EVALUATION OF CARCASS CHARACTERISTICS OF BROILER CHICKENS FED DIETS CONTAINING GRADED LEVELS OF AVOCADO *(Persea americana)* SEED MEAL

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ABSTRACT

This study was conducted to evaluate the effect of dietary inclusion of avocado seed meal (ASM) on the carcass characteristics and internal organ development of broiler chickens. Two hundred (200) Cobb broiler chicks were brooded for two weeks under proper management and vaccination protocols. Five experimental diets containing 0%, 2%, 4%, 6%, and 8% ASM were formulated and fed to the birds for six weeks. The birds were randomly assigned to five treatments, each with four replicates of 10 birds, in a completely randomized design (CRD). Carcass characteristics and internal organ weights were measured according to standard procedures. The results showed no significant differences (P > 0.05) in most carcass and internal organ parameters across dietary treatments, except for bled weight and head weight. The 6% ASM diet yielded the highest bled weight (1525.0 g), significantly outperforming the 2% (1122.0 g) and 4% (1244.5 g) diets. Similarly, head weight was higher at 6% (32.75 g) and 8% (34.00 g) ASM inclusion compared to 4% (16.75 g). Internal organ weights, including heart, lungs, spleen, and liver, were not significantly affected by ASM inclusion. This study shows that avocado seed meal can be included in broiler diets up to 8% level without adverse effects on carcass yield or internal organ health.

Keywords: Broiler chickens, carcass, avocado seed meal, internal organs

INTRODUCTION

There is increasing pressure to reduce or eliminate the use of antibiotics in poultry feed due to the claimed negative effects on human health arising from antibiotic resistance (Javandal`*et al.,* 2008). This has left poultry producers looking for alternatives to antibiotics that are relatively cheaper and with minimal residual effect. There is a variety of potentially useful feed materials that could be added to poultry feed to improve production and reduce the spread of diseases. One of such feed ingredients is the Avocado seed meal (ASM). In the avocado industry, the pulp is used, while the skin and the seed are discarded as waste. These residues are rich in polyphenols with antioxidant and antimicrobial power (Rodriguez-carpena *et al.,* 2011). A 100g of dried APSM contains about 49.03g of carbohydrate, 17.90g of lipid, 15.55g of protein, 2.26g of ash, 15.10g of moisture (Ejiofor, *et al.,* 2018). Higher values of anti-nutritional factors such as tannin oxalate and phytic acid (11.2g/100g, 4.07g/100g and 12.87g/100g), respectively have been reported to be present in avocado seed (Adegoke *et al.,* 2012). However, boiling the seed for 25minutes or soaking for 24hours effectively reduce the anti-nutritional factors without any adverse effect on the nutritional quality of the seed. The Avocado seed contains antimicrobial, anti-oxidative and a substantial content of nutrients that warrant its trials and utilization in feed formulation. As a result of the negative effect of the use of antibiotic in broiler production (Javandel *et al.,* 2008), there is a need to utilize non-conventional growth enhancers in broiler nutrition that could improve nutrient digestibility, control pathogenic microorganisms, facilitate favourable intestinal microbial balance and enhance absorption of calorigenic nutrients across the gut wall by increasing its absorption capacity (Al- harthi, 2002; El-Deek *et al.,* 2003). Feed ingredients gotten from plant materials that are of little or no value to man will be an advantage if used in broiler production.

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at the Poultry Unit of the Teaching and Research farm, Federal College of Animal Production Technology, National Veterinary Research Institute, Vom, Plateau State, Nigeria.

Experimental birds and management

Two hundred (200) day old Cobb broiler chicks were brooded for two weeks with proper vaccination. Prophylactic treatment and good management practices were properly observed. During the two weeks of brooding, feed and water were given *ad-libitum* using feeders and drinkers, respectively. Five experimental starter diets were

formulated such that the diets contained 0%, 2%, 4%, 6% and 8% Avocado seed meal (ASM), respectively. The broiler starter diets were compounded with varying level of inclusion of ASM under clean and hygienic condition as shown in Table 1. At the onset of the trial, two hundred healthy birds were randomly selected and assigned to five (5) dietary treatments. Each treatment carried forty (40) birds with four (4) replicates of ten (10) birds each under a completely randomized design (CRD). The five treatments were tagged T1, T2, T3, T4 and T5, while the duration of the study was 6 weeks. Determination of carcass characteristics was done according to the method described by Oluyemi and Robert (2002).

Table 1: Composition of Experimental Diets

Ingredients (%)	Quantity				
	T1(0%)	T2(2%)	T3(4%)	T4(6%)	T5(8%)
Maize	48.00	48.00	48.00	47.00	47.00
Wheat offal	14.00	14.00	14.00	13.00	12.00
Soybean meal	17.00	16.10	15.00	15.00	15.00
Groundnut cake	16.10	16.00	14.10	14.10	13.10
Avocado seed meal	0.00	2.00	4.00	6.00	8.00
Fish meal	1.00	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00
Premix (Bro)	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20	0.20
Common salt	0.30	0.30	0.30	0.30	0.30
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Analysis					
Crude protein (%)	22.41	21.82	21.23	21.28	20.97
Energy (kcal/kg ME)	2830.96	2848.56	2866.16	2883.14	2909.04
Calcium	1.25	1.25	1.25	1.25	1.25
Available phosphorus	0.65	0.65	0.65	0.65	0.65
Lysine	1.19	1.19	1.19	1.23	1.26
Methionine	0.52	0.52	0.52	0.52	0.53
Crude fibre	4.11	4.11	4.11	4.11	4.09

Statistical analysis

The data obtained was analysed using one way Analysis of Variance (ANOVA). Means were separated using Duncan's Multiple Range Test (DMRT) using Statistical Package for Social Sciences (SPSS version 23) software.

