

Effect of feed supplementation with olive oil on serum testosterone, triiodothyronine, thyroxine and some biochemical metabolites in teddy goat bucks

Muhammad Farooq¹, Shujait Ali¹, Muhammad Zubair^{2*}, Qudrat Ullah¹, Huma Jamil¹, Muhammad Haroon¹, Abdul Ghaffar¹

¹Department of Theriogenology, University of Agriculture, Faisalabad, Pakistan

²Faculty of Veterinary and Animal Sciences, University of Poonch, Rawalakot, AJK, Pakistan

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Abstract

Teddy is highly proliferative goat breed, as female of this breed are famous for high twinning rates. Feed supplementation of olive oil has been shown to improve semen quality of goat bucks. In this study, the effect of feed supplementation with olive oil on serum testosterone, triiodothyronine (T3), thyroxine (T4) and some biochemical metabolites in teddy goat bucks were investigated. For this purpose, 9 adult male goats, with clinically normal reproductive tract, were randomly separated into by three equal assemblies A, B and C. Animals in Cluster A were fed control ration (control group), whereas goats in group B and C were nourished with complemented 15 and 30 ml Olive oil, respectively, in morning daily for 8 weeks. Blood was collected weekly from each experimental animal and analyzed for serum testosterone, T3 and T4 concentration through ELISA. Similarly, serum alanine aminotransferase (ALT), Aspartate aminotransferase (AST), total cholesterol, triglycerides and glucose were determined using commercially available kits. Results revealed that serum concentrations of testosterone, T3 and T4 were higher ($P<0.05$) in bucks of groups B and C compared to those of control group. However, differences in concentration of these hormones between bucks of the former two groups were non-significant. Among biochemical metabolites, serum ALT, total cholesterol and triglycerides differed significantly ($P<0.05$) among three groups, with highest in control group and lowest in group C. Serum AST activity was also lower in bucks of assembly B and C than control, but, changes between groups B and C were non-significant. Similarly, the treatment had no effect on serum glucose concentrations. Based on results of the present studies, it was concluded that feed supplementation of olive oil improves semen quality and libido of Teddy goat bucks. However, its effects on health biomarkers and fertility rates of buck may be investigated before making any recommendation.

Keywords: Olive oil, Thyroxin, Tri-iodothyronine, Albumin, Globulin, Triglycerides

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*Corresponding author email:
drzubairabbasi@gmail.com

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Introduction

Teddy is solitary of famous breeds of Pakistani goats due to its slight size, relaxed behavior, virtuous reproductive efficacy and passive nature. This breed is originating all over the Pakistan state, especially in north zones and Azad Kashmir. Teddy goats are usually higher over other indigenous breeds due to its capability of adaptation to the harsh environmental conditions (Kuthu et al., 2013). Adequate amount of fatty acid is not available in animals so they are unable to produce omega-3 and omega-6 fatty acids. Hence, nutritional bases are stated to animals to fulfil their body requirements (Wathes et al., 2007). Some minor biochemical metabolites like phenols, sterols, tocopherols and fatty acid is major sources of olive oil. Olive oil has 899.87Kcal of energy, 0.3g/ 100g of Omega-3 fatty acid, 9.8g/100g of Omega-6 fatty acid, 14g of saturated fat, 61.29g/100g of monounsaturated and 9.24g/100g of polyunsaturated fat (Wani et al., 2013). The constancy and confrontation of olive oil to oxidation is mostly occurrence of oleic acid, palmitic acid and to a lesser extent due to linolenic acid (Saleem, 2015). Indication of usage of olive is originate in antiquated and sacred messages, for example, the Holy Quran (Belarbi et al., 2011).

