Chapter one

1. INTRODUCTION

Nutrient is an economic factor that affect the success of broiler and diet represent 70% of all cost that is why it is so important to care about nutrition.(Gwad1994) The increase in the price of meat and fish make citizens to shift to broilers.(Mossad1998) The poultry production depends on type, nutrition and immunity status. The introduction of balanced nutrition that contain amino acid proteins vitamins will increased the bird production . Bio-Mos is newly natural discovered substance used in animal, poultry and fish feeding.

The initial interest of using Mos is to protect gastrointestinal health originated from work done in the late 1980s. At this time researchers looked at the ability of mannose, the pure product of the oligo saccharides in Mos, to inhibit *salmonella* infections. Different studies showed that *salmonella* can bind via type-1-fimbriae (finger-like projections) to mannose. The binding to mannose reduces the risk of pathogen colonization in the intestinal tract (Oyofo 1998) . Mos as a natural nutritional supplement offers a novel approach to support the microflora and thus improve overall health and well-being.

Today how ever there is a global push to reduce the use of medically important antibiotic as feed additive for fam animals , due to concerns about this practice promoting the emergence of antibiotic resistant micro_organisms.This trend has fueled interest in natural nutritional concepts. Based on alarge body of research Mos has established itself as a one of the more important natural additives in farm animal production (Hooge _ et al 2004).

So the Objectives of this study is to determine the effect of using the Mos on broiler performance.

Chapter two

2. LITERATURE REVIEW:

2.1. MOS purposed benefits:

MOS as a nutritional supplement for companion animals,MOS is included in diets for horses, dogs, cats, rabbits and birds by feed manufacturers, mainly due to its benefits for their health. MOS as a nutritional supplement offers a natural approach to support the microflora and thus improve overall health, well-being and longevity.

To reduce the risk of digestive upsets it is critical to keep the concentrations of potential pathogens low. MOS has been shown to reduce faecal *E. coli* and C. perfringens and tended to have greater concentrations of lactobacilli and bifidobacteria (Strickling , etal. 2000).

The mechanism of action for reducing the numbers of *C. perfringens* may differ from that previously explained for bacteria with type-1-fimbriae. Research in other species has demonstrated that MOS has an effect on intestinal morphology as well as both innate and acquired immune system components, which may help to explain the observed reductions in *C. perfringens*. Research shows an increase in serum lymphocytes and lower plasma neutrophils when adult dogs were supplemented with MOS and FOS. These findings indicate an improvement in immunity that, in turn, gives rise to increased protection against intestinal pathogens (Swanson , etal .2002).

Mannan oligosaccharides have been widely evaluated in feeding trials. As animal health and performance are influenced by many factors other than nutrition, the responses to a feed additive will vary between production systems. Therefore, a concept such as MOS should not be evaluated based on single trials. A meta-analyses, which summarizes a large number of published research trials allows for a more comprehensive overview.

Other areas of interest to dog owners are the effect of MOS on nutrient digestibility and stool quality; both for health and practical (poop-a-scoop) reasons (Kappel , etal .2004).

2.2. Structure defines function:

In the yeast cell wall, mannan oligosaccharides are present in complex molecules that are linked to the protein moiety. There are two main locations of mannan oligosaccharides in the surface area of *Saccharomyces cerevisiae* cell wall. (Stewart, etal . 1998). They can be attached to the cell wall proteins (Lesage, etal.2006). as part of –O and –N glycosyl groups and also constitute elements of large α-D-mannanose polysaccharides (Kath, etal.1999). " (α-D-Mannans), which are built of α-(1,2)- and α-(1,3)- D-mannose branches (from 1 to 5 rings long), which are attached to long α-(1,6)-D-mannose chains. (Vinogradov, etal. 1998). This specific combination of various functionalities involves mannan oligosacharides-protein conjugates and highly hydrophilic and structurally variable 'brush-like' mannan oligosaccharides structures that can fit to various receptors of animal digestive tracts, (Mansour , etal. (2003). and to the receptors on the surface of bacterial membranes, (Garofalo, et al. 2008).

