Chapter one

1.1 Introduction

Broiler industry has been developed worldwide to the most intensive and efficient model in comparison to other animal production sectors. The rapid growth, efficient utilization of feed, tender meat production, the ability of the stock to grow, thrive and produce under varied environmental conditions have been achieved through advanced genetic improvement of the modern broiler chicken. *(*Yu and Robinson, 1992*).*

The addition of fat to diet, besides supplying energy, enable the absorption of fat-soluble vitamins, increases the palatability of the rations. By increasing fat sources to broiler diet, the amount of feed intake decreased and feed efficiency was improved (Jeffri *et al*., 2010)

To date, a number of different fat sources are available for poultry from both animal and vegetable sources and from the rendering industry (Sanz *et al*., 2000). Sanz *e*t *al*., (1999) fed broilers with sunflower oil or tallow in diet and found that the utilization of saturated fats resulted in greater abdominal fat deposits compared to birds fed un supplemented diet . Newman *et al* .(2002) reported that broilers fed 8% beef tallow in the diet resulted in a significant depression of feed efficiency compared to birds fed sunflower or fish oil. On the other hand Shahryar *et al*. (2011) found that the addition of 6% animal fat in broiler diet led to an increase of abdominal fat and carcass weight in comparison with those of birds fed un supplemented diets.

The numbers of cattle increased annually, therefore the amount of animal fats increased depending on the increasing numbers of the slaughter cattle (Ministry of Animal Resources and Fisheries 2014).

The objective of this study is to determine the effect of supplementation of beef fat on the performance of broiler.

Chapter two

Literature review

2.1 Animal fats :

Animal fats are rendered tissue fats that can be obtained from a variety of animals. Basically, these are the by-products, made available as a result of the preparation of meat either for sale as edible meat or from the manufacture of the meat products . (Sharma et *al* ., 2013 **)**

2.2 Types of animal fats:

Tallow: It is hard fat rendered from the fatty tissues of cattle that is removed during processing of beef.

The types of tallow are divided into Two types (Edible and inedible Tallow)

Edible tallow: The Codex Alimentations recognizes standard for this as rendered from certain organs of healthy bovine animals. It is also known as dripping.

A- Oleo-stock**:** It is high grade tallow that is obtained by low temperature wet rendering of the fresh internal fat from beef carcass. It has light yellow color, mild pleasant flavor and free fatty acid content less than 0.2%. (Heena *et al*., 2013 **)**

B- Lard**:** It is defined as the fat rendered from clean, sound edible tissues of hogs in good health at the time of slaughter. Its production is limited to certain killing and cutting fats from the hog. (Heena *et al*., 2013 **)**

C- Depot fats such as those surrounding the kidney portion are examples of killing fats, since they are removed during the slaughtering operation. Cutting fats are those fats which are obtained when the hog is cut into its various wholesale or retail cuts. (Heena *et al*., 2013 **)**

D- Cauls fat: It is the fatty membrane which surrounds internal organs of some animals, such as cow, sheep, and pigs also known as the greater omasum. It is

often used as a natural casing. It is also known as Lace Fat. (Heena *et al.*, 2013 **)**

E- Leaf fat: It is the fat lining the abdomen and kidneys of hog that used to make the lard. (Heena *et al.*, 2013 **)**

F- Rendered pork fat: It is the fat other than the lard, rendered from clean, sound carcasses or edible organs from hogs in good health at the time of slaughter, with certain parts of the animal specifically excluded. It includes bacon skins, fleshed skins, cheek meat trimmings, sweet pickle fats and fats obtained from skimming the rendered tanks. (Heena *et al.*, 2013 **)**

Inedible tallow and greases: These are the main inedible animal fats which are produced in many grades. Inedible tallow and greases produced by meat packing meat industry may contain either hog or beef fat. These are described in terms of their hardness. Fat with titer of 40ºC or greater than 40 ºC are called as inedible tallow and those with titers less than 40ºC are called as greases. Titer is the measure of the temperature developed as a result of the heat of crystallization during cooling of melted fatty acids from the fat. (Heena *et al* ., 2013**)**

Chicken fat: It is the fat obtained (usually as a by-product) from chicken rendering and processing. It is high in linoleic acids, the beneficial omega-6 fatty acid. Linoleic acid levels are between 17.8 to 22.9%. It is used in the production of pet foods and bio-diesel Chicken.

