Sudan University of Science and Technology

College of Graduate Studies

Effect of Feeding Locally Produced Fish meal on Broiler Performance

(أثر تغذية بدرة السمك المصنع محليا في أداء الدجاج اللاحم)

A thesis Submitted for the Fulfillment of the Requirements for the Degree of Master of Science (M.Sc) in Tropical Animal Production

(POULTRY NUTRITION)

BY:

ABUBAKER SAEED GISM ALLA GUBART ALLA

SUPERVISOR:

DR. ELFADIL AHAMED ADAM FADUL

August 2015

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الآية

قـــل تـــعالي:

(ولحم طير مما يشتهون)

صدق الله العظيم

سورة الواقعة الاية (21)

قـــل تـــعالي:

(وما أوتيتم من العلم الا قليلا)

صدق الله العظيم

سورةالاسراء الاية (85)

Dedication

To my parents

Brothers

Sisters

Supervisor

Friends and all who gave help I dedicate this work.

Acknowledgement

I would like firstly to thank Allah for giving me knowledge, patience and support to complete this task. This study was conducted and accomplished with the help and assistance from many parties to whom I extend my sincere appreciation and thanks. At the outset I would like to express the deep gratitude which I feel for the serious and patient supervision provided to me by Dr / El fadil Ahmed Adam. Also I would like to thanks Ustaz / Mohammed Abed El Rahman for help and support and to all people who helped and encouraged me during the study period. I would like to extend my thanks to the staff of Animal Production Department, College of Agricultural Studies, Sudan University of Science and Technology.

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Abstract

The experiment was conducted at the poultry farm of the College of Animal Production Science and Technology. Sudan University of Science and Technology. To study the effect of the feeding on locally produced fish meal on broiler productive performance. A total of 96 unsexed (ROSS 308) broiler chicks and were randomly distributed into four experimental treatment of 24 on day old chicks. The treatments were subdivided into three replicates of 8 birds each. Four experimental diets contained graded levels of locally produced fish meal (0.0, 5, 7.5 and 10%) were formulated .Chicks were randomly distributed to consume the experimental diets for 42 days.

The performance data in term of feed intake(g/bird), live weight (g/bird), weight gain(g/bird), feed conversion ratio (FCR) (g feed/g gain) and mortality rate (%) were recorded. Statistical analyses were made by analysis of variance for a completely randomized design (CRD).

The results revealed that feeding graded levels of locally produced fish meal decreased feed intake, body weight, and weight gain and feed conversion ratio without detectable effect on mortality rate. Therefore, we conclude that feeding locally produced fishmeal diets did not positively support broiler performance.

الملخص باللغة العربية

اجريت التجربة بمزرعة كليّة علوم وتكنولوجيا الإنتاج الحيواني بجامعة السودان للعلوم والتكنولوجيا. وذلك لدراسة اثر التغذية بدرة السمك المصنع محليا على الاداء الانتاجي للدجاج اللاحم .

تم توزيع 96 كتكوت عمر يوم غير مجنسة من سلالة روس(308) الى اربعة مجموعات بحيث تحتوي كل مجموعة علي 24 كتكوت والتى قسمت بدورها الى ثلاثة تكرارات بحيث يحتوي كل تكرار على 8 كتاكيت. تم تركيب اربعة علائق تمثل العليقة الاولى العليقة القياسية او الضابطة وهي لا تحتوي علي بدرة السمك المصنعة محليا (0.0%) ، ثم اضيفت بدرة السمك المصنعة محليا للعلائق الثلاث الاخرى بنسب متدرجة (5% و7.5% و10%) على التوالي وبدون اضافة المركز لهذه العلائق. وزعت الكتاكيت عشوائيا لاستهلاك علائق التجربة لمدة 42 يوم والتي خلالها تم تسجيل استهلاك العلف (جم/طائر)، الوزن الحي (جم/طائر)، الوزن المكتسب (جم/طائر) ومعدل التحويل الغذائي (جم علف/جم وزن مكتسب) اسبوعيا بالاضافة لنسبة النفوق. النتائج المتحصل عليها تم تحليلها بواسطة تحليل التباين للتصميم العشوائي الكامل

أظهرت النتائج انخفاض معنوي في الوزن النهائي واستهلاك العلف والوزن المكتسب ومعدل التحويل الغذائي وعليه فان اضافة مستويات متدرجة من بدرة السمك المصنع محليا لم تؤدي الى تحسن إيجابي علي اداء الدجاج اللاحم .

