

Effect of Different Levels of Milled Flaxseeds on Some Macro Minerals and Testosterone Levels in the Blood Serum of Karadi Male Lambs

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Abstract

The objective of current study was to determine the effect of different level of milled flaxseed on some macro minerals (Sodium (Na), phosphorus (P), potassium (K) and chloride (Cl) concentrations and testosterone level (T) in male Karadi lambs. In this study (6) males Karadi lambs were used (Live body weight 26-30 kg and 4-5 months old), which were purchased from a well-known source. The lamps were individually isolated in box (1 x 1.5 m²). Three treatments of milled flaxseed supplementation with optional feeding were conducted on six male lambs. At the beginning of the experiment the lambs were randomly allocated into three treatments (T), two lambs for each treatment. Where: T1 is the control treatment (no milled flaxseed (MF) was added to the feed, T2: contained 4% of (MF), T3: contained 8% of (MF). All the lambs were received an equal daily allowance of concentrated ration (3% of the body weight) over the periods of 10/11/2014 to 13/1/2015. Blood samples were collected via jugular venipuncture. The results indicated that milled flaxseed effect in blood serum for macro minerals (Na, P, K and Cl) and (T) was not significant ($P \geq 0.05$). Correlation coefficient among all traits were computed and ranged between (-0.600 to +0.467), the correlation coefficient was not significant macro minerals except between K and Cl that had positive correlation ($r = 0.467$, $P \leq 0.05$). The usage of the milled flaxseed levels in feed intake within normal physiological limits, could led to variation in some macro minerals' concentration, and also it can also affect the levels of testosterone hormone in blood male Karadi lambs.

Keywords: Flaxseed, Macro minerals, Testosterone, Karadi lambs.

Introduction:

Karadi sheep constitute about 18-20% of the total sheep population in Iraq (Al-Doori, 2006). According to Animal Production and Veterinary Directorate, (2011), the sheep breeding makes a major contribution to the agrarian economy, with a population of 3,500,000 heads, in Kurdistan region of Iraq.

Flax (*Linum usitatissimum*) is an oilseed, produced predominantly in the northern Great Plains and Canada (Berglund and Zollinger, 2002). According to Mustafa *et al.*, (2002) and Petit (2002, 2003) the oil level in flaxseed is of 40% of total seed weight, and approximately 55% of oil's total fatty acids is

linolenic acid. Environmental factors and method of analysis can affect the composition of flax (Daun *et al.*, 2003). In animal's diets, an important component which is required by organisms to utilize other nutrients in the diet is minerals (Szefer and Nriagu, 2007). Deficiency of minerals in sheep under grazing (Samanta and Samanta, 2002) and grazing plus concentrate supplementation (Mandokhot *et al.*, 1987) has been reported. In free grazing animals, minerals derived from natural feedstuffs are often inadequate and require supplementation to satisfy animal requirements (Sowande *et al.*, 2008). The male characteristics is regulated by Testosterone hormone in male (Seideman *et al.*, 1982). Sexual behavior, operation of testis, epididymis and accessory glands behavior are controlled by Testosterone hormone (Issa *et al.*, 2001). Each of breed, nutrition level, season and age can affect the levels of Testosterone hormone in ram blood (Zamiri and Khodaei, 2005).

The aim of this study was to determine the effect of different levels of milled flaxseed on:

1. Serum macro minerals (Sodium (Na), Phosphorus (P), Potassium (K) and Chloride (Cl)) concentrations in Karadi male lambs.
2. The level of Testosterone hormone (T) in serum Karadi male lambs.

Materials and Methods:

1: Experimental Animals:

This study was conducted at the Animal Production Field, Department of Animal Science, Faculty of Agricultural Sciences, University of Sulaimani, Bakrago, Sulaimani, Iraq, over the periods of 10/11/2014 to 13/01/2015. Six male Karadi lambs purchased from a well-known local source and were individually isolated in box (1 x 1.5 m²).

2: Feeding trail Experiment:

Three treatments of milled flaxseed supplementation with optional feed of six male Karadi lambs (Live body weight ranged from 26 to 30 kg. and 4-5 months old) at the beginning of the experiment. The lambs were randomly distributed into three treatments, two lambs in each treatment. T1 is the control treatment (no milled flaxseed (MF) was added to the feed, T2: contained 4% of (MF), T3: contained 8% of (MF).

