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Effect of Treated Cowpea Seeds on Broiler Chicken

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ABSTRACT

Poultry investment became one of the most important farming activities in Sudan. The aim of this experiment was to investigate the effect of dietary treated cowpea seeds on the performance of broiler chicks. Four rations were formulated that contained 0 cowpea for the control diet (A) and 15% cowpea for the three tested rations. The test diets contained cowpea soaked with no enzyme addition (B), soaked with enzyme addition (C) or roasted (D). One hundred and sixty unsexed chicks were used in a complete randomized design. The results indicated that roasted seeds contained low crude protein, ether extract, crude fiber, ash and metabolizable energy than soaked seeds, while it contained high nitrogen free extract than soaked seeds. Treatment differences had no significant effects on weekly and overall feed intake. There were only significant differences on weight gain in third and fourth weeks. Chicken fed diet C gained the highest weight in week (3267.6) while chicken fed diet C and D gained the highest weight in week 4 (350.6 and 354.1g). Overall weight gain in the four treatments was not significantly different (1598.2 -1737.2 g). Treatments significantly affected feed conversion ratio in week 3 and 4 only diet C and D showed best results in the two weeks than the control and D diet. Over all feed conversion ratio was significantly better for chicks fed cow pea incorporated diets than those fed the control diet (2.40 vs. 2.60 kg feed / kg weight).

Key words: Cowpea Seed, Broiler, Chicken.

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INTRODUCTION

Many researches were conducted to evaluate the nutritive value of local plant protein sources aiming to reduce the cost of imported concentrates (Algam *et al*., 2012).Cowpea and black common bean are well adapted, cheap legumes that can be used in animal feeds in tropical countries (FAO, 1999).Cowpea is used by human as a nutritious component (Berssani,

1985).Amino acids are balanced in cowpea with the exception of methionine which is deficient (Carnovale *et al*., 1990) but the amount of lysine is considered high (Akanji, 2002).The limiting aspect in the use of legumes in animal feed is presence of antinutritional factors (Miega, 1987; Wiryawan and Dingle, 1999 and Teguia and Beynen., 2005;).Grain legumes like cow pea contain many anti-nutritional factors as chymotrypsin inhibitors, amylase inhibitors, tannins and phytic acids (Kratzer *et al*., 1968, Singh,1988; Duc, 1996; Amaefuil *et al*., 2005and Teguia and Beynen, 2005).Chicks performance was remarkably reduced when fed raw legumes (Wiryawan and Dinlge, 1999, Bressani, 2002, Teguia *et al*., 2003).Cowpea content of anti-nutritional factors is reduced by roasting (Vaishale *et al*., 1998) and in the rural areas cocking is a conventional method of removing legume toxins (Defang *et al*., 2008)The nutritive value of legumes is increased by cooking and this is due to the decrease in the activity of trypsin inhibitors or the decrease in other toxins (Duke 1981).The purpose of the study is to investigate the effect of cow pea incorporation in broiler feeds.

MATERIALS AND METHODS

Experimental site

This experiment was conducted in the premises of poultry research unit in faculty of Animal Production at Khartoum North. During the experiment the maximum and minimum environmental temperatures were 34.3- 22.7º C and 24.7- 11.3º C while the relative humidity of 20 to 40%.

Housing and Management

The study was carried out in an open side poultry house. The house (5.5×4m) was portioned internally into 15 pens (1×1m) with suitable working place allowance. the house was cleaned and disinfected before the study and saw dust was laid as beddings to each pen. Each pen was provided with manual feeder and drinker. The light was maintained for 24 hours natural and artificially.