CHAPTER ONE

1. INTRODUCTION

In commercial poultry production the main constraint is the feed cost which accounts for about 60 to 65 % of the total cost of production (Hossain, *et al*., 2003).The chronic shortage of supply of protein concentrates for poultry necessitates investigations of the potentials of some feed resources that are cheaper, locally available and have comparative nutritional value as the conventional protein sources. Hence, a feasible approach that seems worthy is to incorporate agricultural and aquatic by-products not directly consumed by man. These are valuable feed for poultry, reduce competition for food with humans and reduce feed cost and problem of waste disposal (Boushy Vander, and Walraven., 1994). Plant proteins are usually low in lysine and methionine which are critical on poultry diets. To prepare a poultry diet certain amounts of animal protein sources like fishmeal, blood meal and meat meal must be added to the diet in order to balance the deficiencies of the essential amino acids (Scott et. al., 1976). These amino acid sources supply some unidentified growth factors (Balton and Blair, 1977). A notable feed ingredient with high nutrient content that deserves attention as livestock protein source available is fishmeal. Because of the well-balanced amino acid profile, most fish meals are good sources of protein (Donald and William, 2002). Fish meal is the only source of animal protein being used to overcome these deficiencies, it contains all the essential amino acids especially lysine and methionine in adequate quantities required for poultry (Singh and Panda, 1990).With the present trend of rising prices of feedstuffs, considerable attention has been placed on the search for non-conventional feedstuffs. Fishmeal, a conventional feed resource, has been used as the source of animal protein in diets of poultry in many countries due to unavailability of cheaper alternative protein sources. Although a substantial amount of work has been reported

using fish meal in animal diet elsewhere, much less has been studied on the nutritive value of locally made fish meal. The levels of inclusion of locally prepared fish meal into poultry ration need to be re-established. This study was conducted to assess the replacement value of imported concentrate with graded levels of locally produced fish meal in broiler starter and finisher diets and the effect of this replacement on growth performance indicators such as live weight, weight gain, feed conversion ratio, feed intake as well as mortality rate.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Nutrition of Poultry

Poultry feeding and nutrition have been changed more than the feeding and nutrition of any other species. The vast majority of commercial poultry feeds are produced in large feed mills wherein the maximum of science and technology exists. The current trend in poultry production is toward controlled environment, which usually resulted in lower feed consumption. The nutrient contents of feed (energy, amino acids, vitamins, and minerals) are varied so as to compensate for the reduced feed intake and to meet the requirements which are often taken into consideration (Ensminger, 1990). According to previous studies (Samara, 2000) feed accounts for more than 65-75% of production broilers costs .This has been attributed to the high prices of imported feedstuffs especially protein concentrate. Groundnut cake has been traditionally used as the sole protein source in broiler diets (about 30% of the ration).

2.2 Proteins in Poultry nutrition

The usefulness of a protein feedstuff for poultry depends upon its ability to furnish the essential amino acids required by the bird, the digestibility of the protein, and the presence or absence of toxic substances. As a general rule, several sources of protein produce better results than single protein source. Both vegetable and animal protein supplements are used for poultry (Ensminger, 1990). Most of the protein supplements of animal origin contribute amino acids, minerals and vitamins which significantly affect their value in poultry rations, but they are generally more variable in composition than the vegetable protein supplements (NRC, 1994).

2.3 Animal Proteins

Protein supplements of animal origin are derived from meat packing and rendering operations, poultry and poultry processing, milk and dairy processing, and fish and fish are processing (Denton *et al*., 2005). Before the discovery of vitamin B-12, it was generally considered necessary to include one or more of these protein supplements in the rations of chickens. Many protein supplements of animal origin are difficult to process and store without some spoilage and nutrient loss. If they cannot be dried, they must be usually refrigerated. If not heated to destroy disease-producing (pathogenic) bacteria, they may be a source of infection. On the other hand, protein availability will be reduced and some nutrients are lost if the feed is heated excessively (Ensminger, 1990). Firman and Robbins (2004) reported a long history of worldwide animal protein use in the poultry industry. Products currently being utilized include meat meals from ruminants, swine, and poultry origin, as well as the blood and fat products from each of these animals. Feather meal, hatchery by-product, spent hens and fishmeal (Cozzi *et al*., 1995; Kersey *et al*., 1997; Deshmkh and Patterson, 1997; Klemesrud *et al*., 1998; Grant and Haddad, 1998; Moritz and Latshaw, 2001).

