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EFFECTS OF REPLACEMENT OF DICALCIUM PHOSPHATE BY OYSTER SHELLS AS A SOURCE OF CALCIUM AND PHOSPHORUS IN BROILER RATIONS ON FEED INTAKE AND PERFORMANCE

[1]Saliha Hmmad Kafe Teya, [2]Arabi Haroun Arabi Haroun, [3]Somia Ammar Jabir Fadelmula
[4]Salah AdulGabar Salah Bukhari, [5]Nura El Dikeir KoGoor Hussein, [6,]*Jumaa Barram Barram Jadalla

[1]Department of Food Science and Technology, Faculty of Natural Resources and Environmental Studies, University of Kordofan, Sudan
[2]Ministry of Production and Economic Resources, north Kordofan State, Sudan
[3]Department of animal production, Faculty of Natural Resources and Environmental Studies, University of Kordofan, Sudan
[4]Department of animal production, Faculty of Natural Resources and Environmental Studies. University of Kordofan Al Salam Alfula, Sudan.
[5]Department of animal production, Faculty of Agricultural Sciences, University of Dallanj, Sudan.
[6]Department of animal production, Faculty of Natural Resources and Environmental Studies, University of Kordofan,

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ABSTRACT

This study was conducted at the University of Kordofan with the objective of evaluating effects of replacement of dicalcium phosphate with varying levels of oyster shell in broiler rations on feed intake and performance. Two hundred one day old unsexed commercial broiler chicks (Hubbard) were divided randomly into five groups of equal initial body weight and four replicates. Each group was randomly given one of the five treatment diets with oyster shell and dicalcium phosphate with 100% Dicalcuim (A) replaced by 25, 50 and 75 and 100% oyster shell (B,C,D,E respectively). The experiment was a complete randomized design. The chicks were maintained on twenty four hours light with feed and water provided ad libitum. Feed intake and body weight were weekly recorded. Feed conversion ratio was calculated at the end of the experimental period. The data were analyzed via analysis of variance. The differences among treatment means were detected via Duncan multiple range test (DMRT). The results showed that no significant differences (p>0.05) were recorded in feed intake and body weight gain of treatment that could be attributed to type Ca and P source except when the replacement increased over 50%. The results also showed no significant differences (P>0.05) among treatments in overall performance except for feed conversion ratio. Treatment (C) and (E) were significantly (P< 0.05) better in feed utilization in the 6th week. The feed cost per kg live weight was significantly (P>0.05) reduced with the increasing level of oyster shell in addition to provision of sufficient Ca and P for broiler chicks. It was concluded that Oyster shell could replace Dicalcuim phosphate without negative effects on chick performance. It recommended that studies be conducted to evaluate effects of replacement on meat quality.

Keywords: broiler ration, mineral sources, Di-calcium phosphate, Oyster shells, Performance

INTRODUCTION

Poultry includes a wide range of indigenous birds and small domesticated commercially reared animal species such as chickens, ducks, pigeons, guinea fowl, geese, rabbits and turkeys (Crawford, 1990). Family poultry production remains critically important, with estimates suggesting that more than 80% of the world poultry stock is kept in small numbers, from as few as one up to about 20. It plays a key role in many households for food and nutrition security with particular attention to extensive and small-scale intensive (Carter 2009). Broiler production is an important sector of the poultry industry, comprising 25% overall meat production, and has increased by 125% between 1999 -2009 (Windhorst, 2011). Poultry farming is the form of animal husbandry which raises domesticated birds such as chickens, ducks, turkeys and geese to produce meat or eggs for food. It has originated from the agricultural era. Poultry – mostly chickens – are farmed in great numbers. More than 60 billion chickens are killed for consumption annually. (Sanders,2020) Chickens raised for eggs are known as layers, while chickens raised for meat are called broilers (Jadalla *et al.,* 2014). Poultry production is constrained by several problems. The most important ones include the climate change with its effects on precipitation. Low amount of rainfall leads to shortage of cereal crops production, which reflected in high cost of grains price, competition with human food, and other uses as biogas recently (Jadalla *et al.,* 2014). The constraints to sustainable poultry production in North Kordofan and Sudan is mainly based on dependence of the industry on imported and expensive feed sources. Minerals are essential nutritional ingredients in animal feed since they constitute about 4% of vertebrate animal diet of which calcium and phosphorus make up more than half of this amount (Jacob, 2013). Calcium and phosphorus are essential for the formation and maintenance of the skeleton. The two minerals occur in the body in combination with each other most of the time and an inadequate supply of either of the tow in the diet limit the utilization of both (Leeson and summers 2001). The ratio of calcium to phosphorus in the diet affects the utilization of both minerals (Loughril, *et al.,* 2017). In broilers, the body calcium and phosphorus increase more than 60 times during 6 weeks of life (Mutucumarana and Cowieson,2015). Sudan poultry industry is dependent on imported ingredients and sometimes concentrated premix. Dicalcium phosphate is one of the ingredients imported in large quantities with hard currency. Dicalcium phosphate (DCP) is an excellent source of available phosphate and calcium, with an ideal Ca:P ratio for feed requirement of all types of animals. Nevertheless, the price of it is very high and increasing day after day. Therefore a strong economic incentive exists to find an alternative animal calcium and phosphorus source. Oyster shell is one of the most common species of P and Ca. It is aquatic in nature and found mostly in fresh water ponds, lakes and rivers (Mako *et al.*, 2017). The hard coating of oyster is cheaply available, crushed and used as calcium and phosphorus supplement.

