

## RESEARCH PAPER

# Effect of feeding fermented fish silage on the meat quality of broiler Japanese quails (*Coturnix coturnix japonica*)

SASMITA PANDA<sup>1</sup>, LAXMAN KUMAR BABU<sup>1</sup>, ARUN KUMAR PANDA<sup>2</sup>, KULDEEP KUMAR PANIGRAHY<sup>3</sup>, SHAILESH KUMAR GUPTA<sup>3</sup> AND PROMILA MARNDI<sup>4</sup>

<sup>1</sup>Department of Livestock Production and Management, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, BHUBANESWAR (ODISHA) INDIA

<sup>2</sup>ICAR- Central Institute for Women in Agriculture, BHUBANESWAR (ODISHA) INDIA

<sup>3</sup>Division of Livestock Production and Management, National Dairy Research Institute, KARNAL (HARYANA) INDIA

<sup>4</sup>Department of Floriculture and Landscaping, College of Agriculture, Orissa University of Agriculture and Technology, BHUBANESWAR (ODISHA) INDIA

Email : [smileysas555@gmail.com](mailto:smileysas555@gmail.com)

**Article Info** : Received : 03.08.2016; Revised : 22.08.2016; Accepted : 09.09.2016

The research work was carried out for a total period of 4 weeks to study the effect of dietary supplementation of fermented fish silage on the meat quality of broiler Japanese quails. 192, seven-day old broiler Japanese quail chicks of either sex were randomly distributed into four dietary treatment groups with four replicates in each group with 12 chicks in each pen. The dietary treatments were T<sub>1</sub> control diet, T<sub>2</sub> diet containing 5 per cent fermented fish silage, T<sub>3</sub> diet containing 10 per cent fermented fish silage and T<sub>4</sub> diet containing 15 per cent fermented fish silage. The chemical composition like moisture, crude protein (CP) and ether extract (EE) content of the broiler quail meat taken from the breast region of birds did not vary significantly among the dietary treatments; however, there was a significant difference (P<0.05) in the total ash content. The total ash content in the meat samples of the birds fed diet containing 15 per cent fermented fish silage (FFS) was significantly higher (1.94±0.06%) compared to all other dietary treatments. The inclusion of FFS had no adverse effect on meat composition (CP and EE). Further, FFS inclusion in the diet had a beneficial effect on meat ash content.

**Key words** : Fermented fish silage (FFS), Meat quality, Japanese quail

**How to cite this paper** : Panda, Sasmita, Babu, Laxman Kumar, Panda, Arun Kumar, Panigrahy, Kuldeep Kumar, Gupta, Shailesh Kumar and Marndi, Promila (2016). Effect of feeding fermented fish silage on the meat quality of broiler Japanese quails (*Coturnix coturnix japonica*). *Asian J. Bio. Sci.*, 11 (2) : 277-280. DOI : 10.15740/HAS/AJBS/11.2/277-280.

## INTRODUCTION

The primary objective of poultry production is to reduce the feed cost as it accounts for 65-70 per cent to total cost of production. Increasing cost of feed ingredients and chronic shortage of protein and energy rich animal feeds due to enhanced needs of ever increasing human population are the major threats to reorient poultry industry into an economic enterprise in India. Constant

efforts are, therefore, being made to search the newer and alternate feed resources and their evaluation for optimum inclusion in the poultry ration. Since protein sources are costlier, measures are often adopted to partially or completely replace the dietary protein with non-edible and non-competitive protein rich byproducts in order to reduce the cost of production. One such byproduct is the byproduct of fish industry which could be a valuable protein source in poultry feed if processed

properly into edible form (Zynudheen *et al.*, 2008). Fermented fish silage is a liquid product produced from the whole fish or parts of it, to which fermentable carbohydrate sources or, lactic acid producing bacteria are added, with the liquefaction of the mass provoked by the action of enzymes from the fish (FAO, 2007). The decrease in pH value of the fish silage below 4.5 is partially responsible for preservation (Soltan *et al.*, 2008).

On the other hand, with increasing demand for fast food and competition among broiler and layer farmers some alternative and equally competitive farming has become very essential for the survival of the farmers. In this situation, quail farming proves to be an ideal venture for the poultry farmers who desire to increase their profit through diversification. Quail being the smallest among

various poultry species is farmed worldwide for its cardiac friendly and nutritious meat with unique flavour and egg production (Baumgartner, 1994). Quail meat and eggs are considered to be a good alternative source of cheaper animal protein in terms of very low fat and cholesterol content which makes it the choice of people suffering from high blood pressure (Rogerio, 2009).

