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Annals of Biological Research, 2011, 2 (5) :485-491
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Effect of Choline Chloride Supplement on the Internal Organs and Carcass Weight of Japanese quail

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ABSTRACT

This experiment was carried out to evaluation usage different levels of Choline Chloride Supplement (CCS 60%) (0, 500 and 1000 mg/kg) in the basal diet (corn and soybean meal) and their effects on the different parts of carcass weight (breast and thigh) and internal organs weight (liver, heart, spleen, gizzard, proventriculus and abdominal fat) in Japanese quail. A total of 135 Japanese quail were randomly divided in to 3 experimental treatments with 3 replicates (15 birds per pen) and arranged in a completely randomized design. The experimental period lasted 6 weeks and during this period, the birds have free access to feed and water. Experimental diets consisted of: Basal diet 0 mg/kg choline chloride supplement, basal diet with 500 mg/kg choline chloride supplement and basal diet with 1000 kg/kg choline chloride supplement. These diets were isonitrogenous and isoenergetic were given to Japanese quail throughout a 42-d growth period. Data was analyzed with one way ANOVA and means compared with Duncan test. Three male Japanese quail selected with each pen and slaughtered. Result showed choline chloride supplement in all levels not significantly effects on the chilled carcass weight, breasts, thighs weight and gizzards, spleen, hearts and proventriculus weight not affected whit all of treatments. But result showed choline chloride supplement in levels of 1000 and 500 mg/kg (T3 and T2, respectively) significantly decrease the livers weight and abdominal fat deposition ($p<0.0001$) in relationship to basal diet, as the 3 treatment include of 1000 mg/kg has a highest effects.

Key words: Japanese quail, choline chloride, internal organs, breast and carcass.

INTRODUCTION

Quails and poultry industry is increasing dramatically throughout the developing countries. There have been a notable increase in growth rate and feed efficiency in commercial poultry in last 20 years. Nowadays human need a foremost food for a attain the best peace. Hereof, advert to alimentation is very important for a nutrition critic. Choline is an essential nutrition for the poultry. One of its functions is to furnish methyl groups that can also be furnished by betaine and

methionine 10, 14 and 15]. Quail fed corn-soybean meal diets containing (total) choline is excess of the NRC (1994), requirement will display a growth response to supplemental choline [3, 10 and 11], indicating a choline bioavailability of less than 100% in these diets. Molitoris et al. (1976) estimated a choline bioavailability of 60-75% for soybean meal. Choline has three chemically reactive methyl groups attached to the nitrogen atom of the glycine molecule. Therefore, it can be used as a methyl group donor partially to replace methionine in poultry and pig [17]. In poultry, choline's methyl group is available after the conversion to betaine in the liver. Recent work suggests that betaine and choline has an energy sparing role by reducing maintenance requirement poultry and pig [17]. Choline has three essential metabolic roles e.g. as a constituent of phospholipids, hepatic lipid metabolism to prevent fatty liver and as a precursor for acetylcholine synthesis [5 and 21]. Additionally, choline has further non-essential metabolic function as a labile methyl group as well as prevention of perosis and fatty liver syndrome in broiler chicks [5 and 21]. The aims of this study are the measured the internal organs and carcass weight in the Japanese quails with consumption of dissimilar levels of choline chloride in diets.

MATERIALS AND METHODS

Animals and diets: A total of 135 one-day old Japanese quail chicks of from male and female sex were placed in 9 pens of 1×1 meters with ten birds per each pen. Feed and water were provided *ad libitum*.

Table 1: Percentage composition of experimental diet in starter period

Ingredients	(%)
Corn	53.5
Soybean	34.5
CCS	0
Starch	8
Wheat bran	0
DL-Methionine	0.54
Lysine	0
DCP	1.38
Oyster	1.33
Vitamin	0.25
Mineral	0.25
Salt	0.25
Coccidiostat	0
Sand	0
	100
Calculated nutrient content	
ME kcal/kg	2920
Crude protein (%)	21
Calcium (%)	0.94
Available P (%)	0.43
ME/CP	139.7
Ca/P	2.1

1:Vitamin content of diets provided per kilogram of diet: vitamin A, D, E and K.2: Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000mg; Zn, 80,000mg; Fe, 90,000mg; Cu, 15,000mg; I, 1,600mg; Se, 500mg; Co, 600mg.

