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Effects of Utilizing Disposed Fish of White Nile River in performance Pullets, Gezira, Sudan

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Abstract
An experiment had been carried out to examine the suitability of using the White River Nile waste and disposed fish after simple heat treatments (Sun drying, roasting, direct boiling and indirect boiling) in growers and pullets rations from the seven to the twelve week as growers and from the thirteenth up to the eighteenth week as pullets by replacing the imported concentrates. The diets were contain different levels (0, 1.5, 3.5 and 5%) of treated fish replacing concentrates were used for the two periods. The crude protein of treated fish samples were (50.75, 52.50, 50.55 and50.05%) respectively and the super concentrate 31.50%. A total of 390 birds of Hy-line W-98 at the seventh week of age, randomly distributed for groups, 5 group (30 bird/ treatment). The performance of the growers fed roasted fish (1.5%) performed high weight gain (600.17g/bird), while (5%) direct boiling fish (431.50 g/bird) was the lowest ones. The growers showed high feed intake for (1.5%) sun-dry fish i.e. 438.67 g/bird, while the lowest feed intake was at (3.5%) indirect boiled fish (372.98.66g/bird). Levels of sun-dried, roasted fish and the control gain the best weight, where indirect boiled and direct boiled fish were the lowest feed intake. Pullets fed different levels of roasted, sun dried fish and control showed high feed intake, reflected in high body weigh compared to direct and indirect boiled fish diets. The study investigated the usefulness of wasted and disposed fish after simple local heat treatments to replace imported concentrates for growers and pullets rations.

Keywords: Growers, Pullets, Disposed Fishes, Concentrates, sun-dry fish.

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Introduction

Poultry has seen the greatest increase in production, this trend will likely continue. Both poultry eggs and meat are well positioned to meet demands for increased supply from our growing world population [1]. Most feed stuff provides a source of one or more nutrients such as protein, energy, minerals or vitamins that required for animal [2]. According to [3] poultry population was estimated about 45.6 million birds. [4] reported that the annually about 15000 tons of spoiled and wasted fishes were produced after rice harvested at Khor Abugassaba (central Sudan, southern Eldweim town, at the west bank of White River Nile). However, High cost and demands of protein concentrate resources lead to uneconomic poultry diets. Cost of feed increase about (60% to 65%) of the total cost of poultry production and protein costs about 13% of the feed cost [5]. Cheap sources of protein are available as sources of feed ingredients such as fish meal. Fish meal is an excellent source of protein. It is considered to be one of the best ingredients for layers and broilers, as it enhances the feed consumption and feed efficiency [6]. Proper fish meal is usually marketed at 65% crude protein, but this can vary from (57 to 77%) depending on the species of the fish used [7].The crude protein for fish meal in Sudan was (43.5%) with similar content of ether extract (9.6%) [8]. The sun-drying time for (5 and 7days) were similar in crude protein (50.77%) and ether extract (17.13%) [9]. Based on these observations, Some studies have shown that poultry by-product meal cannot replace more than 50% of fish meal in fish diets [10], but other studies have shown that with the recent improvement of the quality of poultry by-product meal it could replace 75% or 100% of fish meal without significant decrease in fish growth [11]. the objectives of this paper to Make use of the disposed fishes of the White River Nile and other places after certain simple treatments (Sun drying, roasting, direct boiling and indirect boiling). And to determine the effect of replace the imported concentrates for growers and pullets diets from seventh week of age up to the eighteenth week and discuss their performances.

Materials and methods

Location and Study

The experiment had been carried out at Rural Development and Extension Center, Faculty of Animal Production, University of Gezira, El-Managil town Gezira State, Sudan, (14.25N - 32.99 E, 76 km. western Wad-Medani town). The temperature at the gezira state ranged

between 20° c to 47°c; with relative humidity of 45- 80% while the raining level during autumn season (july, august, september and october) ranges between 110-120 ml, a.r.c. [12].