## RESEARCH METHODOLOGY

A total of 192, seven-day old broiler Japanese quails of either sex were randomly distributed into four treatment groups. There were 4 pens, each having a floor area of 40 sq. feet (8 feet x 5 feet) with 48 chicks in each pen, divided into four replicates in it. Rice husk was used as

**Table A : Design of the experiment**

Treatment no.	Treatments	No. of chicks
T <sub>1</sub>	Control diet	48
T <sub>2</sub>	Diet with 5% fermented fish silage	48
T <sub>3</sub>	Diet with 10% fermented fish silage	48
T <sub>4</sub>	Diet with 15% fermented fish silage	48

**Table B : Formulation of ration with 5 per cent, 10 per cent and 15 per cent fermented fish silage**

Sr. No.	Ingredients (Parts/quintal)	Control diet	Diet with 5% fish silage	Diet with 10% fish silage	Diet with 15% fish silage
1.	Maize	58.1	54.17	50.79	47.28
2.	Fish silage*	-	5	10	15
3.	Deoiled rice bran	-	-	-	-
4.	Vegetable oil (Rice bran oil)	-	-	-	-
5.	Deoiled soya meal	38.5	37	35.5	34
6.	Choline chloride 50 %	0.12	0.12	0.15	0.15
7.	Salt	0.2	0.25	0.25	0.25
8.	Sodium bicarbonate	0.2	0.2	0.2	0.2
9.	Calcite powder (Ca = 34%)	1.34	1.4	1.25	1.25
10.	Dicalcium phosphate	1.28	1.6	1.56	1.56
11.	ABDK vitamin	0.025	0.025	0.025	0.025
12.	DL-Methionine	0.12	0.13	0.13	0.14
13.	B- Complex	0.03	0.025	0.025	0.025
14.	L- Lysine	-	-	-	-
15.	Coccistat (CMP1)	-	-	-	-
16.	Mineral mixture*	0.12	0.12	0.12	0.12
	Grand total	100.00	100.00	100.00	100.00
<b>Nutrient composition (Calculated)</b>					
1.	ME (kcal/kg)	2905	2925	2924	2940
2.	CP %	23.9	23.83	23.85	23.69
3.	CF %	-	-	-	-
4.	Lysine (%)	1.26	1.28	1.29	1.28
5.	Methionine (%)	0.35	0.5	0.51	0.51
6.	Calcium (%)	0.9	0.9	0.91	0.92
7.	Phosphorus (%)	0.42	0.43	0.44	0.44

litter material. The experiment was carried out for a total period of 4 weeks from last week of March, 2016 to mid of April, 2016 during early to mid summer season. The design of the experiment conducted is presented in Table A.

During the period of study, all the birds were provided with an isocaloric and isonitrogenous ration containing 2900 kcal of ME/kg of ration and 24 per cent CP with *ad lib* provision of water. The ingredients and nutrient composition of the diets are presented in Table B.

At the end of the experiment, two birds from each replicate were selected in a random basis and were kept off fed 6 hours prior to slaughter with provision of water before slaughtering. Body weights of each bird were taken prior to slaughter also known as the preslaughter weight. After taking the pre-slaughter body weight, the birds were sacrificed by cervical dislocation and then allowed to bleed for five to ten minutes upto complete cessation of bleeding. The removal of breast meat from the carcass was performed from the caudal end of carina sterni. With the carcass in the lateral recumbence the cut was directed in the carino lateral direction along the lateral border of pectoral muscle. Then the incision continues horizontally through the cartilage joining both the rib parts and was directed to shoulder joint. These cuts were made on both sides together to remove the breast meat from the carcass. The breast meat collected at 5 weeks of age was minced properly and moisture, fat, protein and total ash were estimated as per AOAC, 1995.

### Statistical analysis :

The data pertaining to various parameters were subjected to statistical analysis under Completely Randomized Design employing one-way analysis of variance-Snedecor and Cochran (1989). The means of different treatments were compared with Duncan's multiple range test (Duncan, 1955) and significance was considered at ( $P<0.05$ ) level.

## RESEARCH FINDINGS AND ANALYSIS

The chemical composition *viz.*, moisture, crude protein, ether extract and total ash taken from the breast region of birds are presented in Table 1. The moisture, protein and fat content did not vary significantly among dietary treatments, however, there was a significant difference ( $P<0.05$ ) in the total ash content. The total ash content in the meat samples of the birds fed diet containing 15 per cent fermented fish silage (FFS) was significantly higher ( $1.94\pm 0.06\%$ ) compared to all other dietary treatments.