Experimental Diets

Vignaunguiculata seeds was purchased from Khartoum state (at a price of 2 SP/Kg 0.50 $) and has been decorticated, then divided into three parts one for roasting, the other for soaking, to one third (soaked) multi enzymes were added (Endo-B-1,4xylanase, Endo-pentosanase, protease, and amylase). Four experimental diets were formulated with 0.00% Vignaunguiculata level in the control and 15 % Vignaunguiculata in the other three diets. These diets were formulated to meet the requirements for broilers as recommended by NRC (1994). Seeds were treated by soaking over night (12 hours) then boiled for 10 minutes or roasted in electric oven at 100º C for 15 minutes.

Experimental birds

One hundred and sixty unsexed, one day old broiler chicks (Ross 508) were obtained from Bageir commercial company after being vaccinated against marek's disease. The chicks were

then weighed and allotted randomly into pens of eight chicks as replicate. Each treatment consists of 40 chicks that were replicated 5 times in complete randomized design.

Data collection

Parameters studied were body weight (BW), feed intake (FI), and weight gain (WG) plus feed conversion ratio (FCR) that was calculated for the individual replicates of each dietary treatment. Mortality was recorded when it occurred. The experiment extended for six weeks and at the end of the period 25 chicks were randomly selected from each dietary treatment (5 birds/replicate), leg banded, weighed individually and slaughtered. Hot carcass weight was recorded and dressing out percentage was determined by expressing hot carcass weight to live weight.

Chemical methods

Samples of Vignaunguiculata seeds dry and wet treated were approximately analyzed on dry matter basis for chemical components according to AOAC (1982).

Experimental design and statistical analysis

A complete randomized design was used. The data generated from the experiment were statistically analyzed using SPSS software. Duncan's multiple range tests were used to analyzed the differences between treatment means (Gomez and Gomez, 1984).

Table 1.composition of experimental diets (as feed %)

Ingredient	Diet			
	A	B	C	D
V. unguiculata%	0.00	15.00	15.00	15.00
Sorghum	64.60	54.80	54.80	54.80
Groundnut cake	17.00	15.00	15.00	15.00
Sesame cake	11.00	5.00	5.00	5.00
Super Concentrate*	5.00	5.00	5.00	5.00
Dicalcium phosphate	0.25	1.73	1.73	1.73
Nacl	0.25	0.25	0.25	0.25
Vitamin Premix**	0.25	0.25	0.25	0.25
Lysine	0.25	-	-	-
Vegetable Oil	0.03	3.00	3.00	3.00
Wheat bran	0.10	-	-	-
Total	100	100	100	100

(A): control diet, (B):15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cowpea seeds, (D): 15% roasting cowpea seeds

*super concentrate (%) CP 40, lysine 10, methionine 3,methionie+cystine 3.3, ca 10, available phosphate 6.40, CF1.44, C fat 3.99, ME 1750 kcal/kg, crude minerals 39.30

**Vitamin composition per kg of diet: vit A: 200.000 IU,vit D3: 70.000 IU, vit B1:50mg, B2:120mg, B12:180 mg, K3:30mg, niacin:440 mg, zincL: 1.6 mg, copper :450 mg, iodine 550 mg, selenium : 8 mg, cobalt: 9 mg, iron : 580 mg, molyden 20 mg

Table 2.calculated and determined chemical analysis of experimental diets

Parameters	Diets			
	A	B	C	D
Crude protein	22.45	22.54	22.52	22.50
Metabolizable energy (Kcal/ kg)	3100.29	3100.25	3002.20	3003.40
Lysine%	1.11	1.19	1.17	1.16
Methionine%	0.45	0.45	0.43	0.47
Ca%	1.24	1.10	1.14	0.14
Total P%	0.64	0.62	0.63	0.68
Determined analysis				
Dry mater	96.86	96.40	95.30	95.47
Ash	5.72	5.90	5.43	5.14
Ether Extract	5.14	5.03	5.11	4.57
Crude protein	22.45	22.54	22.52	22.50
Crude fiber	3.00	3.20	4.14	4.20

(A); control diet, (B): 15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cow pea seeds, (D): 15% roasting cowpea.

