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Effect of sex and age on chemical composition of sheep, cattle and camel meat

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Abstract

Meat is highly valuable food product for human consumption because it is a good source of all essential amino acids, crude protein, energy, minerals and major source of vitamins that necessary for human nutrition. The distinctive flavor, tenderness, choiceness and agreeable make it one of the preferred food. In this study three types of meat samples, these are sheep, beef and camel (male and female) with different age group (young, medium and old) were selected and allotted to three experimental groups (treatments). The study was conducted to assess the effects of age and sex on chemical composition for different types of meat. A (3×3×2) factorial arrangement in Complete Randomized Design (CRD) was conducted. The study showed highly significant differences ($P \leq 0.001$) among different treatments. Camel meat had scored the highest values of moisture, fiber, ash and (F^+) while sheep recorded the lowest value. Sheep meat tended to have the highest values of crude protein, fat, (Ca), and (K^+) content while camel meat recorded the lowest values. With regard to the age group the study showed that young age group had obtained the highest values of crude protein and (Ca) contents while old age group scored the less values. Medium age group had reported the highest values of moisture, fat, ash and (K^+) content followed by the old age group. Concerning interaction effects of meat type, sex and age group female sheep with medium age (FSM) had reported the highest values of moisture while female sheep with young age (FSY) and female beef with young age (FBY) revealed the highest values of protein content. On other hand female beef of young age (FBY) and female sheep of medium age (FSM) scored the highest values of fat content. Irrespective of animal type, female meat of medium age tended to have better values; due to the results we recommended that selecting female medium age group for producing meat with highly quality attributes.

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Keywords: Beef, Sheep Meat, Camel Meat, Sex, Age, Chemical Composition

Introduction

Sudan is well endowed with livestock resources. In 2007, the total Sudanese livestock population was estimated at 139 million heads, comprising 41, 51, 43 and 4 million heads of cattle, sheep, goats and camels, respectively (MARF, 2007) [12]. The average annual growth rate of the livestock sector was estimated at 3.1% (Faki *et al*., 2008) [8]. Sheep play a remarkable role in the livelihoods of Sudanese people, providing food, income and enriching the land with animal manure. In addition, it provides the country with foreign currencies; as mutton and live animals are exported annually. About 5571 tons of mutton and 1.7 million heads of live sheep were exported in 2004 (Marf, 2005) [13]. Camel meat is unique and more beneficial for human body due to several regards; e.g 14 known essential trace elements for man, animals and plants; Fe, Cu, Li, Sn, Ni, V, Mn, Zn,Co, Mo, Se,

Cr, B and Si (Bowen, 1949) [5].
The high protein, low fat, and low cholesterol content of camel meat makes it deemed safe for human eating. (Si, 2022). When it comes to other commercial red meats like beef and mutton, camel meat is naturally lean and has a lower fat level. All of the essential amino acids are found in red meat, which is a significant source of high-quality protein. (Manheem, 2023) [11]. The approxmate is about 75% water, 19% protein 2.5% lipid, 0.65%minerals and som vitamins. Genrally, the chemical composition is 75%water, 18%protein, 3.5% soluble non protein substnce and 3%Fat (Lawarie, 1991). (Williams, 2002) [20], record that red meat contains high biological value protein and important micronutrients that are needed for good health throughout life. Meat quality is significantly affected by pre-slaughter factors. Atmospheric conditions in the pre-slaughter period, and especially those causing an additional stress for animals can be important. Seasonal changes in temperature can affect the level of glycogen in muscles after slaughter and the ultimate pH, and consequently the quality of meat. An increase in glycolysis results from excessive excitement, starving and stress caused by ambient temperature, which in turn leads to high post-mortem pH values and consequently meat colour is influenced (Honkavaara *et.al.*, 2003) [9]. Many researchers studied the effect of age and sex on meat chemical coposition (Lawrie, 1991, Babiker *et al*., 1990, Cameron and Enser, 1991, Sen et.,al., 2004, Niedziolka and Pieniak, 2006, El-waziry *et al*., 2011 and Shija *et al*., 2013) [10, 4, 6, 14, 16]. The objective of this study was to evaluate the effect of sex on chemical composition on different animal meat and to evaluate the effect of age on chemical composition on different animal meat.