Fat is one of the two types of animal fat referred as Schmaltz. (Heena *et al.*, 2013 **)**

2.3 Fats and oils

Fats provide a concentrated source of energy, and so relatively small changes in inclusion levels can have significant effects on diet (ME). Most fats are handled as liquids, and this means heating of most fats and fat blends that contain appreciable quantities of saturated fatty acids.

Depending upon the demands for pellet durability, 3 – 4% is the maximum level of fat that can be mixed with the other diet ingredients. To this, up to 2 – 3% can be added as a spray-on coat to the formed pellet. (Lesson and summers 2001) Alternate technology of spraying fat on to the hot pellet as it emerges from the pellet diet means that much higher inclusions are possible since the hot pellet seems better able to absorb the fat. Under these conditions, there is concern for manufacturers who demand extreme pellet durability, since fines will already be treated with extra fat, prior to their recycling through the pellet mill. (Lesson and summers 2001)

All fats and oils must be treated with an antioxidant which ideally should be added at the point of manufacture. Fats held in heated tanks at the mill must be protected from rancidity. (Lesson and summers 2001)

The more unsaturated fat, the greater chance of rancidity. Fats also provide varying quantities of the essential nutrient fatty acid linoleic . Unless a diet contains considerable quantities of corn, it may be deficient in linoleic acid, because all diets should contain a minimum of 1% linoleic . A major problem facing the industry at the moment is increasing the use of restaurant grease in feed-grade

fats. These greases are obviously of variable composition in terms of fatty acid profile. (Lesson and summers 2001)

2.4 Tallow:

Tallow has traditionally been the principle fat source used in poultry nutrition. However, over the last 10 years, there has been less use of pure tallow and greater use of blended fats and oils. Tallow is solid at room temperature and this presents some problems at the mill, especially when heated fats are added to very cold ingredients originating from unheated outside silos. Being highly saturated, tallow

is not well digested by young chickens, although there is some evidence of better utilization by young turkeys. (Lesson and summers 2001)

The digestibility of tallow can be greatly improved by the addition of bile salts suggesting this to be a limiting feature of young chicks. However, the use of such salts is not economical and so inclusion of pure tallow must be severely restricted in diets for birds less than 15 – 17 days of age makes them uneconomic for animal feeds .(Lesson and Summers 2008)

2.5 Description of fat tissue:

Fat tissue is made up of fat cells embedded in a matrix of connective tissue. Triglycerides within fat cells make up about 85% of the fat tissue. Each triglyceride is made up of three fatty acids; the three can be any of many combinations of saturated fatty acids (SFA) , mono-unsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA).

Connective tissue and other protein makes up around 3% of the fat tissue, with water the remainder—around 12%. About Seven different fatty acids (Mysteric, Plasmatic , Paclmiotelic , Stearic ,Trans-vaccenic , Oleic and Linoleic acid) predominate in the fat of cattle and sheep. (Smith *et al* ., 2008).

All fats and oils from animal, and vegetable sources, contain mixtures of both saturated and unsaturated fatty acids. Saturated fatty acids contain only single carbon-to-carbon bonds, are quite stable, and are the least reactive chemically. Unsaturated fatty acids contain one (monounsaturated fatty acids) or more (polyunsaturated fatty acids) carbon-to-carbon double bonds in configuration. The chemical reactivity increases as the number of double bonds increase. Trans fatty acids are unsaturated fatty acids that contain at least one double bond in sthe trans configuration. The ratio of saturated fatty acids, mono unsaturated fatty acids, and poly unsaturated fatty acids and the position of specific fatty acids in the glycerol

molecule of the triglyceride contribute to specific physical and physiological properties of fats and oils. In general, animal fats contain larger amounts of saturated fatty acids and are solid at room temperature; plant fats (oils) have a higher content of unsaturated fatty acids and are liquid at room temperature. Conjugated linoleic acid, a Tran's fatty acid found in beef, is a collective term for a group of geometric and positional isomers of linoleic acid, an essential fatty acid. All fatty acids, regardless of the type (saturated or unsaturated) provide the same number of calories per gram when metabolized for energy (Putman and Denke .1994).

