CHAPTER ONE

INTRODUCTION

In the last two decades poultry industry has played an important role in meeting the shortage of animal protein through the increased the availability of eggs and meat in Sudan. Poultry production is the quickest way to increase the availability of high quality protein for human consumption .Since the feed cost alone conciliates about 70.75% of the total cost of production, economically poultry production is, therefore, possible only when the feed cost is reduced and efficiency of feed utilization is increased. To achieve profitable balance among the cost of feed, the broiler performance and quality of products, certain feed additives are available in market for the use in broiler ration. Someofthese additives are recommended for chemotherapeutic and prophylactic purpose while other are reputed for the growth promoting effect.

For several decades antibiotics and chemotherapeutics in prophylactic doses haves have been used in animal feed to improve animal performance and to obtain economic benefits in terms of improve animal performance and reduce medication cost. However, there are increasing concerns about the risk of developing cross resistance and multiple antibiotic resistances in pathogenic bacteria in both human and livestock linked to the therapeutic use of antibiotic livestock. **(Hajati and Rezaei, 2010) Ashayerizadeh*et al* 2011)**consequently, some countries have banned or limited(EuropeanUnion January2000, total withdrawal Jan, 2006) the general use of in feed antibiotics as growth promoter in animals **(Elijah and Ruth 2012)** In order to find better alternatives to antibiotics research has focused on utilization of natural feed additives such as enzymes, probiotics, prebiotics, synbiotics ,organic acids and their extracts **(Yang et al2009)**in animal nutrition

probiotics are defined as a viable microorganism used as feed additives, which feed to beneficial effect for the host by improving its microbial balance **(Fuller, 1989)** the propertiesof the indigenous microflora**(Havenaar and Hutsin,1992)**. Variety of microbial species have been used as probiotics, including species of Bacillus,Bifidobacterium, Enterococcus,cherchia , Lactibacillis, Lactococus,Streptococcus,avariety of yeast pecies,and undefinedmixed culture.Lactovacillus and Bifidobacterium species have been used most extensively in humans, whereas species of Bacillus ,Entrococcus and Saccharomyces yeast have been the most common organisms used in livestock

(Simon*et al* 2001).The possible modes of action of probiotics were extensively reviewedby**(Jin*et al,* 1997) Simon et al .2001,Ghadban2002,Edens,2003)**. Two basic mechanisms by which probiotic act to maintain beneficial microbial population include "competitive exclusion" and immune modulation, competitive exclusion involves. Competition for substrates, production of antimicrobial metabolites that habitat pathogens and competition for attachment sites **(yangand Choct 2009).**

Prebiotic defined as a non- digestible feed ingredient which beneficially affects the host by selectively stimulating the growth of and /or activating the metabolism of one or limited number of health promoting bacterial in the intestinal tract, thus improving the hosts microbial balance **(Gibson and Roberfriod 1995).**The growth of endogenous microbial population groups such as bifidobacteria and Lactobacillus is specifically stimulated and these bacteria species are perceived as beneficial to animal health. Prebiotic have the advantage, compared with probiotics, that bacteria are stimulated which are normally present in the GIT (growth intestinal tract) of that individual animal and therefore already, adapted to that environment **(Snel*et al*., 2002).** The dominant prebiotics are

fructo.oligosaccharide products (FOS,oliofructose,(anulin)**(PattersonandBurkholder,2003)**. gluco. Oligosaccharide, stachyose,malto.oligsacchrides and oligochitosan have also beeninvestigated in broiler chickens **(zhang*et al* 2003) Gao and shan,2004) Jiang *et al* 2006 and huang*et al* 2007).**

Synbioticis,its simplest definition a combination of probiotic and prebiotic **(Collins and Gibson, 1999, Schrezenmeir and de vrese, 2001).** This combination could improve the survival of the probiotic organism, because its specific substrate is available for fermentation. This could result in advantages to the host through the availability of the live microorganisms and the prebiotic **(Bengmark, 2001)**. Examples of a synbiotic are FOS(fructo.oligosaccharide) and bifidobacteria, and Lactitol and Lactobacilli **(Collins and Gibson, 1999)**.Several studies have identified the separate use of prebiotic and probiotic as natural growth promoter, but little information's were available about combined therapeutic effect prebiotic and probiotic , as synbiotic on performance of broilers Therefore this study was conducted to evaluate different levels of synbiotic product (Poultry Star) on the growth performance and subjected meat quality parameters of broilers.

CHAPTER TWO

LITERATURE REVIEW

2.1 Feed additives:

Feed for broilers and laying hens is formulated to contain an optimum nutrient concentration obtainable at reasonable cost for desirable growth production and efficiency of feed utilization, to insure that dietary nutrient are ingested, digested protected from destruction absorbed and transported to the cells of body, certain non.nutritive feed additive are sometimes used in addition to this optimum concentration and balance nutrients. Other feed additives gave been used to alter the metabolism of the chicken in an effort to produce better growth or more desirable finished products **(Leesons and Summers,2001)**

Additives are usually included in the feed mixture in very small quantities and require very careful weighing, handling and mixing. The feed additives are falling in to two groups. The first group comprises those additives that have a specific nutritional role and includes fifteen or more growth promoting substances alone. The second group covers those compounds concerned with the prevention and control of disease and here the number used has so for topped sixty. Antibiotics may be included in both groups **(Ray and Fox, 1979).** The most common Type feed additives used are:

(1) Antibiotics and arsenicals, which have been used at low levels to help protect feeds from microbial destruction and to prevent production of toxic products by the intestinal micro flora: (2) Anticoccidials, Which are routinely used in broiler feeds and also (usually at lower levels) in diets for rearing replacement

pullets (3) Antifungal, have been used to prevent growth of harmful molds and fungi in feeds or in the digestive tract of the chicken: (4) Worming drugs, which are periodically added to feed for protection against internal parasites. (5) Antioxidant, are used to protect poly- unsaturated fatty acids and that fat soluble vitamins from destruction by peroxidation,(6) probiotic, which can be used to influence the intestinal micro flora ,(7) enzymes, which have been shown, under certain condition, to improve the digestibility of specific nutrients,(8) pellet binders, which effect texture and firmness of pelleted feeds, (9) Flavoring agents, have been used in an effort to improve the palatability of feed,(10) carotenoids, which are added to many feeds to improve pigmentation of broiler or egg yolks **(Parks *et al*, 2000,and Allam,2000)**

2.2Antibiotics

The aim of the intensification of crop and livestock production is satisfy the demand people for food, especially for animal protein. Therefore, the process animal growth must be supported by various feed additives. Until January 2006, themost commonly used supplements were antibiotic growth promoters (AGP) Antibiotic growth promoters, which gave the positives production result , despite the poor living conditions of animals and restrict certain diseases of the digestive system **(Slizewska,*et al*. 2006)**

Feed antibiotics stabilize the micro flora of the gastrointestinal tract, by limiting the growth of negative microorganisms and their toxins, promote the growth of beneficial bacteria's, reduce the emission of methane and ammonia, cause better use of phosphorus, whereas in poultry they reduce the risk of coccidiosis. Furthermore, feed antibiotics accelerate growth and extension the weight of meat of animal. The presence of antibiotics growth promoters in animal

feed causes thinning of the intestinal wall and better their blood supply. As a result of this increased absorption of nutrients from the intestinal lumen is observed **(Roozbeh*et al*, 2012).** However, there a problem possible negative effect of feed additives on the quality of animal products, as well as on human health. Threats to humans and animal have become antibiotics, resistant strain of bacteria that are selected under the influence of use of antibiotics. Susceptible bacteria at the time of contact with the antibiotic are suppressed in growth or destroyed, while the resistant bacteria present in the gut flora can multiply to higher or lower degree. Suppressionofantibiotics. Sensitive bacteria created an opportunity for colonization by resistant bacteria derived from external sources. Frequent use of antibiotics not only conducive to the formation, but also fortification of resistance in bacteria.**(Dankowialowskaand Marek2013)**.

In the European Union antibiotic growth promoters have been withdrawn on 1 January 2006, in accordance with Directive No A5.0373/2002.This prohibition is a challenge for farmers and feed producers, and leads to look for new nutritional solutions and the application of such supplements that are safe for animal of food production. Modern methods and farming and animal nutrition entails numerous of threats which previously were eliminated by antibiotic growth promoters .Alternative to antibiotics may constitute aprobiotics and prebiotics ,which stabilize the gut micro flora and control the multiplication of pathogens . This property is the basis for the mechanism of "competitive exclusion" (CE) **(Elijahand Ruth, 2012)**.

2.3 Probiotics :

Probiotics, a name which means for life, has been defined in several ways. In the beginning it was defined as those substances produced by microbes that stimulate one another **(Lilly and Stillwell , 1965:Hounidonougbo*et al* ,2011)** but

later this term was used for animal supplements which produce beneficial effects on the host animal **(parker 1974Saleh and Hayashi, 2011)** Later still the definition was refined to live microbial cultures beneficially affect the host by improving its intestinal microbial balance **(Fuller ,1989)** The experts of the joint FoodandAgricultureOrganizationoftheUnitedStates/WorldHealth organization(FAW/WHO)define Probiotics as, live microorganism which ,when administered in adequate amounts,confer health benefit to the host **(Anonymous ,2001)** Today it is well recognized that probiotics are strain –specific living microbial cultures that produce beneficial effects on the host's body **(O'Dea *et al* .2006)** These living organisms may be bacteria ,fungi or yeasts **(Fox, 1988)** They are isolated from the gut of a healthy adult animal typical of the same species to which the probiotics will be given**(O'Dea *et al*.2006).** Probiotics are being used to improve the health of birds and subsequently result better production **(panda *et al* 2003)** The success of probiotics depends upon the survival and stability of the probiotics ,the strain ,specificity of the strain to the host , dose frequency ,health and nutritional statues of the birds as well as the age physiological stress level, and genetic make- up of the host **(Chichlowski*et al* 2007)** .

