EFFECT OF ENZYME SUPPLEMENTED MALTED SORGHUM 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_i is the Enzyme addition effect, (TZ), is the MSP by Enzyme interaction effect, while Eik 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, βglucanases 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 nonconventional 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

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134.90 d 176.00 a 169.50 b 152.00 c 6.36 0.000 151.10 b 165.10 a 4.50 (14.00 d 140.50 a 136.90 b 129.00 5.04 0.004 123.50 b 136.70 a 3.57 (30.70 d 52.00 a 50.20 b 39.20 c 2.60 0.000 39.60 46.40 a 1.84 (30.70 d 52.00 88.90 3.24 0.070 86.10 91.70 2.30 (41.70 b 67.40 a 1.76 b 67.40 a 1.76	134.90 d 176.00 a 169.50 b 152.00 e 6.36 0.000 151.10 b 165.10 a 4.50 114.00 d 140.50 a 136.90 b 129.00 e 5.04 0.004 123.50 b 136.70 a 3.57 30.70 d 52.00 a 50.20 b 39.20 e 2.60 0.000 39.60 b 46.40 a 1.84 81.60 93.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30 53.80 d 74.30 a 67.00 b 63.20 e 2.48 0.000 61.70 b 67.40 a 1.76	134.90 d 176.00 a 169.50 b 152.00 c 6.36 0.000 151.10 b 165.10 a 4.50 (114.00 d 140.50 a 136.90 b 129.00 c 5.04 0.004 123.50 b 136.70 a 3.57 (30.70 d 52.00 a 50.20 b 39.20 c 2.60 0.000 39.60 b 46.40 a 1.84 (4.40 a 52.00 a 8.90 3.24 0.070 86.10 91.70 2.30 (4.40 a 1.76 a 53.80 d 74.30 a 67.00 b 63.20 c 2.48 0.000 61.70 b 67.40 a 1.76 a 1.	(%)	0.84	0.94	0.93	0.74	60.0	0.370	0.70 b	1.02 a	0.07	0.000
176.00 169.50 152.00 6.50 0.000 153.50 136.70 3.57 (9.000 55.00 0.000 123.50 136.70 3.57 (9.000 55.00 50.20 88.90 2.60 0.000 88.90 91.70 2.30 2.30 67.40 176 67.40 176 67.40 176	176.00 169.50 152.00 6.50 0.000 151.10 151.00 152.00 2.50 0.000 151.10 153.50 136.70 3.57 0.000 25.00 2.60 0.000 39.60 46.40 1.84 0.000 93.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30 0.000 74.30 67.00 63.20 2.48 0.000 61.70 67.40 1.76	176.00	rofile			d or or	90000	202	0000	141 10 b	165 10 8	4 50	0.034
4 140.50 a 136.90 b 129.00 c 5.04 0.004 123.50 136.70 a 3.57 c 52.00 a 50.20 b 39.20 c 2.60 . 0.000 39.60 b 46.40 a 1.84 c 52.00 88.90 3.24 0.070 86.10 91.70 2.30 c 53.00 c 5	4 140.50 a 136.90 b 129.00 c 5.04 0.004 123.50 136.70 3.57 3.57 52.00 a 50.20 b 39.20 c 2.60 0.000 39.60 b 46.40 a 1.84 63.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30 74.30 a 67.00 b 63.20 c 2.48 0.000 61.70 b 67.40 a 1.76	4 140.50 a 136.90 b 129.00 c 5.04 0.004 123.50 136.70 3.57 3.57 52.00 a 50.20 b 39.20 c 2.60 0.000 39.60 b 46.40 a 1.84 65.00 93.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30 eans on the same row having different superscripts are significantly (P<0.05) different town and different superscripts are significantly (P<0.05) different town and Error Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low ty Lipoprotein +E- With Enzyme -E-Without Enzyme e of broiler chickens		134.90	176.00"	169.50	127.00	0.30	0.000	101.101	01.00	00:0	0.00