2.3.1 Fishmeal.

Fish meal is an excellent source of protein it is consider to be one of the best ingredients for broiler and layers, when used as a complementary protein for poultry feed and has a positive influence on productive performance (Solangi *et al*., 2002).The percentage of fishmeal in poultry diets rarely exceed 10 percent, but it sometimes may exceed this percentage only in the early stages of growth when the needs of the animal for high protein (Nadeem, 2003 and Hossain *et al*., 2003). Dabrowski *et al* (1989) reported that the modified dietary fish meal can be used in mixture for broiler, but at a limited rate (max. 5%). Salih (2009) showed no significant differences on broiler performance when used fish meal at 0, 1.5. 3.5 and 5%. On the other hand, better response

was observed by some authors when local fish meal included at higher levels (25, 50, 75 and 100%) instead of imported protein concentrate in poultry diets (Jaffer 2010 ; Mukhtar, 2014). The presence of fish meal in a complete diet will supplement any deficiencies of the amino acids in vegetable protein (Barlow and Windsor, 1984; Miles and Jacob, 1997).Fishmeal is also fed to farm animals not only to improve productivity, but also to protect health and welfare and reduce dependence on antibiotics and other drugs (Pike, 1999; Anonymous, 2002).

2.3.1.1 The value of Fishmeal.

Fishmeal is a natural balanced feed ingredient that is high in protein, energy, minerals (Calcium and phosphorus), natural source of vitamins (including choline, biotine and vitamin B12, A and E) and the microelements, selenium and iodine. The protein in fishmeal has a highly biological value in diets for animals (Pike, 1999). It is rich in the essential amino acids particularly lysine and the sulfur amino acids (Anonymous, 2002).

The importance of fish meal as feed ingredient in poultry production is quite enormous. It is a feed ingredient with very high nutrient density and high digestibility. Among the animal protein sources fish meal is particularly suited to meet the nutrient requirements of animals (Karimi, 2006).It contains high level of protein and appreciable quantities of fat and minerals. The protein in fish meal has high biological value because it is rich in essential amino acids particularly lysine and sulphur amino acids (Karimi, 2006). The nutrient composition of fish meal can vary depending on the type and species of fish, the freshness of the fish before processing and the processing methods.

Fishmeal naturally contains from 62% to 64% proteins and digestible fat. It is quality varies due to the variety, parts of fish and processing technologies (Fickler, 2002; and Dale *et al*., 2004). According to NRC (1994), protein

content of fish meal varies from 60.00 to 72.30% due to type of fish and method of preparation. The quality of fish meal is quite uncertain due to the use of different processing technologies in its production in addition it is often contaminated with other ingredients such as ands, sawdust and fish bones and the use of chemicals for preservation often caused toxicity to poultry birds (Khatun *et al*. 2003; Khatun *et al*, 2005; Karimi. 2006). In Asian countries, fish meal is prepared from mixture of trash fish and byproducts of the canning industry, resulting in a product of very variable composition. fishmeal varies in nutrient composition, with crude protein ranging from 32.00 to 58.8% (Choo and Sadiq, 1982).

Balougum et al (1986) Demonstrated that fishmeal produced from tuna (Katsuromus plemis) wastes had protein 54%, ash 26, lipid5.52%, fiber 4.48%, calcium7.75%, and phosphorus0.9% . Randal *et al* (1960) indicated that fish meal exhibited very good quality protein than whole fish or washed muscle. The same authors added that meal from fish scales and skins exhibited very poor quality protein.

2.3.1.2 Effect of feeding fish meal on broiler performance.

Fishmeal has been a popular poultry feed ingredient for many decades. The literature describing the use of fish meal has been reviewed Ghanim (2009) reported that feeding elevated levels of Tilapia replacing soybean meal on weekly feed intake resulted in significant differences ($p<0.001$) in broiler feed consumption from 7 to 42 d of age . Birds on diets contained 75 and 100% tilapia fish meal had significantly lower feed consumption as compared to those fed 0, 25 and 50%. Karimi (2006) clarify that feed intake during 11-20d, 21-32d and 0-42d had significantly increased with fish meal inclusion rate increased, he stated that the beneficial effects of fishmeal on broiler performance become most evident at higher inclusion level and during the mid points of the growth period, mainly via stimulation of feed intake rather than improvement in feed conversion ratio of diets. Studies results using fish

meal in broiler diets (Ponce and Gernat, 2002) showed no significant differences in body weight feed consumption and feed conversion ratio on broiler.

