Influence Of Animal Type And Pedigrees On Physicochemical Properties Of Fat Extracted From Meats

Khadir E. Khadir, Omer M. Izzeldin, Gaafar A. Nugdallah, Mohammed Abdalbasit A. Gasmalla, Azhari A. Mohammed Nour, Amir M. M. Bushara

ABSTRACT: In this study used five pedigrees from animals, actually two kind from each pedigree or genus (Kabashi and Hamari from Sheep, Baggara and Nilotic from Beef, Anafi and Hawari fom Camels, Ross and Hubbard from Chicken, Synodoutis. (Garqur or Galabeya.) and Bagrus. (Bayad or Kabarus.) from Fish), where taken comprehend samples from animals meat, then extracted the fat from it and analyzed the physiochemical of fats. The result showed that the physical characteristics values for animal fats was a significant difference (P≤ 0.05) between most samples, when melting point (Co) was determinated the higher value of melting point (50.20) recorded by Gargur and the lower value recorded by Bagara (34 C^0), in density(g/Cm3) the higher value of density (1.421) recorded by Kabashi sheep and the lower value recorded by Ross chicken (0.960), in the refractive index (o) the higher value of it recorded by bayad fish (1.465) but the lower value recorded by Baggara beef (1.453), in the viscosity (CPs) the higher value recorded by Baggara beef (28.4), lower value recorded by Anafi camel (23.6), in fats colour (0) analysis Anafi camel recorded higher value in blue colour (0.200) and lower value was zerro (0.00) recorded by Ross chicken, in yellow colour nilotic beef was recorded higher value (50.5), lower value recorded by Ross chicken and Hummary sheep (20.7), but in red colour Garqur fish recorded higher value (8.6) and nilotic beef recorded lower value (1.4). chemical constants determination had performed for animals fat, there was significant difference (P≤ 0.05) between all Samples, when peroxide value (ml eq peroxide/kg fat) was determination the higher value recorded by Kabashi camel (5.61), lower value recorded by Kabashi sheep(1.57), in saponification value (mg NaoH/g oil) Hummari sheep recorded higher value (199.00) when Garqur fish recorded lower value (189.33), in unsaponifable matter (%)Baggara beef recorded higher value (0.817) when Bayad fish recorded lower value (0.237), in acid value (mg NaoH/g oil) the results showed the higher value recorded by Hummari sheep (4.63) the lower value recorded by Nilotic beef (0.93), in free fatty acids the results showed the higher value recorded by Hummari sheep (2.32) the lower value recorded by Nilotic beef (0.47), in moisture content (%) Baggara beef recorded the higher value (1.34) the lower value recorded by Kabashi camel (0.03).

KEY WORDS: Pedigrees, physicochemical properties, Meat, Free Fatty Acid, Iodine value, Colour, Saponification, Peroxide values

1 INTRODUCTION

Fats (and oils) may be divided into animal and vegetable fats according to source. Further, they may be classified according to their degree of unsaturation as measured by their ability to absorb iodine at the double bonds. This degree of unsaturation determines to a large extent the ultimate use of the fat. Liquid fats (i.e., vegetable and marine oils) have the highest degree of unsaturation, while solid fats (vegetable and animal fats) are highly saturated. Solid vegetable fats melting between 20 and 35 °C (68 and 95 °F) are found mainly in the kernels and seeds of tropical fruits. They have relatively low iodine values and consist of glycerides containing high percentages of such saturated acids as lauric, myristic, and palmitic.

- *Khadir E. Khadir, Omer M. Izzeldin, Gaafar A. Nugdallah, Mohammed Abdalbasit A. Gasmalla, Azhari A. Mohammed Nour, Amir M. M. Bushara*
- *Department of Food Science & Technology, Faculty of Agriculture, Omdurman Islamic University, P.O. Box 382, 14415, Khartoum, Sudan*
- *Department of Biotechnology, Faculty of Science & Technology, Omdurman Islamic University, P.O. Box 382, 14415, Khartoum, Sudan*
- *Department of Nutrition &Food Technology, Faculty of Science & Technology, Omdurman Islamic University, P.O. Box 382, 14415, Khartoum, Sudan*