Important species commonly used asprobiotics are L, bulgaricus ,L, plantarum ,L acidophihus ,L helveticus , L, lactis , L, salivariusL.casei, Bacillus subtilis, Enterococcus faeciumstreptoccus thermophiles, Enterococcus faecalis,ASpergillu, oryzae, saccharomyces cerevisiae ,Bijidobactrriumspp .and E.coli **(Starvic, 1987; Fuller 1989; O'Dea *et al* .2006 ;choudhari*et al* 2008; Hassanein and Soliman,2010)**several fungal genera, which include Asperigillus,oryzae, saccharomyces cerevisiae and saccharomyces acidophilum, have also been reported as probiotics **(Huang*et al* 2004)**

2.3.1Characteristics of effective probiotics:

Just as not all strains of bacteria are the same , not all probiotics are the effectiveness of a probiotic supplement depends upon what it contains and agood Probiotic should have the following characteristics :

* The culture should be acid and bile resistant and should contain a minimum of 30,109 CFU**(Patterson and Burkholder , 2003: Choudhari*et al*2008)**

* It should be strain specific. The culture should possess survival ability and multiply fast in the conditions within the poultry gut **(choudhari*etal,* 2008)**

* The culture should not have any side effects. It should be neither pathogenic nor toxic to the host **(Patterson and Burkholder, 2003Choudhari*et al,* 2008)**

* The culture should have a strong adhesive capability with the digestive tract of the poultry **(Patterson and Burkholder, 2003)**

* Be durable enough to withstand the duress of commercial manufacturing, processing and distribution **(Patterson and Burkholder, 2003)**

The culture should have the a ability to reduce pathogenic microorganism **(Patterson and Burkholder, 2003)**

* The culture should have ability to reduce pathogenic microorganisms **(Patterson and Burkholder, 2003Choudhari et al, 2008)**

* It should be able to modulate immune response **(Patterson and Burkholder, 2003)**

2.3.2Modeofactionprobiotics:

The probiotic term was first used for the substances produced by microorganisms that stimulate the growth of man and animals. This name was taken from the latin words "pro"and"bios".Probiotics (for the life) are preparations containing the required intestinalmicroflora, applied in the form of living cells or yeast, or spores. Microorganisms usedfor obtaining the probiotic preparations for animals are micro-organisms of thespecies Bacillus, Enterococcus, Lactobacillus and Saccharomyces. Probiotic bacteriaworks in two ways. The first one is the competitive exclusion - bacterias in thegastrointestinal environment, produce substances which inhibit growth of pathogenicmicroorganisms and compete with them for a place in the intestinal epithelium. Thesubstances are short-chain organic acids (lactic, acetic, propionic), bacteriocins (nisin, acidolina, acidofilina, lacatcyna, lacocydyna, reutryna, laktoline, entrocine) andhydrogen peroxide. Bacteriocins have a high antibacterial activity against Escherichiacoli, Salmonella, Staphylococcus aureus, Clostridium perfringers, Campylobacter.

The second mode of probiotics action is to stimulate the efficiency of immune system. Infant is born with a sterile digestive system, and before his organism will be able toproduce its own antibodies, microorganisms from the environment begin to colonizethe digestive system. Therefore, the use of probiotics, due to their ability of adhesionto the intestinal mucosa, allows to create a natural barrier against potentialpathogens, and thus enhances immunity. Probiotic stimulation of the immune systemmanifested by increased production of immunoglobulin, increased activity ofmacrophages and lymphocytes, and stimulate the production of γ-interferon **(Yang et al., 2009; Pietrasand Skraba, 2000; Świątkiewicz andKorelski, 2007).**

Key role in the digestive system in maintaining and shaping the microbial system playtwo segments: crop and cecum blind. In the crop lactic acid bacteria’s causes areduction of pH, synthesize short-chain fatty acids and pre-digest

(bacterial-enzyme) feed. Therefore, bacteria's protect the gastrointestinal tract against colonization bypotential pathogens and prevent their proliferation. In the gut microbial fermentationprocess takes place. They are produced short chain fatty acids, which in the refluxprocess are not only nutrient for the intestinal epithelium, but also are the controlfactor living there micro flora. Addition of prebiotics reduces the colonization ofpathogens and their movement into the internal organs and eggs, moreoverincreases the absorptive surface of intestinal. This facilitates the absorption ofnutrients and secretion of digestive enzymes, leading to improvement of digestibilityand assimilation nutrients delivered in the feed. In laying hens fed a mixture with theaddition of probiotics, it is higher productivity, better feed conversion andimprovement of the thickness and strength of egg shells. Similar effects wereobtained for broiler chickens, where was noted a decreased mortality, increasedweight gain, better slaughter parameters and a higher weight of edible offal (heart, stomach). Moreover, the pH of the contents of the small intestine, and caeca wasreduced. Probiotics applied for broiler chickens decrease levels of triglycerides andLDL fraction in the blood **(Janocha*et.al.* 2010; Islam, *et. al.*, 2004; Taherpour*etal,* 2009).** Growth and activity of probiotics are effectively stimulated by prebiotic preparationsbetween prebiotics and probiotics a mutual correlation exists. Animal diet may besupplemented with both of these components by using synbiotic preparations.

2.4Prebiotics

Prebiotics are defined as a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon **(Gibson and Roberfroid1995).** In other words, prebiotics are meant to provide a substrate for beneficial gastrointestinal microbes. Large amounts of bacteria present in the monogastric small intestine and

are potentially capable of utilizing these indigestible carbohydrate sources for energy. Recently, some researches **(Houdijk et al., 1997; Hillman, 2001)** have been conolucted to manipulate beneficial bacteria in Gastrointestinal Tract (GIT). **Bezkorovainy (2001)** suggested that the use of prebiotics is a promising approach for enhancing the role of endogenous beneficial organisms in the gut. They can be used as potential alternatives to growth promoting antibiotics**(Hatemink, 1995).** The European Union has banned all in-feed use of antibiotics from 2006 and the use of antibiotics in feed is being considered for elimination (or intense regulation) in other parts of the world. This perspective has stimulated nutritionists and feedmanufacturers to search for new and safe alternatives. The primary alternatives studied include; acidification of the feed by organic acids, feeding probiotic organisms and feeding prebiotic compounds. In the ’l980’s the possible potential effects of prebiotics in animal feeds was already recognized. Since then the interest in the use of prebiotics in animal feed and pet food has resulted in a high research activity. The use of prebiotics in diets for farm animals and pets has been documented by **Mul and Perry (1994)** farm and pet animals**, Houdijk *et al* 1997, lji and Tivey(1998; I999), Flickinger and Fahey (2002) and Patterson and Burkholder (2003)**. The non-digestible inulin-type fructans are found widely in many vegetable feed and food ingredients and are perhaps the most well studied and documented prebiotics in domesticated animals **(Flickinger et al., 2003)**.The use of prebiotics or fermentable sugars instead of antibiotics is going to be popular in birds in order to improve the useful microbial population of the Gastrointestinal (GI) tract **(Kermanshahi and Rostami, 2006)**

2.4.1 Advantages of prebiotic supplementation:

Favorable effects of addition of prebiotics reflect in presence of antagonism towards pathogens, competition with pathogens, promotion of enzyme reaction,

reduction of ammonia and phenolProducts and increase of resistance to colonization.

- Improve gut health (improvement intestinal microbial balance).

- Improve performance.

- Enhance nutrient utilization (eg, amino acids and proteins).

- Decrease environmental pollution.

- Decrease production cost **(Perice*t al*., 2009; Khksare*t al*., 2008;Ghiyasi*etal*., 2007).**

2.4.2 Characteristics of prebiotic:

- Should be neither hydrolyzed nor absorbed in the upper part of the gastrointestinal tract.

- Be a selective substrate for one or limited number of bacteria commensal to caecum/colon, which are stimulated to grow or metabolically activated.

- Able to alter the colonic flora in favor of a healthier composition.

- Induce systemic effects that are beneficial to the host's health.

-Should have known structure، which can be document.

-Should be palatable as feed ingredient and large scale processing most be easy.**(Hajati and Rezaei (2010)**

2.4.3 Substances used as prebiotic:

Non-digestible carbohydrates (oligo and polysaccharides), somePeptides, proteins and certain lipids (both ester and ethers) is candidate

prebiotic. Lactose is a disaccharide consists of glucose and galactose, which has prebiotic effect in chickens. Since chickens does not have lactase enzyme, lactose enters to the lower segment of the intestine and caeca, where hydrolyzed by microbial activity. The dominant prebiotics are fructo- oligosaccharide products (FOS, oligufroctose, inulin); gluco-oligosaccharides, stachyose, malto-oligosaccharides and oligochitosan have also been investigated in broiler chickens **(Jiang *et al.*, 2006; Huang *etal.*, 2007).**

2.4.4 Mechanism of actions of prebiotic:

Prebiotics can either directly bind the pathogens or increasing the osmotic value in the intestinal lumen. However, they have indirectly effects through metabolites that are generated by intestinal flora while utilizing prebiotics compounds for their own metabolism. Mechanism of actions of prebiotic can be listed as followed:

1. Lowering the gut pH through lactic acid production **(Chio*et al*., 1994; Gibson and Wang, 1994).**

2. Inhibiting/preventing colonization of pathogens **(Morgan *etal.*, 1992; Bengmark, 2001).**

3. Modifying metabolic activity of normal intestinal flora **(Demigne*etal*., 1986).**

4. Stimulation of immune system **(Monsan and Paul, 1995).**

Poultry health: by adding prebiotics to poultry diets, producers can minimize the use of antibiotics and drug resistance to bacteria. **Patterson and Burkholder (2003),** have reported that prebiotic supplementation can improve health status of the bird's gastrointestinal tract. FOS reduced the colonization of Salmonella in the chickens' intestine, especially when the animals received competitive exclusion flora in addition to FOS **(Bailey *etal*, 1991).** Supplementation of 0.4% FOS in the

diet of broiler chicks significantly increased the number of Bifidobacteria and Lactobacilli and decreased E. coli in the caecum and small intestine. FOS has been observed to alleviate Salmonella induced necrosis of cecal mucosal epithelium, enhances the length of ileal microvilli **(Chio*et al*., 1994)** and thereby increases the surface area for digestion and absorption of nutrients. However; there are many considerations in supplementing prebiotics in animal feed. These include the type of diet (i.e., the content of non-digestible oligosaccharides); the type and inclusion level of the supplements; the animal characteristics (species, age, stage of production); and the hygiene status of the farm **(Verdonk*et al*., 2005).** The primary ones are the type and inclusion level of the supplement as high dosage of prebiotics can have negative effects on the gut system and retard the growth rate of birds as observed by **Biggs *et al*. (2007)**. It is reported that rapid fermentation of prebiotics, leading to highconcentrations of organic acids, impaired the barrier function, which reduced the ability of rats to resist salmonella infection **(Ten Bruggencate*et al*., 2003).**