Material and Methods

Site of the study

This study was carried out at meat science laboratory, Faculty of Animal Production, University of
Gezira (Elmanagil, Gezira State, Sudan) 76 kilometer western Wad medani city. This site lies between latitudes 13.30 and 14.45 longitudinally and 32.45 and 33.15 horizontally at the center of Sudan, during perioed 2019-2021.

Experimental units and grouping

Three types of meat samples, these are sheep, beef and camel (male and female) with different age (old, medium and young) had been prepared and allotted to 18 experimental groups (treatments) were selected as the following:

1. Group (A), male and female sheep meat,contain three categories of meat animal age :
   - 1.1. Male Sheep Young Age group **(**MSY**)** with 6-7 months of age**.**
   - 1.2. Male Sheep Medium age group (MSM) with 9-13 months of age.
   - 1.3. Male Sheep old Age group (MSO) with 15-20 months of age.
   - 1.4. Female Sheep Young Age group **(**FSY**)** with 6-7 months of age.
   - 1.5. Female Sheep Medium age group (FSM) with 9-13 months of age.
   - 1.6. Female Sheep Old age group (FSO) with 15-20 months of age.
2. Group (B) male and female beef meat, contain three categories of meat animal age:
   - 2.1 Male Beef Ooung age group **(**MBY) with2 years of age.
   - 2.2 Male Beef Medium age group (MBM) with 4 years of age.
   - 2.3 Male Beef Oldage group (MBO) with 6 years of age.
   - 2.4 Female Beef Young age group (FBY) with 2 years of age.
   - 2.5 Female Beef Medium age group (FBM) with 4 years of age.
   - 2.6 Female Beef Old age group (FBO) with 6 years of age.

3 Group (C) male and female camel meat, has been made of three categories of meat animal age:
   - 3.1 Male Camel Young age group (MCY) with 2 years of age**.**
   - 3.2 Male Camel Medium age group (MCM) with 4 years of age.
   - 3.3 Male Camel Olda ge group (MCO) with 6 years of age**.**
   - 3.4 Female Camell Young age group (FCY) 2 years of age.
   - 3.5 Female Camel Medium age group (FCM) 4 years of age**.**
   - 3.6 Female Camel Old age group (FCO) 6 years of age.

Samples collection

Meat samples, of sheep, cattle meat and camel meat were collected immediately after slaughtering from Al-managil slaughter house and kept under low temperature using an ice cooler box during transport to the laboratory for proximate analyses.

Sample Preparation

All samples were prepared according to the following steps:
Meat samples were grinded by an electric meat grinder with pore size of 12mm. Before the analysis the grinded samples were kept under freezing conditions.

Methods

Proximate analysis

Moisture content

Initial and final moisture content was determined according to the method described by (AOAC, 2005). The moisture content of the samples was calculated using the following equations:

$$\text{Moisture \%} = \frac{(W_a - W_b)\times 100}{W_s} \quad (1)$$

Where:
W_a = weight of clean crucible and wet sample
W_b =weight of clean crucible and dry sample.
W_s =weight of wet sample.

Crude protein content

The protein content of different samples oF meat were determined according to the methods of American Association of Cereal Chemists **(A.A.C.C, 1983)** [1]**.**

$$\text{CP\%} = \frac{\text{Titration value} \times 0.0014 \times 6.25 \times 20 \times 100}{\text{Weight of sample}} \quad (2)$$

Fat content

Crude fat was determined according to the method of the American Oil Chemists Society **(A.O.C.S, 1981)** [3]

$$\text{Fat \%} = \frac{\text{Fat weight} \times 100}{\text{Sample weight}} \quad (3)$$

Ash content

Ash content was determined according the method of (**A.O.A.C., 2005)** [2]

$$\text{Ash \%} = \frac{(\text{Wt of crucible before ashing + S,wt}) - (\text{Wt of crucible after ashing+Ash}) \times 100}{\text{Sample weight}} \quad (4)$$

Fiber content

Crude fiber was measured using the (**A.O.A.C., 2005)** [2].

$$\text{Fiber \%} = \frac{\textit{Loss of weight on ignition}}{\textit{Weight of sample}} \times 100 \quad (5)$$

Mineral analysis

Potssium (k) mg/g; calcium (Ca) mg/g and iron (Fe) mg/g contents were analysed by calibration in a Gallen RamP Flame Analyser and spectrophotometer. The anlyses were done in the laboratory of food Technology, Faculty of Engineering and Technology, University of Gazira Wad madani, Sudan.