Fats from fruits of many members of the palm family, notably coconut and babassu oils, contain large amounts of combined lauric acid. Most animal fats are solid at ordinary temperatures; milk fats are usually characterized by the presence of short-chain carboxylic acids (butyric, caproic, and caprylic); and marine oils contain a large number of very long chain highly unsaturated acids containing up to six double bonds and up to 24 or even 26 carbon atoms. Fats are practically insoluble in water and, with the exception of castor oil, are insoluble in cold alcohol and only sparingly soluble in hot alcohol. They are soluble in ether, carbon disulfide, chloroform, carbon tetrachloride, petroleum benzin, and benzene. Fats have no distinct melting points or solidifying points because they are such complex mixtures of glycerides, each of which has a different melting point. Glycerides, further, have several polymorphic forms with different melting or transition points. Fats can be heated to between 200 and 250 °C (392 and 482 °F) without undergoing significant changes provided contact with air or oxygen is avoided. Above 300 °C (572 °F), fats may decompose, with the formation of acrolein (the decomposition product of glycerol), which imparts the characteristic pungent odour of burning fat. Hydrocarbons also may be formed at high temperatures. Fats are hydrolyzed readily. This property is used extensively in the manufacture of soaps and in the preparation of fatty acids for industrial applications. Fats are hydrolyzed by treatment with water alone under high pressure (corresponding to a temperature of about 220 °C [428 °F]) or with water at lower pressures in the presence of caustic alkalies, alkaline-earth metal hydroxides, or basic metallic oxides that act as catalysts. Free fatty acids and glycerol are formed. If sufficient alkali is present to combine with the fatty acids, the corresponding salts (known popularly as soaps) of these acids are formed, such as the sodium salts (hard soap) or the potassium salts (soft soaps). (Britannica, 2011). The Melting point (Co) in meat fat samples of sheep is about (40.33 – 43.03) it was of four treatments. (Moharrery, 2006). The usual range in constants of Lard, the Melting point at 40o C is (34o – 45o), in Fatty acids of Lard it̉ s (37o - 47o) and in Fatty acids of Beef Fat it' s (40o - 44o) (Pearson, 1970). The relative density (40o C/water at 20 o C) in lard is (0.896-0.904), Tallow (0.894-0.904) (Codex-A. 2001). The usual range in constants of Lard, the Specific gravity at 100o/15.5oC is (0.859 – 0.864)(Pearson, 1970).The refractive index of a substance is the ratio of the speed of light in a vacuum to speed of light in the substance. The index of refraction of oils is characteristic within certain limits for each kind of oil. It is related to the degree of saturation but it is affected by other factors such as free fatty acid content, oxidation, and heat treatment. (Kowale, et al, 2008). In this method the fat is liquefied by heating and its refractive index is estimated. All liquids including oils possess a specific refractive index and it is estimated by refractometer. (Kowale, et al, 2008). The refractive index (n) of a substance is the ratio of the velocity of light in vacuum to its velocity in the substance. It varies with the wavelength of light used in its measurements. It may also be defined as the ratio of the sine of angle of incidence to the sine of the angle of refraction. Clean the refractometer with alcohol and ether. A drop of oil or fat (in case of a solid fat the temperature should be suitably adjusted by circulating hot water) is placed on the prism. The prism is closed by the ground glass___ half of the instrument. The dispersion screw is adjusted so that no colour line appears between the dark and illuminated halves. The dark line is adjusted exactly on the cross wires and the refractive index is read on the scale. Usually commercial instruments are constructed for use with white light but are calibrated to give the refractive index in terms of sodium light of wavelength, 589.3 nm at a temperature of 40 C^0 unless otherwise specified. The refractive Index is (1.448-1.460) in lard, (1.448-1.460) in tallow (Codex, 2001). The Refractive Index of a substance is the ratio of the velocity of light in vacuum to its velocity in substance. It varies with the wavelength of light used in its measurement. It may also be defined as the ratio of the sine of angle of incidence to the sine of the angle of refractive. (Kowale 2008). The Refractive Index in meat fat samples of sheep is about (1.4565 –1.4571) it was of four treatments.(Moharrery, 2006). The usual range in constants of Lard, the Refractive Index at 40o C is (1.4583 – 1.4610)and in Beef Fat it̉ s (1.455 – 1.459) (Pearson, 1970).Viscosity defined as term of internal resistance to oil molecules when it stream . consideration to no exist big difference between the viscosity to different oils, the viscosity determination is not important for food analyzers except it used in determination of heated oil quality specially frying oil where it increase through the heat treating (frying) result to polymers forming . As it used also in determination the pumps and pipes volume in many factories. might determinate by multi methods : Uebbelohde-type capillary viscometers or Ostwald method or Hoebbler apparatus (Ebrahim and Atif, 2003). The peroxide value in fats and oils is an up to 15 milliequivalents of active oxygen/kg oil in virgin oils and cold pressed fats and oils , up to 10 milliequivalents of active oxygen/kg oil in other fats and oils . (Codex, 2001).Saponification number is defined as the number of milligrams of potassium hydroxide required to saponify one gram of fat. It is an indication of the molecular weight of the fat and is inversely proportional to it. The saponification value gives an infication of the nature of the fatty acids in the fat since longer the carbon chain the less acid is liberated per gram of fat hydrolysed. Human fat has asaponification number of (194 – 198), butter (210 – 230) and coconut oil (253-262). (Kowale, 2008). Saponification value (mg KOH/g fat) in lard is (192-203), Tallow (190-202) (Codex, 2001). Saponification number of fats and oils in lard (195.4), Mutton tallow (192-195.5) and Beef tallow (193.2-200). (EL-Magoli, 2006). Characterization of fat from different animal tissues was determined by (Khan, etal, 2009), the saponification (g/100g fat) was (189.0) in Beef, (180) Mutton, (183) Poultry and (185) in fish. Saponification Number is defined as the number of milligrams of potassium hydroxide required to saponify one gram of fat. It is an indication of the molecular weight of the fat and is inversely proportional to it. The saponification value gives an infication of the nature of the fatty acid in the fat since longer the carbon chain the less acid is liberated per gram of fat hydrolysed. Human fat has a saponification number of 194 – 198, butter 210 – 230 and coconut oil 253 – 262. (Kowale 2008).The Saponification Value (g/100g fat) in different animals' tissues is: Beef (189.0), Mutton (180.0), Poultry (183.0) and Fish (185.0). (Abdul Rehman, et al, 2006). The usual range in constants of Lard, the Saponification value is (192 - 200) and in Beef Fat it̉ s (194 - 200) (Pearson, 1970). Physicochemical parameters of two different of the local tallow explain by (Muhammad, et al, 2008), the Saponifiation Value (mg KOH/g fat) was (195) in Tallow A (yellow color) and (197) in Tallow B (white color).Unsaponifiable Matter includes those substances frequently found dissolved in fats and oils which cannot be saponified by the alkalies but are soluble in the ordinary fat solvents. Included are the higher aliphatic alcohol, sterols, pigments, and hydrocarbons (Kowale, et al, 2008). Unsaponifiable Matter (g/kg) in Lard is ≤ 10, Tallow ≤ 12 (Codex, 2001). The usual range in constants of Lard, the Unsaponifiable Matter (%) is (0.2 – 0.7) (Pearson, 1970). The Iodine Value test is based on the amount iodine absorbed by the unsaturated fatty acids present in the fat and varies in different animals. The iodine value of animal fats are: Beef fat: 38 to 46, Sheep and goat fat: 35 to 46. The iodine value of ox and sheep are to some extent found to be closely identical. Hence, it is not possible to confirm the type of meat legally based on iodine number. (Kowale, et al, 2008). Iodine Numbers of common Fats was (46 – 70) Lard, (38 – 46) Beef tallow and (35 – 46) Mutton tallow (El-Magoli, 2006). Characterization of Fat from different animals tissues, the iodine value (g/100g fat) is (45.3) in Beef, (46.7) mutton, (60.0) poultry and (109.2) in fish (Khan, et al, 2009). Iodine value in Lard is (55 – 65), tallow (40 – 53).(Codex, 2001). The Iodine Value (g/100g fat) in different animals' tissues is: Beef (45.3), Mutton (46.7), Poultry (60.0) and Fish (109.2). (Abdul Rehman, et al, 2006). The usual range in constants of Lard, the Iodine value is (51 – 70) and in Beef Fat it̉ s (35 - 44) (Pearson, 1970). Physicochemical parameters of two different of the local tallow explain by (Muhammad, et al, 2008), the Iodine Value (Wijs) was (48.66) in Tallow A (yellow color) and (49.15) in Tallow B (white color). Fatty acids present in substantiol amounts in fats of meat animals are oleic , palmitic and stearic . Free fatty acids are the products of enzymatic or microbial lipolysis of lipids and hence . goes on increasing during storage of meat and is responsible for flavor determination in meat which is particular noticeable when the acidity of the extracted fat reaches 2 to 3 percent (as oleic acid) . The acid value of a fat is the number of mg of potassium hydroxide (KOH) required neutralizing the free fatty acids in 1 gram of the substance (Kowale, et al, 2008). The maximum level of Acid value in lipids is 0.6 mg KOH/g fat or oil, 4mgKOH/g fat or oil in virgin fats and oils, 4mgKOH fat or oil on cold pressed fats and oils. (Codex, 2001). Characterization of fat from different animals tissues was determined by (Khan, et al, 2009) the Acid value (mg KOH/g fat) was (2.5) in Beef, (2.72) Mutton, (1.6) Poultry and (8.0) in fish. Fatty Acids percent in substantial amounts in fats of meat animals are oleic, palmtic. The Acid value (mg KOH/g fat) in different animals' tissues was: Beef (2.5), Mutton (2.72), Poultry (1.6) and Fish (8.0). (Abdul Rehman, et al, 2006). The usual range in constants of Lard, the Acid value is (0.2 – 1.5) (Pearson, 1970). Physicochemical parameters of two different of the local tallow explain by (Muhammad, et al, 2008), the Acid Value (mg KOH/g fat) was (1.009) in Tallow A (yellow color) and (1.99) in Tallow B (white color). In model lipid systems and various fats containing foods, the rate of oxidation depends strongly on water activity. In dried foods with very low moisture contents (aw value of less than about 0.1), oxidation proceeds very rapidly. Increasing the aw to about 0.3 retards lipid oxidation and often produces a minimum rate. This protective effect of small amounts of water is believed to occur by reducing the catalytic activity of meat catalysts, by quenching free radicals, and / or by imbedding access of oxygen to the lipid. At somewhat higher water activities (aw = 0.55 – 0.85), the rate of oxidation increases again, presumably as a result of increased mobilization of catalysts and oxygen (Owen, 2005). The maximum level of matter volatile at 105oC Lipid is (0.2%m/m). (Codex, 2001). Physicochemical parameters of two different of the local tallow explain by (Muhammad, et al, 2008), the Moisture was (0.266%) in Tallow A (yellow color) and (0.233%) in Tallow B (white color).