Impacts these molecules bioactivity. Mannan oligosacharides-protein conjugates are involved in interactions with the animal's immune system and as result enhance immune system activity. (Wismar, et al .2010). They also play a role in animal antioxidant and antimutagenic defense

2.3. Role of Mannan oligosaccharides:

Carbohydrates are the most abundant biological molecules, and fill numerous roles in living things, including the storage and transport of energy and structural components. Additionally, carbohydrates and their derivatives play major roles in the functioning of the immune system, fertilization, pathogenesis, blood clotting, and development. Carbohydrates are important structural components of the majority of cell-surface and secreted proteins of animal cells (Osborn and Khan, 2000).

Carbohydrates are also a major source of metabolizable energy in the diet. Oligosaccharides are made from isomerization of disaccharides, enzymatic hydrolysis of polysaccharides, or by direct extraction from the cell wall of yeasts. Mannose is a monosaccharide that forms the building block of MOS. The small intestine does not contain the digestive enzymes required to break down mannan oligosaccharide bonds, and therefore they arrive at the large intestine intact after ingestion and passage through the small intestine (Strickling et al., 2000).

Mos was introduced in 1993 as a feed additive for broiler chickens (Hooge, 2003) . Bio-Mos has shown promise in suppressing enteric pathogens, modulating the immune response, improving the integrity of the intestinal mucosa, and promoting improved growth and feed conversion in studies with chickens and turkeys (Olsen, etal.1996). Much of the negative perception concerning oligosaccharides, or more specifically, soy oligosaccharides, stems from assumed depression in nutrient digestibilities and the increase in gas production resulting from fermentation of these substrates (Hata ,et al. 1991).

In addition, investigation continues into the potential relationship between oligosaccharides and human intestinal function (Jenkins et al., 1999) and their role in modulation of human gastrointestinal microflora (Gibson, 1999). Mannans on the cell surface are the primary antigenic components of whole yeast cells and cell walls (Ballou, 1970). Because many gram-negative bacteria attach to the intestinal epithelium using mannose-specific fimbriae (Ofek ,et al.1977), MOS provides competitive binding sites for these intestinal pathogens. Multiple strains of *Escherichia coli* and *Salmonella* agglutinated MOS in vitro (Spring et al., 2000). The MOS is not enzymatically digested in the small intestine; therefore, bacteria bound to MOS likely exit the intestine without attaching to the epithelium (Spring et al., 2000). Mannan oligosaccharides may also enhance health by stimulating antibody production (Savage , et al. 1996) or by affecting intestinal morphology and function (Iji et al., 2001). Inhibition of the bacteria responsible for toxin production could prevent or decrease the severity of diarrhea (Giannella, 1983).

2.4. MOS for poultry:

Uses of Mos in poultry feeding showed an improvement in performanc of chicks (Paul ,etal .2001).

MOS was fed between 0.5 to 2 kg / tone of feed in broilers . led to 1.6% improvements in body weight, 2.0% improvement in FCR and lower bird mortality. (Rosen , etal . 2007). Some researches in turkeys have shown similar responses to Mos as in broilers.(Hooge , etal . 2004) . Several studies also suggest that MOS, when added to poultry diets, allows the birds to perform at a similar level as when fed a diet supplemented with antibiotic growth promoters (AGPs).(Sims , etal .2004) . It may also have benefits for broilers during sub-optimal environmental conditions.

Previous studies have looked at supplementing sow diets with MOS with the aim of improving the health of the sows. A healthy sow produces good quality colostrums and spreads less harmful bacteria in the environment where she gives birth and raises the piglets. Several researchers have reported a significant increase in colostrums production and colostrums quality with MOS. Those changes in colostrums quality and quantity likely explain a reduced pre-weaning mortality and a higher litter size and litter weight at weaning and can thereby help to better protect the piglet from disease, thus improving piglet survival. A recent review of published literature showed that the mortality of young piglets was reduced when MOS was supplemented in the diets of the sow (Le Dividich, etal .2009). Keeping the mortality of young piglets to a minimum is important from an economical as well as from an animal welfare point of view. The next critical phase in a piglet's life is the time of weaning, when it is separated from the sow The change from milk to solid feed leads to changes in the intestinal microflora and structure and thus presents a higher risk of intestinal problems. Two meta-analyses involving a total of 123 comparison ." Miguel,etal2004)". concluded that performance was better in piglets fed MOS-supplemented feed. The data also indicated that piglets, which were particularly challenged during this transition phase (showing a slower growth rate due to the challenge), responded particularly well to MOS supplements. Positive performance effects with MOS were also reported in later production phases, however, those effects appear to be smaller than in the very young animals."Rosen, G. D. (2007)".

