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EEFECTS OF CRUDE OIL POLLUTION AND CARCASS-TRAITS OF THE NIGERIAN NORMAL-FEATHERED LOCAL CHICKEN IN THE NIGER DELTA, NIGERIA

[1]H.H. Gunn, [2]I. Ude, and [2]I.S. Omeje

[1]Department of Animal Science, Rivers State University of Science and Technology, Port Harcourt

[2]Department of Animal Science, Delta State University, Asaba

gunn.hollinshead@ust.edu.ng or gunnholly@yahoo.com

Abstract

The study was conducted to evaluate the effect of crude oil pollution on the carcass-traits of the Nigerian normal-feathered Local chickens in the Niger Delta region raised under a backyard management system. A total of two hundred and forty (240) adult chickens comprising of 120 each from oil producing and non-oil producing communities were used for the study in a 2x2 factorial arrangement. Results from the study showed that Local chicken reared in non-oil producing environment recorded significantly (P<0.05) higher slaughter weight (877.98g vs 788.47g), eviscerated weight (736.63g vs 670.45g) and thigh weight (113.72 vs 105.33g). The result of the study also showed that sexual dimorphism existed among carcass-traits with the male reported with higher mean carcass-trait values than the female. The results of the study also indicated that, cut parts (carcass-traits) that have been influenced by the environment was a reflection of the superiority of birds reared in the non-oil producing communities over oil producing communities. Also, the superiority in carcass-traits as observed with birds for the non-oil producing areas affirmed the local chickens' ability to phenotypically thrive well under good environmental conditions like all other animal genetic resources. These observations reveal that crude oil pollution affects the carcass characteristics of Nigerian local chickens raised in backyard management system in the Niger Delta region.

Keywords: local chicken, normal-feathered, oil pollution, carcass-traits, backyard and sex

Introduction

The Nigerian local chicken has been reported to be small in size and grows slowly but possesses good potential for egg and meat production (Omeje, 1983; 1985). However, besides genetic make-ups, growth response generally in domesticated animals to a larger extent is absolutely determined by its environment. The Niger Delta region is known for its rich agricultural and oil exploration activities. This oil exploration activity over a long term has resulted into a serious environmental modification that has adversely affected agricultural produce, loss of farmland as well as depletion of aquatic lives through incessant accidental oil spillage as well as gas flaring in the region. While oil exploration companies have profited from the resource, local communities in the oil rich areas live with the daily pollution caused by non-stop gas flaring – where the gas associated with oil extraction is burnt off into the atmosphere (Friends of the Earth, 2010). In spite of her agricultural development activities that have been slowed down by the activities of the oil exploration companies, the rural communities in Niger Delta are known to be actively involved in the backyard management system of poultry production for animal protein supply and for income generation. FAO (2006), advocated that poultry production, by small to medium scale holdings through the backyard management, is one means through which poverty eradication could have been achieved as a way of meeting some of the MDGs because it is a great way of using food scraps, having fresh eggs and chicken, and giving kids a first-hand experience of food production. However, following the alteration in the environment in the region, growth of livestock can be greatly hindered due to unfavorable environmental conditions. The rural dwellers in these areas rely on livestock as source of protein and over the years there is presumably accumulated storage of the polluted chemicals and inhaled gases in the body of these livestock found in the Niger Delta that are directly taken by the rural dwellers. Therefore this study aimed at determining the effects of the identified pollutants on the carcass-traits of the Nigerian local chicken raised in the oil rich region –Niger Delta.

Materials and Methods

The study was carried out in four states of the Niger Delta region namely; Akwa Ibom, Bayelsa, Delta and Rivers States. The region has been reported to be situated between latitude 3°N and 6°N, and longitude 5°E and 8°E (Ndubuisi and Asia, 2007), with an average annual temperature range between 22°C – 38°C and the mean relative humidity is 80 – 90 % (Ndon, 2003). It is Africa's largest wetland and the second largest in world after the Mississippi (Nseabasi, 2005). Carcass dissection was done first by starving the birds for 24 hours prior to slaughtering. Thereafter, the

birds were weighed the following day and slaughtered by severing the carotid artery and jugular vein. The standard method for carcass dissection as described by Hahn and Spindler (2002) was used. The dissected carcasses were mainly the cut body parts consisting of the breast, thigh, drumstick, wings, back, shank, head and neck. A total of 240 birds comprising 60 males and 60 females from the two different environments (oil Producing communities and non-oil Producing communities) was used in the study.