2 MATERIALS & METHODS

2.1 Analysis of Physical and chemical properties

Fats were extracted from meat samples by blight and dyer method which described by (Ebrahim, and Atif, 2003). Melting point (C^0), Specific Gravity (g/Cm3), Refractive Index (o), Colour(o), Peroxide value (ml eq peroxide/ kg oil, Saponification value (mg KOH/ g oil), Unsaponifiable matter (%),Iodine value (mg I/g oil), Acid value (mg NaOH/g oil), Free fatty acid (%) determined by methods described by (Kowale, et al, 2008).

Viscosity (CPs): The viscosity of the oil samples was recorded using an Ostwald-U-tube viscometer according to Cocks and Van Rede (1966).

Moisture (%): The moisture content of Oils and Fats should preferably be determined by Dean and Stark' s distillation method using heptane or by the karl Fisher method using n-propanol instead of methanol throughout. Drying methods may also be employed.

Sampling: Place the sample in a screw-capped jar, warm in an oven at 32o – 35oC and shake vigorously from time to time in order to produce a homogeneous fluid emulsion.

Water: Weigh out 3 – 4 g of sample in to a metal dish containing a rod with a flattened end and dry, firstly on a boiling-water bath with stirring and then in a 100oCoven to constant weight (approx 3 hr).(Pearson, 1970).

Statistical analysis: All data were subjected to statistical analysis, each determination was carried out and analyzed in triplicate and figures were them averaged. The means were tested by analysis of variance (ANOVA) with a probability P≤ 0.05. (Duncan, B.O, 1955), (Peterson, 1985).