2.4.5 Beneficial effects of probiotics and prebiotics:

Pathogens have to overcome numerous obstacles inorder to colonize the intestinal tract and cause an infection. In addition to the physical restraints of low gastricpH and rapid transit time in the small intestine, pathogenshave to overcome the inhibitory effects of the intestinalmicrobiota, the physical barrier of the response of host immune tissues. The concept that epithelium, andcross-talk between these systems and between pathogensand the epithelium occurs is well established. Recent datademonstrate that at least some species of non-pathogenic Intestinalmicrobiotaalso communicate with the epithelium and immune system, modulating tissue physiologyand ability to respond to infection. Probiotics and prebioticsalter the intestinalmicrobiota and immune system toreduce colonization

by pathogens in certain conditions. As with growth promotantantibiotics, environmentaland stress status influence efficacy of prebiotics and probiotics. These products show promise as alternatives for antibiotics as pressure to eliminate growth promotantantibiotic use increases. Defining conditions under whichthey show efficacy and determining mechanisms of action under these conditions is important for the effective useprebiotics and probiotics in the future.**(Hajati and Rezaei (2010).**

2.5 Synbiotics:

A synbiotic is, in its simplest definition, a combination of probiotics and prebiotics **(Collins and Gibson, 1999; Schrezenmeir and De Vrese, 2001).** This combination couldimprove the survival of the probiotic organism, because its specific substrate is available for fermentation. This could result in advantages to the host through the availability of the live micro-organism and the prebiotic. **Bengmark (2001)** regards synbioticsas products of fermentation. Since in mixtures of pre- and probiotics, the prebiotics willbe fermented when the appropriate choice of products is used, this definition may also be possible. Examples of synbiotics are FOS and bifidobacteria, and lactitol andlactobacilli **(Collins and Gibson, 1999).Bailey *et al.* (1991)** used a combination ofFOS and competitive exclusion flora to reduce Salmonella colonization in chickens. The combination was more effective in reducing Salmonella colonization than FOS or competitive probiotic alone. While applying the combination of FOS and bacillus to a corn-soybean basal diet, **Li et al. (2008)** observed that average daily gain (ADG) andFCR were improved by 6% and 2 %, respectively; diarrhea and mortality rate were reduced by 58% and 67%, respectively, which were very comparable to aureomycin treatment (the relative changes are 4% for ADG, 2% for FCR, 69% for diarrhea rate and33% for mortality rate). To our knowledge, this is the only experiment publishdegrading the growth-promoting effects of synbiotic in broiler chickens

thus far.Therefore more research is warranted on this kind of products in order to achieve the application significance in the industry HoweverSynbiosis is a term that encompasses two different concepts, specifically, provision of a prebiotic and a probiotic in the same product. First, a prebiotic is an indigestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon **(Gibson &Roberfroid, 1995).**The definition of prebiotic overlaps with that of a dietary fiber. Thus, a synbiotic must contain, as an example, fructooligosaccharides (FOS) that are naturally occurring indigestible short chain fructose polymers found in artichokes, chicory root, garlic, banana, onion, barley, wheat, rye, tomato, asparagus root, brown sugar and honey constituting the fiber used for Bifidobacteria fermentation resulting in lactic and acetic acid production that will kill acid sensitive bacteria and promote the growth of acid loving bacteria such Lactobacillus**(Gibson &Roberfroid, 1995).** A synbiotic relationship between a prebiotic substance and a probiotic organism suggests synergism, and in this case, provision of FOS would promote indigenous Bifidobacteria and indirectly promote Lactobacillus spp. resulting in direct benefit for the host **(Schrezenmeir& de Vrese, 2001).** Thus, provision of FOS will selectively promote healthful Bifidobacteria and Lactobacillus through acid production in the intestine, and these events will tip the balance of the gut microecology in favor of beneficial bacteria away from E. coli, Salmonella, Clostridium, Campylobacter, Citrobacter, and other potential pathogens. **Maiorka*et al.* (2001)** have shown that the use of a synbioticcomposed of Saccharomyces cerevisiae cell walls and the spore forming Bacillus subtitles was an alternative to the use of antibiotics in broiler feed.

2.5.1 Competitiveexclusion: probiotics, prebiotics and synbitics:

The Competitive Exclusion term was first used in 1969 by Greenberg and referred tothe phenomenon in which one strain of bacteria are competing with other bacteria forcolonization of intestinal epithelium **(Edens, *et. al*., 1997).**The emergence of "competitive exclusion" technology allowed in some way to control the disease among the poultry and to prevent them in the early stagesof the life of birds. Furthermore, the application of CE affects the reduction ofmortality among birds and better feed conversion, lowering the viscosity of matterand increase the amount of dry matter in faeces. Numerous studies have shown thatthe method of competitive exclusion is the most effective and the least harmful way ofcontrolling microbial balance of the digestive tract in poultry, which can protect thehost against pathogens such as E. coli, Yersinia enter colitica, Campylobacter jejuni, Campylobacter perfringers, which causes i.a.necrotizing entercolitis.**(Dankowiakowska*et al* (2013)**

2.5.2 The mode of CE action is:

Reducing intestinal epithelium colonization by pathogenic bacteria;

- inhibiting the activity of bacterial toxins;
- stimulating the local activity of the immune system;
- nutrition intestinal epithelial cells **(Jeffrey, 1999)**

2.6The effect of dietary of synbiotic (SYN) on performance of broilers:

Karaoglu and Durdag(2005) tested the influence of dietary probiotic (115-Biogllinox) which containing Saccharomyces cerevisiae at 4*10 colony forming units/g on the performanceand carcass properties of broilers. There dietary treatments were used; p0: (control) 0 gm probiotic/kg; p1= 1gm probiotic/kg and p2=2gm probiotic/kg;and the experiment was extended for 48days . The result showed no significant differences in average daily weight gain feed consumption (except from 8 to 14 days and from 22 to 28 days) and feed efficiency (except

during first two weeks of age). The dietary probiotic (SC) reduced or prevented the mortality. Also the probiotic treatment had no significant effect on hot and cold carcass weight.

Behrouz et al (2012) investigated the effect of dietary supplementation of prebiotic, synbioticand acidifier on broiler performance chickens.Five experimental diets for six weeks. The dietary treated were: 1/ control 2/ Basal diets supplemented with prebiotic (1kg of active MOS/ton) 3/ Basal diets supplemented with probiotic (150/100/50gm of protexin/ton of the starter grower and final diets respectively. 4/ Basal diets supplemented with symbiotic (1kg of Amax4x/ton) 5/ Basal diets supplemented with acidifier (2 liter Gobacid/ton) The result indicated that the highest body weight in synbiotic group which was significantly ($p<0.05$) higher than control group, the body weight of broiler in probiotic group was similar to control. prebiotic and acidifier groups($p>0.05$).Daily weigh gain were significantly ($p<0.05$) increased in experimental groups compared the control group. Total feed intake did not show any significant ($p<0.05$) different between experimental groups. The result showed decreased significantly ($p<0.05$) in FCR of broiler chicks in prebiotic and probiotic group compared with control group.

Gödöllö and Hungary (2004) studied the effect of Biomin (Poultry Star) synbiotic on broiler performance two groups used in this experimental. Group 1 negative control and group 2 additive synbiotic 20g/1000 bird. The results showed that the addition of synbiotic to the diets caused a significant improvement in the final body weight gain and feed conversion ratio of the broiler chicks.

Texas, (2006) investigate the effect of Biomin (symbiotic) on growth parameter performance of broiler chickens. Two groups used in this experimental group1 negative control and group2 Biomin treatment (20g/1000 birds) the result indicated

that the body weight was significantly higher ($p<0.05$) in the chicks fed on synbiotic diet compared to those control group. FCR was significantly ($p<0.05$) improved in broiler receivingBiomin compared in the control group.

Hungary (2004) investigated the effect of synbiotic on broiler performance. Three groups were used in this experiment group (1) negative control (no additives) group2 additives SYN 20/100birds/day via drinking water. Group (3) positive control, antibiotic treatment(2.5mg/kg Avilamycin). The result indicated that the chicks group2 had significantly ($p<0.05$) LBW, BWG compared the negative and positive control groups. Mortality rate were reduced by 50% in treated groups compared to the negative groups.

Hossanein,(2012) the studied effect of probiotic and prebiotic as growth promoting on performance of the broiler chicks. Three diets were used in this experiment. Basal diets (1) negative (control) (2) probiotic100gm/ton protexin(3) prebiotic(1g/kg). The result showed that the FCR and BWG of prebiotic treated were significantly ($p<0.05$) higher compared with probiotic and control groups.

Falaki*et al*, (2010) evaluated the effect of different levels of probiotic and prebiotic on performance and carcass characteristics of broilers chickens. Five tested diet with fermacto(1000 and 2000gm/ton) premalac (900gm/ton) mixture of the fermacto (1000gm/ton) + primalac(900gm/ton) respectively. The result indicated that, the synbiotic group (primalac+ fermacto) had the higher feed intake in each period and allover of the trial. In starter period, (primalac+ fermacto) was significantly ($p<0.05$) higher in body weight gain for broilers fed on mixture PR (900gm) (2000gm/ton). The lowest FCR was belonging to prebiotic (2000gm/ton) the group fed on the mixture had significantly ($p<0.05$) higher of carcass yield.

Roozbeh*et al* **(2012)** studied the effect of probiotic on growth performance. Four diets were used in this experiment (1) control without probiotics(2)experimentalgroup containinprotexin(3) Experimental group contain in primalic(4) experimentalgroup containing Calciparine. The result indicated that feeding broiler with probiotic have significant ($p<0.05$) positive effects on average daily gain(ADG) and (FCR). While it appeared in significant on daily feed intake (DFI) .

Awad*et al*, (2009) investigate the effect of dietary supplementation of synbiotic and probiotic on broiler performance. The dietary treatment were (1) control (2) basal diets supplemented with synbiotic (1kg of Biomin/ton of the starter diets and 0.5kg/ton of the grower diets)(3) basal diets supplement with probiotic (1kg of ahomofermetative and aheterofermetative lactobacillus/ton of feed). The result indicated that the BW, average daily weight gain, carcass yield percentage and FCR were significantly($p<0.05$) improved by the dietary inclusion of the synbiotic compared with the control and probioticfeed broiler. Moreover a slight improvement in performance traits was observed in broilers fed the probiotic compared with control birds.

Mountzouris*et al*, (2010) evaluated the effects of probiotic inclusion level in broiler diets on growth performance. Five experimental diets were used: no addition (c)10/8efu probiotic/kg of diet (p1) 10/10 probiotic/kg of diet (p2) 10/12 probiotic/kg of diet(p3) and2.5mg of vilamycin/kg of diet (A) The result showed that, BWG was significantly higher in treatment (p1) (2.293g) compared with p2(2.193g), and p3 (2.167g) with A (2.230g) being intermediate and not different from p1. FCR similar and significantly better for p1 (1.80) and A(1.80) compared with p2 (1.87) C(1.89) and p3 (1.92).