Olive oil is considered by its sensorial and nutritious assets which is dissimilar from other comestible oils. Its health assistances are payable to its fatty acid configuration and presence of other minor compounds. It has been reported that olive oil has polyphenolic compounds which hold strong radical scavenging activity and antioxidant property (Beecher et al., 1999). Metabolic activities are measured by the basal points of T3 and T4 (Agarwal et al., 1995). Omega-3 fatty acids supplementation in diet of growing goats under harsh environmental conditions will rise T. P and daily weightiness gain of the animal, and also improve thyroid hormones function and lowers ALT, AST, total Cholesterols and triglycerides levels in blood (Okukpe et al., 2011). In Olive oil, the major carotenoids are lutein and β -carotene, while lycopene is in trace amount (Suet al., 2002). β -carotene has antioxidant assets and a predecessor of Vit. A which has an imperative role in care of the eye nerves and reproductive performance (Olmedilla et al., 2001). Vit E of olive oil contains both tocopherols and tocotrienols of which α -tocopherols are present abundantly in creation and has maximum living activity (Herrera and Barbas, 2001). For Cholesterol metabolism, other minor compound of olive oil such

as β -sitosterol reduces the captivation of cholesterol in animals. The purpose of this study was to examine the outcome of olive oil supplementation on serum biochemical metabolites and hormonal profile in teddy bucks.

Material and Methods

The current study was conducted to evaluate the effect of nutritional value of Olive Oil on blood metabolites in Teddy bucks. Commercially, available Olive oil was used in this experiment. Present study was conducted at Department of Theriogenology, University of Agriculture, Faisalabad. Nine mature bucks, having standard generative health position, were divided into three collections. All the bucks were kept separately in North-South way having sufficient cross ventilation and sufficient amount of heat throughout summer. All these experimental animals were provided 0.5kg concentrate (Commercially available Vanda) per bucks per day along with high seasonal green feed with dose rate of 8% of their body weight. Animals were divided into three groups A, B and C. Group A was kept as control, while animals in group B was treated with 15 ml Olive Oil and C with 30 ml for a period of 8 weeks. Blood was collected from jugular vein and serum was separated by centrifuging at 2000 rpm for 10 minutes and kept at -20°C till further analysis (Selvaraju et al., 2012).

Serum analysis was carried out to determine various biochemical compounds i.e., glucose, cholesterol, total proteins, albumin, ALT, AST, Globulin, triglycerides using commercially available standard kits. To evaluate these biochemical constituents, samples and standers were prepared according instructions mentioned in each kit. To measure the absorbance in samples and standards, chemistry analyzer (BTS-330, Biosystems, Spain) was used. Concentration of each metabolite was measured by dividing of absorbance of each sample from the absorbance its respective standard as well as multiplication with the concentration of standard The serum testosterone concentrations were determined using solid phase ELISA based on the principle of competitive binding between testosterone in the sample and testosterone-HRP conjugated for a constant amount of rabbit anti-testosterone. The detail of the assay has been described (Ahmad et al., 2012). Concentrations of T3 T4 were measured by using commercial kits from DRG Instrument GmbH, Germany. The catalog no of each kit was EIA-1650 &



EIA-1134. Minimum detectable level of T3 and T4 was 0.2ng/ml and 0.4 µg/ml, respectively.

Statistical analysis

To determine the degree of variation between trial clusters the data were statistically examined utilizing GLM methodology of SAS (2004) under CRD (steel et al., 1997).

Results

Analysis of data revealed that mean value of serum glucose level (51.40±0.31) in group treated with olive oil 15 ml and 30 ml had no effect of treatment as compare to control group (50.80±0.31) as shown in table 1. The mean serum cholesterol values were (59.87±0.67) and (57.45±0.67) in assembly B & C, correspondingly which revealed a significant decrease in treated groups (P<0.05) compared to control group (69.65±0.67). Serum total protein (7.87±0.09) in group C was higher (P<0.05) significantly as contrast to controller group, though, alteration between treatment groups was non-significant. Albumin and globulin level increased in group treated with oil associated to control group, but change among group B & C of both these constituents was non-significant. Serum ALT level (17.61±0.29) and AST level (111.30±2.12) decreased significantly (P<0.05) contrasted with control gathering, notwithstanding, distinction in serum AST between groups B and C was non-significant. Triglyceride when treated with 15 ml and 30 ml olive oil showed significant decrease (P<0.05) compare to control group. T3 exhibited significant increase (P<0.05) in treatments groups than

control group, but variance between groups B & C was non-significant. Olive oil supplementation showed increase in groups B and C while, group treated with 30ml olive oil was significant (P<0.05) as linked to untreated group. Olive oil supplementation showed significant increase in testosterone level compared to control group.