2.6 The physiochemical composition of beef fat:

Fatty acids composition and thermal properties of cattle subcutaneous, tallow and intestinal fats were determined. Subcutaneous fat differed from the other fat types with respect to its lower melting point (29.07ºC) and higher saponification number and iodine values.

The cattle fat types contained palmitic acid (16:0), stearic acid (18:0), oleic acid (18:1n-9) and linoleic acid (18:2n-6) as the major components of fatty acid composition. A differential scanning calorimetric study revealed that two characteristic peaks were detected in both crystallization and melting curves.

Major peaks (T peak) of tallow and intestinal fats were similar and determined as (24.10–27.71°F) and (2.16–4.75°F), respectively, for crystallization peaks and (7.09–9.39 °F) and (43.28–46.49°F), respectively, for melting peaks in DSC curves; however, those of subcutaneous fat (12.48 °F and –6.79 °F) for crystallization peaks and (3.56°F - 23.55°F) for melting peaks differed remarkably from those of the other fat types. (Mustafa *et al*., 2010).

2.7 The uses of beef fat as a source of animal feeding:

Rendered fats are produced from recycled animal and poultry byproducts, such as slaughter by-products, trimmings, fat, bone, and hides. Some rendered fats include recycled restaurant grease. Rendered fats, such as tallow, lard, and yellow grease, has found wide use in feeds for livestock, poultry, and swine. However, the use of these products in aqua feeds has been limited or even avoided in the past for various reasons, such as poor digestibility, quality variability, impacts on growth and product quality, and more recently, fear of disease transmission. An increasing number of studies are showing that these concerns have little relevance nowadays and that rendered animal fats can be valuable ingredients in fish feed formulation. (Bureau *et al.*, 2002). Historically beef fats were used mainly in poultry and swine diets. More recently dairy diets requiring added energy, in a form other than starch, helped demonstrate the value of fats in ruminant diets. Cereal grain/roughage based feedlot rations usually contain adequate energy to supply the animals' maintenance and growth needs. Fats and oils have been added to rations to reduce the health stress of eating dusty and/or very finely processed feeds, to reduce the incidence of bloat, or to increase the energy density in the ration .

2.8 Utilization of Tallow in dietary ration:

. When the price of grain is low, it has been more economical to add more grain or other feeds to increase energy in the ration. However if the price of grain is high, fat addition may be economical for increasing energy and thus performance. (Brandt and Anderson. 1990).

Fats and oils contain about 2.25 times as much digestible energy as the carbohydrates in grain. They are very concentrated sources of energy when added to animal feeds to increase the energy density of the ration. Adding fats and oils

will reduce the dustiness of feeds. Fats and oils can improve a ration by improving palatability. (Alberta Agriculture Feedlot Specialist, 2000.)

Tallow has traditionally been the principle fat source used in poultry nutrition and its production is noticeable throughout the world and there has been a great use of tallow in blended oils for poultry. Tallow and other saturated animal fats usually have been used in the later phases of feeding, because of limited digestibility in young chicken (Lesson and Summers, 2001).

Tallow include about 42.5% saturated fatty acids and only 1% unsaturated fatty acids that all of them are n-6 fatty acids (Manilla *et al.*, 1999).

2.9 The effect of beef fat on poultry and animal performance:

2.9.1 Weight gain :

Effects of tallow supplementation and feeding different energy to protein ratio on weight gain feeding different levels of tallow and diet protein reduction in both low and high energy diets had no significant effect on weight gain in ages 1-21, 42-56 days and 7-56. In 22-42 day old chicks feeding a diet with highest energy and protein content resulted to highest weight gain and feeding a diet with lowest energy and protein level resulted to lowest weight gain and those different was significant ($P<0.05$). (Sadeghil and Tabiedian .2005)

2.9.2 Feed conversion ratio:

There was no significant difference in feed conversion ratio in chicks fed with different experimental diets in ages 7-21 days, 21-42 days, and 42-56 days. In 7-21 days old chicks fed diets with higher energy level numerically decreased feed conversion ratio and lowest feed conversion had belonged to chicks fed with 5% tallow and higher protein level that it is well coincidence with lower feed intake and higher weight gain in this group. (Sadeghi1 and Tabiedian .2005)