RESULTS AND DISCUSSION

The results of chemical composition of treated cowpea were shown in table 3. The results indicated that roasted seeds contained low crude protein, ether extract, crude fiber, ash and ME than soaked seeds, while it contained high nitrogen free extract than soaked seeds. This may be due to heat effects on proteins. On the other hand Azizah and Zainon (1997), and Mahadevamma and Tharanathan (2004) reported that roasting of legumes reduced insoluble dietary fibers and total fibers but increased soluble fibers. This is in agreement with Defang *et al*., (2008).Cowpea seeds in this study contained 96% dry mater, 2.2-2.9 ether extract, 24.2- 21.4 crude protein, 3.4 – 3.0 crude fiber, 4.90 ash, and 14417- 22714 ME (kal/ kg). Eljack *et al*., (2009) reported that cow pea contain 93.3, 20.91, 2.0, 3.4, 4.1, 62.89, 13.4 MJ/kg dry mater, crude protein, ether extract, crude fiber, ash, nitrogen free extract, metabolizable energy respectively.

Table 3.Proximate analysis (%) of treated cowpea (V. unguiculata) seeds

compound	(soaking+ boiling)	(Roasting)
Dry matter	96.40	96.90
Ether extract	2.90	2.20
Crude protein	24.20	21.40
Crude fiber	3.40	3.00
Ash	4.87	4.90
Nitrogen Free extract	61.00	65.40
Metabolizable energy (kcal/ kg)	22714.00	14417.00

Data of table 4 show that treatment differences had no significant ($p > 0.05$) effects on weekly and overall feed intake. This may be due to the fact estates that treating of cow pea seeds by soaking or roasting lead to enhancement of feed palatability by reducing its content of anti-nutritional factors this idea is in agreement with Gahlawat and Sehgal (1992) who stated that roasting reduces anti nutritional factors in cereals and legumes hence improving their digestibility. As energy content of the four rations formulated was similar, feed intake was expected to be close in the four chick groups (Scott *et al*., 1982). Feed intake in week 1 to week 7 was in the range of 190.1- 216.8, 764.8- 977.4, 407.5- 411.3, 701.0- 742.8, 579.5- 622.5, 1200.1-

1263.3 g respectively, these values were lower than those estimated by Musa *et al*., (2012). Total feed intake was 4104.40-4178.70g and this estimate is higher than the range 3278.75- 3325.49 reported by Abdel Atti *et al*., (2011), the range 3144-3660 reported by Eljack *et al* (2009) and the range 3236-3366 reported by Chakam*et al*., (2010).

Results in table 3 shows that treatments had no significant effects (p> 0.05) on weekly feed intake (table 4).

Table 4. Effect of feeding cowpea (V. unguiculata) (g/bird) on broiler weekly feed intake (g/bird/ week)

Age (weeks)	Diets				
	A	B	C	D	S E
1	208.2	216.8	190.1	192.1	19.0
2	977.40	964.6	930.2	764.8	84.5
3	407.5	409.7	410.7	411.3	19.2
4	742.8	701.0	727.7	731.4	25.7
5	579.4	622.5	622.5	606.7	26.1
6	1263.3	1220.1	1223.7	1200.1	42.2

SE: standard error, (A); control diet, (B): 15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cow pea seeds, (D): 15% roasting cowpea
Means with the different superscript are significantly different (p> 0.05)

Data in table 5.shows the effects of cowpea on weekly weight gain .There was only significant differences (p< 0.05) on weight gain in third and fourth weeks. Chicks fed diet C gained the highest weight in week (3267.6) while chicks fed diet C and D gained the highest weight in week 4 (350.6 and 354.1g). Overall weight gain in the four treatments was not significantly (p> 0.05) different (1598.2- 1737.2 g); this disagreed with Defang *et al*., (2003). Estimated range was higher than that reported by Chakam*et al*., (2010)and Kana *et al*., (2012) who reported 1287.85- 1536.13-g and 1094.93- 1362.49 g. Eljack *et al*., (2009) estimated a higher range for overall weight gain (1683. 29- 2152.02g).