Ghanim (2009) reported that weekly weight gain were almost similar in all treatments when fish meal was added up to the 3.5% level but the higher inclusion (5%) represents the lowest weight gain. Ahmed (2003) studied of the effect of five different locally produced fish meals on broilers performance, the results indicated the superiority of Synodontis whole fish meal, Synodontis gutted whole fish meal and semi spoiled Nile perch whole fish meal over fish entrail meal and fish scrap meal in all production parameters , except feed intake. Fish scrap and fish entrail meals though inferior in terms of feed intake and body weight gain, but their effects on FCR and PER were almost similar, if not better than that of the commercial super concentrate. The overall result indicated the superiority of the locally manufactured concentrate. Al-Marzooqi, *et al* (2010) studies of the effect of feeding different levels of sardine fish silage on broiler performance under closed and open-sided housing systems and reported that fish silage can replace up to 20% of soybean meal in broiler diets without affecting either growth performance or the sensory quality of broiler meat. Khatun, *et al* (2003) reported similarity in weight gain when feeding diets containedfish meal and silkwarm caterpillar meal (SCM).Many studies citing appositive correlation between dietary salmon protein concentrate and growth performance of broiler chickens. Feeding corn-soybean meal based diet containing 11.5% condensed salmon protein concentrate (SPC) compared to control diet, whereas dried SPC did not appear to elicit similar growth performance enhancements compared with that of control diet or menhaden fish meal diet (Lowa state University. Animal Industry Report (2007).On other study by Maigualema and the Gernat (2003) concluded that Tilapia by-product Meal (TBM) can be substituted with Soybean meal (SBM) without

negatively affecting bird performance or carcass quality. (Asian – 2003).Y.Yu (2004) said substitution of fish meal with either meat or bone meal and poultry by-product meal should substantially cause noticeable decline in weight gain. Jamsang (1988)) found that body weight gain was markedly improved when fishmeal included at 6% compared with 4%.kibria, *et al* (1989) demonstrated that diet with 12% fishmeal produced higher growth rate.

Awoniyi *et al* (2003) and Salih (2009) stated that fish meal could be used at different levels up to 8% in broiler diets without adversely effecting weight gain, feed consumption and efficiency.

Replacement of soybean meal (SBM) with tilapia by product meal (TBM) resulted in significant differences ($p<0.001$) in broiler feed conversion ratio from 7 to 42 d of age. Birds on diets containing the 75 and 100% TBM had significantly poorer feed conversions ratio as compared to the 0, 25 and 50% treatments. Schumaier and McGinnis (1969) reported that adding 4.8 to 12% additional protein from fish meal to a basal diet improved growth of chicks up to 30%. Scott *et al*. (1982) observed similar growth responses, but when using fish meal as the sole source of protein chick growth was poor. However, Harms *et al*. (1965)

reported that the addition of 3% fish meal practical broiler diets had no significant effect on any of the measured production parameters. Waldroup, *et al* (1965) obtained similar results when 25 to 50% of SBM protein was replaced with fish meal protein. Rojas *et al* (1969) also reported no significant. changes in body weight, feed consumption, or feed efficiency when SBM was replaced at various levels with protein from Peruvian fish meal. Avila and Balloun (1974) found that different levels of Anchovy meal in broiler diets had no significant effect on body weights or feed efficiency, except when fish meal replaced all of the soybean protein. They detected a significant growth depression when 100% of the soybean protein was

replaced. Wu *et al* (1984) fed four different hydrolyzed fish meal to broiler chicks up to 7 week of age and observed no significant differences among treatments for live body weight and feed conversion. Hulan, *et al* (1989) using red fish meal at levels up to 12% in the ration found no significant effects on overall mortality or feed efficiency, but reductions in body weight and feed consumption occurred, increasing dietary levels of RFM or RFO resulted in a linear decrease in body weights. When substituting up to 50% of the crude protein contributed by SBM with crude protein from TBM, Ponce and Gernat (2002) observed that TBM could partially replace the use of SBM in broiler diets without adversely affecting performance or carcass quality. Carcass weights were significantly higher ($p < 0.001$) for 0, 25, and 50% substitution of TBM for SBM, which was undoubtedly related to higher live weights detected for these treatments. They concluded that tilapia meal agreed with other studies that have shown that different types of fish meal can successfully replace SBM up to a certain concentration without causing adverse effects on broiler production parameters. Because of the potential economic losses from undesirable off-flavored meat (Carlson *et al*.1957: Waldroup *et al et al*. 1965) and growth depression effects caused by adding high levels of fish meal in broiler diets, the inclusion of fish meal is usually limited. However, In conclusion, TBM could partially replace the use of SBM in broiler diets up to 50% without negatively affecting growth performance or carcass quality. The similarity in weight gain indicated that the diets were equally efficient with no superiority of fish meal over silkworm caterpillar meal (SCM). This result agreed with the findings of Ichhponani and Malik (1971), Khatun *et al* (2003) and Loselevich *et al* (2004). Y.Yu (2004) reported that substitution of fish meal with either meat or bone meal and poultry by-product meal resulted in Low feed efficiency.