Local disposed Fish collection and preparation

More than 500kg of disposed fish brought from the White Nile River, Khor Abugassaba site about 15 km north Eldueim town, central Sudan. Usually after the flood season some fish trapped at cultivated rice and irrigation canals. When the water run out, trapped fish naturally died with some spoilage symptoms. Different fish types have been collected, and identified which includes: Tilapia spp. (Bulti), Mormyrius niloticus (Khshmelbanat), Shilbe mystus (Shellbaya), Labeo nilotcus (Debsa), Synodontis nilotcus (Gurgor) and Protopterus aethiopicus (Um-koru).The whole quantity has been grinded by commercial mill then the raw grinded fish, stored in a plastic bag to avoid moisture, microbial contamination and parasites.Then the raw grinded fish has been treated simply by heat via flowing treatments:

a. Sun drying treatment (SDT)

Some quantity subjected to sun-treatment, by exposure about 125 kg of raw grinding fish to direct sun radiation. A cage made of screen-net has been used to protect processing fish meal from all direct contact of animal and insects. The sun-treated fish subjected to direct solar radiation for 72 hours (table 1).

b. Roasting treatment (RT)

Some raw grinded fish, about 125 kg subjected to roasting by special local designed metal drum. The metal drum was exposed to modrate stove gas fire for 15 minutes with manual turned drum. The product of roasting has been weighted and stored in a plastic bags and put in a clean and aerated room (table 2).

c. Direct boiling treatment (DBT)

The direct boiling treatment depend on cooking about 125 kg of raw grinding fish on an alumium pot and gas stove. Tap water boiled, after water start boiling gradually raw fish added, then the mexture boiled for 20 minutes on gas stove, then the mixture dried by air in the cage which been used for the first treatment, then the direct bioling fish meal has been weighted and stored in a plastic bags and put in a clean and aerated room (table 3).

Table 1: Sun dried fish rations for growers and pullets and level of inclusions from 7 to 18 weeks of age

Age in weeks	**(growers) 7-12weeks**			**13-18weeks (pullets)**		
Level of Ingredients	1.5%	3.5%	5%	1.5%	3.5%	5%
Sorghum	56.28	58.28	58.28	56.28	59.32	60.36
Groundnut cake	15	13	13	15	9	8
Wheat bran	20	20	20	20	20	20
Sun-dried fish meal	1.5	3.5	5	1.5	3.5	5
Supper concentrate	3.5	1.5	0	3.5	1.5	0
DCP	0.3	0.3	0.3	0.3	0.4	0.4
Lime stone	0.4	0.4	0.4	0.4	0.4	0.4
Salt (NaCl)	0.25	0.25	0.25	0.25	0.3	0.3
Lysine	0.1	0.1	0.1	0.1	0.1	0.1
Methionine	0.045	0.045	0.045	0.045	0.045	0.045
Sand (Filler)	2	2	2	2	5	5
Antitoxins	0.125	0.125	0.125	0.125	0.135	0.135
Premix	0.5	0.5	0.5	0.5	0.3	0.3
Total	100	100	100	100	100	100

*Diets formulated according to Hy-line W-98 Performance Standers Manual

Table 2: Roasted fish rations for growers and pullets and level of inclusions from 7 to 18 weeks of age

Age in weeks	**7-12weeks**			**13-18weeks**		
Level of inclusion Ingredients	1.5%	3.5%	5%	1.5%	3.5%	5%
Sorghum	58.28	58.28	58.32	58.32	59.28	60
Groundnut cake	14	13	10	10	13	8.32
Wheat bran	19	20	20	20	19	20
Roasting fish meal	1.5	3.5	1.5	1.5	5	5
Supper con.	3.5	1.5	3.5	3.5	0	0
Dicalcium phosphate	0.3	0.3	0.4	0.4	0.3	0.4
Lime stone	0.4	0.4	0.4	0.4	0.4	0.4
Salt (NaCl)	0.25	0.25	0.3	0.3	0.25	0.3
Lysine	0.1	0.1	0.1	0.1	0.1	0.1
Methionine	0.045	0.045	0.045	0.045	0.045	0.045
Sand (Filler)	2	2	5	5	2	5
Antitoxins	0.125	0.125	0.135	0.135	0.125	0.135
Premix	0.5	0.5	0.3	0.3	0.5	0.3
Total	100	100	100	100	100	100