3 RESULTS & DISCUSSION

3.1 Physical properties of animal meat fats

3.1.1. Melting point (Cº): The Physical properties of Animal meat fats are shown in table (1). The melting point of animal parentages were found to be 40.06 C^0 and 40.00C^0 Kabashi and Hamari sheep respectively, while that for Baggara and Nilotic beef found to be 34.60 C^0 and 42.70 C^0 respectively, but for Anafi and Kabashi camels were found to be 47C^0 and 45 C^0 respectively, for Ross and Hubbard chicken were found to be 40C^0 and 41C^0 respectively, and for Gargur and Bayad were 50C^0 and 39C^0 respectively. The results obtained showed a significant difference (p< 0.05) between Anafi, Kabashi, Gargur, nilotic and other samples. The higher value of melting point 50.20 C^0 recorded by Gargur and the lower value recorded by Bagara 34 C^0 . The values of melting point it were similar of that results obtained by pearson (1970) others they reported values ranged between 37 C^0 and 47 C^0 . The differences between the values it may be according to many factors e.g varities, animal feedings and environmental conditions e.g (heating).

3.1.2 Specific gravity (g/Cm3): As shown in table (1) the specific gravity of fats of animals were found to be 1.421 g/Cm3 and 1.017 g/Cm3 for Kabashi and Hamari sheep respectively, but for Baggara and Nilotic Beef were 1.048 g/Cm3 and 0.961 g/Cm3 , for Ross and Hubbard chickens were 0.960 g/Cm3 and 1.108 g/Cm3 respectively, while for Anafi and Kabashi camels it were 1.116 g/Cm3 and 0.990 g/Cm3 and for Gargur and Bayad were 0.971 g/Cm3 and 1.077 g/Cm3. The obtained results showed a significant difference (p< 0.05) between all samples except fishes fats and beef fats it showed no significant difference (p<0.05). The values of specific gravity of all parentages were higher than that obtained by pearson (1970) except Nilotic beef, Kabashi camel, Ross chicken and Gargur fish. The difference between the values of specific gravity according to varieties, feeding and environmental conditions .

3.1.3 Refractive index (o): The refractive index value presented in table (1) were found to be 1.463 and 1.463 for Kabashi and Hamari respectively, 1.453 and 1.456 for Baggara and Nilotic respectively,1.456 and 1.455 for Anafi and Kabashi Camels respectively, 1.454 and 1.462 for Ross and Hubbard respectively, and for Gargur and bayad were 1.522 and 1.465 respectively. A significant difference ($p<0.05$) between the values observed between beef parentages, also chickens and fishes . also the results showed a significant difference ($p<0.05$) between parentages of animal except sheep parentages which showed non significant difference ($p<0.05$). The variation in values of refractive index as the result of varieties of animals and environmental conditions. Viscosity (CPs poise at 32 ± 2 C^0): As shown in table (1) the viscosity of animal fats was ranged from 23.6 to 28.4 poise for Anafi and Baggara respectively. Statistical analysis showed a significant difference between beef parentage which were 28.4 and 25.1 poise for Baggara and Nilotic respectively, also between camels parentage and other animals there is a significant difference ($p<0.05$) was showed. The difference between the viscosity values of animals values it may be according to animals feeding and environmental conditions. Viscosity of fats effected by degree of saturation and chain of fatty acids.

3.1.4 Colour

3.1.4.1 Blue: As shown in (Table 1, figure 1) the results showed that the blue Colour Value of raw Animal meat Fats (Kabashi and Hamari Sheep(was found to be 0.020 and 0.003 respectively , Baggara and Nilotic Beef was found to be 0.020 and 0.030 respectively , Anafi and Kabashi Camels was found to be 0.200 and 0.100 respectively, Ross and Hubbard Chicken was found to be 0.000 and 0.010 respectively, Garqur and Bayad Fish was found to be 0.010 and 0.003 respectively. The results showed higher value in anafi Camels 0.200 while had lowest value 0.000 Ross Chicken. The results showed there is no significant difference ($P \leq 0.05$) between all genus with them except Camels genus there was a significant difference ($P \leq 0.05$) between them. The results showed there was a significant difference ($P \leq 0.05$) between Anafi Camels and all samples. So the results showed there was a significant difference ($P \leq 0.05$) between Kabashi Camels and all samples. Also The results showed there is no significant difference ($P \leq 0.05$) between Kabashi Sheep , Hamari Sheep Baggara Beef, Nilotic Beef, Ross Chicken, Hubbard Chicken, Garqur Fish and Bayad Fish with them, but there was a significant difference ($P \leq 0.05$) between them and other Animal. The variation of Blue colour value of animal Fats attributed to type of meats, Percentage of pigments, period of meats storage, environmental conditions, animals feeding, age, weight and may be animals type of breeding.

3.1.4.2 Yellow: As shown in (Table 1, figure 1) the results showed that the Yellow Colour Value of raw Animal meat Fats (Kabashi and Hamari Sheep (was found to be 30.4 and 20.7 respectively, Baggara and Nilotic Beef was found to be 31.5 and 50.5 respectively, Anafi and Kabashi Camels was found to be 40.8 and 30.4 respectively, Ross and Hubbard Chicken was found to be 20.7 and 50.4 respectively, Garqur and Bayad Fish was found to be 30.5 and 30.4 respectively. The results showed higher value in Nilotic Beef 50.5 while had lowest value 20.7 in Hamari Sheep and Ross Chicken. The results showed there is no significant difference ($P \leq 0.05$) between Fish genus with them, but there was a significant difference ($P \leq 0.05$) between all genus with them. The results showed there is no significant difference ($P \leq 0.05$) between Nilotic Beef and Hubbard Chicken with them, but there was a significant difference ($P \leq 0.05$) between them and all Samples. The results showed there is no significant difference ($P \leq 0.05$) between Nilotic Beef and Hubbard Chicken with them, but there was a significant difference ($P \leq 0.05$) between them and all Samples. The results showed there was a significant difference ($P \leq 0.05$) between Anafi Camels and all samples. The results showed there was a significant difference ($P \leq 0.05$) between Baggara Beef and all samples. The results showed there is no significant difference ($P \leq 0.05$) between Kabashi Sheep, Kabashi Camels, Garqur Fish and Bayad Fish with them, but there was a significant difference ($P \leq 0.05$) between them and all Samples. The results showed there is no significant difference ($P \leq 0.05$) between Hamari Sheep and Ross Chicken with them, but there was a significant difference ($P \leq 0.05$) between them and all Samples. The variation of Yellow colour value of raw animal meat samples attributed to type of meats, percentage of fats in meats, period of meats storage, environmental conditions, animals feeding, age, weight and may be animals type of breeding.