2.5. MOS for calves:

The first trial ever reported with Mos was with young bull calves (Newman ,etal .1993). noted improved intake and subsequently better growth rates. The health status of young calves is one of the most important factors contributing to growth and performance. Diarrhoea in young calves is a major issue in the dairy sector. The cause can be viral or bacterial, however, *E.coli* is often involved. As MOS can bind *E. coli* (see Effects of Mos on the intestinal microflora), it can modify and help to improve the composition of the intestinal microflora. This resulted in a reduction in faecal *E. coli* counts .(Jacques ,etal .1994). and improvements in faecal score in calves fed MOS. These improvements were coupled with an increase in concentrate (dry feed) intake " Heinrichs,etal . (2003).and better performance In addition to the changes in the gut, several authors also noticed improvements in re6spiratory health, which can also contribute to better performance. (Newman, etal . 2007). Conversely, one trial reported no effects on liveweight gain despite increased feed intake. Higher live weight gain, similar to that gained with the use of antibiotics, has been achieved following supplementation of milk replacer with Mos Dairy cows fed MOS had better immune protection against rotavirus and were able to pass some of this protection on to their calves. (Morrison, etal. .2010).

2.6. Growth Performance:

Antibiotics have been shown to improve growth, feed efficiency, and overall herd health when used in poultry, swine, and cattle production diets. Due to increasing regulatory restrictions based on consumer concerns, producers have begun the search for substances to replace the use of antibiotic growth promotants in production diets. Mannan oligosaccharide supplementation has been and continues to be investigated as an alternative to antibiotic supplementation to improve performance traits.

2.7 Cattle:

The effects of MOS supplementation in cattle diets has received less attention relative to production-enhancements effects of poultry and swine supplemented diets. Heinrichs et al. (2003) investigated the effects of MOS or antibiotics in dairy calf milk replacer diets, and found the addition of 4 g MOS/day was as effective as antibiotic use to maintain normal fecal fluidity and consistency and to decrease scours severity.

Addition of MOS or antibiotics increased the probability of normal scores for fecal fluidity, scours severity, and fecal consistency as compared to controls over the course of the study. Feed consumption increased when MOS was included in the diet, but this did not result in a difference in growth measures (Heinrichs et al., 2003). In this study, calves were fed to an age of six weeks. The gut morphology of neonatal calves (as during the time period of this trial) allows feed to bypass the rumen, therefore this study may not be indicative of a true ruminant trial.

2.8. Broilers:

Waldroup et al. (2003) conducted a study to evaluate the effects of combinations of antibiotics, mannan oligosaccharides, and organic forms of copper in the diet of broilers. These authors found that overall, Bio-Mos had no significant effect on feed conversion but interacted with some of the other factors. At 21 d there was an interaction between the antibiotic program and the inclusion of Bio-Mos adding Bio- Mos in the absence of antibiotics tended to improve feed conversion while adding Bio-Mos in the presence of antibiotics tended to decrease feed conversion. Lack of response to antibiotics in later stages of growth suggests that the birds were performing well with minimal stress, and perhaps is the reason for the lack of response to Bio-Mos or to the copper sources. It is also possible that the levels of Bio-Mos used in this study were not sufficient to elicit a positive.

Chapter three

Materials and Methods

3:1 The experimental site and duration:

Experimental work of the present study was carried out at faculty of animal production science and technology, Sudan University of Science and Technology ,during the period from 3rdDecemper 2014 to15thJanuary to study effect added of Y_Mos on broiler performance .

3:2Experimental birds and housing

A total number of chicks is 144 of one day old (Haberd15) were used .They were distributed randomly in to four groups of twelve equal replicates , each replicate containing 12 chicks. chicks were reared in cages of (4*4) open sided house which provided with feeders ,drinkers ,used as bedding materials .

3:3The experimental diets

The experimental diets of four levels of Y_Mos (0%, 0.06%, 0.08%, 0.1%) as group A, B, C and D were formulated as shown in (table1).

The experimental diets were formulated to satisfy the birds total requirements according to NRC recommendation.