Ahaotu and B. U. (2009) reported that the final weight of the experimental birds varied significant between treatments. Mukhtar and Tabidi (2014)

replaced imported concentrate by local concentrate contained high level of fishmeal (20%) with synthetic amino acids mainly synthetic lysine (12%) and methionine (4.3%) and plant protein sources (groundnut cake and sesame cake) in broiler diet they found that chicks performed significantly better 7.26 of 7.65 % more body weight. consisted of 0, 25, 50, 75 and 100% local fish meal instead of imported protein concentration. Jaffer (2010) study effect of using local fish meal (Liza abu) as protein concentration in broiler diets, the trial lasted for 42 days, he reported that all fish meal fed levels, chicks obtained similar body weight, feed consumption, feed conversion and mortality to those of control group. On the other hand, Asrat *et al* (2009) studied the effect of partial substitution of plant protein by fishmeal prepared out of cooked and sun dried fish offal on feed intake and carcass traits of Rhode Island Red chicks they concluded that fish meal inclusion into diets of growing RIR chicken up to the levels of 16.6% of the DM of the diet did not affect health or performance traits; however, best results were obtained at 9.96%. Al-Marzooqi *et al*., (2010) produced evidence that fish silage can replace up to 20% of soybean meal in broiler diets without affecting body weight, weight gain, FCR, feed intake and sensory quality of broiler meat.

Ghanim (2009) said that roasting of the locally disposed fish meal can suppressed the activity of its' fatal microorganisms. Hulan *et al* (1989) fed red fish meal at levels up to 12% in broiler diet they found no significant effects on overall mortality or feed efficiency. Ponce and Gernat (2002) observed that no significant differences were observed between treatments on mortality or carcass yield when broiler fed tilapia by product meal. Awoniyi *et al* (2003), Oduguwa *et al*(2005)reported that fish meal could be used at different levels up to 8% in broiler diets with no significant differences among treatments on mortality recorded, this result in corresponding with the results found by (Salih,2009)

CHAPTER THREE

3.0MATERIALS AND METHODS

3.1 Experimental site and duration.

The experiment was conducted at the Poultry Farm of the College of Animal Production Science and Technology. Sudan University of Science and Technology during the period between September and October 2013, the average temperature ranged between 32 – 39Cº.

To study the effect of feeding locally produced fish meal on broiler performance.

3.2 Experimental House.

The experiment was conducted in an open sided deep litter, poultry house (10x4squ.m) and (2.7m) height, with concrete floor and corrugated sheet roof, the house extended South North and it was constructed from red prick covered by soft cement at east west side and wire netting at south and north sides. The house equipments were cleaned and disinfected before the experiment was started using formalin (10%) and black phenol. The house was divided into equal 12 units (1*1 m) each; the floor was covered by 2inch deep wood shaving as litter. Each unit was provided with one tubular feeder and one fountain drinker.

3.3 Experimental birds.

Ninty six unsexed one day old broiler chicks (Ross 308) were purchased from Ennma Company, they were received a dose of multivitamin in drinking water to help reduce transportation stress. Birds were visually inspected for health vigor and the underweight chicks were excluded. The chicks were weighed and assigned into four experimental groups of 24 birds each. Each

treatment was furthered subdivided into four replicates of 6 birds each. The treatments were distributed in a completely randomized design (CRD).

3.4 Experimental diets.

Twenty kilogram of fish meal was purchased from Shaumbat research center. While other ingredients (sorghum- groundnut cake- super concentrate- oyster shell- methionine- lysine- dicalcium phosphate- premix-salt) were purchased from the local market. Two types of diets (Starter and Finisher) were formulated to meet the requirements given by the National Research Council (NRC) (1994) for starter and finisher broiler chicks, table (1). Dietary treatments included, diet1 (T1) without locally produced fish meal served as control diet, (0.0), then locally produced fish meal was included at 5, 7.5 and 10% resulting in Diet 2 (T2), diet 3 (T3) and diet 4(T4) respectively.

3.5 Rearing Programme.

Feed and water were provided for adlibitum consumption. The experimental diets (starter and finisher diets) were used over the period of the experiment (42 days).Chicks were vaccinated against Newcastle (ND) and infectious bronchitis (IB) on arrival by spraying , all other vaccines Gumboro vaccine (IBD) at 14 and 28days, Newcastle (ND) at 17 and 24 days old were administrated through drinking water. Vitamins (1gm/liter) were added after each vaccination for three consecutive days.

3.6 Performance Traits:

3.6.1 Body weight (BW).

Body weight was measured for all bird at the beginning of the experiment, and it was repeated weekly at the beginning of each week at the same time.

3.6.2Weight gain (WG).

Weight gain was calculated by subtraction the live weight at the beginning of the week from live body weight of the next week.

3.6.3 Feed intake (FI).

Feed intake is the amount of feed consumed every week; it was calculated for each treatment on weekly basis. At the end of the week the residual amount of feed was weighed and subtracted from the known weight of feed at the beginning of the week. The product was divided by the total number of bird.