2.9.3 Organs weight:

Feeding different levels of tallow and protein had no effect on carcass, abdominal fat and liver weight (Donaldson *et al* ., 1985). This is in agreement with results of Tabiedian *e*t *al*. (2005) who showed that feeding different levels of soybean oil and protein had no effect on carcass, pancreas, intestine and preventriculus weight. Abdominal fat in chicks fed with lower protein diets was higher numerically and could be a result of unsuitable amino acid pattern in these diets and stimulating of gluconeogenesis pathway in these chicks, so extra calories could be deposit as fat. Also adding animal fat resulted to more fat deposition. Some reports indicate that unsaturated dietary fat may be used for metabolic purposes; consequently, this could affect deposition of body fat showed that diets containing large energy: protein ratios promote de novo lipogenesis and result in obese broiler chicken (Donaldson *et al* ., 1985).

Chapter three

Material and methods

3.1: Experimental location and duration:-

The study was conducted at the Poultry Farm, Animal Production college ،Sudan University of Science and Technology during the period from 21of March to 9 of April 2015.

3.2: Experimental housing:-

The experiment was conducted in an open side deep litter house in gabled shape by 8×5m dimension (4m) central altitude and 2.5m sidle altitude constructed by corrugated iron sheets roofing wire netting sheets supported by 50cm cement wall at side and concretely floor. The long axis of the house extended east-west facing the wind direction for efficient ventilation.

The house was divided into 8 (replicates of equal size ($1.5m^2$) x75cm walls light which separate experimental sections.

The experimental house and equipments was cleaned،burned،and disinfected، and then fresh wood shaving litters were spread in the experimental section floor at depth of 5cm. Moreover،each section was provided with one metal feeder and round plastic drinker. A lighting system of 24 hr/day was used .

3.3:Experimental birds:-

A total of 200 one day-old unsexed broiler chicks (ROS 308) were used in this experiment. The chicks were purchased from Inmaa Project for Poultry and Feed Production. On the 15 day chicks were weighted and randomly divided

into two groups with eight replicates of (25) chicks . The complete randomized design . was used Water was supplemented with multi –vitamin from 28 -31 days.

3.4: Experimental treatments and feeding trails:-

The experimental consist of two treatments (T1 and T2) during the finishing period T1 group fed no fat (0%)،T2 group fed (3%) beef fat as described in table (1)، Each group was further subdivided into four replicates of twenty five birds in each replicate.

The experimental diets were formulated to be approximately iso-caloric and iso-nitrogenous to meet the nutrient requirements for broiler chicks as recommended by the American National Research council (NCR،1994)،

3.5: Health program:-

Water was supplemented with multi –vitamin from 28 -31 day Anti- biotic was used as prevention dosage from 35-40 day.

3.6 Experimental diets :

Beef fat was collected from Animal production researches centre at (Tamboul) - Aljazeera state . The other ingredients were purchased from the local market. For experimental diets were formulated to meet the requirement recommended by National Research council (NRC) (1994). 3%) . The calculated chemical analysis of the experimental diet are tabulated in table (1) . The calculations were based on values according to (Kuku) bulletin by Yousif and Afaf (1999) , Chemical composition of concentrate in Table(3) . On other hand the determined composition of beef fat was based on the actual analysis using method table (1) .The variations in energy concentration were adjusted using vegetable oil

when required .The diets also were supplemented with either lysine (as lysine monohydrochloride) or methionine or both were necessary .

3.8 Data collection:-

3.8.1 Weight gain (g/ bird / day):-

Weight gain was recorded on weekly basis for each replicate by subtracting the initial body weight from the final body weight every day .

3.8.2 Feed intake (g/bird / day):

Feed intake from the day was calculated by subtracting the amount of feed remained from the amount of feed given.

3.8.3 Feed conversion ratio (FCR) (g feed / g/gain) :

Feed conversion ratio was calculated by dividing the amount of feed consumed by body weight gain (g feed intake / g body weight gain).