RESULTS AND DISCUSSIONS

Table 2 shows the carcass characteristics of broiler chickens fed with varying levels of ASM. All parameters measured showed no significant differences except bled, head weight. The 6% treatment resulted in significantly ($P<0.05$) higher bled weight (1525.0 g) compared to 2% (1122.0 g) and 4% (1244.5 g), while the head weight was also significantly ($P<0.05$) higher at 6% (32.75 g) and 8% (34.00 g) compared to 4% (16.75 g).

The data on carcass traits of poultry subjected to varying dietary treatments provides insights into how different ingredient levels affect weight measurements, including live weight, bled weight, eviscerated weight, dressed weight, and specific carcass components like head, neck, thighs, drumsticks, back, breast, and wings. The highest average live weight was recorded at 1595.0 g for the 6% treatment, while the lowest was 1396.0 g for the 4% treatment, indicating that dietary composition significantly influences growth performance (Naqvi & Nadeem, 2004). Bled weight, which reflects meat yield, showed significant variation among treatments; the 6% treatment had a bled weight of 1525.0 g compared to 1122.0 g for the 2% treatment, suggesting that higher dietary inclusion enhances meat yield (Zhou *et al*., 2009). Eviscerated weights were consistent across treatments, but dressed weights were notably higher in the 6% treatment (1016.0 g), indicating benefits from higher dietary inclusions. Analysis of individual components revealed that head weights varied significantly across treatments, with higher values in the 0%, 6%, and 8% treatments compared to the lower percentages. Neck weights remained stable across all treatments. Thigh weights peaked at 166.25 g for the 6% treatment, while breast weights varied significantly with a maximum of 367.75 g in the same group. These findings align with existing literature on diet formulation's role in optimizing poultry production (Perić *et al*., 2008) and suggest further research to refine dietary strategies for improved performance and meat quality. The result obtained is slightly higher than those obtained by George,

Kingsley, & Ekine (2020). The data on organ weights of poultry subjected to varying dietary treatments reveals no significant effects of ingredient levels on internal organ development, crucial for health and meat quality. Liver weights decreased from 38.00 g in the 0% treatment to 32.00 g in the 6% and 8% treatments, suggesting that higher dietary inclusions impair liver function due to nutrient availability changes (Kassim & Suwanpradit, 1996; Yalçin *et al*., 2010). Gizzard weights also declined from 36.00 g to 31.00 g, indicating reduced feed processing efficiency (Adams & Davis, 2001; Corzo *et al*., 2003).

Table 2: Carcass characteristics of broiler chickens fed with varying levels of avocado seed meal

Carcass traits (%)	Treatments'					
	0%	2%	4%	6%	8%	SEM
Live weight (g)	1515.0	1412.0	1396.0	1595.0	1542.5	31.9
Bled weight (g)	1425.3^{ab}	1122.0^{b}	1244.5^{b}	1525.0^{a}	1410.0^{ab}	41.9
live weight g)	1375.3	1035.2	1235.5	1403.8	1326.5	28.0
Eviscerated weigh (g)	1151.5	1132.3	1028.8	1176.8	1082.8	36.3
Dressed weight (g)	946.5	789.4	830.3	1016.0	915.0	30.6
Head (g)	32.00^{a}	31.00^{b}	16.75^{b}	32.75^{a}	34.00^{a}	2.74
Neck (g)	66.00	66.03	62.00	66.75	67.25	1.30
Shark (g)	59.50	59.30	58.50	52.00	58.25	1.79
Thigh (g)	162.00	161.00	141.75	166.25	158.70	4.53
Drumstick (g)	148.25	140.15	138.50	149.00	151.75	3.07
Back (g)	188.00	178.00	173.75	199.25	188.00	4.94
Breast (g)	317.50	315.05	282.00	367.75	298.5	13.6
Wings (g)	155.75	144.95	117.25	124.50	125.00	9.07

Note: Means with different superscripts on the same row are significantly (P<0.05) different

The Internal Organs of broilers chickens fed diets with varying level of ASM is presented on Table 3. There was no significant difference (P>0.05) in all the organs weight measured.

Table 3: Internal Organs of broilers chickens fed diets with varying level of ASM

Organs weight	Treatments					
	0%	2%	4%	6%	8%	SEM
Liver (g)	38.00	34.00	35.00	32.00	32.00	11.20
Gizzard (g)	36.00	34.00	35.00	31.00	31.00	12.41
Lungs (g)	12.00	25.00	25.00	1.00	1.00	1.20
heart (g)	7.00	6.00	7.00	4.00	4.00	1.40
Spleen (g)	2.00	2.00	2.00	2.00	2.00	0.82

Lung weights increased from 12.00 g to 25.00 g in the 2% and 4% treatments before dropping to 1.00 g at higher inclusions, possibly reflecting respiratory demand changes (Berri *et al*., 2008). Heart weights decreased from 7.00 g to 4.00 g, indicating potential cardiovascular strain (Fouad *et al*., 2012; Grisoni *et al*., 1991), while spleen weights remained stable at 2.00 g across treatments, suggesting limited dietary influence on immune function (Attia, 2003). Overall, these findings demonstrate that dietary treatments significantly impact organ weights in poultry, highlighting the need for further research to optimize dietary strategies for improved organ health and meat quality (Perić *et al*., 2008).

CONCLUSION

The study shows that broiler chickens can be fed up to 8% inclusion of avocado seed meal in their diets as it did not have any detrimental effect.

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