52.00 a 50.20 b 39.20 c 2.60 . 0.000 39.60 b 46.40 a 1.84 0.31.0 92.00 88.90 3.24 0.070 86.10 91.70 2.30 0.30 0.30 0.000 61.70 0.30 0.30 0.30 0.30 0.30 0.30 0.30 0	52.00 a 50.20 b 39.20 c 2.60 0.000 39.60 b 46.40 a 1.84 1.84 52.00 88.90 3.24 0.070 86.10 91.70 2.30 74.30 a 67.00 b 63.20 c 2.48 0.000 61.70 b 67.40 a 1.76	52.00 a 50.20 b 39.20 c 2.60 0.000 39.60 b 46.40 a 1.84 1.84 52.00 a 92.00 88.90 3.24 0.070 86.10 91.70 2.30 93.10 92.00 88.90 3.24 0.000 61.70 86.10 91.70 2.30 eans on the same row having different superscripts are significantly (P<0.05) different to From Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low ty Lipoprotein +E- With Enzyme -E-Without Enzyme e of broiler chickens		114 00 d	140.50 a	136.90 b	129.00°	5.04	0.004	123.50 °	136.70 "	3.57	0.013
93.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30	93.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30 74.30 67.00 63.20° 2.48 0.000 61.70 67.40 1.76	93.10 92.00 88.90 3.24 0.070 86.10 91.70 2.30 (91.70 2.30 74.30 74.30 67.00 b 63.20 c 2.48 0.000 61.70 67.40 1.76 (91.70 cans on the same row having different superscripts are significantly (P<0.05) different to Standard Error Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low ty Lipoprotein +E- With Enzyme -E-Without Enzyme et of broiler chickens		30 70 d	52 00 a	50.20 b	39.20°	2.60	0000	39.60 b	46.40 a	1.84	0.014
74.70.0 67.70.0 67.70.0 67.70.0 1.76	74.30 a 67.00 b 63.20° 2.48 0.000 61.70 67.40 a 1.76	74.30 a 67.00 b 63.20 c 2.48 0.000 61.70 b 67.40 a 1.76 eans on the same row having different superscripts are significantly (P<0.05) different Standard Error Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low ty Lipoprotein +E- With Enzyme -E-Without Enzyme 2. Interaction effect of enzyme supplemented MSP based diets on carcass quality and serum lipid e of broiler chickens		91.70	03.10	92.00	88 90	3.24	0.070	86.10	91.70	2.30	0.094
	74.30 07.00 U.30 U.30 U.30 U.30 U.30 U.30 U.30 U	eans on the same row having different superscripts are significantly (P<0.05) different Standard Error Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low ty Lipoprotein +E- With Enzyme -E-Without Enzyme 2: Interaction effect of enzyme supplemented MSP based diets on carcass quality and serum lipid e of broiler chickens		00.10	74.208	67.00 b	63.200	2 48	0000	61.70 b	67.40 a	1.76	0.028