3.8.4 live Body weight (LBWT) (g /bird / day):-

Body weight (BWT) was determined daily using sensitive balance .

3.8.5 Mortality:

The rate of mortality is the ratio between the number of dead birds and the initial total number of birds multiplied by 100.

$$\text{Mortality \%} = \frac{\text{number of dead bird} \times 100}{\text{Total number of birds}}$$

Mortality was recorded daily after daily .

3-8.6 Relative water

$$= \frac{\text{water intake/ ml}}{\text{body weight/ g}} \%$$

3-8.7 Protein efficiency ratio (PER) :

$$= \frac{\text{weight gain (g)}}{\text{protien intake (g)}}$$

Protein intake = feed intake (g) X dietary crude protein

3-8.8 Efficiency energy utilization =

$$\frac{\text{weight gain(g) X100}}{\text{Total metaboilzable energy intake}}$$

Total metabolizable energy intake = feed intake (g) X dietary Metabolic energy

3.8.9 Lysine efficiency

$$= \frac{\text{lysine intake}}{\text{weight gain(g)}}$$

Lysine intake = feed intake (g) X dietary lysine

3.8.10 Production efficiency factor

$$= \frac{\text{final weight (g) X life ability}}{\text{age/day X feed conversion ratio (g) X 100}}$$

$$\text{Life ability} = \frac{\text{NO.of live birds}}{\text{Total No.of birds}}$$

3-8.11 Hematological analysis of broiler blood :-

Anti coagulant (EDTA) preserved blood was used for the estimation of various hematological parameters like hemoglobin (HB), packed cell volume (PCV), and blood cell count. Estimation of hemoglobin content was done according to Van Kampan and Zijlstre (1961) ,packed cell volume according to microhamatocrit method of Struma *et al* .(1954). Red blood cell (RBC) count and total Leukocyte count (TLC) according to routine clinical method. These values will be utilized for collocated mean corpuscular hemoglobin concentration (MCHC) according to Deice and Lewis (1977).

3-8.12: Statistical analysis:-

The Completely randomized design (CRD) was used for the analysis the effect of beef fat on broiler performance . The data was subjected (Independent sample – T .test) using the statistical obliged package of social science (SPSS) version 16.0 (2007) Microsoft office computer program.

A probability of ($p \leq 0.05$) was required for statements of significance.

Table (1) The determined chemical composition analysis of the experimental diets :

Ingredients	Control	Beef fat
ME(Mj/Kg)	0	13.9
CP%	20.89	19.92
CF%	3.40	3.72
Ca%	0.99	1

Av.p%	0.45	0.56
Lysine%	1.20	1.19
Methionine%	0.48	0.54

Diets were formulated according to the recommendations of the natural research council (NRC 1994)

Table (2): Composition and of the calculated chemical analysis of the experimental finisher diets :

Treatment / Ingredients	**T1**	**T2**
Sorghum	74.6	70.5
Wheat bran	0.1	0.9
G.N.C	18.85	19.08
Lime stone	0.83	0.85
D.C.P	0.01	0.01
Lysine	0.5	0.5
Methionine	0.06	0.05
Common Salt	0.1	0.1
Super Concentrate	5	5
Beef fat	0	3
Premix	0.01	0.01
Calculated analysis		
ME(Mj/kg)	13.397	12.96
CP%	19.85	18.75
CF%	4	4.8
Ca%	1	1
Av.p%	0.60	0.62
Lysine%	1.01	1.01
Methionine%	0.50	0.50

Table (3):Chemical composition of concentrate:

Item / Ingredients	ME Mj/kg	CP %	Ca %	Lysine %	Methionine %	CF %
Concentrate	10.02	35	10.6	1.1	4.3	1.5

Source: lab of Hendrix Company،Netherlands.

Chapter four

Results

4:1 Chemical composition of beef fat:

The calculated chemical composition of the experimental diets was showed in the table (2) . On the average beef fat diet contains. 13.9 Mj/kg calculated metabolizable energy, 19.86 % crude protein, 4.8 % crude fiber, 1% calcium, and 1.01 % lysine.