* Diets formulated according to Hy-line W-98 Performance Standers Manua

Table 3: Direct boiled fish rations for growers and pullets and level of inclusions from 7 to 18 weeks of age

Age in weeks	**7-12 weeks**			**13-18 weeks**		
Levels of inclusion	1.5%	3.5%	5%	1.5%	3.5%	5%
Ingredients						
Sorghum	58.28	58.28	58.28	60	60	59.32
Groundnut cake	13	13	13	8.32	8.32	9
Wheat bran	20	20	20	20	20	20
Boiled fish meal	1.5	3.5	5	1.5	3.5	5
Supper concentrate	3.5	1.5	0	3.5	1.5	0
Dicalcium phosphate	0.3	0.3	0.3	0.4	0.4	0.4
Lime stone	0.4	0.4	0.4	0.4	0.4	0.4
Salt (NaCl)	0.25	0.25	0.25	0.3	0.3	0.3
Lysine	0.1	0.1	0.1	0.1	0.1	0.1
Methionine	0.045	0.045	0.045		0.045	0.045
Sand (Filler)	2	2	2	5	5	5
Antitoxins	0.125	0.125	0.125	0.135	0.135	0.135
Premix	0.5	0.5	0.5	0.3	0.3	0.3
Total	100	100	100	100	100	100

* Diets formulated according to Hy-line W-98 Performance Standers Manual

Table 4: Indirect boiling fish rations and level of inclusions from day old up to 18 weeks

Age in weeks	**7-12weeks**			**13-18weeks**		
Levels of	1.5%	3.5%	5%	1.5%	3.5%	5%
Ingredients						
Sorghum	57.28	58.28	60	59.32	58.28	60
Groundnut Cake	14	13	8.32	9	13	8.32
Wheat bran	20	20	20	20	20	20
Indirect boiled fish meal	1.5	3.5	5	1.5	3.5	5
Supper con	3.5	1.5	0	3.5	1.5	0
DCP	0.3	0.3	0.4	0.4	0.3	0.4
Lime stone	0.4	0.4	0.4	0.4	0.4	0.4
Salt (Nacl)	0.25	0.25	0.3	0.3	0.25	0.3
Lysine	0.1	0.1	0.1	0.1	0.1	0.1
Methionine	0.045	0.045	0.045	0.045	0.045	0.045
Sand (Filler)	2	2	5	5	2	5
Antitoxins	0.125	0.125	0.135	0.135	0.125	0.135
Premix	0.5	0.5	0.3	0.3	0.5	0.3
Total	100	100	100	100	100	100

* *Diets formulated according to Hy-line W-98 Performance Standers Manual*

d. Indirect boiling treatment (IBT)

Locally pots made of double wall aluminum, simler to waterpass aim. The heats form gas stove during the treatment transmit via water between wall of aluminum pots. The raw grinding fish were placed inside the inner pots and tap water was poured in the space between the two bowls, that will transferred the heat indirectly to the raw grinding fish, which subjected to the indirect boiling fish. The double bowl was covered. The treatments for grinded raw fish depend on gas stove fire process till the water boiling point, then left for fifteen minutes. Then indirect boiling fish subjected to drying via screen-net cage, Then, the indirect bioling fish has been weighted and stored in a plastic bag and put in a clean and aerated room and results are shown in table (4).

Chemical analyses of samples

The samples chemically analyzed according to Association of Official Analytical Chemists (AOAC) [13], at biochemistry lab, Faculty of Veterinary, University of Khartoum and Soba National Laboratory. Metabolizable Energy value (ME) of the feed ingredients were calculated according to equation [14]: ME = 1.549 + 0.0102 CP + 0.0275 EE + 0.0148 NFE - 0.0034 CF (table 5).