3.1.4.3 Red: As shown in (Table 1, figure 1) the results showed that the Yellow Colour Value of raw animal meat Fats (Kabashi and Hamari Sheep (was found to be 8.4 and 1.5 respectively, Baggara and Nilotic Beef was found to be 4.61 and 1.4 respectively, Anafi and Kabashi Camels was found to be 6.8 and 8.3 respectively, Ross and Hubbard Chicken was found to be 1.5 and 1.5 respectively, Garqur and Bayad Fish was found to be 8.6 and 8.3 respectively. The results showed higher value in Garqur fish 8.6 while had lowest value 1.4 in Nilotic beef. The results showed there is no significant difference ($P \leq 0.05$) between Chicken genus with them, but there was a significant difference ($P \leq 0.05$) between all genus with them. The results showed there was a significant difference ($P \leq 0.05$) between Garqur Fish and all samples. Also results showed there was a significant difference ($P \leq 0.05$) between Kabashi Sheep and all samples. The results showed there is no significant difference ($P \leq 0.05$) between Kabashi Camels and Bayad Fish with them, but there was a significant difference ($P \leq 0.05$) between them and all Samples. The results showed there was a significant difference ($P \leq 0.05$) between anafi Camels and all samples. The results showed there was a significant difference ($P \leq 0.05$) between Baggara Beef and all samples. The results showed there is no significant difference ($P \leq 0.05$) between Hamari Sheep, Ross and Hubbard Chicken with them, but there was a significant difference ($P \leq 0.05$) between them and all Samples. The results showed there was a significant difference ($P \leq 0.05$) between Nilotic Beef and all samples. The variation of Red colour value of animal fats attributed to type of meats colour, percentage of peroxide value, percentage of minerals in animal fats, environmental conditions, animals feeding, age, weight and may be animals type of breeding.

3.2 Chemical properties of animal meat fats

3.2.1 Peroxide values (ml eq peroxide/ kg oil): As can be seen in table (2) peroxide values of animals fats were 1.57 and 1.63 for Kabashi and Hamari respectively, 4.46 and 4.57 for Baggara and Nilotic sheep respectively, for anafi and Kabashi camels were 4.77 and 5.61 respectively, 4.00 and 3.30 for Ross and Hubbard chicken respectively, and for fish parentage were 3.30 and 3.63 for Gargur and Bayad respectively. The results obtained showed non significant difference ($p<0.05$) in parentage of animal between parentages in beef and camels, and also between chicken and fish parentages, a significant difference showed between sheep and other animals. The higher value of peroxide value was obtained by Kabashi camels and lower value by Kabashi sheep. All the results obtained were lower than the standard obtained by codex, (2001). The variation in peroxide values between animals fats according to the feeding and environmental conditions.

3.2.2 Saponification values (mg KOH/ g oil): As shown in table (2) the Saponification values of types of animals were 195.67, 199.00, 19167, 195.00, 196.33, 193.33, 195.67,198.00, 189.33 and 191.00 for Kabashi, Hamari, Baggara, Nilotic, Anafi, Kabashi, Ross, Hubbard, Gargur and Bayad respectively. A significance difference ($p<0.05$) between parentage of animal showed in sheep, camels, chicken and fish types, but between beef parentage showed non significance difference ($p<0.05$) , the values of saponification between parentages of all animals fats showed significantly ($p<0.05$) . The higher value 199.00 recorded by Hamari and lower value 189.33 recorded by Gargur. The results obtained for Gargur it similar of that observed by Khan et al, (2009). The reported 189.00 g/100 g and other results it were in the range of 190__ 202 mg/100g obtained by codex, (2001). The differences in values of saponification values as the result of feeding and varities and environmental conditions.

3.2.3 Unsaponificable matter (%): As shown in table (2) the Unsaponificable matter values animals fats were 0.657 and 0.402 for Kabashi and Hamari sheep respectively, 0.817 and 0.440 for Baggara and Nilotic beef respectively,0.394 and 0.377 for Anafi Kabashi camels respectively, 0.509 and 0.565 for Ross and Hubbard respectively, and for Gargur and Bayad were 0.510 and 0.237 respectively. a significant difference ($p<0.05$) between animal parentage observed in sheep, beef, and fish. Between animals parentages a significance difference ($p<0.05$) observed Kabashi sheep, Baggara beef, Gargur fish and other results. The higher score recorded by Baggarabeef and lower score recorded by Bayad fish. The results obtained it were in the range of 0.2 - 0.7 result obtained by pearson (1970) except Baggara beef it was higher than that. The variation in values may be according to animals feeding and environmental conditions.