.Statistical Analysis

Carcass parameters collected were analysed with the use of PROC. GLM of statistical analysis system (SAS, 1999) using a two-way classification of variance. The model as described below was used for the analyses that accommodated effects of environment, sex and their interactions.

$Y_{ijk} = \mu + G_i + X_j + (GX)_{ij} + E_{ijk}$

Where

Y_{ijk} = Observed value of the carcass-traits of k^{th} chicken in the j^{th} sex in the i^{th} environment.

μ = overall mean

G_i = effect of i^{th} environment (i = oil producing and non-oil producing communities)

X_j = effect of j^{th} sex (j = male and female)

$(GX)_{ij}$ = effect of interaction of environment and sex

E_{ijk} = random residual error.

Results and Discussion

Table 1 presents the mean and standard error of the mean values for carcass characteristics of the Nigerian normal-feathered local chicken as affected by environment. While breast weight was highly significantly (P<0.01) affected by the environment, slaughter, eviscerated, thigh, back and head weights, were reported very highly significant (P<0.001). The weight of breast, thigh, back, and eviscerated weight recorded highest for non-oil producing communities birds against counterparts with the following corresponding values; 159.82± 2.28g vs 144.88 ± 2.28g, 113.72± 1.51g vs 105.33± 1.51g, 166.92 ± 2.65g vs 145.63 ± 2.65g and 736.63 ± 9.29g vs 670.45± 9.29g respectively. The results reflected the superiority of birds reared in the non-oil producing communities which was expected because, the oil producing communities of the Niger delta where these birds were sourced is known for high level of pollutant, marred with series of oil spillage and gas flaring over the years, and these have triggered adverse environmental impacts in the region (Amnesty International, 2009). Again, since environmental condition is one among other factors that contribute to the general performance of poultry production (Sonaiya *et al.* 1986; Monsi and Ayodele, 1989; Rai and Amit, 2002), therefore the superiority confers on birds reared in the non-oil producing environment may be attributed to the environmental condition under which these birds were bred and nurtured.

Table 2 presents the mean and standard error of the mean values for carcass-traits of the Nigeria Local chicken as affected by sex. Wing and breast weights were highly significant (P<0.01) while slaughter weight, eviscerated weight, thigh weight, drumstick weight, shank weight, head and neck weights were very highly significantly (P<0.001) influenced by sex. From the results, the male were superior to their female counterparts in all parameters studied except back weight. Breast weight (156.56 ± 2.28 against 148.13 ± 2.28g), Drumstick (91.07 ± 1.44g against 70.47± 1.44g), Thigh weight (120.03 ± 1.51g against 99.12±1.51g) and 45.45 ± 0.8g against 34.00 ± 0.8g for neck weight. The results in Table 2, showed that male birds generally recorded higher mean values than the females in carcass-traits, and this conformed with those of Sonaiya and Benyi (1983); Ikeobi *et al.*, (1995); Fayeye *et al.* (2006); Oguntunji and Ayorinde (2009) and Tercic *et al.* (2009). These authors reported sexual dimorphism in favour of the male birds due to feeding habits and growth pattern.

Table 1. Carcass Traits of the Nigerian Local Chicken as Affected by Environment

Parameters	Oil producing Communities	Non oil producin Communities	g	SL
Slaughter weight (g)	788.47	877.98	10.15	***
Eviscerated weight (g)	670.45	736.63	9.29	***
Thigh weight (g)	105.33	113.72	1.51	***
Drumstick (g)	80.51	81.03	1.44	NS
Shank weight (g)	30.78	30.15	0.60	NS
Back weight (g)	145.63	166.92	2.65	***
Head weight (g)	33.89	36.45	0.55	***
Neck weight (g)	38.91	40.54	0.80	NS
Wing weight (g)	74.49	73.26	1.23	NS
Breast weight (g)	144.88	159.82	2.28	**

Key: SL= significance level; NS= not significant; * = p < 0.05 significant; ** = p < 0.01 highly significant; *** = p < 0.001 very highly significant.