4:2 Effect of feeding beef fat on weekly feed intake:

Data showed the effect of feeding beef fat on weekly feed intake (g) was showed in the table (4), the data indicated feed intake by group fed tallow a highly ($p<0.01$) during week1 and week 2, but insignificant effect was showed at week3 response to dietary treatments.

4.3 Effect of feeding beef fat on weekly water intake :

The weekly data for the water intake are presented in table (5). water intake was showed an insignificant effect at week 1 , while the data at week 2 and week 3 was showed a highly significant effect at week2 ($p <0.01$) and a significant effect ($p<0.05$) at week 3 of an experiment .

4.4: Effect of feeding beef fat on weekly body weight :

Data showed the effect of feeding beef fat on weekly body weight was showed in the table (6) , the data indicated that from week1 to week3 was showed a highly significant ($p<0.01$) response to the dietary treatments .

4:5 Effect of feeding beef fat on weekly weight gain :

Data showed the effect of beef fat on the weekly weight gain are presented in the table (7) , an insignificant effect was showed at week 1 , but weight gain at week 2 and week3 showed a highly significant effect ($p<0.01$) response to dietary treatments .

4:6 Effect of feeding beef fat on weekly feed conversion ratio :

The weekly data for the feed conversion ratio are presented in the table (8). FCR showed insignificant difference at week 1, however week 2 and week 3 also showed a highly significant difference ($p<0.01$) at week 3 and a significant effect ($p<0.05$) at week2 response to the dietary treatments.

4.7: The dietary effect of beef fat on relative water intake:

The result of feeding beef fat on relative water in the table (9) , (week1) showed insignificant response to the dietary treatments , but week 2 showed a significant effect ($p<0.05$) , also week 3 showed a highly significant($p<0.01$) response to the dietary treatments .

4.8: The dietary effect of beef fat on protein efficiency ratio on weekly performance:

Data showed the effect of protein efficiency ratio in the table (10), week 1and week2 showed a significant difference ($p<0.05$), also a highly significant difference ($p<0.01$) was showed at week (3) response to the dietary treatments.

4.9: The dietary of effect on efficiency energy utilization :

The result of the data in the table (11) showed that efficiency energy utilization has a highly significant ($p<0.01$) at week 3 . Data showed during week 1 and week 2 showed a significant effect ($p <0.05$) of the broiler performance response to the dietary treatments .

4.10: The dietary effect on lysine efficiency :

The result of weekly lysine efficiency was showed in the table (12) lysine efficiency was lower the group fed on beef fat compared to control . Statistical analysis of the effect of beef fat showed insignificant difference at week 1 , but a highly significant differences ($p<0.01$) was showed at week 3 and a significant effect ($p<0.05$) at week2.

4.11: The dietary effect of the production efficiency factor on weekly performance:

The result of production efficiency factor showed in the table (13) statistical analysis of the effect of beef fat showed highly significant effect ($p< 0.01$) during the week 1, week2 and week 3 from the data response to the dietary treatments.

4:12 The dietary effect of beef fat on blood analysis in broiler performance:

The result of blood analysis (HB, P.C.V, W.B.C. R.B.C) was showed in the table (14), blood analysis showed a highly significant effect ($p<0.01$) during the experiment period response to the dietary treatments.

4:13 The dietary effect of beef fat on serum analysis in broiler performance:

The result of serum analysis (M.C.V, M.C.H.C) showed in the table (14), showed a highly significant ($p<0.01$) in the experiment analysis, while (M.C.H.) had showed an insignificant effect response to the dietary treatments.

4:14 The effect of beef fat on Carcass weight g/ bird:

The result of data showed that in the table (16), beef fat had an insignificant effect on the Carcass weight response to the dietary treatments.

4: 15 The effect of beef fat on cholesterol analysis:

The data of broiler cholesterol analysis showed in the table (17) insignificant effect had showed response to the dietary treatments.

4:16 Overall performance of chicks fed beef fat on the dietary treatment:

The results of the over all effect of feeding 3% of beef fat to the ratio, on the broiler performance are presented in the table (18) . Feed intake ,water intake , body weight , weight gain , feed conversion ratio. The data showed feed intake was insignificant difference, while water intake showed a highly ,. Body weight and weight gain showed a highly significant effect ($p<0.01$) response to the dietary treatments, also efficiency energy utilization and lysine efficiency showed a significant effect ($p<0.05$) response to the dietary treatments.