The experimental design consisted in a completely randomized design with 3 treatments [T1 Control (soybean + corn), T2 (500mg/kg CCS) and T3 (1000mg/kg CCS)] with three replication. The treatment diets of were isonitrogenous and isoenergetic.

Table2: Percentage composition of experimental diet in grower period

	Experimental diets		
Ingredient	T1	T2	T3
Corn	64	64	64
Soybean	27.4	27.4	27.4
CCS	0	0.000084	0.000168
Starch	3.74	3.74	3.74
Wheat bran	1	1	1
DL-Methionine	0	0	0
Lysine	0	0	0
DCP	1.13	1.13	1.13
Oyster	1.5	1.5	1.5
Vitamin	0.25	0.25	0.25
Mineral	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Coccidiostat	0.15	0.15	0.15
Sand	0.33	0.33	0.33
	100	100	100
Calculated nutrient content			
ME kcal/kg	2920	2920	2920
CP (%)	18.2	18.2	18.2
Calcium (%)	0.9	0.9	0.9
Available P (%)	0.35	0.35	0.35
ME/CP	160.1	160.8	160.7
Ca/P	2.5	2.5	2.5

1:Vitamin content of diets provided per kilogram of diet: vitamin A, D, E and K.2: Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000mg; Zn, 80,000mg; Fe, 90,000mg; Cu, 15,000mg; I, 1,600mg; Se, 500mg; Co, 600mg.

Diets were formulated by adding 0, 500 and 1000mg/kg choline chloride supplement (60%) be based diet (corn and soybean meal) that met requirement recommended by the National Research Council (1994). The control diet, which was not enriched with choline chloride supplement and was administered throughout the 21 days of experimental period (starter). The levels of choline chloride supplement were replaced with corn in diets during 2 different periods (grower and finisher). Ingredient composition and nutrient analysis for each treatment is described in Table 1-3. In the end of the experiment 4 birds from each replicate were slaughtered and different part of body weighted. Mortality was also recorded for each treatment.

Statistical analyses: Data were analyzed in a complete randomized design using the GLM procedure of SAS (2000) version 12:

$$Yij = \mu + \alpha i + \varepsilon ij$$

Where:

Yij = All dependent variable

μ = Overall mean
αi = The fixes effect of CCS levels (i = 1, 2, 3)
εij = The random effect of residual
Duncan multiple ranges used to compare means.

Table3: Percentage composition of experimental diet in finisher period

	Experimental diets		
Ingredient	T1	T2	T3
Corn	66.5	66.5	66.5
Soybean	24.1	24.1	24.1
CCS	0	0.000084	0.000168
Starch	3.81	3.81	3.81
Wheat bran	0	0	0
DL-Methionine	0.44	0.44	0.44
Lysine	0.043	0.043	0.043
DCP	0.89	0.92	0.89
Oyster	1.38	1.36	1.31
Vitamin	0.25	0.25	0.25
Mineral	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Coccidiostat	0.15	0.15	0.15
Sand	1.937	1.937	1.937
	100	100	100
Calculated nutrient content			
ME kcal/kg	2920	2920	2920
CP (%)	16.5	16.5	16.5
Calcium (%)	0.8	0.8	0.8
Available P (%)	0.3	0.3	0.3
ME/CP	176.8	176.4	176.6
Ca/P	2.6	2.6	2.6

1:Vitamin content of diets provided per kilogram of diet: vitamin A, D, E and K.2: Composition of mineral premix provided as follows per kilogram of premix: Mn, 120,000mg; Zn, 80,000mg; Fe, 90,000mg; Cu, 15,000mg; I, 1,600mg; Se, 500mg; Co, 600mg.

RESULTS AND DISCUSSION

Carcass weight: Results for carcass weight shown in Table 4. Result shows that with usage levels of choline chloride supplement in experimental diet (T3 = 1000 mg/kg choline chloride supplement and T2 = 500mg/kg choline chloride supplement, respectively) numerically increase the carcass, breasts and weights ($p<0.0001$) in relationship to basal diet, but no significant. In the some experiments, it has showed the presence of choline chloride supplement and betaine in diets no improvement effect on meat yield and carcass weight (breast and thigh) in broiler [1 and 18]. These finding is an according with this study finding about Japanese quails. Whitherward these researchers has reported the presence of choline chloride supplement in diets no improvement the feed intake and feed conversion ratio in the broiler chickens, so it has seem the Japanese quail of the carcass weight in relationship with the Japanese quail of feed intake and feed conversion ratio in broiler. These observe has conformed to our finding in this study. But not the similar research about quail in this subject, and this experimental is an initiatory research.