Discussion

In present study, effects of olive oil in teddy bucks were studied. The results of present study showed non-significant increase (P>0.05) in glucose treated groups as accompanied to control group. These results agree with findings of Adibmoradi et al. (2012) who reported non-significant outcome on glucose level in goat kids treated with soybean and fish oil of nutritional supplementation. Whereas, Motlagh (2015) reported significant (P<0.05) increase in serum glucose level in ostriches within 60 days after supplementation with 3% canola oil has omega-3 activity.

Total cholesterol was reduced in present study and these results are in line with those Zangeneh and Torki (2011) who reported 5% decreased cholesterol level when feeding with olive pulp. This reduction may be Olive oil contain omega 3FA which is responsible for decreasing cholesterol level Adeyemi et al. (2016). The result of present study shown that olive oil increased significantly (P<0.05) albumin and total protein and these results are in line with Alberghina et al. (2010) who revealed comparative estimation of aggregate protein fixation in the blood of clinically sound goats (*Capra hircus*).

Table 1. Serum biochemical metabolites and hormonal profile in control and treated groups of teddy bucks

Serum parameters	Group A (Control)	Group B(15 ml olive oil)	Group C(30 ml olive oil)
Serum glucose (mg/dl)	50.80±0.31 ^A	51.14±0.31 ^A	51.40±0.31 ^A
Serum cholesterol(mg/dl)	69.65±0.67 ^A	59.87±0.67 ^B	57.45±0.67 ^C
Serum total protein (g/dl)	7.17±0.09 ^B	7.54±0.09 ^A	7.87±0.09 ^A
Serum albumin (g/dl)	2.94±0.05 ^B	3.10±0.05 ^{AB}	3.18±0.065 ^A
Serum globulin (g/dl)	4.23±0.10 ^B	4.43±0.05 ^{AB}	4.70±0.065 ^A
Serum ALT (U/L)	25.83±0.29 ^A	19.72±0.29 ^B	17.61±0.29 ^C
Serum AST (U/L)	130.52±2.12 ^A	116.37±2.12 ^B	111.30±2.12 ^B
Serum triglyceride(mg/dl)	15.72±0.26 ^A	11.39±0.26 ^B	10.36±0.26 ^C
T3(ng/m)	1.06±0.02 ^B	1.16±0.02 ^A	1.21±0.02 ^A
T4 (ug/dl)	4.05±0.10 ^B	4.19±0.10 ^{AB}	4.32±0.10 ^A
Testosterone (ng/ml)	6.18±0.14 ^B	7.95±0.14 ^A	8.18±0.14 ^A

Values (Mean±SD) with different superscripts in a row or in a column are differ significantly (P<0.05) whereas means with similar superscripts are non-significant.



Besides, Mohammad et al. (2016) revealed the estimation of aggregate protein run from 6.0 to 7.0 g/dl in Kuwaiti's dry and fascinating Damascus and Barbari goat raised under an escalated arrangement of creation. In this investigation serum albumin is in short proximity for revealed reference estimation of albumin being 2.7 to 3.9 g/dl in goat (Fielder, 2008). Thus, Mohammad et al. (2016) additionally revealed that in four types of goat the mean scope of serum albumins was 2.7 to 3.8 g/dl. In lipid metabolism liver play an essential role, many stages of lipid synthesis and transportation, therefore an abnormal lipid profile can be expected in those with liver dysfunction. Rise in globulin is in line with El-Sayed et al. (2013) who reported significantly ($P<0.05$) improved serum globulin level in broiler chicks that fed food added with 0.5% of both guava leaves and olive oil. In the present study, decrease serum ALT and AST agrees with Okukpe et al. (2011) who reported that omega3 fatty acids in food reduced the AST& ALT level. Our results are also similar with Necib et al. (2013) who reported significant ($P<0.01$) decreased in the serum ALT activities after treating the rats with olive oil 2 ml. The variable effects of olive oil supplementation on biochemical constituents of Teddy buck and other animals or bird might be due to variation in enzymatic differences in the digestive process