Table 5. Effect of feeding cowpea (V. unguiculata) (g/bird) on broiler weekly weight gain (g/bird/ week)

Age (weeks)	Diets				
	A	B	C	D	S E
1	69.3 [a]	65.0 [a]	7.00 [a]	60.2 [a]	3.80
2	152.1 [a]	167.2 [a]	166.0 [a]	154.8 [a]	6.90
3	228.0 [a]	256.0[ab]	267.6 [b]	233.4 [a]	8.90
4	292.5 [a]	350.6 [b]	354.1 [b]	303.6 [a]	14.9
5	379.2 [a]	369.3 [a]	395.6 [a]	402.3 [a]	20.8
6	476.8 [a]	529.1 [a]	426.3 [a]	506.3 [a]	34.00

SE: standard error, (A); control diet, (B): 15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cow pea seeds, (D): 15% roasting cowpea
Means with the different superscript are significantly different (p> 0.05)

Effects of treatment on feed conversion ratio were shown in table 6. Treatments significantly (p>0.05) affected feed conversion ratio in week 3 and 4 only diet C and D showed best results in the two periods than the control and D diet. Over all feed conversion ratio (Table 7) was significantly (p>0.05) better for chicks fed cow pea incorporated diets than those fed the control diet (2.40 Vs 2.60 kg feed / kg weight). These results were similar to Abdelgani *et al*., (2013) for the control diet and higher for treated cow pea contained diets. Estimated results were lower than

those estimated by Kana *et al*., (2012) who found a range of 2.74-3.18but higher than Eljack *et al*., (2010).

Table 6. Effect of feeding V. unguiculata (g/bird) on broiler weekly feed conversion ratio (g/bird/ week)

Age (weeks)	Diets				
	A	B	C	D	SE
1	2.10	3.40 [a]	2.80 [a]	3.20	0.30
2	6.50 [a]	5.80 [a]	5.60 [a]	4.90 [a]	0.60
3	1.80 [a]	1.60 [ab]	1.50 [b]	1.80 [a]	0.10
4	2.60 [a]	2.00 [b]	2.10 [ab]	2.40 [a]	0.20
5	1.50 [a]	1.70 [a]	1.60 [a]	1.50 [a]	0.10
6	2.70 [a]	2.30 [a]	2.90 [a]	2.50 [a]	0.20

SE: standard error, (A); control diet, (B): 15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cow pea seeds, (D): 15% roasting cowpea

Table 7. Effect of treated cowpea (V. unguiculata) seeds on overall performance of broiler chicks (0-45days)

Parameters	Diets				
	A	B	C	D	S E
Total feed intake (g)	4178.70 [a]	4143.10 [a]	4104.90 [a]	4104.40 [a]	84.47
Total weight Gain (g)	1598.20 [a]	1737.20 [a]	1680.10 [a]	1660.70 [a]	39.30
Total Feed conversion ratio	2.60 [a]	2.40 [b]	2.40 [b]	2.40 [b]	0.10

SE: standard error, (A); control diet, (B): 15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cow pea seeds, (D): 15% roasting cowpea
Means with the different superscript are significantly different (p> 0.05)

Live body weight, carcass weight and dressing percentage were not affected (p> 0.05) by dietary differences this may be related to similar feed intake and diets that were all isocaloricisonitrogrnous. Live weight is higher than that estimated by Abdelgani *et al*., (2013).

Table 8. average live weight, hot carcass weight and dressing percentage of broiler chicks fed diets containing treated cowpea (V. unguiculata) (g/bird)

Parameters	Diets				
	A	B	C	D	S E
Live body weight (g)	1826.70	1859.0	1844.9	1828.2	24.9
Hot carcass weight (g)	1218.20	1233.20	1243.4	1238.3	35.1
Dressing %	66.0	66.0	67.0	67.0	1.0

SE: standard error, (A); control diet, (B): 15% soaking boiling cowpea seeds+ enzymes, (C): 15% soaking boiling cow pea seeds, (D): 15% roasting cowpea
Means with the different superscript are significantly different (p>0.05).