***Corresponding Author: Jumaa Barram Barram Jadalla,**
6Department of an animal production, Faculty of Natural Resources and Environmental Studies, University of Kordofan, Sudan. jumaaaringola2000@gmail.com

The objective of the study

The overall objective of the study is assist in development of low cost poultry production systems based on available resources at home. The specific objectives of this study are: To study the effect of replacement of dicalcium phosphate with oyster shell in broiler rations on feed intake, body weight change and feed conversion ratio.

MATERIALS AND METHODS

The study area

This study was conducted at El-Obeid, Sheikan locality, North Kordofan State (latitudes 11º:15'-16º:30'N; longitudes 27-32ºE; altitudes 560 meters above sea level). Average temperature varies between 30-35ºC during most of the year with peaks of above 40ºC during April, May and June and with minimum temperature of 10º in January. The rainy season extends from July to October with maximum rainfall in August. Long-term average annual rainfall is about 280 mm (Technoseve, 1987; El-Tahir *et al.*, 1999). According to Ministry of Animal Resources and Fisheries, (MARF), estimates, the livestock population in the Sudan counts 103,278,000 heads, including 28,618,000 heads of cattle, 39,296,000 sheep, 30,649,000 goats and 4,715,000 camels, distributed as follows: 30.7% in Darfur, 26% in Kordofan, 25.9% in the central region, 10.9% in the East, 4.7% in the Northern region and 1.3% in Khartoum state (MARF, 2011). Goats play important roles in the livelihood of rural area through income generation via sales of their products (milk, meat, skin, etc.) or the animals themselves. They, also, play an important role in the social systems. Chicken is the most important poultry species in the State,

The experimental birds

Two hundred (200) one day old unsexed commercial broiler chicks (Hubbard type) were brought from a company in Khartoum. The chicks were weighed when received from the dealer at the experimental site and were divided randomly into five groups of equal initial body weight. Each treatment had five replicates. The chicks were put in 25 pens of 1.5 meter each. The stocking density per pen was ten chicks. Birds were given water with sugar immediately after they were weighed and divided into the experimental groups. The 200 birds were randomly assigned to the five experimental rations as treatments. All birds were orally vaccinated against Newcastle disease (Colon+IB) in 5 and 30 days old, Gomborow disease (CH80) in 14 and 22 days old.