Sherief*et al,* (2012) evaluated the effects of probiotic, prebiotic and synbiotic supplementation on performance of broiler chicks. Four diets were used in this experiment (1) Basal diet (control) (2) Basal diet plus mannan_ oligosaccharide (MOS) at level 2g/kg of starter diet and 0.5g/kgof the grower diets. (3) Basal plus probiotic(3g/kg diet saccharomyces cerevisiae) ,(4) Basal diet plus combination of prebiotic and probiotic (synbiotic) The result indicated that the final body weight, weight gain, and feed conversion efficiency were significantly higher in probiotic and synbiotic supplemented broilers compared with the control and prebiotic groups.

Mookiah*et al*,(2013) studied the effect of prebiotic (pre) (isomalto_ oligosaccharide IMO) amulti strain probiotic (pro) (consisting of lactobacillus strains) and combination of these dietary (symbiotic).on performance of broiler chicks.Basal diet (1) 1g/kg (pro) (2) (pre) 5g/kg IMO (pre05).(3) (pre) 10g/kg kg IMO (pre10). (4) Symbiotic (SYN) combination1g/kg pro + 5g/kg pre (SYN5) or (SYN) 1gm/kg pro+10gm /kg pre (SYN10). The result showed that feeding broiler with (SYN5) and (SYN10) had significantly ($p>0.05$) improved theweight gain and feed conversion ratio compared with other treatments, the dietary synbiotic did not show a two- fold synergistic effect in all parameters studied when compared to those prebiotic or probiotic alone.

Kim *et al* (2011) investigated the effects of dietary supplementation withthe pre (fructo_oligosaccharide) (FOSandmannan-oligosaccharide(MOS) on performance Six dietary treatment groups: (1) control (2) avilamycin 6mg/kg(3).025% FOS (4) 0.5% FOS (5) 0.052 MOS (6) 0.05% M0S. The result indicated that the overall BWG of bird treated with avilamycin and pre were significantly ($p<0.05$) higher than those of the control group. No significant differences were found between the control and supplemented groups in overall feed intake FCR, and mortality.

CHAPTER THREE

MATERIAL AND METHODS

This experiment was conducted during winter season from 24th September to 1 thNovember 2014) .This ambient temperature averaged 28.5- 40C.during the experimental period (6 weeks).

3-1 Experimental chicks:

A total number of 84 one day commercial unsexed broiler of Abor Acres strain from (local commercial Hatchary (meico) and transported to the student poultry premises, faculty of Agricultural Studies, Sudan university of Science and Technology, (Shambat).These chicks were adapted to the premises and fed over 7 days before start of the experiment. At the end of adaption period, all chicks were weight with an average initial weight of 130g.The chicks were then assigned randomly into four dietary treatment groups (A,B,C and D) in completely randomized design (CRD) . Each group was divided into Three replicated each of 7 chicks Ground brooding (rearing system was adapted for 6 weeks experimental period. The birds were vaccinated against infectious Bronchitis (IBD) by IB078. And Newcastle disease (ND) by coloni 30 at7 days of age .Of age using Multi-vitamin. At 14 days were vaccinated against Gambro. The dosage was the repeated at 21 and 28 days of age for Newcastle and (IBB) respectively.

3-2 Housing:

An open system poultry house was used. The house was constructed on concrete floor with corrugated metal sheat roof and solid brick western. Eastern wall up to 5 meters. The eaves and 2.5 meter for apex 12pens, 1m each inside the house. Each pen was equipped with one feeder and drinker to allow adlibitum of

feed and water. light was provided approximately 24 hours in a farm of natural light during The day and artificial light during The night 60watt) were used for This purpose The house was cleaned and well disinfected before the commencement of the experiment.

3-3 Experimental ration:

The commercial synbiotic (Poultry Star) product used in this experiment is combination of probiotic and prebiotic products. Probiotic used was a 5-bacteria species product that comprised probiotic bacteria isolated from the crop, (Lactobacillus sreuteri) jejunum (Entrococcusfaecium) ileum(Bifidobacterumanimalis),caecum(pediococcusacidilactici) and(Lactobacillus salivarius) of healthy adult chickens. While substance Fructo-oligosaccharides product was usedas prebiotic .their symbiotic product was purchased from Hadir international CO. LTD.KhartoumSudan. The chicks were fed on 4 dietary treatments. The first group A fed on basal diet without synbiotic .the other groups B, C, and D were fed on the basal diet supplemented withsynbiotic as natural growth promoter, at levels of 500,100 and1500 gm/ton, respectively .The basal diet was formulated to meet the nutrients requirements of broiler chicks according to the **NRC(1994).**

The ingredients percent, composition and calculated chemical analysis of the experimentaldiet were presented in table (1, 2). The experimental diets were fed for 6 week.

3-4 Data collected:

3-4-1Performance data: - Average body weight, weight gain and feed intake (gm) for each group were determined weekly through the experimental period. Health of experimental stock and mortalities were closely observed and recoded daily.

3-4-2. Slaughtering procedure:

At the end of experiment three chicks were selected randomly from each group and weighed individually after an overnight fasting with only water allowed, them they were slaughtered by severing the right and left carotid and jugular vessels, trachea and esophagus. After bleeding they were scalded in hot at the nock joint.

Evisceration was accomplished by posterior ventral cut completely remove the visceral organs, the hot carcass were weighed for calculation the dressing percentage. The legs were separated from each carcass then they were deboned the meat was frozen and stored for sensory evaluation.

3-4-3The taste panel:

Frozen deboned legs cuts were Thawed at 5-7c before cooking for sensory evaluation. The meat was trapped in aluminum foil. Place in roast pan and cooked at 176.7c in conventional preheated electrical oven to about 80c internal muscles temperature the cooked meat was allowed to cool to room temperature for about 10 minutes .The samples were kept warm until served. Trained panelists were instructed to eat crackers drink water between, samples testing to clear the the plate and pause for 30 seconds between all samples evaluated. Flowing recommended procedure **(Hawrysh*etal*., 1980**). The sensory panel evaluated the chops for tenderness, flavor, color and juiciness using and eight- Point scale (Appendix 2)

3-5 Experimental Design and statisticalData Analysis:

Completely randomized design was used in this experiment the data were tabulated and subjected to one – way Analysis of variance (ANOVA).by using the SAS computer program (**SAS, 1994**).The significant difference (LSD) was used

for treatment means separation as outline by using **Steel and Torrie (1986).**All values were presented as means and standard error.The significantly set up ($P < 0.05$).

Table 1: ingredient percentage composition of experimental diet

Ingredient%	Diets			
	A	B	C	D
Dura	64.142	64.142	64.142	64.142
G.N cake	14	14	14	14
Concentrate	5	5	5	5
Seasm	15	15	15	15
Ostershell	0.487	0.487	0.487	0.487
Dical	0.618	0.618	0.487	0.487
Salt	0.25	0.25	0.25	0.25
Methionine	0.159	0.159	0.159	0.159
Lysine	0.344	0.344	0.344	0.344
Total	100	100	100	100
synbiotic(Poultry Star)	__	500g/ton	1000g/ton	1500g/ton

Broiler concentrate 5% * ME poultry 2.122K cal/Kg Crud protein 40% crud fiber 1.5% lycine1.5% lysine 13.5% methionine 5.9% meth+cystin 6.25% calcium 6.8% phosphoursav 4.6% phosphours tot 3% sodium 1.5% vitamin A250.000 IU/kg vitamin E 800 ppm vitamin k3 60 ppM vitamin B1 40ppM vitamin B2 100 ppM. B6 50ppM, vitamin B12 300ppb vitamine c 4000 ppM biotin 2000 ppb ,folic acid 30ppM choline chloride 30000ppM betain 3000 ppM iron (fe) 1.000 ppMcoper, 300ppM zinc 1000ppM manganese ,1600ppM iodine ,20 PPM selenium 5ppM cobalt, 12ppM 16 phytese 1500 FYT antioxidant added.

Table (2) Calculated analysis of the basal experimental diet on dry matter basis (DM)

Components	Diets			
	A	B	C	D
Dry matter	49.85	49.85	49.85	49.85
Crud protein	22.70	22.70	22.70	22.70
Crud fiber	04.53	04.53	04.53	04.53
Ether extract	03.35	03.35	03.35	03.35
Ash	04.65	04.65	04.65	
Ntrogien.free extract	59.80	59.80	59.80	59.80
Calcium	01.06	01.06	01.06	01.06
Total phosphorus	00.79	00.79	00.79	00.79
Available phosphorus	00.50	00.50	00.50	00.50
ME.kcal/kg	3117	3117	3117	3117

- Calculating according to the**Ellis,1981**: Kuku Bulletien

CHAPTER FOUR

RESULTS

4.1 Response of broiler chicks to dietary synbiotic.

4.1.1 Performance

Effect on growth performance of broiler chicks fedon different levels of dietary symbiotic (SYN) for 6 weeks is shown in Table (3).

All group started in similar body weight (130gm). The result indicated that the Chicks of group D obtained significantly ($p<0.05$) higher body weight gain than that of group A, whereas no significant differences were observed between groups B, C in weight gain throughout the experimental period.

The treatment effect on the feed consumption was not significant ($p>0.05$). However, the chicks in group B, C and D were consumed more feed than the group A. The feed conversion ratio (FCR) was better in groups B, D compared with group A but the differences were not significant among all treatment groups.

The mortality rate was high significantly ($p<0.05$) in the chicks of group A compared to the other treatment groups throughout the experimental period.

4.1.2 Carcassdressing percentage:

The result indicated no significant differences ($p>0.05$) between all treatment groups in carcass dressing percentage. However, a chick in group D has the highest carcass dressing percentage.(Table 4)

Table (3) Effect of different levels of dietary synbiotic (poultry star) on growth performance of broiler chicks

Items	A	B	C	D	L.SD0.05	SE±
Initial weight g/bird	130	130	130	130	_	
Final weight g/bird	1380	1480	1530	1600	_	
Weight gain/ bird	B 1250	A 1350	a 1400	b 1470	Ns 0.060	31.638
Feed intake g/ bird	A 2500	a 2560	A 2590	a 2650	Ns 0.975	102.814
Feed conversion ratio	A 2.00	A 177	A 1.85	a 1.80	Ns 0.835	74.881
Mortality	A 1.12	B 0.28b	B 0.28b	b 0.28b	s 0.224	0.01414

Means inaraw not differences significantly ($p>0.05$)

LSD: least significant difference

SE ±: standard error

N.s: not significantly differences ($p>0.05$)

S: significant

A: negative controlled group

B: 500 g/ ton synbiotic

C: 1000 g/ ton synbiotic

D: 1500 g/ ton synbiotic

Table (4)Effect of different levels of dietary synbiotic (poultry star) on carcass dressing percentage

Items	Testament groups					
	A	B	C	D	I.sd 0.05	SE
carcass dressing percentage	69.35	69.48	69.53	70.50	Ns .994	1.43699

Means inaraw not differences significantly (p>0.05)

LSD: least significant difference

SE ±: standard error

N.s: not significantly differences (p>0.05)

S: significant

A: negative controlled group

B: 500 g/ ton synbiotic

C: 1000 g/ ton synbiotic

D: 1500 g/ ton synbiotic

4.1.3 Panel Test (subjective meat attributes):

The effect of dietary treatment on subjective meat attributes is shown Table 5 the mean average of subjective meat quality score value of color , tenderness , juiciness and flavor of leg cust(thigh and drumstick) did not differentsignificantly($p>0.05$) among the dietary treatment and score given forall attributes are above moderate acceptability level.