3.6.4 Feed Conversion Ratio (FCR).

Feed conversion ratio (FCR) was calculated on weekly basis by the following equation: Feed conversion ratio (FCR) = Feed consumed (g)/Weight gain (g) (Naji, 2006)

3.6.5 Mortality.

Mortality was recorded when occurred for each replicate and mortality percent was calculated by the following equation:

Mortality (%) = Total dead birds / Total number of birds ×100

(Naji, 2006)

2.6 Statistical Analysis

Data generated from the experiment was carried out in a complete randomized design (CRD).These data were subjected to analysis of variance (ANOVA) according to general linear model procedure of SPSS soft ware (SPSS, 2001). The significant differences among means were determined by LSD tests (Steel *et al*.,) (1997).

Table (1) Determined analysis of locally produced fish

Moist.	DM	CP	Fat	CF	Carb.	Ash	Ca	P	*ME kg/Kg
3.07	96.93	39.37	7.95	1.98	15.62	32.01	5.11	1.16	2390

*ME :estimated value calculated according to the equation of Lodhi, *et al* (1987)

Table (2) Composition and calculated analysis of broiler starter diets:-

Fish meal inclusion (%)				
Ingredient	**0**	**5**	**7.5**	**10**
Sorghum	65.5	65.5	65.5	65.45
G.N.C	28	28	25.45	23
*Conc.	5	0.0	0.0	0.0
Locally produced Fish meal	0.0	5	7.5	10
Lim stone	1	1	1	1
Dical. phos.	0.2	0.2	0.2	0.2
Meth.	0.05	0.05	0.05	0.05
Lysine	0.1	0.1	0.1	0.1
Salt	0.2	0.2	0.2	0.2
Calculated analysis:-				
ME / Kcal/Kg	3123.8	3119.9	3100.6	3082.3
CP%	22.86	22.49	22.18	21.92
CF%	4.29	4.29	4.04	3.80
Ca%	1.12	1.22	1.61	1.94
P%	0.52	0.62	0.69	0.58
Methionine%	0.41	0.50	0.54	0.43
Lysine%	1.2	0.70	0.63	0.60

*Concentrate (NUTRISTAR) supplied cp 40% , CF 1.44% , Ca 10% , Av p 6.4% ME/kcal/kg 1950, Methionine 3.0% . Lysine 10-12% , Sodium

2.77% , Nacl 6.0%

Table (3) Composition and calculated analysis of broiler finisher diets:-

Fish meal inclusion (%)				
Ingredient	**0.0**	**5**	**7.5**	**10**
Sorghum	75	75	73.5	71
G.N.C	19.8	19.8	18.8	18.8
*Conc.	5	0.0	0.0	0.0
Locally produced Fish meal	0.0	5	7.5	10
Lime stone	0	0	0	0
Dical. Phos.	0	0	0	0
Meth.	0	0	0	0
Lysine	0	0	0	0
Salt	0.2	0.2	0.2	0.2
Calculated analysis:-				
ME / Kcal/Kg	3225.8	3221.9	3193.5	3158.1
Crud protein %	20.6	20.2	20.4	20.8
Crud fiber %	3.7	3.7	3.59	3.53
Calcium %	0.66	0.83	1.10	1.5
Av.phosphorus %	0.57	0.55	0.64	0.54
Methionine %	0.42	0.58	0.47	0.47
Lysine %	1.08	0.88	0.96	0.85

*Concentrate (NUTRISTAR) supplied cp 40% , CF 1.44% , Ca 10% , Av p 6.4% , ME/kcal/kg 1950, Methionine 3.0% . Lysine 10-12% , Sodium 2.77% , Nacl 6.0%

CHAPTER FOUR

4.0 RESULTS

4.1 Chemical composition of locally produced fish meal.

The proximate chemical composition of locally produced fish meal is shown in Table (1).On average the locally produced fish meal contained, DM96.93%,CP39.37%, Fat 7.95%, CF 1.98%, Ash 32.01%,Carbhydrate 15.62%, Ca 5.11%,.av. P 1.16% and 2.4 MJ/Kg calculated metabolizable energy(ME).

4.2 Effect of feeding locally produce fishmeal on weekly body weight (g/bird).

The effect of feeding locally produce fishmeal on weekly body weight is shown in table (4).The body weight of broilers supplemented with graded levels of locally produce fishmeal was significantly ($P<0.05$) lower than broilers in control group throughout the experimental period. Highly significant differences were observed between the control group and the birds fed locally produced fishmeal during week 3^{rd}, 4^{th}, 5^{th} and 6^{th}.

