CP (method 930.15; AOAC, 2007), ether extract (method 930.15; AOAC, 2007), crude fiber (method 930.15; AOAC, 2007), and ash (method 930.15; AOAC, 2007).

Statistical analysis

Data were analyzed using the Student's T-test using the SAS software. The α-level used to determine significance and tendencies between means were 0.05 and 0.10, respectively.

RESULTS AND DISCUSSION

Growth performance

Overall, no significant difference ($P<0.05$) was found in the ADG of pigs supplemented with L-lysine HCl and herbal lysine (Table 2 below). In a similar study conducted by Johnston et al. (2002), daily gain is also not affected by lysine form (natural vs. synthetic). On the other hand, ADFI of pigs fed herbal lysine was significantly better than the pigs supplemented with L-lysine HCl ($P<0.05$). Components of the herbal lysine used in this study might have an influence on the palatability of the diet. According to Costa et al. (2013) herbal extracts are often used in the animal diets to improve palatability, however, studies on testing the palatability of the diets with phytogenics are limited. In addition, Costa et al. (2007) explained that essential oils in lower dose may contribute to feed intake by improving flavor and palatability resulting in higher feed consumption. He further explained that the initial effect of adding herbals to feed for pigs is the stimulation of appetite through aroma. These aromas excite the olfactory nerves and taste buds resulting in an improvement on feed intake.

In a study conducted by Yusuf et al. (2014) on Boer goats, addition of whole plant of *Androphagis paniculata* also significantly improved feed intake. However, results of this study on feed intake are in contrast with what Johnston et al. (2002) found in their trial with 50-100 lb pigs wherein daily feed intake was not affected by natural lysine. Schone et al. (2006); Yan et al. (2012) reported that reduced palatability of diet in weaned piglets are as a result of the inclusion of essential oils. They related this to the high level of essential oils in the study and to the

Table 1. Feed ingredients and nutrient content of experimental diets.

Ingredients	L-Lysine HCl	Herbal Lysine
Yellow corn	619.00	619.00
Soybean meal HP	222.32	222.32
Hydrolyzed protein	5.00	5.00
Rice bran D_1	50.00	50.00
Wheat pollard	30.00	30.00
Limestone	11.52	11.52
MDCP	12.00	12.00
Soya lecithin	12.00	12.00
L-lysine HCl	2.00	-
Herbal lysine	-	2.00
DL-methionine	0.12	0.12
Salt	4.00	4.00
Vitamin premix[1]	1.00	1.00
Mineral premix[2]	1.00	1.00
L-threonine	0.12	0.12
Copper sulfate	0.20	0.20
Ferrous sulfate	0.20	0.20
Zinc oxide	0.20	0.20
Toxin binder	1.00	1.00
Choline chloride	0.32	0.32
Total	1000.00	1000.00
Calculated nutrient:		
Metabolizable energy, kcal/kg	3070.26	3070.26
Crude protein (N x 6.25), %	17.12	16.96
Dig. Lysine, %	0.94	0.94
Crude fat, %	4.71	4.71
Crude fiber, %	2.81	2.81
Calcium, %	0.84	0.84
Available P, %	0.38	0.38

[1]Provided the following quantities of vitamins per kg of complete diet: Vitamin A, 11,128 IU; vitamin D3, 2,204 IU; vitamin E, 66 IU; vitamin K, 1.42 mg; thiamin, 0.24 mg; riboflavin, 6.58 mg; pyridoxine, 0.24 mg; vitamin B12, 0.03 mg; D-pantothenic acid, 23.5 mg; niacin, 44 mg; folic acid, 1.58 mg; biotin, 0.44 mg.
[2]Provided the following quantities of micro minerals per kg of complete diet: Cu, 10 mg as copper sulfate; Fe, 125 mg as iron sulfate; I, 1.26 mg as potassium iodate; Mn, 60 mg as manganese sulfate; Se, 0.3 mg as sodium selenite; and Zn, 100 mg as zinc oxide.

Table 2. Growth performance of pigs fed diets containing L-lysine HCl and herbal lysine.

Item	L-Lysine HCl	Herbal Lysine	
			p-value
Initial weight, kg	30.15[a]	34.83[a]	0.108
Final weight, kg	56.35[a]	61.28[a]	0.129
ADG, kg	0.87[a]	0.88[a]	0.071
ADFI, kg	1.75[a]	2.17[b]	0.008
FCR	2.01[a]	2.47[a]	0.846

ADG = average daily gain; ADFI = average daily feed intake; FCR = feed conversion efficiency
[ab]Means in rows with different letters are significantly different (P<0.05)

organoleptic properties of the herbal extract mixture (essential oils may have strong odor or sharp flavors if used in high concentration).

Like ADG, no significant difference (P<0.05) was also found in the FCR of pigs fed L-lysine HCl and herbal lysine. This is in accordance with the study conducted by

Johnston et al. (2002), where in feed efficiency is unaffected by the lysine form. Numerically however, FCR was better in herbal lysine fed pigs due to higher feed intake.

CONCLUSION

The use of herbal lysine in swine grower diet did not significantly affect the ADG and FCR. However, a significant improvement in ADFI is observed in pigs supplemented with herbal lysine. It is, therefore, concluded that herbal lysine can be utilized by the farmers as an alternative for synthetic lysine.

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