4.1.4 Economic appraisal:

The total cost return / net profit and profitability ratio per head of broiler chicks fed different level of synbiotic for 6 weeks are shown in table 5 .Chicks purchase management and feed cost value (SDG) where the major input considered.The selling values of meat are the total revenues obtained. The result of economical evaluation indicated that, the dietary groups B, C and D gained more net profit than that of group A. but the value of profitability ratio (1.50) of group D(1500 g/ ton, symbiotic) was the highest of the tasted groups .

Table (5) the effect of different dietary levels of synbiotic product(Poultry star) on percentage of subjective meat quality attributes of broiler chicks for 6weeks.

Items	Groups					
	A	B	C	D	LSD0.05	SE±
Tenderness	6.18	6.2	6.25	6.29	Ns .580	.13323
Flavor	6.10	6.30	6.35	6.38	Ns .959	.17349
Color	6.2	6.20	6.20	6.19	Ns .976	.08138
Juiciness	6.0	6.0	6.10	6.15	Ns .988	.16389

Mean in araw do not different significant ($p>0.05$)

LSD: least significant difference

SE ±: standard error

NS: not significantly differences ($p>0.05$)

A: negative controlled group

B: 500 g/ ton synbiotic

C: 1000 g/ ton synbiotic

D: 1500 g/ ton synbiotic

Table (6) the total cost, revenue and net profit of broiler chicks fed on different levels of synbiotic (poultry star) for 6 weeks.

Item	**A**	**B**	**C**	**D**
Cost				
Chick purchase	3	3	3	3
management	2	2	2	2
Total feed cost	13.92	14.16	14.33	14.67
Total cost of production	18.92	19.16	19.33	19.67
Average carcass weight/kg	0.867	0.936	0.973	1.036
Price/kg/bird	33	33	33	33
Total Revenue	28.6	30.9	32.1	3401
Total cost	18.92	19.16	19.33	19.67
Total profit	9.68	11.74	12.77	14.43
Profitability ratio/kg	1	1.22	1.32	1.50

*** Total cost calculatedaccording to October 2014.

***At Current (2014) price of meat 33 (SDG) Kg

CHAPTER FIVE

Discussion

This experimental was conducted to evaluate the effect of feeding different level of synbiotic on performanceand subjective meat attributes of broiler chicks. Thesynbiotic was added to the basal diet at levels of 0, 500, 1000, 1500gm/ton. Whereas, the basal diet which received no synbiotic additive was served as control diet.

The result of the present study showed the addition of dietary (SYN) had no significant effect on feed intake of broilers throughout the experimental period. This result was agreed with the findings of **(June*et al* 2008; Behrouz*et al*2012)** whofound that, addition of probiotic and prebiotic did not have any significant effect on feed intake of broiler chicks,Whereas, this result was disagreed with those obtained by **(Chowdhury et al 2009; Awad*et al* 2009)** who found that, additionof dietarysynbiotic increased significantly ($p<0.05$) the feed intake of broiler chicks.

Although the inclusion of synbiotic to the broiler diets improved the body weight gain of broiler chicksin this study, but the difference were significant ($p<0.05$)only between the diets supplemented with 1500gm/tonsynbiotic and control diets.This improvement in the weight gain in group fed on synbiotic may be due tosynergistic effectof the mixture of probiotic plus prebioticas symbiotic in the diet which could reduce the count of pathogenicbacteria and increase the population of useful microflora in the gut, this may lead to better capacity for absorption of available nutrients **(Michaela2005andsantin*etal* 2001).**Furthermore, the effect of probiotics and prebiotic on reduction of pathogenic bacteria could

reduce the breakdownof proteins to nitrogen. In this waythe utilization of proteins (amino acids) is improved, particularly from in the diet which was deficient in crud protein and essential amino acids**(Mikulec*et al* , 1999)** Finally, each of the above mentioned reasons may lead to better growth responses of broiler chicks.

The result of this study was consistent of the finding of**(Behrouz et al., 2012; Awad*et al* 2009 and Sajjad2012)**.Who found that addition of dietary (SYN) improvement of the body weight gain of the broiler chicks .similarly, the beneficial effect of probiotic and prebiotic (SYN) products on the body weight gain of broilerwas reported by several researcher**(Zulkiflie *al* 2000; Thitaram*et al* 2005; Nayebpor*et al* 2007; Falaki*et al* 2010).** result were disagrees with those obtained by(**June*et al*2008)**who found that addition of dietary glacto_ oligosaccharides **(**GOS**)** and Bifedobacterialactis had no significant effect on body weight gain of the broiler chicks. Like-wise several researchers reported that the using of dietary prebiotic and probiotic did not have any significant effect on body weight gain of broiler**(Gunal*et al* (2006), Zhang *et al* (2005) and Willis *et al* (2007)**.

The result of this study indicated that the chicks fed on supplemental diet with the various levels of synbiotic had the better feed conversion ratio compared with control groups, but the differences was not significant ($p>0.05$) This result was consistent with the findingof (**June *et al* 2008; Ortiz *et al* 2009andSalianeh2011;Texas2006)**who found no significant ($p>0.05$)differences between broiler chicks fed on synbiotic diet and those of control group .This result were disagreedwith those obtained by **(Talebi*et al* 2008 and Nezhad*et al* 2007)** who found there was significantly ($p<0.05$) improvement in (FCR) of the broiler chicks fed on (SYN) diets compered to control groups. They attributed this improvement in feed conversion ratio (FCR) to the combination of probiotic and prebiotic in the synbiotic product which could improve the survival and availability

of probiotic micro.organisms through specific substrate needed for fermentation which provided by the probiotic. This could result in improving the host intestinal microbial balance, thereby, the digestion, absorption and utilization efficiency of overall nutrients were improved.

The results of present study showed that the broiler chicks supplemented with (SYN) had significantly ($p<0.05$) lower mortality rate compared with control group. Thismay be due to the ability of (SYN) to reduce of disease infection **(Sayed*et al* 2014**).through stimulating of the immune system by increase the production of immunoglobulin, increase activity of macrophages and lymphocytes and stimulate the production of interferon**;(Michaela2005,Choct 2009).**Moreover, the synbiotic could be suppressed pathogenic bacteria in intestinal tract **(Maiorka*et al* 2001)** This result was supported by the findings of **(Collins and Gibson (1999) and Bailey *et al* (1991)**who found that, the addition of combination of probiotic and prebiotic to the diet was more effective in reducing salmonella colonization than probiotic or prebiotic products alone. This results were in line with **(Michaela2005)** who found positive effect of dietary (SYN) on mortality rate in broiler. This results were inconsistent with **(Texas2006)** who found that inclusion the (SYN) product in the broiler diets had no significant ($p>0.05$) effect on mortalityrate.

The result of the present study showed that, the carcass dressing percentage was not affected significantly by supplemental of dietary (SYN). This was in line with finding of**(Acosta *et al* 2008; and Karaoglue and Durdag2005**) who found that, the addition of (SYN) to the diets had no significant effect on carcass dressing percentage of broiler chicks.

No significant differences were observed among all treatment groups in subjective meat quality attributes (color, flavor, juiciness, and tenderness) and all scores being above moderate values in the present study. This results could be supported by the finding of**(Maloranoet al (2015)** who stated that, influence of probiotic and symbiotic administration was not significant on meat quality of broiler chicks.

There is wide variation in the results cited in the literature concerning with the response of broiler chicks fed on (SYN) supplemented of diets, This may be due to effciency dietary (SYN) depends on several factors, such as microbial species composition (e.g, single or multi strain), Viability administration level, application method frequency of application, type of diets (i.e. the content of non-digestibleoligosaccharides) the bird characteristics (strain) age and stage of production) the .Overall farm hygiene status and environmental stress factors,**(Pattersion and Buokholder, 2003, Gaoet al 2008)**

The result of economical evaluation of experimental diets showed that supplementation of dietary (SYN) improved the performance of broiler chicks and resulted in economical benefit. The profitability ratio 1:32 and 1:50 of group (1000gm) and (1500gm) were the highest of the test groups. This result was agreed with those obtained by **(Ashayerizadehet al 2011)**

Conclusionandrecommendation

Conclusion:

- The Level of commercial (Synbiotic) product (Poultry Star) 1500gm/ton added to the diet improved the body weight gain without any effect on feed intake, feed conversion ratio and dressing percentage of the broiler chicks.
- Using synbiotic at various inclusion levels in the dies made no changesin the subjective meat quality attributes of broiler chicks.
- Adding Synbioticto the broiler diets resulted in economical benefits.

Recommendation:

-Practicalimplication

- The result of the present study showed that thecommercial (Synbiotic) product (Poultry Star) could be used as natural feed additives to improve broiler chick's performance without any negative effect onsubjective meatquality attribute.
- All levels of Poultry Star (SYN) added to the broiler diet in this study is recommended economic wise, but the level of (1500g/ton)is more profitable.

-Suggestion for future research

- Further research is needed to get better understand about the effect of (SYN) product as natural feed additives on poultry production and their specific function mechanisms in digestives tract of the chick.
- Finding of the study point to the possibility of using synbiotic products in layers as well as testing it for egg production and quality rate in broiler.

- The future study should be focused on the effect of othernatural feed additives suchas, essential oils extracted from aromatic plants, enzymes,and organic acid in poultry production.

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Appendix (1)

Weekly average maximum internal ambient temperature during the period 24th September 1 th Novmber2014)

Week	Max. Temperature C	Min. Temperature C
1	37.4	32.3
2	33.4	31.4
3	33	27.9
4	28.9	27
5	35.1	27.3
6	36	26.6
average	34	28.8

Appendix (2)

Card used for judgment of subjective meat Quality attributes Sensory evaluation cardEvaluated these sample for color, flavor juiciness tend mess. Foreach sample. Use the appropriate scale to show your attitude by checking at point that dest describes your felling about the sample .if you have any question please ask .Thanks your cooperation .