Potassium (K^+)

$$\text{Extractable (mg/g)} = \text{K in the extract (mg/g).} \times \frac{100}{5} \quad (6)$$

Where:
100 = total valume of extract (ml)
5 = weight of minced meat sample taken (g).

Calcium (Ca)

$$\text{Ca(mg/g)} = \frac{\text{AxNx1000}}{\text{V}} \quad (7)$$

Where:
A = EDTA used for titration (ml). N = EDTA normaly V = Vlume of extract titarated (ml)

Iron (Fe+)

10ml iron solution were transferred to the titration cell (spctrophometer apparatus). 10ml of the buffer solution of PH =4.0 were added, and 120ml water were added too, tis was decreased the pH to 2.3. After that, titration cell was inserted into the spectrophotometer, the stirrer was immersed and the tip of the 5ml micro-burette (graduated in 0.02ml). In the solution. Then the tungsten lamp was switched on and the spectrophotometer was allowed to warm up for 20 minutes, the solution was stirred after that, 4 ml of standard Ethylene diaminetetra acetic acid (EDTA) was added, the wavelength was cent at 525 nm, and the slit width of the instrument was adjested so the reading on the absorbance scale was 0.03 and 1.0 ml of the salicylic acid solution was added the absorbance immediately increased to very large value (>2). The string was continued. Ethylene diaminetetra acetic acid EDTA solution was added slowly from micro-burette until was absorbance approached 1.8 and the volume of titrant was recorded. The Ethylene diaminetetra acetic acid EDTA solution was introduced in 0.05 ml aliquots and the absorbance was recorded after addition. The titration was continued untile four reading were taken beyond the end point (fairly content absorbance). The volume was plotted against the volume of titrant added; the intersection of two straight lines gave the true end point. The concentration of iron (mg/ml) was calculated in the solution and compared this with true value.

Statistical analysis

All data of the experiments had been statistically analyzed factorially (3×3×2) by analyses of variance applicable to randomized complete designs **(Steel and Torrie, 1980)** [19] using the computer program SPSS and Duncan′s Multiple Range Tests were used to detect difference between means **(Snedecor and Cochran, 1980)** [18]**.** P value of ≤0.05 was considered statistically significant.

Results and Discussion

Table 1: Chemical Composition (%) of Meat according to Animal Species, Sex and Age

Animal Species		Parameter				
		Moisture	Crud protein	Fat	Ash	Fiber
Meat type	Sheep	71.95^c	22.11^a	4.24^a	0.55^c	0.20^c
	Beef	72.01^b	21.59^b	3.61^b	0.66^b	0.34^b
	Camel	72.13^a	21.55^b	3.24^c	0.84^a	0.36^a
	S.E	0.02	0.02	0.02	0.02	0.02
	Sig.	**	**	**	**	*
Animal sex	Male	72.14	21.62	3.21	0.69	0.39
	Female	71.93	21.87	3.50	0.68	0.21
	S.E	0.01	0.02	0.02	0.02	0.02
	Sig.	**	**	**	*	**
Animal Age	young	71.20^c	23.52^a	2.72c	0.30^c	0.50^a
	Medium	72.87^a	22.84^b	4.23^a	0.95^a	0.41^b
	Old	72.03^b	18.88^c	3.42^b	0.81^b	0.20^c
	S.E	0.01	0.02	0.02	0.02	0.02
	Sig.	**	**	**	**	**

***= Significance different at P≤0.01*
** = Significance different at P≤0.05*
$^{a, b, c}$ = means the mean with different superscript in the same column are significantly different at.
Sig. = Significant level
SE = Stander Error.

Table (1) shows that moisture content values of different types of meat. The study showed highly significant differences (P≤0.01) among different treatments. According to the meat type the study recorded that camel meat, beef meat and sheep meat was found to be (72.13%, 72.01% and 71.95%) respectively. (On the other hand concerning to the sex the study showed that male group had recorded the highest value (72.14%) while female group scored the lowest value (71.93%). Age group (young, medium and old) had great effects in moisture content, in this study was found to be (71.20%, 72.87%, 72.03%) respectively. Protein content values of different type of meat shows in Table (1). The study showed highly significant differences (P≤0.01) among

