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Intestine Morphometry of the *Coturnix coturnix japonica* in Relation with Different Levels of Lysine in the Feed

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Abstract: Generally the poultry intestinal tract has the main role of absorption of food nutrients and changes with certain compounds like aminoacids, however little work has been done with quails. Four hundred one day old *Coturnix japonica*, were used to assess the effect of four different lysine levels (1.1, 1.2, 1.3 y 1.4%) in a ground sorghum-soybean meal based diet on the gastrointestinal morphological changes. All treatement had four replicates of 25 birds. Ten percent of the birds were humanely sacrified at 1, 4, 7, 10, 13, 17, 19 days of age to measure length and weight of small intestine and liver. Data were analyzed as repeated measurements on time. Parameters determined in the organs showed a positive response with the 1.3% of lysine in the feed ($p<0.01$), hence, based on the result of the present trial the previous aminoacid percentage is recommended for quails fed sorghum grain-soybean meal diets.

Key words: Lysine, *Coturnix coturnix japonica*, intestine morphometry

INTRODUCTION

Poultry is the main source of protein for human consumption due to the cost of production, hence all the improvement (management, nutritional, genetic, environmental) induced may impact its performance. Yolk provides nutrients for the poult the first 72 h from eclosion, aftewards, any change in the intestine structure can affect the absorptive capacity[1-6]. The nutrients contained in the yolk allow the intestine to adapt to the agresive conditions of feed consumption and at the same time an harmonic organ growth. On the other hand, the intestine is an active interphase between the animal and the food consumed.

Hence the animal growth rate is closely related to the intestine development in rapid growing species like the japonase quail (*Coturnix coturnix japonica*). On the other hand, some factors of the ingredients can affect in a quite variable manner the intestine development[3,7,8]. In the study of the broiler, selected for its rapid rate of growth, more nutrients are needed to cope with the intestine development, elasticity, integrity and fuctionality[5,6,8,9]. Salado *et al*.[10] working with chickens reported a link between the amino acid lysine with the development of the intestine villy. However, during the literature review no published report were found on the effect of lysine level and the morphometry development of the gastrointestinal tract and the liver in the domestic quail (*Coturnix coturnix japonica*).

MATERIALS AND METHODS

For the presente experiment four hundred unsexed quails (*Coturnix coturnix japonica*) were used. Animals were sorted in 25 chick groups (replicate) in cages for quail provided with feeder and waterer to waranty constant availability of water and feed. Four lysine levels (1.1, 1.2, 1.3 and 1.4% dry matter basis) were used in ground sorghum and soybean meal based rations, following nutrient recommendations of the National Research Council[3] for the quail.

Each lysine level had four replicates. The general parameter measured were body weight (initial and final) and feed intake. Besides five percent of the animals were humanely sacrificed, under the supervision of a representative of animal right and following the animal protection mexican act (NOM-062-ZOO-1999) every three days. Initial parameters were used as co-variable. The weight, length of the gastrointestinal tract (without the content) and liver weight were measured. The statistical analysis of the data was realized as repeated measurements in a random design stablishing an alpha

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of 0.05 to declare differences among treatments and when they exist the means were separated using the Duncan method[4].

RESULTS AND DISCUSSION

In general the body weight (averaged 11.92 g), was affected by the age of the quail ($p<0.05$) and the level of lysine in the feed ($p<0.05$; Table 1). The liver and gizzard weight also were affected by the age of quail chicks, level of lysine and their interaction ($p<0.05$; Table 1).

On the other hand, small intestine weight did not change with the lysine level of the diet ($p>0.05$), but the length of the organ increased as the aminoacid level was augmented in the diet of the quail ($p<0.05$). This could therefore be the augmentation of the mass and hence the strength, absorption and immune response of the small intestine. Huff *et al.*[8] reported the increase of the strength of chickens as the use of some acids in the feed of the animal also Mireles and Kim[2] mentioned the change on the elasticity and strength of the intestine of broiler as the dietary level of protein was reduced.

And we observed in Fig. 1 the interaction of the age of bird and the level of lysine, with the 1.3% was generally higher ($p<0.05$). But as showed in Fig. 2, the length of the intestine the first day of life of the quail chicks was unchanged by the lysine level ($p<0.05$), may be reflection of the remnants of the yolk as source of the aminoacid, furthermore we observed that with the 1.2% lysine level the parameter in the older quails was affected.

The gross intestine weight was also affected by the age of the bird ($p<0.05$), the lysine level in the diet ($p<0.05$) and their interaction ($p<0.05$) as observed in Table 1. And, the gross intestine length was not changed by the aminoacid level in the feed offered ($p>0.05$). This lack of effect could be due to the utilization of the lysine in the small intestine and the residue leaving to the gross intestine was not enough to cause a singnificative change of the morphometry.