SEM. Standard Error Mean, HDL - High Density Lipoprotein LDL - Low Density Lipoprotein VLDL - Very Low		profile of broiler chickens		Density I	Lipoprotein +E.	- With Enzyme ect of enzyme s	-E-Without Enz	ryme ASP based di	ets on carcass qua	lity and serum	lipid		
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	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	f broiler chicke	sus							

PARAMETERS 0% 10% 20% 10% 20% SEM P-VALUE Carcass Quality 10% 20% 10% 20% 30% P-VALUE P-VALUE Carcass Quality 1940.00 b 1936.67° 1900.00° 1755.00 c 2100.00 a 1907.05 d 56.11 0.010 Live weight(g) 1302.08 1341.37 1278.35 1225.40 1374.50 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 0.159 Dressing (%) 9.40 9.93 10.30 10.30 9.76 11.07 9.05 10.39 0.244 1.000 Drumstick (%) 9.40 9.93 10.10 10.30 9.76 11.07 9.05 10.39 0.74 0.03 Breast (%) 14.42 15.17 15.43 16.43 15.96 15.36 4.47 b 0.63 17.40 17.40 17.		profile	profile of broiler chick	cens							
RS 0% 10% 20% 30% 30% 0% 10% 20% 30% SEM 10% 20% 30% SEM 10% 1936.67° 1900.00° 1755.00° 2100.00° 1750.00° 1907.05° 56.11 100.00° 1936.67° 1900.00° 1755.00° 2100.00° 1907.05° 56.11 100.00° 1936.67° 1900.00° 1755.00° 1750.00° 1750.00° 1907.05° 56.11 100.00° 1936.67° 1900.00° 1755.00° 1750.00° 1907.05° 56.11 100.00° 1907.05° 56.11 100.00° 1907.05° 1900° 2.44 10.30° 10.30° 10.30° 10.30° 10.30° 10.30° 10.30° 10.30° 10.30° 10.30° 10.30° 10.37° 10.30° 10.37° 10.30° 10.37° 10.30° 10.37° 10.30° 1			-EI	NZYME			+ EI	ZYME			-
iity 1940.00 1936.67 1900.00 1755.00 2100.00 1750.00 1907.05 55.11	PARAMETERS	%0	10%	20%	30%	%0	10%	20%	30%	SEM	F-VALUE
ht(g) 1936.67° 1936.67° 1900.00° 1755.00° 2100.00° 1790.00 210.00 210.00	Carcass Quality					00000	300 022	8000000	1007 0cd	56 11	0100
ht(g) 1302.08 1341.37 1278.35 1225.40 1374.50 1241.10 1428.67 1325.30 52.62 67.50 68.43 67.17 72.92 65.34 70.67 74.60 78.00 2.44 67.50 9.93 10.30 10.30 9.76 11.07 9.05 10.98 0.60 9.40 9.95 10.10 10.10 9.98 10.27 10.30 10.37 0.44 14.42 15.17 15.43 16.43 15.90 15.03 15.05 15.98 0.74 3.30 4 4.47 5 3.40 3.40 4.17 3.88 4 4.63 0.22 Profile 123.00 127.50 172.40 161.30 161.30 165.50 165.50 142.70 6.93 106.80 119.60 135.20 40.10 33.50 66.40 47.50 38.20 3.60 74.90 83.10 92.50 93.70 88.30 85.00 65.90 59.90 3.38	Live weight(g)	1940.00	1936.67	1900.00	1755.00	2100.00	1/20.00	7100.00	1907.03	20.11	0.010
(%) 67.50 68.43 67.17 72.92 65.34 70.67 74.60 78.00 2.44 76.50 68.43 67.17 72.92 65.34 70.67 74.60 78.00 2.44 76.50 9.93 10.30 10.30 10.10 9.98 10.27 10.30 10.37 0.44 76.50 9.95 10.10 10.10 9.98 10.27 10.30 10.37 0.44 76.50 9.95 10.10 10.10 9.98 10.27 10.30 10.37 0.44 76.50 9.95 10.10 10.10 9.98 10.27 10.30 10.37 0.44 76.50 9.95 10.10 92.50 93.70 83.10 92.50 93.70 83.10 92.50 93.70 83.10 92.50 93.70 83.10 92.50 93.70 85.00 65.90 85.00 85.90 83.30	Descreed Weight(a)	1302 08	1341 37	1278.35	1225.40	1374.50	1241.10	1428.67	1325.30	52.62	0.159