CONCLUSION

Inclusion of treated cowpea seeds in broiler diets resulted in similar performance as in the control diet. The level of anti-nutritional factors in cow pea can be reduced by roasting or soaking.

REFERENCE

A.O.A.C. 1982. Official methods of Analysis. Association of Official Agriculture Chemist, Washington D. C.

Abdelatti, K. A., B. M. Dousa, and A. M. FadelElseed. 2011. Effect of Substitution the imported concentrate by Plant concentrate on The Performance and Blood chemistry of broiler Chicks. *Pakistan Journal of Nutrition*. 10 (11):1000-1003.

Abdelgani, A. A., K. A. Abdelatti, K .M. Elamin, K. Y .Dafalla, H .E. E. Malik, and B. M. Dousa. 2013. Effects of Dietary Cowpea (Vignaunguiculata) seeds on the performance of broiler chicks, *Wayamba Journal of Animal Science*. 5:678-684.

Akanji, A. M. 2002. Enhancement the utilization of some tropical legume seeds in diet of exotic meat type and egg type chicken. Ph.D. thesis, university of Ibadan.

Algam, T. A., K. A. Abdelatti, B. M. Dousa, S. M. Elawad, and A. M. F. Elseed. 2012 .Effect of dietary raw chick pea (Cicerarietinum L.) seeds on broiler Performance and blood constituents. *International journal of Poultry Science*. 11:294-297.

Amaefuil, K. U., and F. M. Osuagwu. 2005. Performance pf pullet chicks fed graded levels of raw bambarra groundnut (Vigna subterranean (L.) Verdc) offal diets as replacement of soybean meal and maize. *Live stock Research for Rural Development*. 17.

Azizah, A. H, and H. Zainon. 1997. Effect of processing on dietary fiber contents of selected legumes and cereals. *Malaysian Journal of Nutrition*. 3 (1): 131-136.

Bressani, R. 2002. Factors Influencing nutritive value in food grain legumes, Mucuna in comparison to other grain legumes. In: Mucuna as a food of feed: current use and the way forward. Edited by M. Flores., M. Eilitta., R. Myhrman., L. Crew and R. Carsky. Workshop held April 26-29, 2000 in Teguiligalapa, Honduras. CIDICCO.

Carnovale, E., L. Mareltta, E. Marconi, and E. Boris .1990. Nutritional and hydration properties in cowpea. Cowpea genetic. Resources: 113. contribution in cowpea exploration, Evolution and Research from Italy and the International Institute of tropical Agriculture.

Chakam, V.P., A. Teguia, and J. Tchoumboue. 2010. Performance of Finisher Broiler Chickens As affected by Different Proportions of Cooked Cowpea (Vignaunguiculata) in the Grower Finisher diet. *African Journal of Food Agriculture Nutrition and Development*. 10(4):2427-2438.

Defang, H. F, T. A. Awash- Ndukum. J. Kenfack, A. Ngoulaand, and F. Metuge. 2008. Performance and carcass characteristicsof broilers fed boiled cowpea (VignaunguiculataL.Walp) and or black common bea (Phaseolus vulgaris) meal diets. *African Journal of Biotechnology*. 7(9):1351-1356.

Defang, H. F., A.Teguia, J. Awash-Ndukum, A .Kenfack, F. Ngoula, and F. Metuge. 2008.Performance and carcass characteristics of broilers fedboiled cowpea (Vignaunguiculata L Walp) and or blackcommon bean (Phaseolus vulgaris) meal diets. *African Journal of Biotechnology*. 7 (9):1351-1356.