Table 5: Control rations for growers and pullets and level of inclusions from 7-18 weeks of age

Age in weeks / **Ingredients**	**7-12 Weeks**	**13-18 Weeks**
Sorghum	57.78	60.32
Groundnut cake	14	9
Wheat bran	19	19
Treated fish meal	0	0
Supper concentrate	5	5
Dicalcium phosphate	0.5	0.4
Lime stone	0.7	0.4
Salt (NaCl)	0.25	0.3
Lysine	0.1	0.1
Methionine	0.045	0.045
Sand (Filler)	2	5
Antitoxins	0.125	0.135
Premix	0.5	0.3
Total	100	100

** Diets formulated according to Hy-line W-98 Performance Standers Manual*

Results and Discussions

All the treated disposal fish samples were a good source of protein and its protein content was very close to previously published values in many previous studies as shown in table 6. Table (6) shows chemical analyses of the treated disposed fish samples and feed ingredients used in the experiments. Metabolisable energy was calculated using [14] equation ME MJ/kg (0.004184 kcal/kg = 1.549 + 0.012 CP + 0.0275 EE + 0.0148 NFE - 0.0034 CF). The crude protein content of treated disposed fish for sun-dried, roasting, direct and indirect boiled samples of treated disposed fish were very high (50.75, 52.50, 50.55, 50.05%) respectively. compared to super concentrate (34.41%). Ether extract content of treated disposed fish samples scored < 8% compared to imported super concentrate-control (3.3%). The crude fiber of treated disposed fish samples scored < 4.06 % and super concentrate was (13.88 %). The nitrogen free extract value was scored < 4.56 %, which was less than value of super concentrate (25.81%). All treated disposed fish ash content, calcium and phosphorus was high than imported supper concentrate. Calculated ME values for testing treated disposed fish scored < 9.876 MJ/kg with low value for imported super concentrate (9.294 MJ/kg) compared to all treated disposed fish.

The chemical composition of treated disposed fish and the feed stuffs used were shown in Table (6), all of the treated disposal fish samples were a good source of protein and its protein content was very close to many previous studies ([15]; [16]; [17]).Almost anything that adversely affects a pullet will usually be reflected in lower body weights and poor flock uniformity. Underweight pullets approaching peak egg production just cannot consume enough energy each day to maintain or even attain peak production [18].

Feed intake

The total feed intake indicate showed significant differences among treatments, high feed intake in (5%) sun-dried fish, then(1.5%) roasted fish, (1.5%) sun-dried fish, (3.5%) roasted fish, (5%) roasted fish, (5%) control, (3.5%) sun-dried fish, (3.5%) direct boiling fish, (1.5%) indirect boiling fish,(5%) indirect boiling fish (3.5%) indirect boiling fish, (1.5%) and direct boiling fish (5%) was the lowest feed intake.

The periods of growing chicks, the roasted fish (1.5%) and Sun-dried fish (1.5%) were (2644.67 and 2632g/bird) respectively were the highest feed intake, while the lowest feed intake showed at direct boiling treatment (2152.33 g/bird). The developer chicks, sun-drying fish 5% and roasted fish levels showed high feed intake (3391.67 and 3382.34 g/bird),

Table 6: Chemical analyses of treated samples and calculated metabolizable energy of the ingredients used in feed formulations

Components / Treatments	ME (kcal/kg)	CP (%)	E.E (%)	CF (%)	Ash (%)	NFE (%)	Ca (g/kg)	P (g/kg)
Sun-dried fish	2395.55	50.75	9.20	4.06	30.45	6.04	49.10	29.62
Roasted fish	2418.61	52.50	8.32	5.05	29.85	6.22	48.81	30.54
Direct boiled fish	2370.62	50.55	9.43	6.12	32.95	4.56	48.84	29.37
Indirect boiled fish	2360.24	50.05	8.60	4.65	30.05	5.61	53.59	33.79
Imported Concentrates	2088.66	31.50	3.30	13.88	22.60	6.50	14.25	7.75
Sorghum	2306.82	13.26	2.63	8.41	19.25	56.45	0.44	0.26
Groundnut cake	2516.45	43.75	4.57	15.03	11.88	24.77	0.55	0.64
Wheat bran	2023.92	14.00	4.83	23.98	5.05	52.14	0.32	7.75

ME= Calculated Metabolizable Energy according to equation [8].