Table (4) Effect of feeding beef fat on weekly feed intake g / bird			
Item / Treatment	Week1	Week2	Week3
Control	75.06±9.4	99.56±.0.2	88.81±15.4
Ration added beef fat	85.22±5.09	127.±10.54	112.1±14.90
Significant	**	**	NS
± : Standard deviation ** : Highly significance different at (p< 0.01) NS : No significant different			

Table (5) Effect of feeding beef fat on weekly water intake Ml / bird			
Item / Treatment	Week1	Week2	Week3
Control	212.6±85.2	378.8±40.0	452.10±55.6
Ration added beef fat	227.5±32.1	445.2±60.7	494.9±19.4
Significant	NS	**	*
± : Standard deviation ** : Highly significance different at (p< 0.01) * : significant difference at (p<0.05) NS : No significant different			

Table (6) Effect of feeding beef fat on weekly body weight g / bird			
Item / Treatment	Week1	Week2	Week3
Control	761.5±78.8	991.9±131.4	1257.7±151.2
Ration added beef fat	864.4±95.03	1258.9±130.8	1396.9±119.3
Significant	**	**	**
± : Standard deviation ** : Highly significance different at (p< 0.01)			

Table (7) Effect of feeding beef fat on weekly weight gain g / bird			
Item / Treatment	Week1	Week2	Week3
Control	46.79±.12.7	45.12±7.9	50.27±11.33
Ration added beef fat	46.24±.726	63.9±1.12	81.08±2.95
Significant	NS	**	**
± : Standard deviation ** : Highly significance different at (p< 0.01) NS : No significant different			

Table (8) Effect of feeding beef fat on weekly FCR g / bird			
Item / Treatment	Week1	Week2	Week3
Control	1.75±0.61	2.27±0.4	1.82±0.4
Ration added beef fat	1.88±0.123	1.98±.16	1.38±0.17
Significant	NS	*	**
± : Standard deviation ** : Highly significance different at (p< 0.01) * : significant different at (p<0.05) NS : No significant different			

Table (9) Effect of feeding beef fat on weekly Relative water %			
Item / Treatment	Week1	Week2	Week3
Control	27.4±9.30	38.8±6.65	35.94±3.4
Ration added beef fat	26.4±3.41	35.4±3.97	29.3±2.24
Significant	NS	*	**
± : Standard deviation ** : Highly significance different at (p< 0.01) * : significant different at (p<0.05) NS : No significant different			

Table (10) Effect of feeding beef fat on weekly protein efficiency ratio			
Item / Treatment	Week1	Week2	Week3
Control	3.21±1.1	2.27±0.4	2.88±0.7
Ration added beef fat	2.67±1.7	2.54±.22.4	3.68±.51
Significant	*	*	**
± : Standard deviation * : significant different at (p<0.05) ** : Highly significance different at (p< 0.01)			

Table (11) Effect of feeding beef fat on weekly efficiency energy utilization			
Item / Treatment	Week1	Week2	Week3
Control	4.8±1.7	3.39±.59	4.30±.98
Ration added beef fat	3.98±.25	3.78±.33	5.4±.78
Significant	*	*	**
± : Standard deviation * : significant different at (p<0.05) ** : Highly significance different at (p< 0.01)			

Table (12) Effect of feeding beef fat on weekly lysine efficiency / bird			
Item / Treatment	Week1	Week2	Week3
Control	19.30±6.7	25±0.4	20.05±0.4
Ration added beef fat	20.8±1.37	25.75±1.88	21.21±4.88
Significant	NS	*	**
± : Standard deviation ** : Highly significance different at (p< 0.01) * : significant different at (p<0.05) NS : No significant different			

Table (13) Effect of feeding beef fat on weekly production efficiency factor / bird			
Item / Treatment	Week1	Week2	Week3
Control	14.93±4.1	11.32±1.95	15.34±23.7
Ration added beef fat	20.88±1.38	17.94±11.99	15.38±20.2
Significant	**	**	**
± : Standard deviation ** : Highly significance different at (p< 0.01) NS : No significant different			