different treatments. Regarding to the meat types the study observed that sheep meat had recorded the highest value (22.11) of protein while, slightly varied values for beef and camel meat (21.59 and 21.55).On the other hand concerning to the sex the study showed that female group had recorded the highest value (21.87) of protein content while, male group had the lowest value (21.62). According to the age group the study observed that young age group had showed the highest value (23.52) of protein content followed by the medium age group (22.84) while, the oldage group recorded the lowest value (18.88). The fat content was highly significant different (P≤0.01) between treatment groups. According to the meat type, sheep meat recorded the highest value of fat present (4.24%) followed by beef meat (3.61%) and camel meattended to have the lowest value (3.24%). With regard to sex group female group recorded the highest value (3.50) of fat content compared to male group (3.21) of fat content. On the hand age group indicated that there was highly significant (*P*<0.01) different among the different treatments for fat content, medium age of group was revealed highest value of fat content (4.23%) followed by old age group (3.42%) while, young age of group recorded the lowest value (2.72%). Ash content values of different types of meat shows in Table (1). The study showed highly significant differences (P≤0.01) among different treatments. According to the meat type the study recorded that camel meat had scored the highest value (0.84%) followed by beef meat (0.66%) while sheep meat had recorded the lowest value (0.55%). On the other hand concerning to the sex the study showed no significant different (P≥0.05) among different treatments although female group had recorded the highest value (0.69%), while male group scored the lowest value (0.68%). Age group had great effects in ash content, in this study the medium age group had recorded the highest value of moisture content (0.95 %) followed by the old age group (0.81 %) while, the young age group recorded the lowest value (0.30%) of ash content. In Table (1). Shows fiber content values of different types of meat. The study showed significant differences (P≤0.05) among different treatments. According to the meat type, the study recorded that camel meat had scored the highest value (0.36%) of fiber content followed by beef meat (0.34%), while sheep meat had recorded the lowest value (0.20%). Regarding to sex group, female animal tended to have the highest value (0.39%) of fiber content while male animal scored the lowest value (0.21%).On the other hand concerning to the age group the study observed highly significant differences (P≤0.01) among different treatments. Young age of group had showed the highest value of fiber content (0.50 %) followed by medium age group (0.41%) while, the old age group recorded the lowest value (0.20 %).

Table 2: Interaction of Chemical Composition (%) of Meat according to Animal Species, Sex, and Age

Meat type		Parameter				
		Moisture	**C.P**	**Fat**	**Ash**	**Fiber**
Sheep	Male					
	Young	72.08	23.11	3.19	0.16	0.45
	Medium	72.92	23.13	3.87	0.73	0.36
	Old	71.15	19.58	2.55	0.79	0.00
	Female					
	Young	70.32	24.19	3.03	0.14	0.27
	Medium	73.18	23.73	3.07	0.65	0.16
	Old	72.04	18.89	2.27	0.84	0.00
Beef	Male					
	Young	71.29	23.17	3.13	0.29	0.85
	Medium	72.74	22.75	4.47	1.01	0.78
	Old	72.48	18.34	2.91	0.83	0.00
	Female					
	Young	71.10	23.44	3.47	0.28	0.27
	Medium	72.76	22.93	3.06	0.89	0.16
	Old	71.70	18.87	2.82	0.67	0.00
Camel	Male					
	Young	71.09	23.81	2.41	0.38	0.61
	Medium	73.06	21.96	3.12	1.19	0.52
	Old	72.41	18.71	2.66	0.84	0.00
	Female					
	Young	71.29	23.87	3.86	0.56	0.56
	Medium	72.5	22.53	3.91	1.25	0.47
	Old	72.36	18.88	3.11	0.85	0.00
S.E		0.05	0.05	0.06	0.04	0.08
Sig		**	**	**	NS	N.S

***= Significance different at P≤0.01*
NS = not Significant differece at P>0.05
[a, b, c] = means the mean with different superscript in the same column are significantly different at.
Sig. = Significant level
SE = Stander Error.

Table (2) shows the average values interaction of chemical composition for different type of meat with different sex and age group. According to the moisture content the study showed high significant differences (*P*<0.01) among different treatments, female sheep with medium age group (FSM) had scored the highest values (73.18%) followed by (MCM) male camel medium age group (73.06%) while female beef with medium age group (FBM) had the less

values of moisture content (72.76%). Regarded to interaction in protein content for different meat type with different sex and age group the study observed that protein content showed highly significant differences ($P<0.01$) among different treatments. Female sheep withyoung age group (FSY) and female beef with young age group (FBY) revealed the highest value of protein content (24.19 and 23.88%) followed by (MCY) male camel young age group (23.81%) while, male beef with old age group (MBO) and male camel with old age group (MCO) tented to have the lowest average value (18.34 and 18.88%) of protein content. The average values of fat content showed highly significant differences ($P<0.01$) among different treatments. Male beef with medium age group (MBY) and male sheep with medium age group (MSM) revealed the highest value of fat content (4.47 and 3.87%) followed by (MCY) male camel young age group (4.41%) while, male sheep with old group (MSO) tented to have the lowest value (2.27%). Generally, the effects of meat type, sex and age on meat chemical composition observed through this study mainly on moisture, crude protein and fat content.