The experimental rations

Five rations were formulated using dicalcium phosphate and oyster shells: A (100% dicalcium, 0% Oyster shells), B (75% dicalcium +25% oyster shells), C (50% dicalcium + 50% oyster shells), D (25% dicalcium 75% oyster shells), E (100% oyster shell+0% dicalcium). The rations were isocaloric and isonitrogenus (table 1). The chicks were housed in an open sided poultry house situated in an east–west direction with two meters' high walls constructed completely from bricks on the east and the west sides to avoid effect of the sun radiation, northern – southern sides were built of bricks to about half meter from the ground level. Iron posts with wire netting sides were used. Those wire netting sides were covered with corrugated iron. Each pen was separated by wire - netting frame and dimension of each pen were used to reduce heat and high humidity. Light was provided 24 at night from a 100 watt bulb per pen were used to supplement the natural light. The experimental rations were offered weekly in the morning. The chicks were grouped and weighed at weekly interval and feed consumption was recorded at the time of weighing by subtracting the residues from the feed offered. The experiment continued for six weeks. At the end of experiment, birds of the experiment were offered water but not feed for 24 hours before slaughtering. Live weight was recorded individually and then each of the birds was slaughtered by jugular vein severing. After the birds were allowed to bleed, they were scalded in hot water and feathers were plucked. Evisceration process was performed by posterior ventral cut and then completed removal of the interval organs, offal's and abdominal fats. A hot carcass weight was individually obtained for the birds. Complete randomized design was used as experimental design according to Gomaez and Gomez,(1996) The data on feed intake, live body weight gain, carcass weight and feed conversion ratio were analyzed via analysis of variance (one – way ANOVA) using SPSS version 20. The significance among treatment means was determined using Duncan Multiple Range Test (DMRT), and differences were considered significant at p<0.05.

Table (1) Percent Ingredients of experimental as percent

	Treatments(Rations)				
Ingredient	A	B	C	D	E
Sorghum	58.8	58.8	58.8	58.8	58.8
GNSC	17.2	17.2	17.2	17.2	17.2
Sesame cake	11.75	11.75	11.7	11.7	11.7
Wheat bran	5	5	5	5	5
Concentrate	5	5	5	5	5
Di-calcium	2	1.5	1.00	0.5	00
Oyster shell	000	0.5	1.00	1.5	2
NaCl	0.25	0.25	0.25	0.25	0.25

*Concentrate wafi B.V Holland contains (%) CP 40 ,lysine 12,methionine 3, Ca 10,P 4 , methionine +cesteine 2, and ME 2100 Kcal/Kg. A=100% dicalcuim phosphate 0 Oyster B=75 dicalcuim phosphate 25 Oyster C= 50 dicalcuim phosphate 50 Oyster D=25 dicalcuim phosphate 75 Oyster E= 0 dicalcuim phosphate 100 Oyster

Table (2): Calculated chemical analysis of the experimental rations treatments

Ingredient	A	B	C	D	E	P	Ca
Crude protein	22.92	22.92	22.92	22.92	22.92		
M E	3104.7	3104.7	3104.7	3104.7	3104.7		
Calcium	1.36	1.32	1.28	1.24	1.2		
Av phosphorus	0.45	0.59	0.63	0.68	0.72		
L –lysine	1.080	1.080	1.080	1.080	1.080		
Dl methionine	0.469	0.469	0.469	0.469	0.469		
Dicalcium phosphate						19	27
Oyster shell						0.06	26

A=100% dicalcuim phosphate 0 Oyster B=75 dicalcuim phosphate 25 Oyster C= 50 dicalcuim phosphate 50 Oyster D=25 dicalcuim phosphate 75 Oyster E= 0 dicalcuim phosphate 100 Oyster Source for Ca and P values: Elis 1985, Fadel Elseed *et al*., 2002

RESULTS AND DISCUSSION

Weekly Feed Intake

The effects of replacement Dicalcium phosphate with varying levels of oyster shell on weekly feed intake is presented in table (4). The results indicated that the type of Ca and P source had no significant (P>0.05) effect on weekly feed intake during the first week. On the 2nd week there was significant (P<0.05) decrease in feed intake for the group on a ration where Dicalcuim phosphate was totally replaced by oyster shell (treatment E) and treatments B,C and D were high than the last group (E) but less than the group on ration A with Dicalcuim phosphate only. However on 3rd week there were inconsistent results were significant (P<0.05) increase in feed was observed in group B, C and D while group A with 100% dicalcium phosphate in their feed intake. calcium phosphate and E with 100% oyster shell. In the 6th week the intake was significantly higher for group A and D and significantly (P<0.05) lower and similar for groups B, C and E .

