EFFECT OF AGE AND SEX ON LIPID PROFILE OF RED SOKOTO GOATS

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ABSTRACT

This study was conducted to determine the effect of age and sex on the lipid profile of Red Sokoto goats. A total of 20 Red Sokoto breed (5 young and 5 adult; 5 bucks and 5 does) were used in the study. The low-density lipoprotein (LDL), high density lipoprotein (HDL), cholesterol and triglycerides were determined by standard procedures. LDL was similar ($P > 0.05$) in both young (18.45 mg/dl) and adults (20.34 mg/dl) goats; HDL was similar in young (46.50mg/dl) and adults (47.26 mg/dl). The cholesterol concentration was significantly ($P < 0.05$) higher in adults (78.50 mg/dl) compared to the young's, (54.56 mg/dl). The triglycerides was significantly ($P < 0.05$) higher in the adults compared to young goats. There was no significant ($P > 0.05$) variation between the LDL of the male and female goats. The HDL value was significantly ($P < 0.05$) higher in the female compared to the male (39.50 mg/dl). Age had no significant ($P > 0.05$) effect on cholesterol concentration. Triglycerides was significantly ($P < 0.05$) higher in the female goat (47. 26 mg/dl) compared to the male (41.24 mg/dl). It was concluded that age had no significant effect on LDL and HDL, cholesterol and triglycerides concentration was higher in the adult goats compared to the young ones. Sex does not have significant effect on LDL and cholesterol, but the HDL and triglycerides were higher in females compared to males. This can be used as reference values for the lipid profile of Red Sokoto goats.

Keywords: lipids, cholesterol, triglycerides, low density lipoprotein and high density lipoprotei**n.**

INTRODUCTION

Small ruminants have the ability to convert poor quality feedstuffs, such as grasses, legumes, forages, farm wastes and crop residues that are unsuitable for human body tissues to gain weight and flesh (Ref). Goats' farming offers ample opportunity for meat production and availability. They are easy to keep, require smaller capital investment compare to cattle raising, play significant role in socio-economic life of the people as they contribute about 35% of Nigerian meat supply (Alokan, 2008) and provides income to farmers (Gbangboche *et al.*, 2005). Lipids are transported and metabolized by apolipoproteins, which combine with lipids to form spherical or disc-shaped lipoproteins, consisting of a hydrophobic core and a less hydrophobic coat (Stanly, 2014).

The density of a lipoprotein is determined by the amount of lipid per particle. HDL is the smallest and most dense lipoprotein, whereas Cholesterol is an energy source in all living organisms. It is also necessary for steroid hormones, bile acids, vitamin D and normal cell function (Khan *et al.*, 2013). Cholesterol plays an important role as an antioxidant and metabolism of cell-soluble hormones, hormone production, cortisone, bile formation, and fat soluble vitamins (Okonkwo *et al.*, 2010). Triglycerides are fatty acid esters of glycerol and represent the main lipid component of the animal fat and fat stores (Eşki *et al*., 2015). This study was aimed at assessing the effect of age and sex on the lipid profile of Red Sokoto breed.

MATERIALS AND METHODS

The study was carried out in the Small Ruminant Unit of Kabba College of Agric. A total of 20 Red Sokoto breed, comprising of 5 young goats and 5 adult goats; 5 bucks and 5 ewes, were used in the study. Blood samples were taken from the jugular vein in to the vacuum tubes without anticoagulant. Blood was allowed to coagulate and then centrifuged at 3000 rpm for 10 minutes. The determination of serum levels of triglyceride was analyzed using colorimetric method after enzymatic hydrolysis with lipases. High density lipoprotein (HDL) and cholesterol were determined using precipitant method. All these analyses were carried out using standard commercial test kits (RANDOX Laboratory profile Ltd., Ardmore, Diamond Road, Crumlin, Co. Antrim, United Kingdom), following strictly the instructions provided by the manufacturers. Low density lipoprotein measured in mg/dl, was calculated from the values of total cholesterol, triglycerides and HDL-cholesterol using the formula described by Friedewald *et al*. (1972). LDL-Cholesterol = Total Cholesterol – Triglycerides /2.2 – HDL-Cholesterol.

Statistical Analyses

Data obtained were subjected to analysis of variance (SAS, 2000) and where significant differences occurred means were separated using Duncan Multiple range test of the same package.