The pre starter diets given to chicks for five days (adaptation period),followed by starter diets from 6day to 21 and finisher the from 21day to 42day .Y_ Mos was get from Khyrat Anile company in Bahri state.

3:4 Vaccination program:

The birds were vaccinated against infectious (IB) and new castle diseases(ND) in first week .At 14 days were vaccinated against Gambaro disease .The dosage then repeated at 21and 28 days of age for Newcastle disease and Gambaro respectively.

3:5Measurments:

Birds and feed were weighed daily to determine body weight and feed intake, and to calculate the feed conservation ratio (FCR). On day 42 after 4 hours all birds were weighed and slaughtered. After slaughtered the carcass was weighed.

3:6Carcass preparation:

At the end of sixth weeks the bird were fasted for 8hours before slaughtered .After that eviscerated carcass weight were recorded and dressing percentage was determined internal organ (liver)and abdominal fats and gizzard were weighed and relative weight for liver and gizzard and abdominalfats was calculated.

3:7 Mortality percentage

Dead birds were removed and recorded with inspected for possible causes. The total number of dead birds was used for calculating mortality percentage(%).

3:8 Statistical analyses:

Complete randomized design was used to analyzed the results obtained from this experiment and subjected to general liner model followed by lest significant difference test using the Spss program.

Table1. The formulation and calculated analysis of the starter

Ingredient	A	B	C	D
Fet	58.5	58.5	58.5	58.5
GNC	28	28	28	28
W.B	6	6	6	6
Con	5	5	5	5
Y_Mos	-	0.06	0.08	0.1
L.S	1.5	1.5	1.5	1.5
DCP	0.4	0.35	0.35	0.35
Veg.oil	-	_	-	-
Salt	0.2	0.2	0.2	0.2
Lysine	0.04	0.09	0.07	0.07
Premex	0.16	0.1	0.1	0.18
Mycotox	0.2	0.2	0.2	0.1
Total	100	100	100	100

Calculated analysis:

ME	12.98	12.98	12.98	12.98
CP	23.09	23.09	23.09	23.09
Ca	1.07	1.06	1.06	1.06
P	0.46	0.45	0.45	0.45
Lysin	1.20	1.25	1.23	1.23
Meth	0.53	0.53	0.53	0.53
CF	3.58	3.58	3.58	3.58

The formulation and calculated analysis of the finisher

Ingredient	A	B	C	D
Fet	63	63	63	63
GNC	23	23	23	23
W.B	5	5	5	5
Con	5	5	5	5
MOS	0	0.06	0.08	0.1
L.S	1.35	1.35	1.35	1.35
DCP	0.48	0.48	0.48	0.48
Veg.oil	1.56	1.56	1.56	1.56
Salt	0.2	0.14	0.12	0.1
Lysine	0.12	0.12	0.12	0.12
Premex	0.09	0.09	0.09	0.09
Mycotox	0.2	0.2	0.2	0.2
Total	100	100	100	100

Calculated analysis:

ME	13.40	13.40	13.40	13.40
CP	20.94	20.94	20.94	20.94
Ca	1.03	1.03	1.03	1.03
P	0.45	0.45	0.45	0.45
Lysin	1.20	1.20	1.20	1.20
Meth	0.52	0.52	0.52	0.52
CF	3.31	3.31	3.31	3.31

Chapter four

4. RESULT:

Table no (2): Effect of Add Y_mos on Daily Feed Intake Per day (g/day):

Feed Intake per Day					
Treatment / Weeks	A M	B M	C M	D M	Sig
1	34.7	35.4	34.8	35.3	NS
2	80.3	80.4	77.3	77.3	NS
3	92.1	96.1	88.2	93.7	NS
4	137.6	141.4	141.4	134.7	NS
5	136.1	159.5	158.9	132.9	NS

M = mean

NS= No Significant difference ($P \leq 0.05$)

Table NO(3): Effect of Add Y_Mos on Daily Feed Intake (g) of Broiler :

Treatment / Weeks	A M ±SD	B M ± SD	C M ± SD	D M ± SD	Sig
WEEK1	242.92±3.145	248.07±6.017	243.75±1.655	246.80±0.888	NS
WEEK2	562.35±8.166	562.77±9.669	540.96±19.274	541.25±9.617	NS
WEEK3	645±72.819	672.99±62.716	617.50±1.909	655.69±3.129	NS
WEEK4	962.91±17.184	989.55±13.406	990±14.19 7	942.91±41.235	NS
WEEK5	953.19±274.683	2±328.515.1116	6±166.678.1112	930.26±23.590	NS
TOTAL	2721.37±375.99 7	3589.58±420.32	3504.81±203.71	3316.91±667.869	