Table 3: Minerals content (mg/g) of Meat according to Animal Spieces, Sex and Age

Meat type		Parameter		
		Ca++	Fe+++	K+
Animal Species	Sheep	26.78^{a}	4.41^{b}	195.67^{a}
	Beef	26.61^{b}	4.54^{a}	183.50^{b}
	Camel	26.67^{b}	4.49^{a}	184.72^{b}
	SE	0.02	0.02	0.80
	Sig.	**	**	**
Animal Sex	Male	26.74	4.43	187.37
	Female	26.63	4.53	188.56
	SE	0.02	0.02	0.65
	Sig.	**	**	**
Animal Age	Young	39.83^{a}	2.46^{c}	184.00^{b}
	Medium	34.05^{b}	2.71^{b}	221.56^{a}
	Old	26.17^{c}	8.27^{a}	158.33^{c}
	SE	0.02	0.02	0.80
	Sig.	**	**	**

***= Significance different at P≤0.01*
$^{a, b, c}$ = means the mean with different superscript in the same column are significantly different at.
Sig. = Significant level
SE = Stander Error.

Calcium (Ca) content values for different type of meat with different sex and age shows in Table (3). The study showed highly significant differences (P≤0.001) among different treatments. With regard to meat type the study recorded that sheep meat had scored the highest value (26.78 mg/ 100g), while beef and camel meat had recorded the lowest value (26.61 and 26,67mg/ 100g).On the other hand concerning to animal sex the study showed that the male group had recorded the highest value (26.74mg/ 100g), while female group scored the lowest value (26.63mg/ 100g). Age group had great effects in (Ca) content, in this study young age group showed the highest value of Calcium content (39.83mg/ 100g) followed by the medium age group (34.05mg/ 100g) while, the Old age group recorded the lowest value (26.17mg/ 100g). Iron (Fe+) content values for different type of meat shows in Table (3). The study showed highly significant differences (P≤0.001) among different treatments. According to the meat type the study recorded that beef and camel meat scored the highest value (4.54 and 4.49mg/100g), while Sheep meat had recorded the lowest value (4.40mg/100g) of (F+) content. On the other hand concerning to animal sex the study showed that female group had recorded the highest value (4.53mg/100g) while, male group scored the lowest value (4.43mg/ 100g). Age group had great effects in Iron content, in this study oldage group had showed the highest value of Iron content (8.27mg/100g) followed by the medium age group (2.71mg/100g) while, young age group recorded the lowest value (2.45mg/100g). Potassium (K+) content values for different type of meat shows in Table (3). The study showed highly significant differences (P≤0.001) among different treatments. Regarding to meat type the study recorded that sheep meat had scored the highest value (195.66mg/ 100g),while Camel and beef meat had recorded the lowest value (184.72 and 183.50mg/ 100g). Concerning to animal sex group the study showed that female group had recorded the highest value (188.55mg/ 100g), while male group scored the lowest value (187.37mg/ 100g). With regard to age group medium age group had recorded the highest value of Potassium content (221.56mg/ 100g) followed by the Young age group (184mg/ 100g) while, old age group recorded the lowest value (158.33mg/ 100g).

Table 4: Interaction of Minerals content (mg/g) of Meat according to Animal Species, Sex, and Age