The non-difference in crude protein (CP) and ether extract (EE) content of broiler quail meat due to dietary incorporation of 5-15 per cent FFS indicated that FFS had no adverse affect on meat composition of broiler quails (Kjos *et al.*, 2000). The quail chicks fed with 15 per cent FFS had shown significantly higher total ash (TA) content compared to other dietary treatments. The higher ash content in the meat of 15 per cent FFS dietary group could be attributed to higher level of minerals in the fish silage which might have absorbed into the system and deposited in the meat (Ramirez *et al.*, 2016). Our study suggested that inclusion of FFS had no adverse effect on meat composition (CP and EE). Further, FFS inclusion in the diet had a beneficial effect on meat ash content.

### Conclusion :

The moisture, protein and fat content of the meat sample did not vary significantly among the treatments due to dietary inclusion of fermented fish silage (FFS); however, there was a significant difference ( $P<0.05$ ) in the total ash content. The total ash content in the meat samples of the birds fed diet containing 15 per cent fermented fish silage (FFS) was significantly higher compared to all other dietary treatments. From the above study it is concluded that the fermented fish silage can be incorporated in the diet of Japanese quails without any adverse effects.

Composition (%)	T <sub>1</sub> (Control diet without fermented fish silage)	T <sub>2</sub> (Diet with 5% fermented fish silage)	T <sub>3</sub> (Diet with 10% fermented fish silage)	T <sub>4</sub> (Diet with 15% fermented fish silage)	S.E.±	P value
Moisture	72.01	71.86	71.94	71.70	0.19	0.718
Crude protein	25.76	25.82	25.77	25.60	0.15	0.629
Ether extract	0.69	0.74	0.72	0.76	0.04	0.423
Total ash	1.54 <sup>a</sup>	1.58 <sup>a</sup>	1.57 <sup>a</sup>	1.94 <sup>b</sup>	0.06	0.051

<sup>a, b</sup> Means bearing different superscripts in a row differ significantly ( $P<0.05$ )

## LITERATURE CITED

- AOAC (1995). *Official methods of analysis*. 16<sup>th</sup> Ed. Association of official Analytical Chemists. Washington, D.C. 2044.
- Baumgartner, J. (1994)**. Japanese quail production, breeding and genetics. *World's Poult. Sci., J.*, **50** : 227-235.
- Duncan, D.B. (1955)**. Multiple range and multiple F-tests. *Biometrics*, **11**: 1-42.
- Kjos, N.P., Herstad, O., Overland, M. and Skrede, A. (2000)**. Effects of dietary fish silage and fish fat on growth performance and meat quality of broiler chicks, *Canadian J. Anim. Sci.*, **80** (4): 625-632.
- Ramirez, J.C.R., Ibarra, J.I., Romero, F.A., Ulloa, P.R., Ulloa, J.A., Matsumoto, K.S., Cordoba, B.V. and Manzano, M.A.M. (2013)**. Preparation of biological fish silage and its effect on the performance and meat quality characteristics of quails (*Coturnix coturnix japonica*), *Brazilian Archiv. Biol. & Technol.*, **56**(6): 1002-1010.
- Ramirez, J.C.R., Ibarra, J.I., Leyva, R.G., Ulloa, P.R. and Ulloa, J.A. (2016)**. Use of biological fish silage in broiler feed: Effect on growth performance and meat quality, *J. Anim. & Plant Sci.*, **27**(3): 4293-4304.
- Rogério, G. T. (2009)**. Quail meat- an undiscovered alternative. *World Poult. J.*, **25** (2) : 7-16.
- Snedecor, George W. and Cochran, William G. (1989)**. *Statistical methods*, Eighth Ed., Iowa State University Press.
- Soltan, M.A., Shewita, R.S., El-Katcha, M.I. (2008)**. Effect of dietary anise seeds supplementation on growth performance, immune response, carcass traits and some blood parameters of broiler chickens. *Internat. J. Poult. Sci.*, **7** : 1078-1088.
- Soltan, M.A. and Fath, El-Bab, A.F. (2010)**. Replacement of fish meal by fermented fish by-products silage in the diets of Nile tilapia (*Oreochromis niloticus*) fry, *Abbassa. Int. J. special issue*.
- Zynudheen, A.A., Anandan, R. and Nair, K.G.R. (2008)**. Effect of dietary supplementation of fermented fish silage on egg production in Japanese quail (*Coturnix coromandelica*), *African J. Agric. Res.*, **3**(5): 379-383.

11<sup>th</sup>  
Year  
★ ★ ★ ★ ★ of Excellence ★ ★ ★ ★ ★