9,40 9,93 10.30 10.30 9,76 11.07 9,05 10.98 0.60 14.42 15.17 15.43 16.43 15.90 15.03 15.05 15.98 0.74 0.44 14.42 15.17 15.43 16.43 15.90 15.03 15.05 15.98 0.74 0.72 16.43 15.90 15.03 15.05 15.98 0.74 0.72 16.43 15.05	Diesed Weight (B)	67 50	68 43	71.73	72.92	65.34	70.67	74.60	78.00	2.44	0.224
9,40 9,95 10.10 10.10 9,98 10.27 10.30 10.37 0.44 14,42 15.17 15.43 15.98 10.27 10.30 10.37 0.44 14,42 15.17 15.43 16,43 15.90 15.03 15.05 15.98 0.74 15.30 15.05 15.98 0.74 15.90 15.03 15.05 15.98 0.77 10.30 15.05 15.98 0.77 10.30 15.05 15.05 15.98 0.77 10.30 15.05 142.70 15.05 15.	Dressing (%)	06.70	00.45	10.30	10.30	92.6	11.07	9.05	10.98	09.0	0.300
14,42 15.17 15.43 16.43 15.90 15.03 15.05 15.98 0.74 15.05 15.98 0.74 15.05 15	Thigh (%)	9.40	9.93	10.30	10.00	000	10.27	10.30	10.37	0.44	1.000
14,42 15.17 15.43 16.43 15.90 15.03 15.05 15.50	Drumstick (%)	9,00	66.6	10.10	10.10	2.70	17:01	200	16.00	0.74	0.462
at (%) 0.56	2 popular (0%)	14.42	15.17	15.43	16.43	15.90	15.03	15.05	15.98	47.0	0.403
at (%) 0.56	The state of the s	2 30 h	3 63 0	4.47b	3.40 f	3.408	4.17	3,800	4.63 a	0.22	0.003
Profile 123.00 U.30 U.30 U.30 U.30 U.30 U.30 U.30	Sizzard (70)	2000	9 90 0	0 62 0	D 77 d	1128	1 03 b	1.22 a	0.77 d	0.13	0.030
Profile 123.00 127.50 172.40 161.30 146.80 204.50 166.50 142.70 8.75 106.80 135.20 135.20 135.30 151.20 161.30 138.60 125.70 6.93 106.80 37.70 52.90 40.10 33.50 66.40 47.50 38.20 3.60 74.90 83.10 92.50 93.70 88.30 103.00 91.50 83.90 4.46 65.50 59.00 65.90 59.90 3.38	Abdominal Fat (%)	0.00	0.00	60.0	11:0	*****					
106.80	Serum Lipid Profile	100 cct	127 50 6	172 Anb	161 30 °	146 80 d	204.50 a	166.50°	142.70 ^d	8.75	0.001
106.80 119.00 155.20 40.10 ⁴ 33.50 ^f 66.40 ^a 47.50° 38.20° 3.60 27.90 ^b 92.50 93.70 88.30 103.00 91.50 83.90 4.46 4.46 46.50° 63.0° 85.0° 59.90° 3.38	Cholesterol	123.00	110.00	126.70	132 30 6	121 20 6	161 30 a	138 60 b	125.70 d	6.93	0.012
27.90° 37.70 52.50 40.10 55.50 65.50 83.90 4.46 74.90 83.10 92.50 93.70 88.30 103.00 91.50 83.90 4.46 70.50 63.50 65.50° 59.90° 3.38	Iriglyceride	106.80	00.611	133.20	40 10 d	22 50 f	86 An a	47 50 6	38.20°	3.60	0.000
74.90 83.10 92.50 93.70 86.50 103.00 91.50 85.50 7.75 74.90 83.10 63.90 3.38	HDL	27.90°	31.10	22.90	40.10	00.00	102.00	01.50	83 00	446	0.120
40.20f 63.10 ⁴ 68.20 ^b 66.50° 58.30° 85.00° 65.90° 59.90° 3.38	Int	74.90	83.10	92.50	93.70	88.30	103.00	00.1%	02.20	7:40	0.1.0
	M. D.	10 0V	63 10 d	68.20 b	66.50°	58.30°	85.00 a	65.90°	59.90 °	3.38	0.001

abed 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