Name:……Date……

Tenderness	flavor	color	juiciness
8/ Extremely tender	**8/ Extremely intense**	**8/ Extremely desirable**	**8/ Extremely juicy**
7/very tender	**7/very intense**	**7/very desirable**	**7/very juicy**
6/ moderately tender	**6/ moderately intense**	**6/ moderately desirable**	**6/ moderately juicy**
5/ Slightly tender	**5/ Slightly bland**	**5/ Slightly desirable**	**5/ Slightly juicy**
4/ Slightly tough	**4/ Slightly bland**	**4/ Slightly desirable**	**4/ Slightly dry**
3/ moderately tough	**3/ moderately bland**	**3/ moderately desirable**	**3/ moderately dry**
2/very tough	**2/very bland**	**2/very undesirable**	**2/very dry**
1/ Extremely tough	**1/ Extremely bland**	**1/ Extremely undesirable**	**1/ Extremely dry**

Serial	Sample cod	Tenderness	flavor	color	juiciness	Comments
1						
2						
3						
4						
5						

Figure (1) body weight gain (g)bird

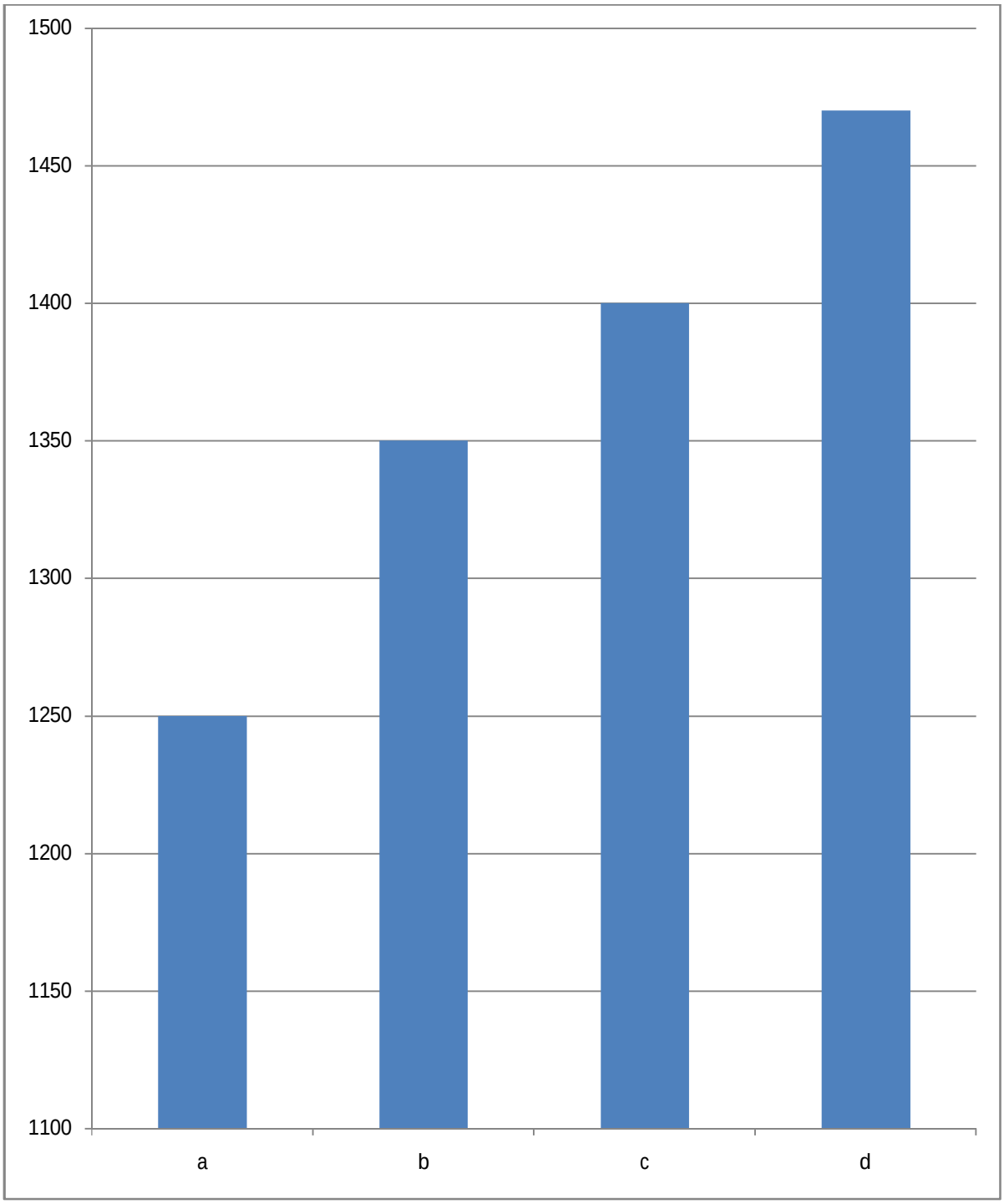

Figure (2) feed intake (g)bird