Table (3) Effect of replacement of dicalcium phosphate with Oyster shell on Broiler chicks' weekly feed intake (gram/bird/week)

Weeks	A	B	C	D	E	SEM
1	107.85	106.68	103.28	105.65	101.4	3 .290
2	259.65 a	249.9 b	243.28 b	245.28 b	235.83 c	15.170
3	659.33 b	680.98 a	597.38 a	666.65 b	568.23 b	27.390
4	952.9b	1178.4 a	875.13 c	959.63b	906.23b	25.470
5	1186. 23a	1175.98a	1169.7 b	1182.55 a	1166.7b	11.480
6	1497.08 a	1455.98b	1454.6b	1493.24 a	1457.4b	16.370

SEM: Standard error of the mean. a: means with different superscripts are significantly different. a-b: Values within columns with no common superscript differ significantly (P<0.05)

Weekly Weight Gain

The effect of replacement of Dicalcium phosphate with graded levels of oyster shell on weekly weight gain is presented in table (4).The results indicated that no significant (P>o.o5) increase in weight gain that could be attributed to type of P and Ca source in first and second week. However in 3th week the group E with 100% oyster shell had the lowest weight gain compared to the other four treatments. In the 4th week treatment A and B gained significantly greater weight gain than C and D and treatment with 100% oyster shell (E) that gained the lowest weight. The last two weeks showed similar trend in weight gain.

Table (4): Effect of replacement of dicalcium phosphate with Oyster shell on

Broiler chicks Weekly weight gain (gram/bird/week)

Age (Week)	A	B	C	D	E	SEM
1	51.325	47.275	47.900	50.000	44.450	3.074
2	86.5	87.000	91.425	86.775	87.675	2.067
3	256.25ab	249.43ab	250.9ab	264.98a	190.15c	5.085
4	355.83a	308.38	326.43	337.83	295.75c	6.055
5	452.00a	448.03a	415.25b	419.5b	401.28c	5.064
6	447.525c	552.00c	480.20b	473.58b	446.80c	8.083

A=100% dicalcuim phosphate 0 Oyster B=75 dicalcuim phosphate 25 Oyster C= 50 dicalcuim phosphate 50 Oyster D=25 dicalcuim phosphate 75 Oyster E= 0 dicalcuim phosphate 100 Oyster SEM: Standard error of the mean, a: Means with different superscripts are significantly different, a-b: Values within columns with no common superscript differ significantly (P<0.05)

Weekly Feed Conversion Ratios

The weekly feed conversion rations, FCR are represented in table (5). The analysis of variance indicated that there was no significant (P≥0.05) among treatment means in weekly feed conversion ratio in the first week where all the treatments had similar treatment. In the second week treatment E with a ration of 100% oyster shell, showed significantly greater value of FCR than the other treatments. Similar results were obtained in the following weeks to the end of the experimental period indicating that more amount of feed was consumed by the group E ration of 100% oyster shell.

Table (5) Effect of replacement of dicalcium phosphate with Oyster shell on Broiler chicks weekly feed conversion ratio (gram/bird/week)

Age (Weeks)	A	B	C	D	E	SEM
1	2.178	2.154	2.149	2.121	2.215	0.000
2	2.772b	2.366c	2.661 b	2.769ab	2.890a	0.063
3	2.587	2.614	2.405	2.253	3.011a	0.056
4	2.684	2.582a	2.696	2.854ab	2.926 a	0.043
5	2.889a	2.639 b	2.703b	2.726b	2.88a	0.051
6	2.870	2.900b	3.000a	2.920b	3.000a	0.034

A=100% dicalcuim phosphate 0 Oyster B=75 dicalcuim phosphate 25 Oyster C= 50 dicalcuim phosphate 50 Oyster D=25 dicalcuim phosphate 75 Oyster E= 0dicalcuim phosphate100 Oyster SEM: Standard error of the mean, a: Means with different superscripts are significantly different, a-b: Values within columns with no common superscript differ significantly (P<0.05)

Overall performance

The assessment of overall performance of chickens as affected by the source of calcium and phosphorus has shown that feed intake was decreased upon increasing level of replacement where at levels more than 50% lead to decrease intake. Consequent growth rates were slower and that could be attributed to imbalance of Ca: P ration. Feed intake, body weight gain, feed conversion ratio and the averages have shown that slow growth rates increased amount of feed consumed to give one kilogram weight gain.. Replacing DCP with oyster shell in broiler diets at 50% DCP, 50% oyster shell (C) had inconsistent significant (P<0.05) difference when compared with treatment (D) (25% DCP, 75% Oyster shell) and control (A) (100% DCP). And replacing DCP with Oyster shell also showed significant differences (P<0.05) between (E) (100% Oyster shell) compared with treatment (B) (75% DCP,25 Oyster shell) and (C) (50% DCP,50% Oyster shell). Table (6) Effect of replacement of dicalcium phosphate with Oyster shell on Broiler chicks performance during 6 weeks experimental period.