3.2.4 Iodine value (mg I/g oil): The values of iodine Value of animals fats were 32.20,31.64, 30.70, 34.35, 28.47, 30.43, 29.82, 27.43, 30.77 and 29.33 for Kabashi, Hamari sheep, Baggara, Nilotic Beef, Anafi, Kabashi camels, Ross, Hubbard chicken, Gargur and Bayad fish respectively. The higher number of iodine Value of animals fats recorded by Nilotic Beef 34.35, but the lower number recorded by Hubbard chicken 27.43. The results showed there is no significant difference ($P\leq 0.05$) between Sheep genus with them, Chicken genus with them, but there was a significant difference ($P\leq 0.05$) between Beef genus with them and Fish genus with them. The results showed there is no significant difference ($P\leq 0.05$) between Kabashi and Hamari sheep, Nilotic Beef, Kabashi camels, Gargur fish. The results showed there is no significant difference ($P\leq 0.05$) between Baggara Beef, Anafi, Kabashi camels, Ross and Hubbard chicken. The results showed there is no significant difference ($P\leq 0.05$) between Kabashi camels and all Samples. This results less than 35 to 46 noticed by Kowale, et al, (2008), 35 – 70 reported by El-Magoli, (2006), 45.3 - 109.2stated by Khan, et al, (2009), 40 – 65 conducted by Codex, (2001) and 48.66 - 49.15 concluded by Muhammad, et al, (2008). The variation in values may be according to animals feeding and environmental and lab conditions.

3.2.5 Acid value (mg NaOH/g oil): As shown in table (2) the Acid Value values of types of animals were 3.73, 4.63, 1.17, 0.93, 1.00, 1.74, 2.33,2.63, 2.77 and 1.43 for Kabashi, Hamari, Baggara, Nilotic, Anafi, Kabashi, Ross, Hubbard, Gargur and Bayad respectively. The higher number of Acid Value of animals fats recorded by Hamari Sheep 4.63, but the lower number recorded by Nilotic Beef 0.93. A significance difference ($p<0.05$) between parentages of animal showed in sheep, Beefs and fish types, but between Camels and Chicken parentages showed non significance difference ($p<0.05$). The results showed there was a significant difference ($P\leq 0.05$) between Hamari Sheep and all samples. The results showed there was a significant difference ($P\leq 0.05$) between kabashi Sheep and all Animals. So the results showed there is no significant difference ($P\leq 0.05$) between Kabashi Camels, Ross and Hubbard Chicken and Gargur fish. Also the results showed there is no significant difference ($P\leq 0.05$) between baggara beef, Anafi Camels and Bayad fish, but there was a significant difference ($P\leq 0.05$) between Nilotic Beef and another Samples. This results obtained within the range 2 to 3 reported by Kowale, et al, (2008), 1.6 – 8 said by Khan, et al, (2009), 1.6 – 8 stated by Abdul Rehman, et al, (2006) and 1.009 – 1.99 noticed by Muhammad, et al, (2008). This results increased for Pearson, (1970) found 0.2 – 1.5 The differences in values of Acid values variation as the result of feeding , meat storage, PH value and varieties and environmental conditions.

3.2.6 Free fatty acids (%): As shown in table (2) the Free fatty acids of fats of animals were found to be 1.87 and 2.32 for Kabashi and Hamari sheep respectively, but for Baggara and Nilotic Beef were 0.59 and 0.47, for Ross and Hubbard chickens were 0.50 and 0.88 respectively, while for Anafi and Kabashi camels it were 1.17 and 1.32 and for Gargur and Bayad were 1.38 and 0.72. The higher number of Free Fatty Acids of animals fats recorded by Hamari Sheep 2.32, but the lower number recorded by Nilotic Beef 0.47. A significance difference ($p<0.05$) between parentages of animal showed in sheep, Beefs and fish types, but between Camels and Chicken parentages showed non significance difference ($p<0.05$). The results showed there was a significant difference ($P\leq 0.05$) between Hamari Sheep and all samples. The results showed there was a significant difference ($P \leq 0.05$) between kabashi Sheep and all Animals. So the results showed there is no significant difference ($P \leq 0.05$) between Kabashi Camels, Baggara Beefs, Anafi Camels, Ross Chicken and Gargur fish. Also the results showed there is no significant difference ($P \leq 0.05$) between Ross and Hubbard and Garqur fish. Also the results showed there is no significant difference ($P \leq 0.05$) between Nilotic Beef And Anafi camels. This results less than 2 to 3 except hamari Sheep conducted by Kowale, et al, (2008). This results obtained within the range 0.507 – 1% concluded by Muhammad , et al, (2008). The difference between the values of Free fatty acids according to varieties, percentage of fatty acids composition, PH value, feeding and environmental conditions.

3.2.7 Moisture (%): The Moisture value presented in table (2) were found to be 0.81 and 0.82 for Kabashi and Hamari respectively, 1.34 and 0.04 for Baggara and Nilotic respectively, 0.96 and 0.03 for Anafi and Kabashi camels, 0.217 and 0.923 of Ross and Hubbard respectively, 0.423 and 0.643 for Gargur and bayad were and respectively. The higher content of Moisture of animals fats recorded by Baggara Beef 1.34, but the lower number recorded by Kabashi Camels 0.03. A significance difference ($p<0.05$) between parentages of animal showed in sheep and fish types, but between Beefs, Camels and Chicken parentages showed non significance difference ($p<0.05$). The results showed there was no a significant difference ($P \leq 0.05$) between Kabashi Sheep, Hamari Sheep, Baggara Beef, Anafi Camels, Hubbard Chicken and Bayad Fish. So the results showed there is no significant difference ($P \leq 0.05$) between Nilotic Beef, Ross Chicken, Gargur fish and Bayad Fish. Also the results showed there is no significant difference ($P \leq 0.05$) between Nilotic Beef and Kabashi Camels. This results obtained within the range 0.1 – 0.85 found by Owen, (2005), 0.2 reported by Codex, (2001) and 0.233 – 0.266 said by Muhammad , et al, (2008). The variation in values of moisture as the result of varieties of animals, storage period of fats and environmental conditions.