Duc, G. 1996. Valeuralimentaireet usage des graines delégumineuses. INRA. Station de génétiqueet _amelioration de plantsdomaine Epoisses. *Sauve qui peut* ! n°8.

Duke, J. A. 1981. The gen revolution. In: office of technology assessment background papers for innovative biological technologies for lesser development countries. USGPO, *Washington paper* 1:89-150.

Eljack,B. H., I. M. T. Fadlalla,and M. T. Ibrahim. 2009. The effect of feeding cow pea (Vignaungialata) on broiler chicks performance and some carcass quality measurements.*Assiut vet. Med. Journal*. 56(124):173-180.

F.A.O. 1999.Food and Agricultural Organization (FAO) .Production year book.FAO statistics series 156. FAO Rome Italy.

Gahlawat, P., and S. Sehgal. 1992. Phytic acid, saponins and polyphenols in weaning foods prepared from oven heated green gram and cereals. *Cereal Chemistry*. 69(4): 463–464.

Gomez, K. A., and A. A. Gomez. 1984. Statistical procedures for agricultural research. John Wiley and sons, Inc. London, UK (2ed) .13-175.

Kana, J. R., A. Teguia, and A. Fomekong. 2012. Effect of Substituting Soybean Meal with Cowpea (Vignaunguiculata) supplemented with natural Plants charcoals in broiler diet on Growth performance and carcass characteristics. *Iranian Journal of Allied Animal science*. 2(4):377-381.

kratzer, R. S.,S. C. Mitjavila ,G. Lacome, and R. Devache. 1968. Effect of Tanic acid and oxidized tanic acid on the growth of rat and chick. *journal of nutrition*. 106:212-232.

Mahadevamma, S., and R. N. Tharanathan. 2004. Processing of Legumes: Resistant Starch and

Dietary Fiber Contents. *Journal of Food Quality*. 27(4): 289-303.

Miega, J. 1987. Les facteurstoxiques des graines de légumineusesUniversité de Geneve, Suisse, p. 34.

Musa , M. M. , K. M. Elamin, K .A. Abdelatti, H. A. Elagib,and A. M. Musa. 2012. Effect of Dietary Levels of Decoticated Cow Pea (Vignaunguiculata) supplemented with Molases on Broiler Chicks Performance and Carcass Traits. *Pakistan Journal of Biological Science*. 15(21):1010-1018.

N.R.C. 1994. Nutrient Requirements of Poultry. Ninth Revised Ed. National Academy Press, Washington, D.C. PP. 19-26.

Scott , M. L., Nesheim, M. C.,and Young, R. S. 1982. Nutrition of the Chicken scatt and associate. Ithaca. New York.

Singh, U. 1988. Anti nutritional Factor of chick pea and pigeon pea and their removal by processing. *Plant Food for Human Nutrition*. 38:251-261.

Teguia, A., A. C. Beynen. 2005. Alternative feedstuffs for broilers in Cameroon. *Livestock Res Rural Dev*. 17(3). http:/www.Cipav.Org.Co/Irrd/Irrd17/3/tegu173. htm.

Teguia, A., I. B. Japou, and E. C. Kamsu. 2003. Response of broiler chickens to Vignaunguiculata(L) Walp (cowpea), and Phaleolus vulgaris (blackbean) and Voandzeiacubterranean (Bambara groundnut) as feedingredients in replacement of meat meal. *Anim. Feed Sci*. 11: 127-133.

Vaishale, A. j., K. Sadhana, P. Seema, C. Kishore, V. Shashi, S. Agte, S. Joshi, K. Khot, Paknikarand,and S. Chiplonkar.1998. Effect of processing on phytate degradation and mineral solubility impulses. *Journal of Food Science and Technology*. Mysore. 35:330-332.

Wiryawan, K. G.,and Dingle, J. G. 1999.Recent research on improving the quality of grain legumes for chicken growth. *Anim. Feed Sci. Technol*. 76: 185-193.