RATIONS (TREATMENTS)

Parameter	A	B	C	D	E
Initial weight(g)	39.90	39.60	39.60	39.70	39.70
Average feed intake (g)	4431.83	4621.38	4368.35	4478.05	4566.15
Average weight gain(g)	1609.43	1692.10	1609.10	1625.95	1606.10
Average FCR	2.65ab	2.59b	2.60b	2.65ab	2.74a

% Oyster shells in Rations: A = 0% B 25% C 50% D=75% E=100%

Means with different superscripts are significantly different, a-b: Values within columns with no common superscript differ significantly (P<0.05)

DISCUSSION

In the present study, broilers groups on rations that were had iso-nitrogenous and iso-calorific consumed feed similarly except when the oyster shell totally replaced dicalcium phosphate. Feed intake in birds is determined by energy satiety ration mineral content (McDonalds *et al.,* 2010) nevertheless growth rate determines final feed intake. Decreased feed intake of the group on a ration of oyster shell might be attributed to their low growth rates. Lower growth rates of the group that had lower amount of Dicalcium could be explained on low phosphorus and calcium content of oyster shell. optimal calcium and phosphorus contents of both is important for growth of chicks especially their skeleton. The two minerals are also important in metabolic process of the body. The result of the present study showed that replacement of dicalcium phosphate with oyster shell and pure oyster shell in the broiler diet caused no significant differences (P<0.05) in feed intake compared with control diet 100% dicalcium phosphate throughout the experimental period, therefore adequate calcium and phosphorus are found in treatment. Similarly to those reported Omole *et al.,* (2005) who found that replacement of dicalcuim phosphate by oyster shell did not decrease feed intake but growth rate. They found that excess calcium may lead to phosphorus deficiency by the formation of insoluble calcium phosphate in digestive tract, impairs metabolic functions. Excess dietary calcium will also contribute to decreased feed intake. Similar results were reported by Roche, (2000) who showed that a high molar ratio of calcium to phytate can lead to formation of externally insoluble calcium-phytate molecule inaccessible to phytase. Total body weight was influenced by the inclusion of dicalcium phosphate and oyster shell in treatment some treatments especially after exceeding % oyster shell over 50% replacement which showed significant (P<0.05) decrease in growth rate . This result was similar to that found by (Bavaresco and Martinez, 2005). He reported that the ratio of calcium to available phosphorus of the diet is the main factor for achieving optimum weight gain during the starter period. In this case of broilers, it is claimed that as the total Ca:P and calcium to phosphorus ratio increased in the diet, biological performance {body weight gain .final live body weight and feed conversion decreased. The result showed that best feed utilization is in the last weeks, these are in accordance with (NRC, 1994, Bavaresco and Martinez, 2005). It is known that the main structural function of calcium and phosphorus is in make – up of bones of the body. Young starter and finisher broiler chicks need a minimum of 1% calcium and 0.5%-0.7% available phosphorus in the diet .we observed a wide range of variation and optimum utilization in feed conversion ratio between treatments every week. This may be due to the available Ca and Pin the diet (Bavaresco and Martinez, 2005) found that most calcium associated problems are related to excess calcium or insufficient levels of available phosphorus. As a result most calcium and / or phosphorus problems are manifested as phosphorus deficiency. In accordance with several finding in literature (whitehead, 2002) the normal contents of starter diets are 10 gram calcium and 4.5 gram available phosphorus/Kg in an approximate ratio. According to Avian Farms (1996), calcium levels in starter and grower diets should be 0.9-1% and 0.85-0.95% respectively. At the same time available phosphorus levels of 0.47-.50% and0.42-0.475 are recommended for chick starter and grower diets, respectively. The result of the present study showed that during 6th week treatment (C) (50% dical, 50% oyster shell) and (D) (25% dicalcuim, 75% oyster shell) and at total replacement of Dicalcuim with oyster shell there was significant (P<0.05) increase on feed conversion ratio compared with other treatment. This is in line with (Weaver,2001) who found that decline in calcium levels result in increased excitability, whereas high levels result in a pseudo – tranquilizing effect. On the other hand (Driver *et al.,* 2006) found that extremely low levels of calcium can result in tetany, which is followed by death. may also lead to phosphorus deficiency by the formation of insoluble calcium phosphate in digestive tract. In the present study it was observed that treatment (D) (25% dicalcuim, 75% oyster shell) and (E) (100% oyster shell) had shown significant (P<0.05) effect with other treatments and similar to treatment (A) (100% dicalcuim) , therefore available Ca : P ratio. These results are in agreement with the results reported by Angel (2013) who reported that it is important that the balance between calcium and phosphorus is seriously considered formulating poultry feeds. Driver *et al.,* (2006) also reported that calcium given freely for poultry to consume, as hen body desires to replace the loss during heavy production.