M ± SD = mean ± standard deviation

NS= No Significant difference (P≤0.05)

Table. NO(4): Effect of add Y_ Mos on weightgain on broiler(g) :

Treatment / Weeks	A M ±SD	B M ± SD	C M ± SD	D M ± SD	Sig
Week1	1.782±13.599	1.846±2.78	1.664±10.271	1.755±6.198	NS
Week2	3.427±14.024[b]	3.880±8.58[a]	3.547±13.331[b]	3.579±16.42[b]	*
Week3	3.393±48.192	4.080±32.718	3.600±24.747	3.705±53.30	NS
Week4	4.445±23.716	4.842±50.260	4.549±53.287	4.930±65.948	NS
Week5	2.566±73.067	2.964±107.620	2.939±76.006	2.228±30.836	NS
Total	15.613±887.882	17.612±201.884	16.299±177.642	16.197±172.804	

M± SD = mean ± standard deviation

NS = No Sig nificant difference (P≤0.05)

* = Significant difference

a,b means the mean with different superscript in same rawe are significantly different at (p≤0.05)

Table NO(5): Effect of Add Y_Mos on Daily FCR of Broiler:

Treatment / weeks	A M ±SD	B M ± SD	C M ± SD	D M ± SD	Sig
Week1	1.363±0.107	1.343 ±0.015	1.463±0.097	1.403±0.050	NS
Week2	1.637±0.058[a]	1.443 ±0.042[b]	1.520±0.044[b]	1.508±0.095[b]	*
Week3	1.903±0.076	1.650±0.180	1.718±0.121	1.790±0.269	NS
Week4	2.167±0.136	2.057±0.228	2.193±0.297	1.940±0.352	NS
Week5	3.933±1.484	4.053±1.755	3.966±1.115	4.233±0.611	NS
Total	11.003±1.861	10.546±2.22	10.86±1.674	10.874±1.377	

M ± Std = mean ± standard deviation

NS= No Sig nificant difference (P≤0.05)

*= Sig nificant difference

a,b means the mean with different superscript in same rawe are significantly different at (p≤0.05).

Table .NO(6) :Effect of Add Y-mos of Mortality%:

Treatment / Weeks	(0%) M± SD	(0.06%) M± SD	(0.08%) M± SD	(0.1%) M± SD	Sig
WEEK1	0.0	0.0	0.0	0.0	_
WEEK2	0.0	0.0	0.0	0.0	_
WEEK3	0.0	0.0	0.0	0.0	_
WEEK4	0.0	0.0	0.0	0.0	_
WEEK5	0.0	0.0	0.0	0.0	_
Total	0.0	0.0	0.0	0.0	_

M±Std = mean ± standard deviation

NS= No Significant difference ($P \leq 0.05$)

Table No(7): Effect of add Y_ Mos on edible offals:

Treatment	A M ±SD	B M ± SD	C M ± SD	D M ± SD	sig
Liver	0.047±0.03	0.052±0.001	0.045±0.002	0.041±0.012	NS
Gizzard	0.045±0.005	0.047±0.004	0.046±0.004	0.042±0.011	NS
Abdominal Fat	0.072±0.101	0.024±0.003	0.025±0.006	0.024±0.009	NS

M± SD = mean ± standard deviation ($P \leq 0.05$)

NS= No Significant difference

Table NO (8): Effect of Add Y_Mos on Carcass:

Treatments	A M ±SD	B M ± SD	C M ± SD	D M ± SD	Sig
Carcass	1.326±0.090[b]	1.496±0.051[a]	1.353±0.058[b]	1.425±0.035[a]	**

M± SD = mean ± standard deviation

NS= No Significant difference (P≤0.05)

**=High Significant

a,b means the mean with different superscript in same rawe are significantly different at (p≤0.05).