Our results shown that serum triglyceride significantly decrease ($P<0.05$) as compared to untreated group which are in line with Wani et al. (2015) who reported the consequence of olive oil in contradiction of high fat diet in mice. The significant ($P<0.05$) reduction in triglycerides level in olive oil groups linked to assembly treated with high fat diet. Serum triglyceride decrease and enzymes of liver normalize due to olive oil. The findings of current study revealed significantly ($P<0.001$) higher means serum tri-iodothyronine in bucks fed olive oil ~ 15 and 30 ml contrast to bucks fed control ration. Though, alteration among bucks treated groups was statistically non-significant in respect of serum tri-iodothyronine this result is harmony with Abdalla et al. (2015) who reported that supplementation of 15% olive pomace concentration significantly ($P<0.01$) increased T3 concentration (40.80%) in goat compared to control group during hot summer. The results were inconsistent with that of Teama et al. (2016) who reported significantly higher level of T3 hormones in goat that was fed with omega-3 plus, 30% fish oil, during warm summer for total duration of 4 months during hot summer.

The significant ($P<0.01$) increase in serum tri-iodothyronine concentration in bucks treated with olive oil as contrast to control ration might be related to the highest antioxidant activity of olive pulp due to its contents of several antioxidants such as carotenoids, tocopherols and phenolic compounds (Bouaziz et al., 2005; Abdalla et al., 2015). Moreover, the significantly ($P<0.001$) increased mean serum tri-iodothyronine action in olive oil is activation of thyroid peroxidase by the ingesting of polyunsaturated fatty acids (Lachowicz et al., 2008). Moreover, olive oil contains antioxidant compound and when supplemented in diet of calves significantly ($P<0.01$) reduce oxidative stress under high temperature (Abdalla et al., 2015). They stated significant increase in thyroxin level in rats which were treated with fish oil. Furthermore, they described significant enhancement in both groups of rats.

Our results are in line with Menisy et al. (2015) who observed that olive oil along with garlic, omega-3 fatty acids and cyclosporine on male rats increased level of serum testosterone in rats fed cyclosporine 10mg/kg along with 2.0 ml olive. Steiner and Cameron (1989) suggested a possible anti-androgenic property of the treatment on the number of Leydig cells which is responsible for the manufacturing of testosterone. The significantly ($P<0.05$) higher mean serum testosterone concentration in bucks treated with olive oil contrast to control group might be due to GnRH pulse activation by the ingesting of polyunsaturated fatty acids present in the olive oil (McGray et al., 2005) and increased thyroid activity (Lachowicz et al., 2008). The results of Attia and kame (2012) are in support of present findings who reported increased blood testosterone concentration in rabbits those were fed soybean lecithin diet containing diglyceride of stearic, palmitic, linoleic and oleic acid.

Conclusion

It was concluded that feed supplementation of olive oil improves semen quality and libido of Teddy goat bucks. However, its effects on health biomarkers and fertility rate of buck may be investigated before making any recommendation.

Contribution of Authors

Farooq M: Performed major component of this experiment.



Ali S: Assisted in the designing of this experiment
Zubair M: Selected the dose and parameters of this experiment.

Ullah Q: Helped in observation and reporting the data

Jamil H: Performed the analysis of data in this experiment.

Haroon M: Helped in the feeding and collection of blood from the experimental animals.

Ghaffar A: Assisted in the measurement of values in serum.

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