Table 4: Least square means for carcass, breast and thigh weight

	Treatment				
	T1	T2	T3	SEM	P>F
Carcass weight	80.55a	80.64a	80.66a	8.679856	0.0001
Breast weight	9.23a	9.33a	9.40a	0.389342	0.0001
Thigh weight	17.26a	17.33a	17.38a	0.484666	0.0001

Table 5: Least square means for internal organs weight

	Treatment				
	T1	T2	T3	SEM	P>F
Liver weight	1.8832a	1.3446b	1.0336c	0.11455	0.0001
Spleen weight	0.0765a	0.0759a	0.0755a	0.06622	0.0981
Heart weight	0.4021a	0.4003a	0.4000a	0.06455	0.0734
Gizzard weight	2.0061a	2.0051a	2.0023a	0.14571	0.0132
Proventriculus weight	0.45141a	0.42766b	0.41344c	0.04573	0.0222
Abdominal fat	148.00a	105.92b	87.77c	9.64598	0.0001

Internal organs weight: Results for internal organs weight shown in Table 5. Results shown that with usage high levels of choline chloride supplement in experimental diet (T3 = 1000 mg/kg choline chloride supplement and T2 = 500 mg/kg choline chloride supplement, respectively) significantly decrease the liver and abdominal fat deposition ($p<0.0001$) in relationship to basal diet, as the treatment include of 1000 mg/kg choline chloride supplement has a highest effects and too results shown that with usage high levels of choline chloride supplement in experimental diet (T3 = 1000 mg/kg choline chloride supplement and T2 = 500 mg/kg choline chloride supplement, respectively) significantly decrease the liver and abdominal fat deposition ($p<.0001$) in relationship to basal diet as the 3 treatment include of 1000 mg/kg choline chloride supplement has a highest effects and too result shown that with usage high levels of choline chloride supplement in experimental diet (T3 = numerically decrease gizzard, heart, spleen and proventriculus weight respectively but not significantly. Harms and Russell (2002) and Jason et al. (1997) in their experiment, it has showed the presence of choline chloride supplements in diets decrease the livers, spleen and heart weights in the poultry. They are recognize these effects in relationship with the donor methyl group by choline and there are contributed in the fats metabolism in these organs. These observe has conformed to our finding in this study. In the some experiments, it has showed the presence of choline chloride supplement and betaine in diets no improvement effects on the gizzard weight in poultry [1, 18 and 20]. These researchers observe has conformed to our finding in this study. In the many of research proventriculus weight not measured, according no that the good references about the effect of choline chloride supplement on the proventriculus weight and size, but in this study it has showed that with usage high levels of choline chloride supplement in experimental diet no significantly effect on the proventriculus weight in the Japanese quails. The primary objective of the present trial was to evaluate if dietary choline chloride supplementation use in diet, decrease significantly abdominal fats [1, 18 and 20].

In the recent study shown that with usage high levels of choline chloride supplement in experimental diet (T3 = 1000 mg/kg choline chloride supplement and T2 = 500 mg/kg choline chloride supplement, respectively) significantly decrease abdominal fats respectively in Japanese

quails. It has seemed the usage of the choline chloride supplement in the quail diets, it has prevent than the fatty liver syndrome in the Japanese quail. In the other hands it has seemed these effects on the abdominal fat deposition in relationship with the donor methyl group by choline chloride supplement and there is contributed in the fats metabolism in these organs. But not the similar reports about quail in this subject, then this subject it has need to another research about this project.

CONCLUSION

Choline Chloride Supplement significantly decrease the liver and abdominal fat deposition in the Japanese quail. In the other hand choline chloride supplement significantly decrease the liver and abdominal fat deposition in the Japanese quail. It has seem the usage of the choline chloride supplement in the quail diets, it has prevent than the fatty liver syndrome in the Japanese quail.

Acknowledgment
Financial support for this study (Islamic Azad University, Shabestar Branch) was provided. The authors are also grateful to them valuable support and to oorumieh jahad university for their skilled technical assistance throughout the experimental analyses.

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