4.3 Effect of feeding locally produced fish meal on weekly body weight gain (g/bird).

The effect of feeding locally produce fishmeal on weekly body weight is shown in table (5).The body weight gain of broilers supplemented with graded levels of locally produce fishmeal was significantly ($P<0.05$) lower than broilers in control group throughout the six weeks experimental period. Broilers fed 7.5% and 10% locally produce fishmeal gained significantly ($P<0.05$) lower weights in the 2^{nd} , 3^{rd} 5^{th} a 6^{th} week of the experiment. On the other hand, birds fed 5% locally produce fishmeal gained similar weight as the control treatment in week 6.

4.4 Effect of feeding locally produced fish meal on weekly feed intake (g/bird).

Effect of feeding locally produce fishmeal on weekly feed intake is presented in table (6). Feed intake of broilers in control group was significantly ($P<0.05$) higher than the treated groups throughout the experimental period Table (2) except week five no significant differences between the treatments were observed .Broilers fed 5% and 10% locally produce fishmeal consumed significantly ($P<0.05$)lower feed in the 2^{nd} and the 3^{rd} week of the experiment.

4.5 Effect of feeding locally produced fish meal on weekly feed conversion ratio (FCR) (g feed/g gain).

Feed conversion ratio differ significantly ($P<0.05$) between groups on week 1-4 and six, no significant ($P<0.05$) differences were observed between the groups on week five table (7)

4.6 Effect of feeding locally produced fish meal on the performance of 6 weeks old broiler chicks.

The results of the effect of feeding locally produced fish meal on overall performance of 6 weeks old broiler chicks are presented in table (8).The results showed that dietary inclusion of locally produce fishmeal significantly ($P<0.05$) reduced body weight ,feed intake , weight gain and increased feed conversion ratio compare to the control group.

Table (4): Effect of feeding locally produce fishmeal on weekly feed intake (g/bird)

	Fish meal Inclusion (%)					
	0.0	5	7.5	10	±SEM	Level of sig.
Week1	213.77[a]	165.3b[b]	163.07[b]	152.73[b]	7.49	*
Week2	342.3[a]	297.6[b]	285.87[b]	265[c]	5.03	*
Week3	556.9[a]	483.97[b]	399.8[c]	307.57[d]	2.78	**
Week4	628.13[a]	509.53[b]	500.67[b]	493.53[b]	4.92	*
Week5	598.33	523.63	517.57	508.13	30.0	NS
Week6	788.1[a]	600.23[b]	593.33[b]	534.33[b]	30.6	*

[a,b,c] Means in the same row with different subscript letter are significantly different.

**Highly significant (P<0.05)

*Highly significant (P<0.05)

NS= Not significant

Table (5): Effect of feeding fishmeal locally produced fishmeal on weekly on weekly weight gain (g/bird)

Fish meal Inclusion (%)						
	0.0	5	7.5	10	±SEM	Level of sig.
Week1	120.87[a]	78.4[b]	72.7[b]	64.23[b]	4.73	*
Week2	251.07[a]	174.13[b]	136.57[c]	114.9[c]	8.54	*
Week3	303.13[a]	246.97[b]	218.27[b]	141.2[c]	14.19	*
Week4	306.8[a]	217.4[b]	197.77[b]	194.57[b]	9.37	*
Week5	330.57[a]	202.33[b]	196.23[bc]	184.83[c]	4.28	*
Week6	369.3[a]	359.77[a]	321.83[b]	255.77[c]	5.31	*

[a,b,c] Means in the same row with different subscript letter are significantly different.

* Significant (P <0.05)

Table (6): Effect of feeding locally produce fishmeal on weekly feed conversion ratio (FCR) (g/ feed/g /gain)

	Fishmeal Inclusion (%)					
	0.0	5	7.5	10	±SEM	Level of sig.
Week1	1.8^{c}	2.13^{b}	2.26^{a}	2.36^{a}	0.04	*
Week2	1.37^{c}	1.73^{b}	2.1^{a}	2.3^{a}	0.1	*
Week3	1.8^{b}	2^{ab}	1.8^{b}	2.2^{a}	0.11	*
Week4	2.03^{b}	2.56^{a}	2.33^{ab}	2.5^{a}	0.10	*
Week5	1.8	2.6	1.8	2.7	0.43	NS
Week6	2.1^{ab}	1.8^{b}	2.3^{a}	1.5^{c}	0.11	*

$^{a.b.c}$ Means in the same row with different subscript letter are significantly different.