RESULTS AND DISCUSSION

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The low density lipoprotein (LDL) was similar (P > 0.05) in both young (18.45 mg/dl) and adults (20.34 mg/dl) goats. This observation was similar to the report of Durak *et al*. (2015), who reported that age had no effect on serum concentration of LDL with a range value of 18.70 – 22.70 mg/dl. However, the value obtained in this study is lower than that of 21.30 – 41.70 mg/dl reported by Cruz *et al.* (2017). The low level of LDL in this study will be beneficial for the animal's health, since LDL also known as malignant cholesterol (Khan *et al.*, 2013).

Age had no significant (P > 0.05) effect on high density lipoprotein (HDL) concentration. It was similar in both young (46.50mg/dl) and adults (47.26 mg/dl). This complied with the report of Cruz *et al*. (2017), he reported that age had no effect on HDL of goats. The concentration of HDL in this study is within the physiological range of 41.80 – 48. 12 mg/dl reported by Durak *et al. (*2015).

The cholesterol concentration was significantly (P < 0.05) higher in adults (78.50 mg/dl) compared to the young (54.56 mg/dl) goats. This correlate with the report of Tahir *et al*. (2019), that cholesterol levels of adult goats were higher and more significant than young goats. Cholesterol, as a precursor to all sex steroid hormones, has an important effect on reproductive physiology, from sex to gamete production (Ref). Saez *et al.* (2011) reported that cholesterol has a positive effect on reproduction, this may be the reason why it was higher in matured adult goats compared to young goats, since this physiological function will be higher in adult goats compared to young kids. The triglycerides concentration varied with age. The observed concentration of triglycerides was significantly (P < 0.05) higher in the adults (48.60 mg/dl) compared to young goats (31.50 mg/dl). According to Blood *et al*. (2007), triglycerides are the most common form of fat in the animal's body and are required for metabolism, this may account for the higher value of triglycerides in the adults compared to the youngs, since the adults required more energy to carry out their daily activities, metabolism and reproduction. However, the observed concentration is within the range of 18.00 – 54.00 mg/dl reported by Gemechu and Kibeb (2017) for healthy goat.

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Parameters (mg/dl)	Young	Adults	P - value
Low density lipoprotein	18.45	20.34	1.27
High density lipoprotein	46.50	47.26	3.47
Cholesterol	54.56^{b}	78.50^{a}	0.02
Triglycerides	31.50^{b}	48.60^{a}	0.03

a, b, - means with different superscript on the same row differ significantly (P < 0.05), SEM - standard error of means.

Effect of sex on lipids profile of Red Sokoto goats

There was no significant (P > 0.05) variation between the LDL of the male and female goats. However, the observed concentration was between the standard physiological range of 18.00 – 22.00 mg/dl reported by Durak *et al.* (2015) and Cruz *et al*. (2017). The HDL value was significantly (P < 0.05) higher in the female (48.05 mg/dl) compared to the male (39.50 mg/dl) goats. This affirmed the report of Tahir *et al.* (2019) who reported higher HDL concentration in the female goats compared to male goats. Sex had no significant (P > 0.05) effect on cholesterol concentration. The concentration of cholesterol was 69.65 mg/dl in the male goats while it was 71.06 mg/dl in the female goats. This is similar to the findings of Opara *et al.* (2010) and Durak *et al*. (2015). Cholesterol, as a precursor to all sex steroid hormones, has an important effect on all areas of both male and female reproductive physiology, from sex to gamete production (Saez *et al.*, 2011), it is therefore needed by both male and female animals for proper reproduction activities and gametogenesis, this may be the reason why there was no sex effect, since both male and female sheep required this lipid fraction. The triglycerides was significantly (P < 0.05) higher in the female goat (47. 26 mg/dl) compared to the male (41.24 mg/dl). Triglycerides are the commonest source of energy available to the animals (Blood *et al*., 2007). This may be the reason why female animals had higher concentration of triglycerides compared to male animals, since female animals required more energy for different physiological reactions going on within their body.