REFERENCES

Angel, Roselina (2013). Calcium to Phosphorus Ratios in Broilers 24th Australian Poultry Science Symposium http://en.enormix.com

Bavaresco, Caroline and Martinez, Fernando N(2020)calcium: phosphorus ratios and Supplemental phytase on broiler performance and bone quality. Journal of Applied Poultry research volume 29, issue 3 pp-584-599

Compassion in world farming, http://ciwf.org.uk

Mutucumarana .R .K., Ravidran V, Ravidran, G and Cowieson A.J. (2015). Measurement of true ileal phosphorus digestibility in meat and bone meal for broiler chickens. Poultry Science Volume 94, issue 7 Pp 1611- 16187

Crawford, R.D.,(1990).Poultry Breeding And Genetics, Elsevier p 1 ISBN 0444-88557-9

Driver,J P , Pesti GM, Bakalli R I Edwards HM Jr(2006).The effect of feeding calcium and phosphorus deficient diets to broiler chickens during the starting and growing-finishing phases on carcass quality . poult Sci 85(11)pp 1939-1945

Elis, N (1985).The nutrients Composition of Sudanese animal feeds. Bulletin I Kuku Research Center Khartoum , Sudan

Fadel Elseed A M and Amin A Khadiga A E Abdel Ati A, Sekine J Hishinuma M and Hamana K (2002).Nutritive Evaluation of some fodder tree species during the dry season in Central Sudan. Asian –Australian Journal of Animal Science, 15(6): 844-850

Gomez, Kwanchai A and Gomez, Arturo A(1996).Statistical Procedures for Agricultural Research, A Wiley Inter-science Publications John Wiley and Sons

Jacob, Jaquie(2013)minerals in organic poultry production. http://eorganic .org/nor

Leeson ,S., and Summers , J.,(2001).Scotts Nutrition of the Chicken.4th edition , University BooksmGuelph , Ontario, Canada

Loughrill E, Wray D, Christides T, Zand N.(2017).Calcuim to Phosphorus ration. Essential elements and Vitamin D in infants food in the UK, possible implications for bone health. Matern hild Nutri.

Mako, A.A., Mosuro, A.O., Adejoke,B.S, Jemiseye F.O.,, Abokede,T, ,F(2017). Comparative use of Oyster shell and limestone as sources of calcium in diet of laying chickens Nigerian Lournal of Animal Production, Vol.44(1) 275-281Nigerian Society of Animal Production

NRC, National Research Council (1994).Nutrient Requirement of Poultry, ninth Revised Edition. National Academy Press Washington DC

Omole, A J; Ogbosuka, RA; Salaka, R A andAjayi O O (2005).Effect of replacing Oyster shell with gypsum in Broiler Finisher diet. Journal of Applied Sciences Research 1 (2)245-248

Sanders , Bas (2020).Global Animal Slaughter Statistics And Charts". Faunalytics. October 10, 2020 file://localhost/C:/Users/0922333125/Desktop/arabi/Poultry%20farming%20-%20Wikipedia.html

Windhorst, H. W. (2011). Special Economic Report the Role of the Egg in the Global Poultry Industry. https://www.International egg. Com/corporate/down loads/details. Asp id: 1493.

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