Fischer, *et al.*[7] reported that with different source of ingredients the size of the gut of broiler chicken increased, but they used two grain sources of nutrients. In the present the grain used was sorghum and the protein source was the sobean meal and a commercial mixture of vitamins and minerals.

Table 1: Effect of the lysine level in the diet and age on the body and organ change

	Percent of lysine (dry matter basis)				Probability		
	1.1	1.2	1.3	1.4	age	Lys	age x Lys
Body, g	11.77a	11.76a	11.56a	12.56b	0.001	0.022	0.002
Liver, g	0.54ab	0.52bc	0.49c	0.57a	0.001	0.008	0.005
Gizzard, g	0.80a	0.79a	0.78a	0.84b	0.001	0.013	0.038
Small intestine							
Weight, g	0.94	0.92	0.94	0.91	0.0001	0.692	0.001
% body	8.13ab	7.96b	8.43a	7.51c	0.0001	0.0001	0.0001
Length, cm	32.01a	36.51b	32.32a	34.64ab	0.0001	0.039	0.008
Gross intestine							
Weight, g	0.12a	0.14b	0.11a	0.12a	0.0001	0.009	0.002
% body	1.00a	1.18b	0.98a	0.96a	0.0001	0.0005	0.0008
Length, cm	3.87	4.09	4.37	4.10	0.0001	0.312	0.007

a-c. Means within the same row with different letter differ significantly ($p<0.05$)

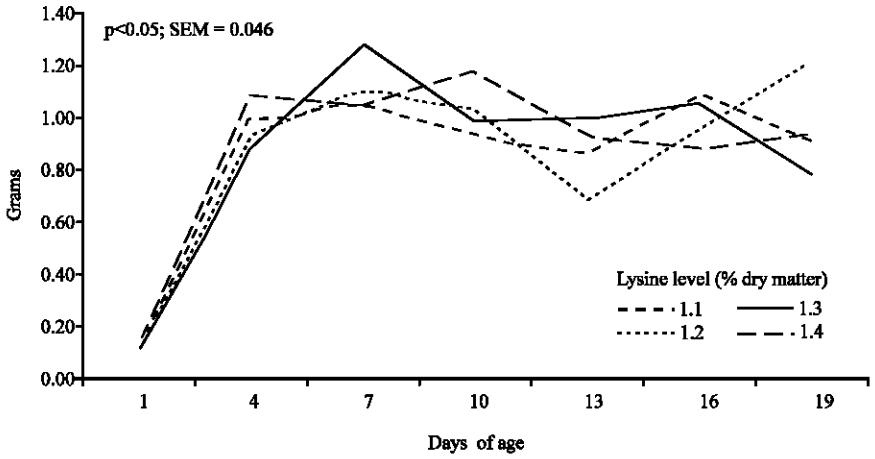

Fig. 1: Effect of lysine level on the small intestine weight of quail

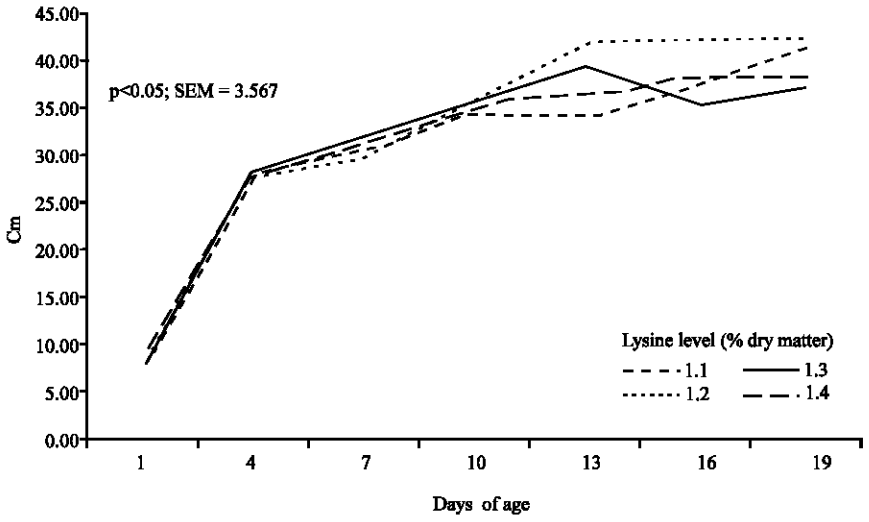

Fig. 2: Effect of lysine level and the length of small intestine

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