Table 2. Carcass Characteristics of the Nigerian Local Chicken as Affected by Sex

Parameters	Male	Female	..	SL
Slaughter weight (g)	867.39	799.05	10.15	***
Eviscerated weight (g)	739.48	667.60	9.29	***
Thigh weight (g)	120.03	99.12	1.51	***
Drumstick (g)	91.07	70.47	1.44	***
Shank weight (g)	32.73	28.20	0.60	***
Back weight (g)	153.54	159.00	2.65	NS
Head weight (g)	39.05	31.29	0.55	***
Neck weight (g)	45.45	34.00	0.80	***
Wing weight (g)	76.64	71.11	1.23	***
Breast weight (g)	156.56	148.13	2.28	**

Key: SL= significance level NS= not significant; ** = $p < 0.01$ highly significant; *** = $p < 0.001$ very highly significant

Table 3 presents the mean and standard error of the mean values for carcass characteristics of the Nigerian Local Chicken as affected by the interaction of environment and sex. With the exception of shank and slaughter weight, other parameters were not statistically significantly ($P>0.05$) affected. Highly significant ($P<0.01$) was recorded for shank weight with males birds raised in oil producing communities recorded with highest mean value of 34.43 ± 0.85g followed by male in non-oil producing communities (31.02 ± 0.85g) and females in non oil producing communities with mean value of (29.23 ± 0.85g) and the least recorded for females reared in oil producing communities with mean value of 27.12 ± 0.85g. Slaughter weight, was noted significantly ($P<0.05$) influenced by the interaction of environment and sex. The results of the effect of environment by sex interaction as noted in this study is an overall presentation of the possible lesser implications of the overriding effect of both factors on carcass-traits measured. Ikeobi *et al.*, (1995) and Wheto *et al*, (2004) in different findings had reported contrary results on the interaction effect of sex and strain on carcass-traits. However, the results obtained in this investigation, probably may be attributed to the role environment play on sex in the expression of these traits

Conclusion

The results of this investigation revealed possible reflection of an external (environment) factor influencing the expression of carcass-traits yield in the Nigerian normal-feathered local chicken. Generally, birds raised in the non-oil producing areas gave better yield in cut-parts than those raised in the oil producing areas. Male superiority over their female counterparts in overall mean weights was considered as a factor of sex dimorphism arising from male physiological activities.

Table 3. Carcass-traits of the Nigerian Local Chicken as Affected by the Interaction of Environment and Sex.

Environment	SEX	SLW (g)	EVW (g)	THW (g)	DRS (g)	SKW (g)	BKW (g)	HDW (g)	NKW (g)	WGW (g)	BRW (g)
Oil producing areas	M	840.08	716.63	115.60	91.40	34.43	145.80	37.45	44.97	76.97	149.30
	F	736.85	624.27	95.05	69.62	27.12	145.45	30.33	32.85	72.02	140.43
Non Oil Producing areas	M	894.70	762.33	124.45	91.40	31.02	161.28	40.65	45.93	76.32	163.82
	F	861.25	710.93	102.98	69.62	29.23	172.55	32.25	35.15	70.20	155.82
SEM		14.35	13.14	2.13	2.04	0.85	3.74	0.78	1.13	1.74	3.22
SL		*	NS	NS	NS	**	NS	NS	NS	NS	NS

SLW= Slaughter weight; EVW=Eviscerated weight; THW= Thigh weight; DRS= Drumstick; SKW=Shank weight; BKW= Back weight; HDW= Head weight; NKW= Neck weight; W GW= Wing weight; BRW= Breast weight; SL=Significant level; NS= not significant (P>0.05); * =Significant ($P < 0.05$); **Highly significant ($P< 0.01$);

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