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Parameters (mg/dl)	Male	Female	P – value
Low density lipoprotein	20.67	21.60	1.34
High density lipoprotein	39.50[b]	48.05[a]	0.03
Cholesterol	69.65	71.06	2.78
Triglycerides	41. 24[b]	47. 26[a]	0.04

CONCLUSION AND RECOMMENDATION

It was concluded that age had no significant effect on LDL and HDL, however, the cholesterol and triglycerides concentration was higher in the adult goats compared to the young ones, while sex does not have significant effect on LDL and cholesterol, but the HDL and triglycerides were higher in females compared to males. This can be used as reference values for the lipid profile of Red Sokoto goats.

REFERENCES

Alokan, J.A. (2008). Small livestock is still beautiful. Inaugural lecture series 49. Delivered at the Federal University of Technology, Akure. Pp15.

Blood, D.C., Studdert, V.D. and Gay, C.C. (2007)**.** Comprehensive veterinary dictionary, 3rd edn, Elsevier, Philadelphia.

Cruz, R.E.S., Rocha, F.M., Sena, C.V.B., Noleto, P.G., Guimarães, E.C., José A, G. and Mundim, A.V. (2017). Effects of age and sex on blood biochemistry of Dorper lambs. *Semina Ciencias Agrarias Londnina*, 38 (5): 3085 – 3089.

Durak, M.H.1, Erkan, R.E.C., Çelik, R., Yokuş, B. I, Kurt, D. and Gürgöze, S. (2015). The effects of age and gender on some biochemical serum parameters in zom sheep raised in the vicinity of Karacadağ. *Israel Journal of Veterinary Medicine*, 70 (2): 33 – 39.

Eşki, F., Taþal., İ., Karslı., M.A., Şendağ., S., Uslu., B. A., Wagner, H. and Wehrend, A. (2015). Concentrations of NEFA, ß-HBA, triglycerides, and certain blood metabolitesin healthy colored Angora goats during the peripartum period. *Turk Journal of Veterinary Animal Science*. 39**:** 401-405

Friedewald, W., Levy, R. and Fredrickson, D. (1972). Estimation of concentration of low density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clinical Chemistry*, 18: 499-502.

Gbangboche, A.B., Hornich, J.L., Adamou-N'Diaye, M., Edorh, A.P., Fanir, F., Abiola, F.A. and Leroy, P.L. (2005). Caractérisation et maîtrise des paramètres de la reproduction et de la croissance des ovins Djallonké (Ovis amon aries). *Annales de Médecine Vétérinaire*, 149: 170 - 182.

Gemechu, G.A. and Kibeb, L. (2017). Effect of age, sex and altitude on the normal physiological and biochemical parameters in apparently healthy local breed sheep at Shebedino district in Sidam zone, *Ethiopia Biochemistry Journals*, 11(6):122.

Khan, A., Rehman., S., Imran. R. and Pitafi. K. D. (2013). Analysis of serum cholesterol level in goats breeds in Gilgit-Baltistan area of Pakistan. *Journal of Agricultural Science Technology*, 2::302 – 305

Okonkwo, J. C., Omeje, I. S., Okonkwo. I. F. and Umeghalu,, I. C. E. (2010). Effects of breed, sex and source within breed on the blood bilirubin, cholesterol and glucose concentrations of Nigerian goats. *Pakistan Journal of Nutrition***,** 9: 120-124.

Opara, M.N., Udevi, N. and Okoli, I.C. (2010). Haematological parameters and blood chemistry of apparently healthy West African Dwarf (Wad) goats in Owerri, South Eastern Nigeria. *New York Science Journal*, 3: 68-72.

Saez, F., Ouvrier, A. and Drevet. J. R (2011). Epididymis cholesterol homeostasis and sperm fertilizing ability. *Asian Journal of Androl*ogy, 13: 11-17.

SAS, (2002). SAS/STAT. User's *Guide: Statistics* (Release 6.04 Ed). SAS Institute Inc., Cary, NC, USA.

Stanly, D. (2014). Davidson's Principles and practice of Medicine, 22nd ed. Edinburgh London New York Oxford Philadelphia St Louis Sydney Toronto : An imprint of Elsevier Limited.

Tahir, K., Neşe, H.A., Ali E. H., Şükrü, D., Gaye, B, Güzin, Ç., İlker, Ç. and Ramazan, I. (2019). Serum cholesterol levels in Hair goats of Aksaray Region. Indian Journal of Animal Resource, 53(1) 63-66.