Table (1)

Physical properties of Animal Meat Fats

Type Of Animals	Parentages	Melting point (C^{0})	Specific Gravity (g/Cm^{3})	Refractive Index (^{o})	Viscosity (CPs)	Colour		
						Blue	Yellow	Red
Sheep	Kabashi	40.06^{b} (±1.63)	1.421^{a} (±0.764)	1.463^{c} (±0.002)	27.3^{a} (±0.34)	0.020^{c} (±0.01)	30.4^{d} (±0.16)	8.4^{b} (±0.01)
	Hamari	40.00^{b} (±0.81)	1.017^{b} (±0.238)	1.463^{c} (±0.004)	27.6^{a} (±0.35)	0.003^{c} (±0.0004)	20.7^{e} (±0.1)	1.5^{f} (±0.02)
Beef	Baggara	34.60^{c} (±3.32)	1.048^{b} (±0.038)	1.453^{g} (±0.000)	28.4^{a} (±0.12)	0.020^{c} (±0.01)	31.5^{c} (±0.33)	4.61^{e} (±0.008)
	Nilotic	42.70^{ab} (±0.95)	0.961^{b} (±0.035)	1.456^{e} (±0.0006)	25.1^{ab} (±1.22)	0.030^{c} (±0.02)	50.5^{a} (±0.39)	1.4^{g} (±0.03)
Camels	Anafi	47.70^{a} (±0.47)	1.116^{a} (±0.0006)	1.456^{e} (±0.0006)	23.6^{b} (±1.43)	0.200^{a} (±0.08)	40.8^{b} (±0.00)	6.8^{d} (±0.08)
	Kabashi	45.10^{a} (±1.24)	0.990^{b} (±0.007)	1.455^{f} (±0.0021)	24.3^{b} (±2.74)	0.100^{b} (±0.08)	30.4^{d} (±0.25)	8.3^{c} (±0.2)
Chicken	Ross	40.00^{b} (±0.00)	0.960^{b} (±0.010)	1.454^{b} (±0.0017)	28.2^{a} (±0.53)	0.000^{c} (±0.00)	20.7^{e} (±0.21)	1.5^{f} (±0.02)
	Hubbard	41.60^{b} (±1.13)	1.108^{ab} (±0.005)	1.462^{d} (±0.0008)	27.9^{a} (±0.45)	0.010^{c} (±0.08)	50.4^{a} (±0.31)	1.5^{f} (±0.011)
Fish	Garqur	50.20^{a} (±0.21)	0.971^{b} (±0.014)	1.522^{c} (±0.0008)	27.6^{a} (±1.41)	0.010^{c} (±0.01)	30.5^{d} (±0.17)	8.6^{a} (±0.006)
	Bayad	39.90^{b} (±0.57)	1.077^{b} (±0.010)	1.465^{a} (±0.0017)	28.1^{a} (±0.00)	0.003^{c} (±0.004)	30.4^{d} (±0.21)	8.3^{c} (±0.09)
S.E ±		0.306	0.0147	0.00042	0.263	0.0081	0.053	0.018
C.V %		3.97	7.54	0.16	5.38	112.9	095	1.9

Values are means of three replicates ± SD

Means not sharing a common superscript letter in a column significantly different at $P \leq 0.05$.