* Significant (P <0.05)

NS= Not significant

Table (7): Effect of feeding locally produce fishmeal on weekly body weight (g/bird)

Fishmeal Inclusion (%)						
Treatment / Period	0.0	5	7.5	10	±SEM	Level of sig.
Week1	265.87[a]	223.4[b]	217.7[b]	209.23[b]	4.73	*
Week2	516.9[a]	397.5[b]	354.23[c]	324.1[c]	10.4	*
Week3	303.13[a]	644.5[b]	572.47[c]	465.3[d]	10.1	**
Week4	1126.8[a]	839[b]	789.83[c]	663.03[d]	1.69	**
Week5	1457.3[a]	1041.3[b]	986.07[c]	847.83[d]	5.69	**
Week6	1826.6[a]	1363.2[b]	1241.8[c]	1207.6[d]	0.99	**

[a,b,c] Means in the same row with different subscript letter are significantly different.

**Highly significant (P≤ 0.05)

*Significant (P≤ 0.05)

Table (8): Effect of feeding fishmeal based diet on overall performance result of 6 weeks old broiler chicks.

Fishmeal Inclusion (%)						
Parameters	0.0	5	7.5	10	±SEM	Level of Sig.
Body weight (g/bird)	1826.6a	1363.2b	1241.8^{c}	1207.6^{d}	1.0	**
Feed intake (g/bird)	3127.5a	2564.5b	2476.0^{bc}	2261.2^{c}	67.3	*
Weight gain (g/bird)	1681.6a	1218.2b	1096.8^{c}	1062.6^{d}	1.0	**
FCR (g/ feed/g /gain)	1.87c	2.1b	2.3^{a}	2.1^{b}	0.03	*

^{a,b,c}Means in the same row with different subscript letter are significantly different.

**Highly significant ($P \leq 0.05$)

* Significant ($P \leq 0.05$)

CHAPTER FIVE

5.0 DISCUSSION

5.1 Chemical composition of locally produced fish meal.

The results obtained from chemical analysis of locally produced fish meal used in the present study showed no similarity in protein content with that recorded by NRC (1999), (60-72.3%). However, the crud protein obtained in the present study was within the range that obtained by (Choo and Sadig, 1982) who reported that fishmeal varies in nutrient composition, with crud protein ranging from 32.0 to 58.8%. These contradicting results may be due to the facts that the quality of fish meal is quite uncertain due to the use of different processing technologies in its production or it may be contaminated with other ingredients such as sand sawdust and fish bones (Khatun *et al*., 2003, 2005 and Karimi, 2006).

5.2 Overall performance of six weeks old broiler chicks fed locally produced fish meal.

The main objective of this experiment was to study the effect of feeding locally produced fish meal on broiler chicks performance.

It is evident from the performance data that feed intake tended to decrease with increased of fish meal dietary levels, this reduction was reflected in terms of reduced body weight and weight gain. This result is inconsistent with the result that obtained by Scott *et al*. (1957) who reported that when using fish meal as the sole source of protein chick growth was poorer. Also it may be due to the fact that the nutrient composition of fish meal can vary depending on the type and species of fish used , the freshness of the fish before processing and the processing and preparation methods (NRC,1994), in addition the quality of fish meal is quite uncertain due to the use of different processing technologies in its production and it is often

contaminated with other ingredients such as sands, sawdust and fish bones and the use of chemicals for preservation often caused toxicity to poultry birds (Khatun *et al*. 2003; Khatun *et al*, 2005; Karimi. 2006). Maiqualema and Gernet , 2003) .On the other hand, Dabrowski *et al* (1989) reported that modified dietary fish meal can be used in mixtures for broiler ,but at a limited rate (5%).The present results were almost disagree with the studies of Awoniyi 2003; Oduho *et al* 2005; Salih 2009) who reported that the beneficial effect of fish meal on broiler performance becomes most evident at higher use levels and during the latter growth periods, mainly via stimulation of feed intake. From which treatment(5) birds were died during the experiment, the stock test was good health and visually inspected for health vigor this mean that fish meal is fed to animals not only to improve productivity but also to protect health and welfare and reduce dependence on antibiotics and other drugs and (Pike, 1999; Anonymous, 2002).

CHAPTER SIX

6.0Conclusions and Recommendations

6.1 Based on the result of the study the conclusions can be:-

1-The proximate chemical composition of locally produced fish meal was DM 96.93%, CP 39.37, Fat 7.95%, CF 1.98%, Ash 32.01, Carbhydrate 15.62%, Ca 5.11%, .av.P 1.16% and 2.4 MJ/Kg calculated metabolizable energy(ME).

2-Complete replacement of imported concentrate with locally produced fish meal adversely affecting feed intake, body weight, weight gain, and feed conversion ratio.

6.2 Based on the result of the study the Recommendations can be:-

3- Further studies with different levels and types of fish need to be conducted

4-Studies need to be conducted to determine if any off-odor or flavors would carry over into the broiler meat.

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