EFFECT OF ENZYME SUPPLEMENTED MALTED SORGIIUM SPROUTS BASED DIETS ON CARCASS YIELD AND SERUM LIPID PROFILE OF FINISHED BROILER CHICKENS

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Abstract

A study was conducted to determine the utilization of enzyme supplemented malted sorghum sprouts (MSP) based diets on the carcass yield and lipid profile using broiler chickens (n= 400) of Anak strain. The unsexed birds were randomly assigned to eight experimental diets of 0%, 10%, 20% and 30% MSP inclusion levels in two groups, one with enzyme supplementation and the other without to give a 2 x4 factorial arrangement for the experimental design.Highest live weight of 2181.77g was observed at 0% inclusion level, followed by 2091.07 at 10% MSP inclusion.Serum lipid profile parameters were all significantly (P<0.05) affected by MSP and enzyme inclusion with the exception of Low Density lipoprotein (LDL). Result showed similar trend of effects at the interaction level between the test ingredient and enzyme supplemented. It was concluded that MSP utilization in the diet of broiler chickens could be at its best use at 20% level of inclusion when supplemented with exogenous enzyme ROVABIO®.

Key words: Broiler chickens, malted sorghum sprouts (MSP), carcass yield and serum lipid profile.

Introduction

Use of various unconventional feedstuffs with high nutrient embedded in it has been widely recorded for use in various biological studies, showing its capacity for adaptability into the animal producing industries even as wastes disposals are been reduced by its use. Ajala *et al.* (2002) defined non-conventional feed stuff as materials including waste, crop residues and specific plants and crops not generally recognized as potential ingredients suitable for compounded feeds. MSP has a lot of prospects as feedstuff for livestock and as expected, it is rich in organic nitrogen and is sold for use as organic fertilizer particularly good for growing maize (Oduguwa, 2001). Malted Sorghum Sprouts is reported to contain about 845, 226,48,33, 16,522 g/kg of Dry Matter (DM), Crude Protein (CP), Ether Extract (EE), Ash, Nitrogen Free Extract (NFE) respectively (Aning *et al.*, 1998). However with so many prospects as a livestock feed its usefulness is limited by its tannin and non-starch polysaccharide content (Fafiolu, 2003). This therefore aroused the need to carry out a study to determine how an enzyme with many constituents that can presumably act well on the feedstuff was considered for use on broiler chickens.

Materials and Methods

A total of four hundred broiler chickens were used to study the effects of dietary inclusion of Malted Sorghum Sprouts (MSP) (0, 10, 20 and 30%) and enzyme (mixture of xylanase, β-glucanases, cellulase and pectinase) on the carcass yield and serum cholesterol profile of broiler chickens. The birds were fed the experimental diet for 56days on eight straight experimental diets with crude protein ranging between 21.40-21.50% and Metabolizable Energy between 2868.50 and 2880.50 Kcal/kg. Four of the diets were fed without enzyme supplementation while the other four contained the enzyme used for the experiment ROVABIO® for a period of 56days. At the 56th day two birds per replicate were selected and blood samples were collected through brachial vein directly into correctly labeled plain bottles for the determination oflipid profile using standard procedure as described by Fafiolu *et al.* (2014). For carcass analysis, two birds per replicate were also selected, weighed and sacrificed, scalded, de-feathered and eviscerated. Dressing and organ weight were recorded. Data collected were analysed using SAS (1999) and significant means were separated using Duncan's Multiple Range Test. The statistical model used is $Y_{ijk} = \mu + T_i + Z_j + (TZ)_{ij} + E_{ijk}$ where Y_{ijk} is the yield, μ is the population mean, T_i is the MSP effect, Z_j is the Enzyme addition effect, $(TZ)_{ij}$ is the MSP by Enzyme interaction effect, while E_{ijk} is the random error.

Results and Discussion

Inclusion of test ingredient in diets of broiler chickens significantly (P<0.05) affected live

weight of the experimental birds for main effect of MSP with the highest value at 0%MSP followed by 10, 20 and 30% respectively. Dressing percentage and gizzard weight was also significant ($P<0.05$) for main effect of MSP. Enzyme inclusion only affected live weight and abdominal fat values where live weight was better with enzyme inclusion. This may be as a result of the diverse complementary action of the enzyme administered to improve the nutrient quality of the food, since several types of xylanases, β-glucanases and cellulases are associated with other essential enzyme activities, and this combination of enzyme works synergistically to degrade a broad range of non-digestible compounds present in the feedstuff to present a better performance of the birds fed the non-conventional feed resource (Olarotimi, 2010). Interaction effect of MSP and enzyme showed that Live weight of the birds were significantly ($P<0.05$) higher and similar at 0 % and 20 % inclusion levels, showing the effect of enzyme on the basal diet even in the absence of the test ingredient MSP, although the abdominal fat is highest at 20 % MSP inclusion level. For the serum lipid profile, Cholesterol and Triglyceride values were significantly lowest and ($P<0.05$) at 30 % inclusion level. Cholesterol, Triglyceride, High Density Lipoprotein (HDL) and Very Low Density Lipoprotein (VLDL) values were significantly ($P<0.05$) affected by MSP inclusion and varied across the treatment levels. Enzyme inclusion also affected all parameters of serum lipid profile with the exception of Low Density Lipoprotein (LDL). The higher concentration of VLDL at 10% inclusion level could be as a result of birds responding to higher demand for meat production (Chapman, 1995).