Meat type		Parameter		
		Ca	Fe+	K+
Sheep	Male			
	Young	39.33^{a}	2.36^{c}	190.33^{b}
	Medium	36.33^{b}	2.73^{c}	236.66^{a}
	Old	4.33^{c}	8.00^{b}	155.33^{c}
	Female			
	Young	39.33^{a}	2.23^{c}	186.33^{b}
	Medium	34.00	2.73^{c}	246.66^{a}
	Old	7.33^{c}	8.36^{a}	158.66^{c}
Beef	Male			
	Young	38.00^{b}	2.50^{c}	183.66^{b}
	Medium	37.33^{b}	2.73^{c}	214.66^{a}
	Old	7.00^{c}	8.33^{a}	156.66^{c}
	Female			
	Young	41.33^{a}	2.56^{c}	180.66^{b}
	Medium	29.66	2.80^{c}	206.33^{b}
	Old	6.33^{c}	8.00^{b}	159.00^{c}
Camel	Male			
	Small	40.00^{a}	2.40^{c}	178.66^{b}
	Medium	32.33^{b}	2.53^{c}	210.66^{b}
	Old	6.00^{c}	8.26^{a}	159.66^{c}
	Female			
	Young	41.00^{a}	2.66^{c}	184.33^{b}
	Medium	34.66^{b}	2.73^{c}	214.33^{a}
	Old	6.00^{c}	8.33^{a}	160.66^{c}
SE		0.4	0.05	1.94
Sig.		**	**	**

***= Significance different at P≤0.01*
$^{a, b, c}$ = means the mean with different superscript in the same column are significantly different at.
Sig. = Significant level
SE = Stander Error.

Table (4), showed the average values interaction of mineral content for different type of meat with different sex and age group. According to the Calcium (Ca) content the study showed high significant differences ($P<0.01$) among different treatments, female beef with young age group

(FBS), female camel with small age group (FCS), male camel with Young l age group (MCY) , male sheep with Young age group (MSY) and female sheep with Young age group (FSY) tended to have the highest values (41.33, 43.00, 40.00, 39.33 and 39.33 mg/100g) respectively followed by male beef with old age group (MBO),male beef with medium age group (MBM) and male sheep with medium age group (MSM) 38, 37 and 36 mg/100g of (Ca) content. Male sheep with old age group (MSO) , male camel with old age group (MCO) and female beef with old age group (FBO) reported 4.33, 6.00 and 6.31mg/100g of (Ca) content respectively. With respect to the Iron (Fe+)content the study showed high significant differences ($P<0.01$) among different treatments, female sheep with old age group (FSO), male beef with old age group (MBO) and male camel with old age group (MCO) tended to have the highest values of (Fe+) content (8.36, 8.33 and 8.26 mg/100g) respectively and followed by male sheep with old age group (MSO) andfemale beef with old age group (FBO) 8.00 and 8.00 mg/100g of (Fe+) content. Female camel with small age group (FCS), male camel with small age group (MCS) and female sheep with old age group (FSO) scored 2.66, 2.40 and 2.23mg/100g of (Fe+) content respectively. With regard to the Potassium (K+) content the study showed highsignificant differences ($P<0.01$) among different treatments, female sheep with medium age group (FSM), male sheep with medium age group (MSM), male beef with medium age group (MBM) and female camel with medium age group(FCM) tended to have the highest values of (K+) content (246.66, 236.66, 214.66 and 214.33mg/100g) respectively, followed by female beef with medium age group (FBM), male sheep with medium age group (MSM) andfemale sheep with Young l age group (FSY) 206.33, 190.33 and 186.34 mg/100g of (K+) content. On the other hand male sheep with old age group (MSO), female sheep with old age group (FCO) and female beef with old age group (FBO) recorded 155.33, 158.66 and 159.00 mg/100g of (K+) content respectively.

Conclusion

Concernig the effect of sex and age on chemical composition of sheep, cattle and camel meat, we can concloued the following, Camel meat reported the highest value of protein followed by beef and sheep meat, in general male sex group with high value protein than female sex group. Concerning the age, medium age with high value protein than others young and old age. Concernig the crude protein, sheep meat have the highest value followed by beef. Sex female group has the highest value protein than male sex group. Concerning age the young age group are with the highest value protein followed by medium age group. Sheep meat are with the highest value of fat followed by beef, concerning the the sex female had the highest value of fat than sex female group. With respect to the age group medium age with the highest value of fat fallowed by old age group. Concerning moisture content, female sheep with the medium age had the highest value of moisture followed by camel medium age group. With respect to minerals content sheep meat was tend to have the higest value of (Ca) compared to beef and camel meat but they with the lowist value of (Fe and k) than beef and camel meat. Female beef with young age, female camel with young age and male sheep with young age group tend to have the highest value of (Ca) content followed by male beef with old age group. As the results this study we recommended that, Young medium and old age of camel as meat animal possess lowest values of fat content with highest values of (Ca, Fe^{+} and K^{+}). For need to protein sheep meat is better than others type of meat.

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