Table 7: Means of feed intake, weight gain, and feed conversion ratio for Growers and Pullets (7-18 weeks).

Treatments	Feed intake (g/bird)		Weight gain (g/bird)		FCR(g/g)	
	7-12wks	13-18wks	7-12wks	13-18wks	7-12wks	13-18wks
Sun-drying fish 1.5%	2632.00	3266.34	520.66	438.67	5.06	7.45
Sun-drying fish 3.5%	2489.01	2877.01	505.67	380.33	4.92	7.56
Sun-drying fish 5%	2670.67	3391.67	519.33	345.00	5.14	9.83
Roasting fish 1.5%	2644.67	3382.34	600.17	427.00	4.41	7.92
Roasting fish 3 .5%	2510.33	3128.66	502.33	424.00	5.00	7.38
Roasting fish 5%	2428.34	3179.01	493.33	405.34	4.92	7.84
Direct Boiling fish 1.5%	2323.34	2734.99	437.33	420.33	5.31	6.51
Direct Boiling fish 3.5%	2387.00	3004.33	469.14	402.44	5.09	7.47
Direct boiling fish 5%	2152.33	2525.66	431.50	426.66	4.99	5.92
Indirect boiled fish 1.5%	2353.99	3018.33	447.59	376.92	5.27	8.01
Indirect boiled fish 3.5%	2360.68	2997.66	449.08	372.98	5.26	8.04
Indirect boiling fish 5%	2321.33	3014.65	440.67	396.00	5.28	7.61
Control 5%	2477.99	3049.33	498.43	417.57	4.98	7.31

respectively, while the lowest feed intake was at (3.5%) indirect boiling fish (2997.66g/bird). Generally, feed intake was high for (5%) level for sun-drying, roasted fish with a little reduction for control (5%), while indirect boiling fish and direct boiled fish were show low feed intake.

Weight gain

Weight gain for growers, roasted fish (1.5%) level was the high weight gain (600.17g/bird), while (5%) direct boiling fish (431.50 g/bird) was the lowest. The pullets showed high weight Gain for (1.5%) sun-drying fish was (438.67 g/bird), while the low weight gain was at (3.5%) indirect boiling fish (372.98.66g/bird). Mostly, levels for sun-drying, roasted fish and control were gain the best weight, while indirect boiling fish and direct boiled fish were show low feed intake, as feed intake was high for treatments free of water also, weight gain was best as appear for high feed intake.

Feed conversion ratio

Feeding pullets treated fish did not improve feed conversion ratio, instead of how different level of roasted fish, sun dried fish and control show high feed intake which reflect in high body weigh compared to direct boiling fish and indirect fish, this may be mainly due to direct relation of protein quality which governing feed intake And body weight. As the hens aged, feed intake increased, with a corresponding increase in body weight [19]. On the other hand, the results showed how different level of roasted fish, sun dried fish and control results better than direct boiling fish and indirect fish [20].

Conclusion

The results concludes that was noticeable differences on the disposal fish samples collected and treated sun-dried, roasted, direct and indirect boiled disposed fish treatments. Roasted fish and sun-dried fish showed positive result during the experiment periods; otherwise direct boiled fish treatment and indirect fish treatment have some trouble especially with high mortality during the growing periods, without major difference during the production periods. Roasted fish and sun-dried fish were score result during the experiment periods even better than the supper concentrate in addition to the price which considered so cheap compared to imported supper concentrate.

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