Conclusion

The study showed that supplementing Malted Sorghum Sprouts (MSP) with an endogenous enzyme with multiple complementary effects (ROVABIO) resulted in an increased live weight. However increased levels of serum lipid profile were observed with the utilization of the test ingredient and its supplementation with enzyme. Therefore to achieve a good carcass quality, MSP could be included in the diets of broiler chickens up to 20%.

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Table 1: Main effect of enzyme supplemented MSP based diets on carcass quality and serum lipid profile of broiler chickens

PARAMETERS	0%	10%	20%	30%	SEM	P-VALUE	-E	+E	SEM	P-VALUE
Carcass Quality										
Live weight(g)	2181.77^{a}	2091.07^{b}	1997.11^{c}	1751.23^{d}	46.56	0.001	1882.90^{b}	1964.38^{a}	27.94	0.049
Dressed Weight(g)	1338.29	1291.23	1353.51	1275.35	36.91	0.392	1286.60	1342.39	126.20	0.146
Dressing (%)	61.33^{c}	61.74^{d}	67.77^{b}	72.49^{a}	1.71	0.004	69.01	72.15	1.22	0.079
Thigh (%)	9.58	10.50	9.67	10.64	0.42	0.175	9.98	10.22	0.30	0.580
Drumstick (%)	9.82	10.11	10.20	10.23	0.31	0.740	9.95	10.23	0.22	0.390
Breast (%)	15.16	15.10	15.24	16.20	0.52	0.361	15.36	15.49	0.37	0.808
Gizzard (%)	3.35^{d}	3.90^{c}	4.17^{a}	4.02^{b}	0.16	0.003	3.70	4.02	0.11	0.050
Abdominal Fat (%)	0.84	0.94	0.93	0.74	0.09	0.370	0.70^{b}	1.02^{a}	0.07	0.000
Serum Lipid Profile										
Cholesterol	134.90^{d}	176.00^{a}	169.50^{b}	152.00^{c}	6.36	0.000	151.10^{b}	165.10^{a}	4.50	0.034
Triglyceride	114.00^{d}	140.50^{a}	136.90^{b}	129.00^{c}	5.04	0.004	123.50^{b}	136.70^{a}	3.57	0.013
HDL	30.70^{d}	52.00^{a}	50.20^{b}	39.20^{c}	2.60	0.000	39.60^{b}	46.40^{a}	1.84	0.014
LDL	81.60	93.10	92.00	88.90	3.24	0.070	86.10	91.70	2.30	0.094
VLDL	53.80^{d}	74.30^{a}	67.00^{b}	63.20^{c}	2.48	0.000	61.70^{b}	67.40^{a}	1.76	0.028

^{abcd}Means on the same row having different superscripts are significantly (P<0.05) different
SEM- Standard Error Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low Density Lipoprotein +E- With Enzyme -E-Without Enzyme

Table 2: Interaction effect of enzyme supplemented MSP based diets on carcass quality and serum lipid profile of broiler chickens

	-ENZYME				+ ENZYME					
PARAMETERS	0%	10%	20%	30%	0%	10%	20%	30%	SEM	P-VALUE
Carcass Quality										
Live weight(g)	1940.00^{b}	1936.67^{c}	1900.00^{e}	1755.00^{f}	2100.00^{a}	1750.00^{f}	2100.00^{a}	1907.05^{d}	56.11	0.010
Dressed Weight(g)	1302.08	1341.37	1278.35	1225.40	1374.50	1241.10	1428.67	1325.30	52.62	0.159
Dressing (%)	67.50	68.43	67.17	72.92	65.34	70.67	74.60	78.00	2.44	0.224
Thigh (%)	9.40	9.93	10.30	10.30	9.76	11.07	9.05	10.98	0.60	0.300
Drumstick (%)	9.66	9.95	10.10	10.10	9.98	10.27	10.30	10.37	0.44	1.000
Breast (%)	14.42	15.17	15.43	16.43	15.90	15.03	15.05	15.98	0.74	0.463
Gizzard (%)	3.30^{h}	3.63^{g}	4.47^{b}	3.40^{f}	3.40^{g}	4.17^{c}	3.88^{d}	4.63^{a}	0.22	0.003
Abdominal Fat (%)	0.56^{f}	0.85^{c}	0.63^{e}	0.77^{d}	1.12^{a}	1.03^{b}	1.22^{a}	0.77^{d}	0.13	0.030
Serum Lipid Profile										
Cholesterol	123.00^{f}	127.50^{e}	172.40^{b}	161.30^{c}	146.80^{d}	204.50^{a}	166.50^{c}	142.70^{d}	8.75	0.001
Triglyceride	106.80^{f}	119.60^{e}	135.20^{c}	132.30^{c}	121.20^{e}	161.30^{a}	138.60^{b}	125.70^{d}	6.93	0.012
HDL	27.90^{g}	37.70^{e}	52.90^{b}	40.10^{d}	33.50^{f}	66.40^{a}	47.50^{c}	38.20^{e}	3.60	0.000
LDL	74.90	83.10	92.50	93.70	88.30	103.00	91.50	83.90	4.46	0.120
VLDL	49.20^{f}	63.10^{d}	68.20^{b}	66.50^{c}	58.30^{e}	85.00^{a}	65.90^{c}	59.90^{e}	3.38	0.001

^{abcd}Means on the same row having different superscripts are significantly (P<0.05) different
SEM- Standard Error Mean, HDL- High Density Lipoprotein LDL- Low Density Lipoprotein VLDL- Very Low Density Lipoprotein +E- With Enzyme -E-Without Enzyme