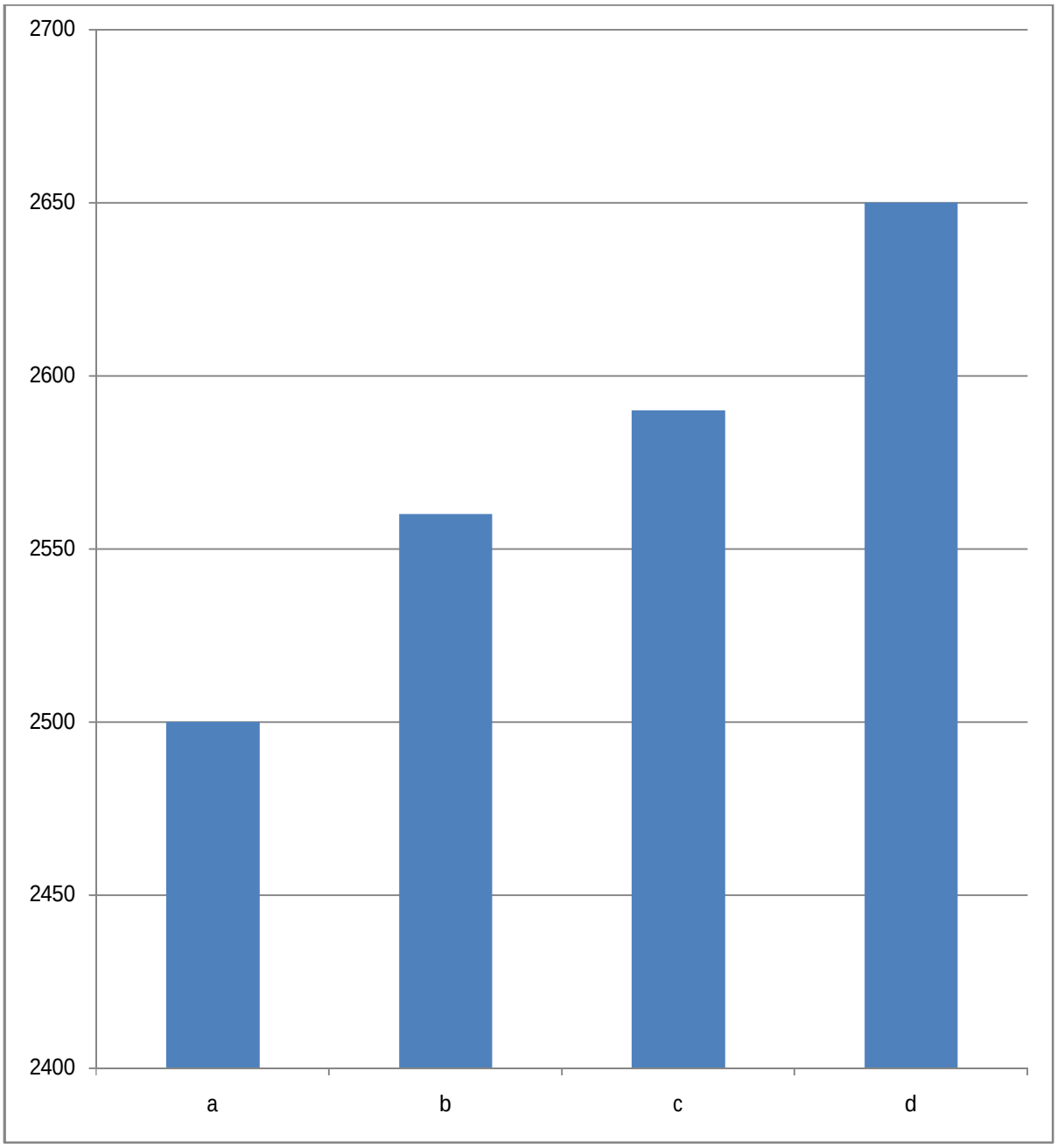

Figure (3) feed conversion ratio

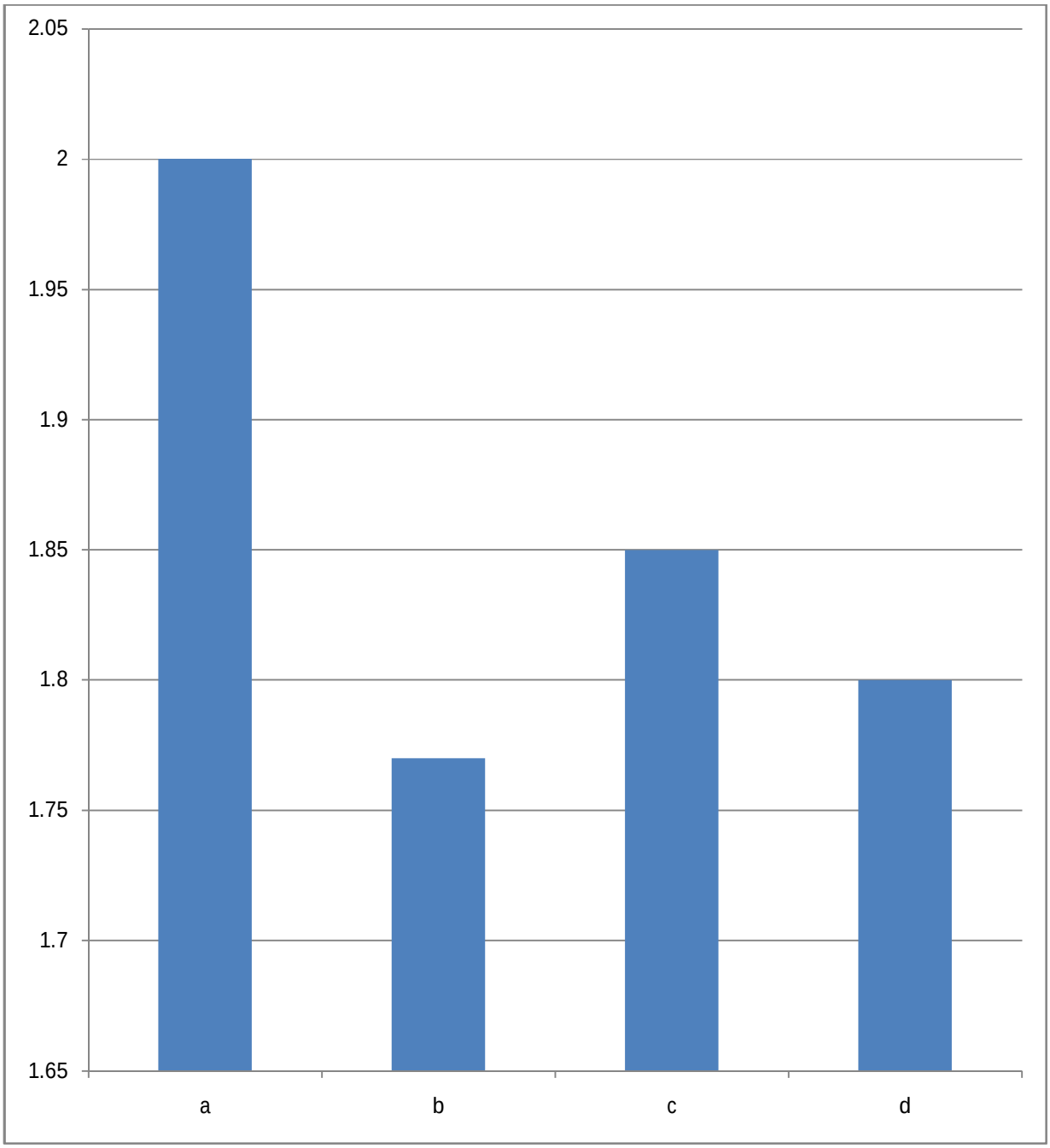

Figure (4) mortality rate

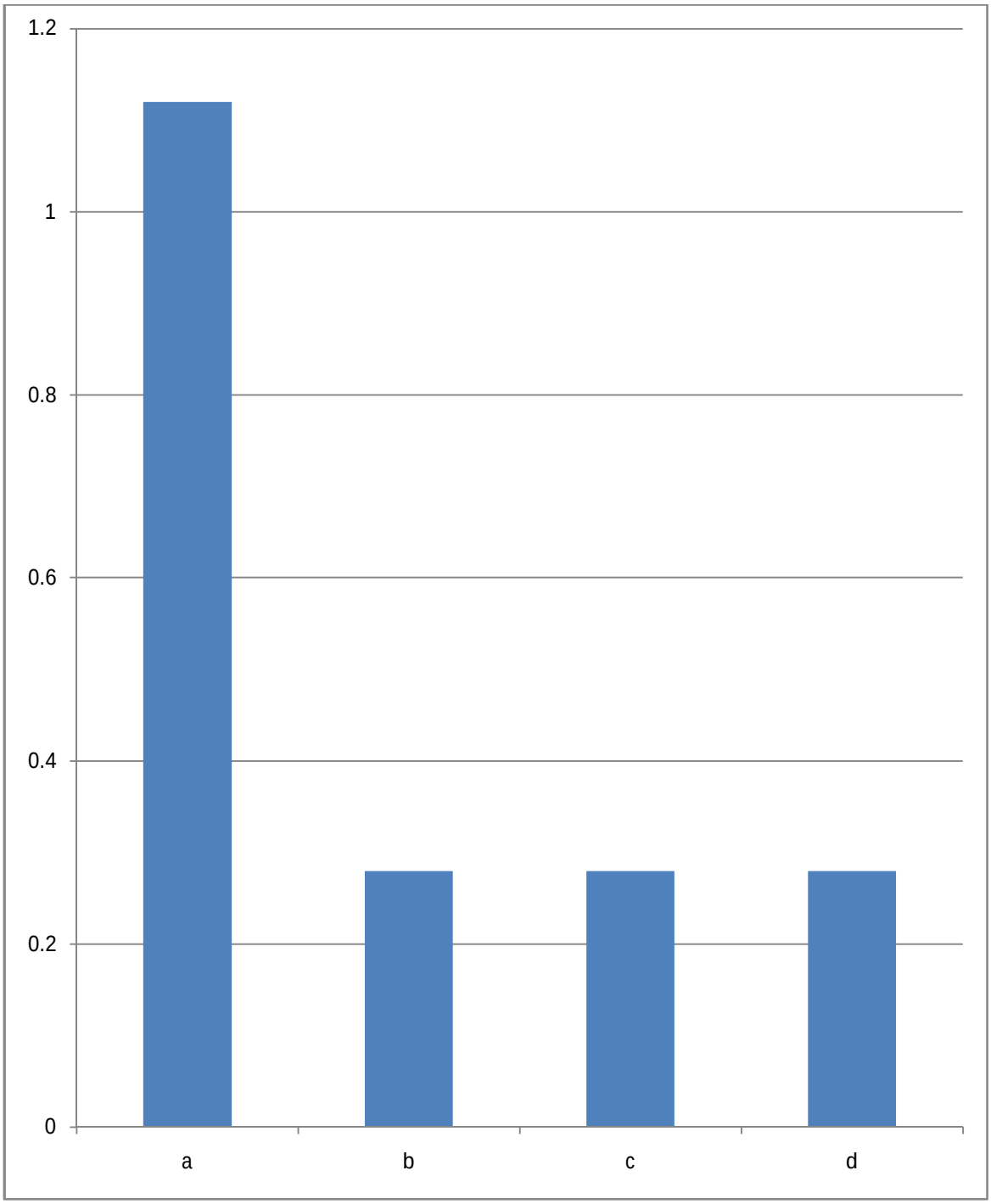

Figure (5) carcass dressing percentage

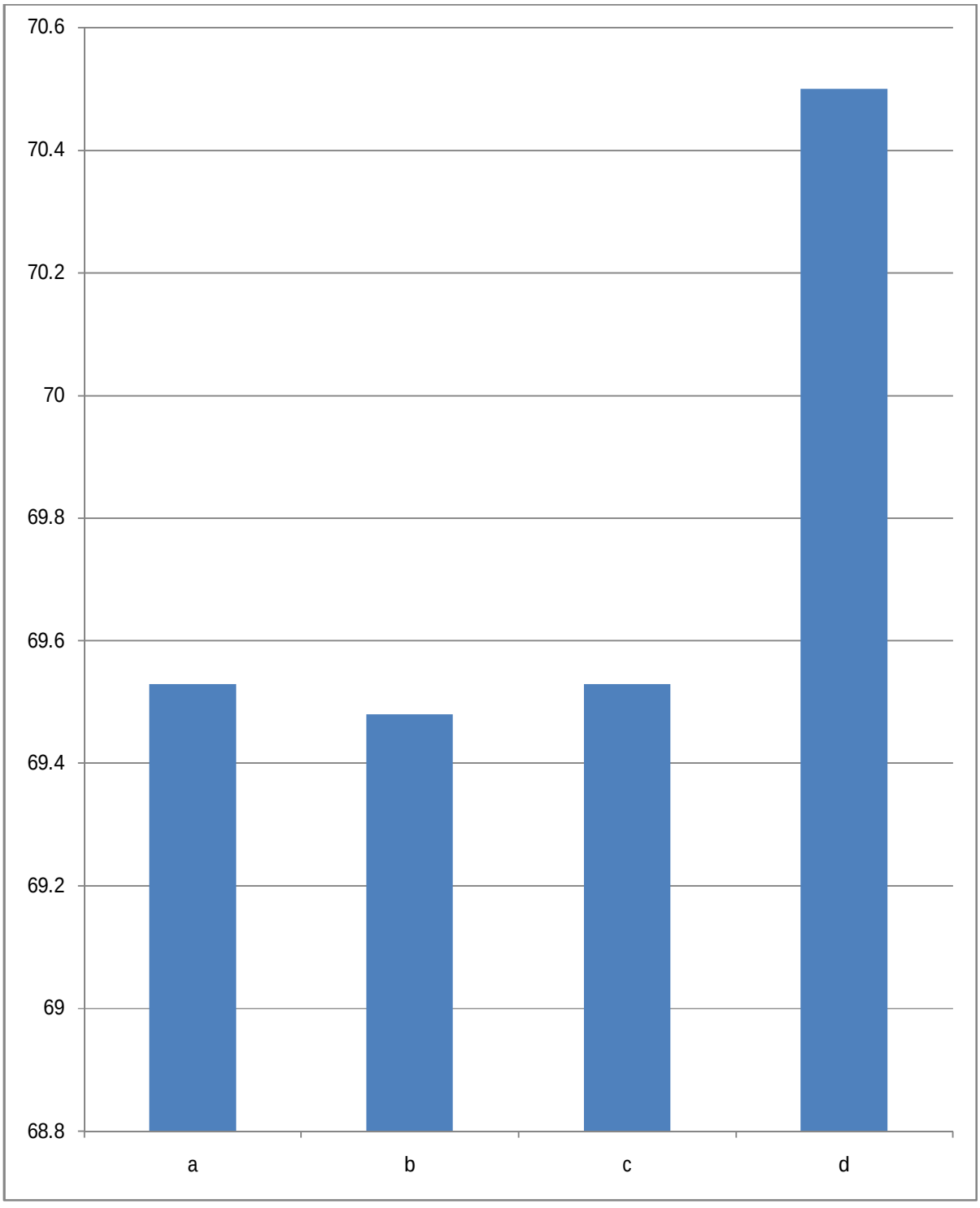

Figure (6) tenderness

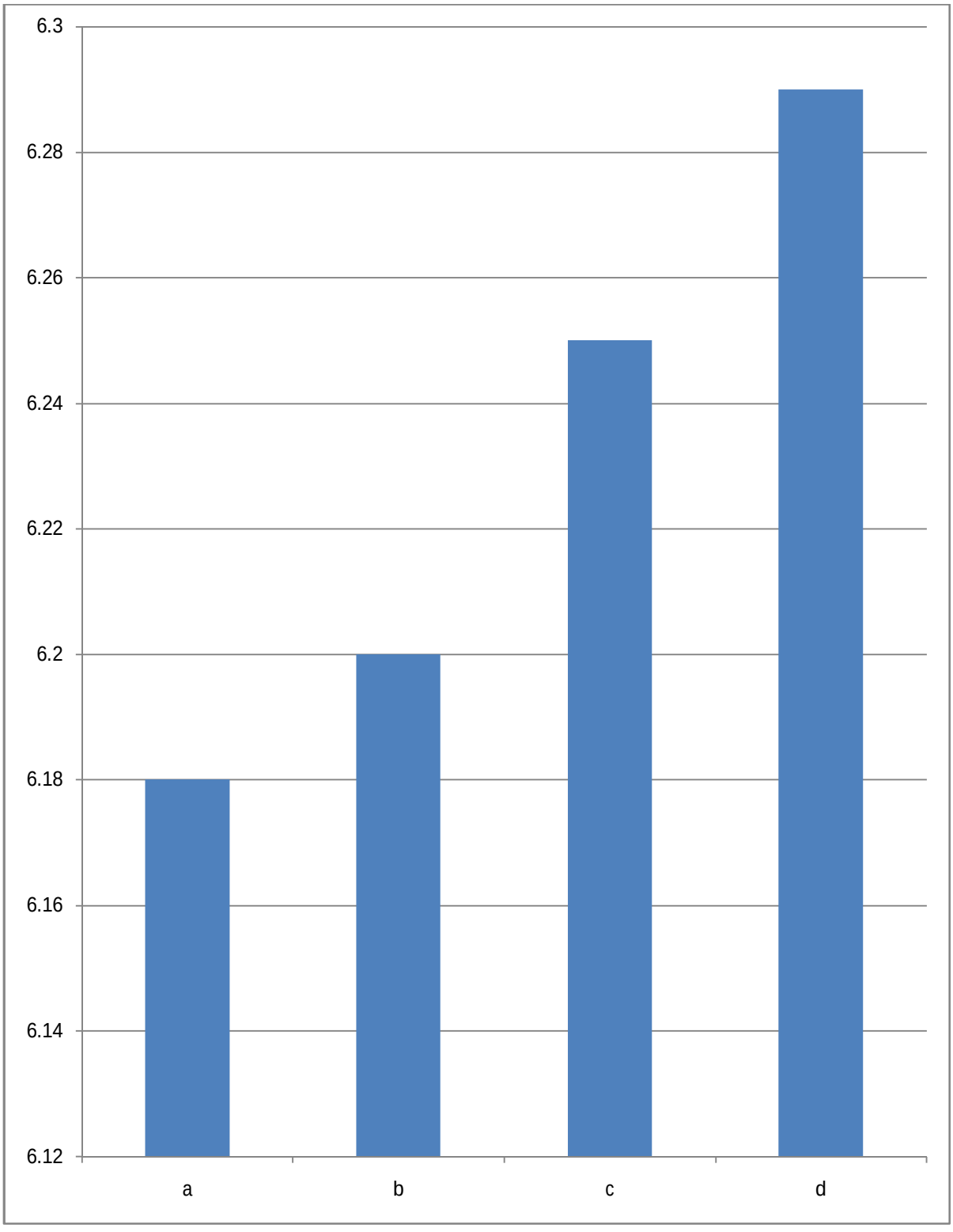

Figure (7) flavor

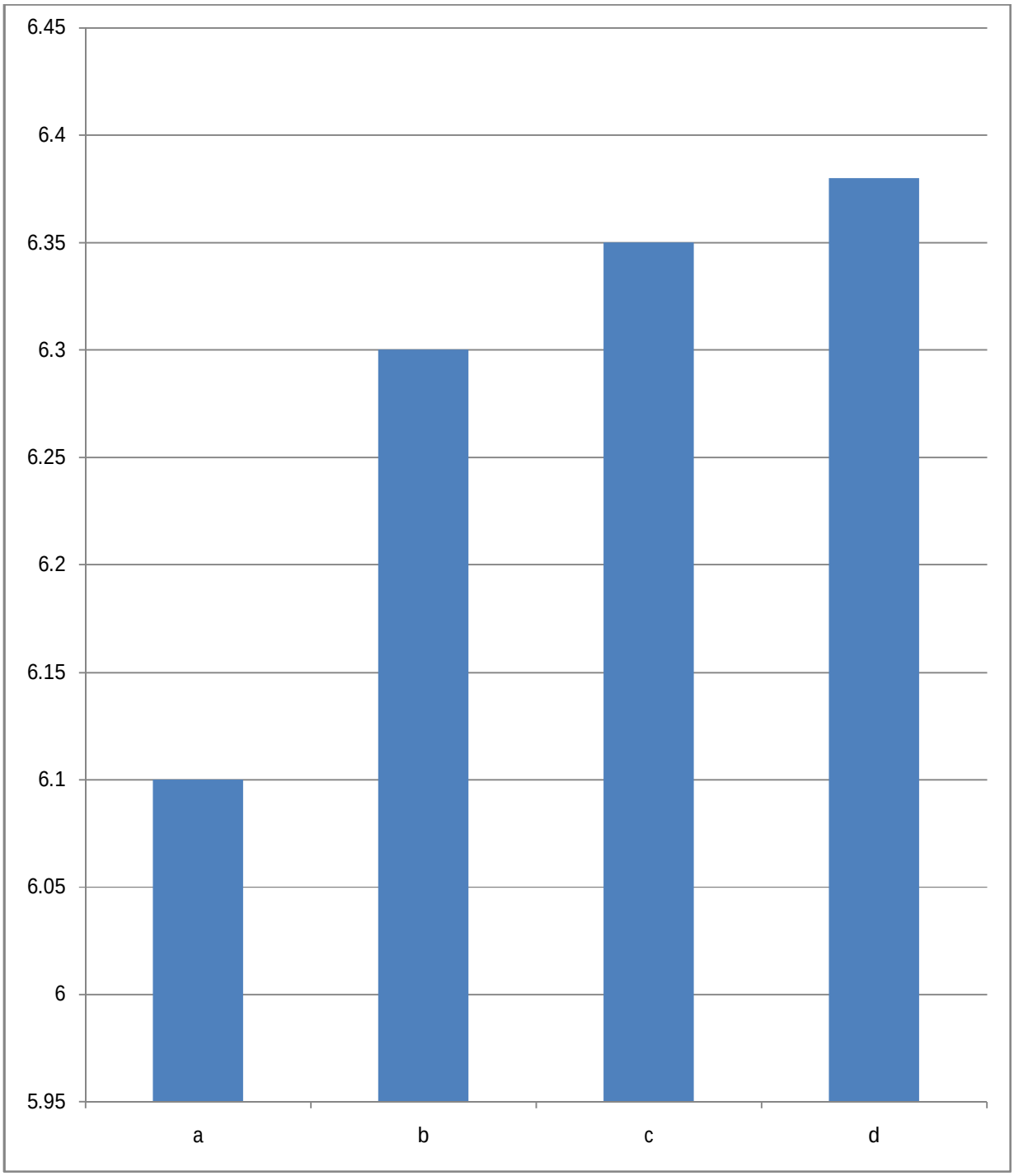

Figure (8) color

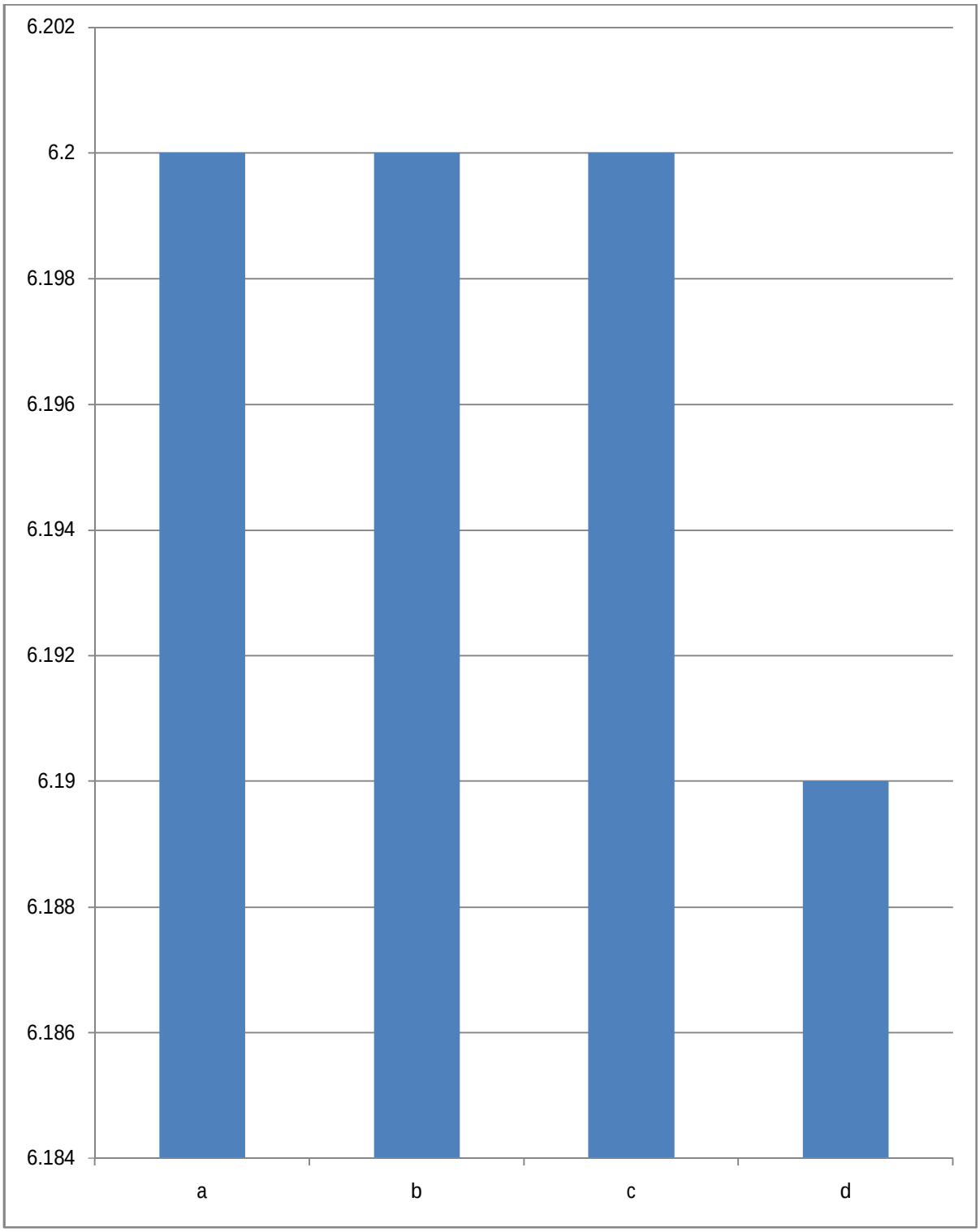

Figure (9) juiciness