Table (14) Dietary (finisher) effects of beef fat on broiler blood analysis g/bird							
Item / Treatment	Hb g/dL	PCV %	WBC mm^3	RBC mm^3	MCV fl	MCH fl	MCHC gHb
Control	9.45±.45	27.±.75	4.8125±.24	4.6825±.39	57.10±4.83	19.26±3.8	.3475±.019
ration added beef fat	11.9±1.20	27.1±1.45	5.4±.72	4.7±0.42	57.9±7.28	25.4±4.09	.43±.02
Significant	**	**	**	**	**	NS	**
± : Standard deviation ** : Highly significance different at (p< 0.01) NS : No significant different							

Table (15) The analysis of initial weight g/ bird	
Item / Treatment	Mean ± std
Control	661±22.7
Ration added Beef fat	804.7±20.8
Significant	**
± : Standard deviation ** : Highly significance different at (p< 0.01	

Table (16) dietary effect of beef fat on Carcass weight g/bird	
Item / Treatment	Mean ± std
Control	842.9±85.9
Ration added Beef fat	1050±.082
Significant	NS
± : Standard deviation NS : No significant different	

Table (17) dietary (finisher) effects of beef fat on broiler Cholesterol analysis Ml gram/ bird /day	
Item / Treatment	Mean ± std
Control	96.36±.6.34
Ration added Beef fat	8.87±1.83
Significant	NS
± : Standard deviation NS : No significant different	

Table(18) The overall effect of the dietary beef fat on broiler performance

Item / Treatment	Control Diet	Beef fat Diet	Significant Level
Feed intake	238.04±44.3	236.02+21	NS
Water intake	912.93±163.8	1167.6±99.27	*
Live body weight (LBW)	1257.7±151.3	1396.9±119.3	**
Weight gain (WG) gram	127.83±28.9	133.86+28.2	**
Feed conversion ratio (FCR)	1.95±0.17	1.75±0.33	NS

5.0 Discussion

The main aim of this experiment was to test weather beef fat with the level 3% had influences on the performance of broiler chicks or not.

5:1 Effect of feeding 3% of beef fat on the performance of broiler chicks :

It is evident from the performance data feed intake was increased by the beef fat , this increase was reflected in terms of increased body weight , weight gain ,and improved feed conversion ratio . This show that beef fat supplementation was improved the performance of broiler chicks . The results of the present study agree with Brandt and Anderson (1990) who had mentioned that using of beef fat increase the energy and performance of the broiler chicks . Alberta university of agriculture and forestry (2000) reported that fats oils can improve ration by improving palatability , also the result showed a high significant in the performance of broiler chicks in weight gain , This result are in line with the result obtained by G.H sadeghi1 and S.A Tabiedian (2005) who studied the effects of tallow supplementation and feeding different energy to protein ratio on weight gain . They stated that feeding different levels of tallow in 22-42 days old chicks in a diet with highest energy and protein content by resulted in highest weight gain and feeding a diet with lowest energy and protein level by resulted to lowest weight gain and those different was significant ($P<0.05$) .

The results also showed that beef fat had significant difference on the feed conversion ratio , this result also was disagreed with the result of Sadeghi1 and Tabiedian (2005) who stated that there was no significant difference in feed conversion ratio in chicks fed with different experimental diets in ages 7-21 days , 21-42, 42-56 days . FCR was improved by addition of beef fat in week 2 and week3 .

5:2 The effect of feeding 3% of beef fat on the Carcass weight :

The result showed that beef fat had no significant effect of Carcass weight , this result was also deal with the findings of G.H Sadeghi1 and S.A Tabiedian (2005) who showed that (Feeding different levels of tallow had no effect on carcass, abdominal fat and liver weight .

6.0 conclusion and recommendation

6:1 conclusion :

Based on the results obtained beef fat can improve the performance of the broiler chicks in the finisher by improving the broiler chicks feed intake , water intake ,body weight , weight gain and feed conversion ratio

6:2 Recommendations:

Based on the result I recommended the use beef fat in research of poultry in nutrition, also Further studies should be conducted by supplementing different levels with high levels of beef fat.

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