Table .NO (9): Effect of added Y_Mos on overall performance of broiler:

Treatment / Measures	(0%) M±SD	(0.06%) M±SD	(0.08%) M±SD	(0.1%) M±SD	sig
Number of birds	36	36	36	36	_
Duration of the Experiment(day)	42	42	42	42	_
Average Initial weight (g)	131.8	134.8	137.1	137.3	_
Average Final weight (g)	1326	1502	1357	1378	NS
Average Feed Intake (g)	73.55±8.9	97.02±10	94.72±4.8	89.65±15.9	NS
Average Weight gain (g)	37.2±4.1	41.9±4.8	44.3±4.2	38.6±4.1	*
FCR g feed/g gain	1.9±2.2	2.3±2.1	2.1±1.1	2.3±3.9	*
Mortality rate%	0	0	0	0	NS

NS= No Significant difference ($P \leq 0.05$)

*= Significant difftienca

Chapter five

Discussion

The results obtained from the present study was shown that there was no significant differences (p=0.05) among different groups in both feed intake and mortality rate .

The study showed that there is a significant differences (p=0.05) in the FCR feed/g gain (table no5) and for weight gain (g) (table no4).

The study revealed that there is no significant in all weeks except in the first week between all treatments and that may be due to lower temperature in this first week .

Broiler chicks consuming the control diet (A) had lowest body weight gains through the four growth periods when compared to birds fed other diets (Table 4). This response was most noted at d 21and 28 with cumulative daily bodyweight gains of group(A) birds being lower (P < 0.05) compared to those of C birds (3.39vs. 4.08and 4.440vs. 4.84.g/d, respectively).weight gain of group (B) birds improved (P < 0.05) compared to birds fed group(A) diet .

Cumulative daily body weight gains of group (C) birds were numerically improved compared to those of group (A). Final body weight gains of birds on group (B) of (1.502 kg) were greater (P < 0.05) compared to group (A) (1.326kg), while birds on group (C) (1.357kg) and group D (1.378kg) were similar to group (A).

Feed consumed by group (A) birds (73,55 g/bird/d) was less (P < 0.05) compared to group (C) (97.02g/d) and group (C) (94.72g/d) birds per day (Table 9). At day 42, the total feed consumed by group (A),(B), (C) , and (D) were 2.721 kg, 3.589 kg, 3.504 kg, and 3.316kg, respectively. Cumulative feed conversion rate (CFCR) was numerically higher (p =0.06) in group (A) birds (2.16) compared to group (D) (1.94) at d 28 (table5). At days 35,CFCR was significantly ($P < 0.05$) improved in group (B) and (D) birds compared to group (A) birds (4.053 vs. 4.233, 2.167 respectively).

The fillet weight in relation to cold carcass from birds fed groups (B) And (D) diets were numerically improved compared to those consuming group (A) diet (1.496kg and 1.425kgvs. 1.326kg respectively).

Numerically improved compared to those consuming group (A) feed (15.41, 15.40, or 15.40 vs.15.21 %, respectively).(table 8).

Indicated the significant increase ($P <0.05$) for group (C) (16.299kg), (D) (16.197 kg), and (B) (17.612kg) compared to (A) (15.613kg).

In previous study showed that mannan oligo saccharide (mos) were feed to broilers ,live weight was improved through 21days and feed conversion continued to improve through 42days (Kumprecht, etal,1997).

Chapter six
CONCLUSIONS and Recommendation

6:1Conclusion:

This experiment concluded that the addition of Bio-Mos in broiler diets has improved over all performance signifcantlyin term of weight, the greater the proportion of entering Y_Mos diet cause an increase in weight of the image function to maintain the stability of feed consoumers.

6:2RECOMMENDATIONS:.

- You can rely on Y-MOS in redusing mortality as the study concluded that adding Y_Mos levels (0.1%,0.08%,0.06%) improvement in quality and softines of the meat on the other hand also observed through experience low mortality to up to 0%
- .This confirm that you can use Y_Mos as feed additive and gives better result s than other ,can be used to up 0.1% of these results we recommended that you repeat the experiment to more research studies in this area.
- It increase the immunity of broiler so it is use will reduce the incidence of disease and increase the weight.
- It reduce the toxins by enhance detoxification in the broiler gut..
- There is an urgent need to promote accurate antenatal care utilization to treat anemia early so as to prevent intra partum transfusion.
- There should be further quantitative and qualitative studies focusing on other uses of Y_Mos

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