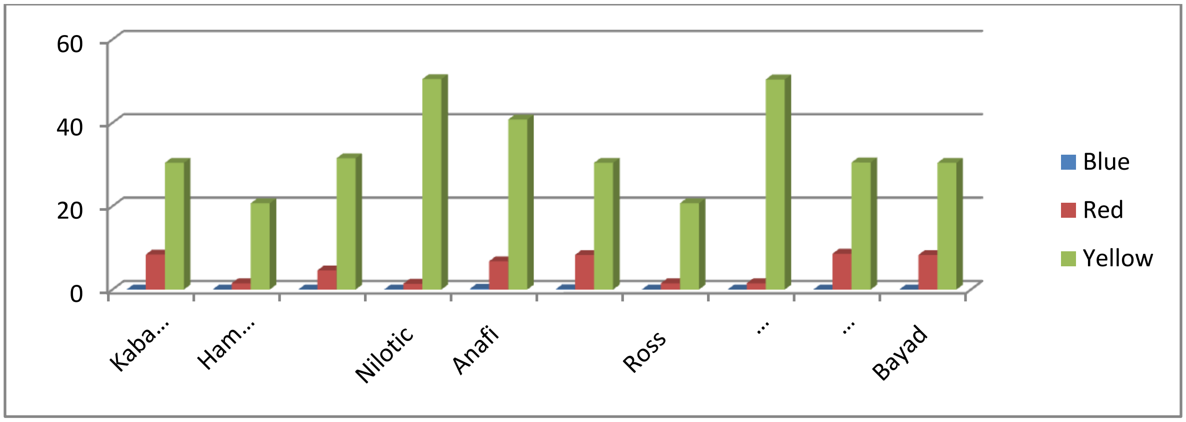

Fig. (1): Colour means in animal meat fats

Table (2)
Chemical properties of Animal Meat Fats

Type Of Animals	Parentages	Peroxide Value (ml eq peroxide/kg oil)	Saponification Value (mg koH/g oil)	Unsaponifiable Matter (%)	Iodine Value (mg I / g Oil)	Acid Value (mg NaoH/g oil)	Free fatty acids (%)	Moisture (%)
Sheep	Kabashi	1.57^{c} (±0.12)	195.67^{b} (±5.44)	0.657^{a} (±0.156)	32.20^{a} (±1.27)	3.73^{b} (±0.05)	1.87^{b} (±0.02)	0.81^{a} (±0.081)
	Hamari	1.63^{c} (±0.047)	199.00^{a} (±0.82)	0.402^{b} (±0.0697)	31.64^{a} (±0.51)	4.63^{a} (±0.68)	2.32^{a} (±0.34)	0.82^{a} (±0.049)
Beef	Baggara	4.46^{a} (±1.06)	191.67^{b} (±1.25)	0.817^{a} (±0.078)	30.70^{b} (±1.76)	1.17^{e} (±0.19)	0.59^{e} (±0.12)	1.34^{a} (±0.031)
	Nilotic	4.57^{a} (±0.69)	195.00^{b} (±1.41)	0.440^{b} (±0.036)	34.35^{a} (±0.03)	0.93^{f} (±0.29)	0.47^{f} (±0.14)	0.04^{bc} (±0.029)
Camels	Anafi	4.77^{a} (±0.74)	196.33^{a} (±1.70)	0.394^{b} (±0.052)	28.47^{b} (±0.67)	1.00^{e} (±0.14)	0.50^{ef} (±0.07)	0.96^{a} (±0.03)
	Kabashi	5.61^{a} (±1.02)	193.33^{b} (±4.50)	0.377^{b} (±0.063)	30.43^{ab} (±0.29)	1.74^{ce} (±0.31)	0.88^{e} (±0.15)	0.03^{c} (±0.005)
Chicken	Ross	4.00^{b} (±1.07)	195.67^{b} (±5.44)	0.509^{b} (±0.077)	29.82^{b} (±1.60)	2.33^{c} (±0.09)	1.17^{ce} (±0.05)	0.217^{b} (±0.01)
	Hubbard	3.30^{b} (±0.64)	198.00^{a} (±0.82)	0.565^{b} (±0.026)	27.43^{b} (±1.24)	2.63^{c} (±0.17)	1.32^{c} (±0.09)	0.923^{a} (±0.41)
Fish	Garqur	3.30^{b} (±0.45)	189.33^{c} (±0.50)	0.510^{ab} (±0.21)	30.77^{a} (±0.82)	2.77^{c} (±0.74)	1.38^{c} (±0.37)	0.423^{b} (±0.27)
	Bayad	3.63^{b} (±0.98)	191.00^{bc} (±4.32)	0.237^{b} (±0.088)	29.33^{b} (±3.27)	1.43^{e} (±0.19)	0.72^{e} (±0.09)	0.643^{ab} (±0.17)
S.E ±		0.167	0.624	0.022	0.325	0.0813	0.040	0.0657
C.V %		24.84	1.758	26.55	5.833	19.90	19.83	64.19

Values are means of three replicates ± SD
Means not sharing a common superscript letter in a column significantly different at $P \leq 0.05$.

CONCLUSION
The findings of this study show that physicochemical properties differ significantly in the fat extracted from animal meat. Our study indicates that type of animal and pedigrees influenced the physicochemical properties of meat's fat.

REFERENCE
[1]. Abdul Rehman, K., Tayyaba,T., Tahseen, G. and Rehman H., (2006), Fats and Their Consumption by Women of Different Age Groups, Pakistan Journal of Nutrition 5 (3): 215-217, 2006

[2]. Aldo, R., E. and Cristina, L.,B., (2003), Conjugated Linoleic acid (CLA) versus saturated fats/cholesterol: their proportion in fatty and lean

meats may affect the risk of developing colon cancer, 2:6 2003.

[3]. Britannica,(2011)."Fat."EncyclopædiaBritannica.EncyclopædiaBritannicaOnline.http://www.britannica.com/EBchecked/topic/202365/fat.

[4]. Cock,L.V. and Van Rede,C. Laboratory Handbook for Oil and Fat Analysis . Academic Press,London and New York. (1966).

[5]. Codex Alimentarius, fats, Oils and Related Products, Joint FAO/WHO Food standards program, Codex Alimetarius, 00100 Rome, Italy. (2001).

[6]. Duncan,.B,.O. , Multiple range and multiple S-test. Biometric 11: 1-42. (1955)

[7]. Ebrahim, M.H. and Atif, A.A, Food Analysis, Faculty of Agriculture, Ain shamis University, Elfajr library. (2003).

[8]. El-Magoli, Dr.,M., M., Morad ,M., Evaluation of some Egyptian Animal fats and their use in shortening ,http://journeytoforeber.org/biofuel_libary/fatsoils2html,(2006).

[9]. Khan, A., R., and Khan, L., H., Advance journal of Food science and Technology 1(1):6.11,2009 ISSN:2042-4876, Maxwell scintific Organization, 2009.

[10]. Kowale., B.,N. Kulkarni., Vivek.,V.,V. kesava Rao , Methods in Meat Science , Printed at Rajkamal Press, B-35/9, G.T.Karnal Road , Delhi.33. (2008).

[11]. Muhammad, A., Waqar, A., Saeed, A., and Ikram, U., , Mineral Composition, Quality and Physico-chemical Parameters of the Local Tallow of Pakistan Department of Biotechnology, University of Malakand, Chakdara, Dir Lower, NWFP, Pakistan, © Asian Network for Scientific Information, 2008.

[12]. Owen R.,F., Food chemistry (Third Edition), university of Wisconsin-madison, printed and bound by Replika press pvt.ltd., India . (2005).

[13]. Pearson, D. The chemical analysis of Foods, National college of Food technology, University of Reading, Weybridge, Surrey, printed in the United States of America. (1970).

[14]. Peterson, R. G., Design and analysis of Experiment. March Dekker. New york. PP: 429. (1985).