The ration of (0% as a control 4% and 8%) of flaxseed milled depended on previous study that used different ration of flaxseed. For example, some researchers used (0%, 3%, 6% and 9%), while other study used (0%, 2.5%, 5% and 7.5%) ration of flaxseed. So, this study included different levels to check different results and demonstrate which one is better. In some previous studies the using of 6% ration exhibited a positive effect on the sheep, but using 9% ration of flaxseed milled showed a negative effect on sheep, therefore; this study %4 and %8 were used as rations of flaxseed milled, which were more than %3 ration and less than %9 in order to detect if they have better results. All the lambs were received an equal daily allowance of concentrated ration (3% of the body weight).

3: Blood Sampling and Examinations:

The blood samples were withdrawn from jugular vein from each lamb by using a disposable syringe into 10 ml plain tubes. The test tubes were left to clot and then centrifuged at 3,000 rpm for 20 min, for serum separation and stored at -20°C until assayed for some macro minerals and Testosterone.

4: Biochemical Analysis:

Serum samples were used for determination some macro minerals (Sodium (Na), Phosphorus (P), Potassium (K) and Chloride (Cl) and Testosterone hormone (T), by using (PZ CORMAY S.A., Poland) reagent kit with Auto Chemistry Analyzer (Model Polimak M10/2, Italy).

5: Statistical Analyses:

Data were analyzed using standard methods of statistical analysis which perform using (SAS, 2005).

Results and Discussions

The changes in blood concentrations of the minerals have been observed in newly absorbed minerals from the intestine, and redistribution from endogenous stores (Piccione *et al.*, 2007). The mean values (\pm SD) of some macro minerals in serum Karadi male lambs are presented in Tables (1).

Table 1. Effect of milled flaxseed on some macro minerals: sodium (Na), phosphorus (P), potassium (K) and chloride (Cl) concentration in blood serum (mean \pm SD)

Treatment (MF)	No. of Animals	(Na)	(K)	(Cl)	(P)
		mmol/L	mmol/L	mmol/L	mg/dL
		mean \pm SD	mean \pm SD	mean \pm SD	mean \pm SD
T1 0%	2	144.00 \pm 2.83	5.350 \pm 0.071	111.500 \pm 0.707	4.430 \pm 0.113
T2 4%	2	138.500 \pm 2.12	4.550 \pm 0.495	106.500 \pm 2.121	4.680 \pm 1.287
T3 8%	2	141.00 \pm 4.24	4.950 \pm 0.071	111.500 \pm 3.535	4.560 \pm 0.848
Range*		(125 – 152)	(3.0 – 4.8)	(93.3 – 116.6)	(3.08 – 5.65)

*(Ranjith and Pandey, 2014).

Milled flaxseed has non-significant effect ($P \geq 0.05$) on blood serum for (Na, K, Cl and P) for all treatments within normal physiological limits as reported by (Ranjith and Pandey, 2014). The mean value of serum sodium for T1, T2 and T3 were (144 \pm 2.83, 138.5 \pm 2.12 and 141 \pm 4.24) mmol/ L respectively. These results are in accompanied with those mentioned by Marko, *et al.*, (2011). The mean values of serum potassium were (5.350 \pm 0.071, 4.550 \pm 0.495 and 4.950 \pm 0.071) mmol/L, respectively, for all treatments, and they are in agreement with Abdel Moniem *et al.*, (2014). The results of blood serum chloride for T1, T2 and T3 were (111.500 \pm 0.707, 106.500 \pm 2.121 and 111.500 \pm 3.535) mmol/L, respectively which are greater than reported by Ranjith and Pandey, (2014).

Marko *et al.*, (2011) determined the serum chloride level, and it was between 94.20 mmol/L and 130.00 mmol/L, with an average of 108.17 mmol/L, and S.E.M. was 0.37 mmol/L. This is in agreement with our study. Albarran and Lugo, (2012) determined the phosphorus level in blood serum of goats in the south of the State of Mexico during the rainy season, the highest P value was (4.79 mg/dl) but the lowest P value was (3.05 mg/dl) at dry seasons. In this study the phosphorus in blood serum in the treatments T1, T2 and T3 were 4.430 \pm 0.113, 4.680 \pm 1.287 and 4.560 \pm 0.848 mg/dl, respectively). NRC, (2007) reported the phosphorus content in grazing ruminants which ranged from 3 to 8 mg/dl. Sharma *et al.*, (2004) reported that there are significant ($p < 0.01$) differences were observed amongst the treatments for phosphorus balance in lambs, this conclusion disagreed with this study, because there were non-significant ($p \geq 0.05$) differences. Testosterone is the most important male reproductive hormone; and it is related to reproductive behavior, spermatogenesis and secondary sexual characteristics (Bezerra *et al.*, 2009).

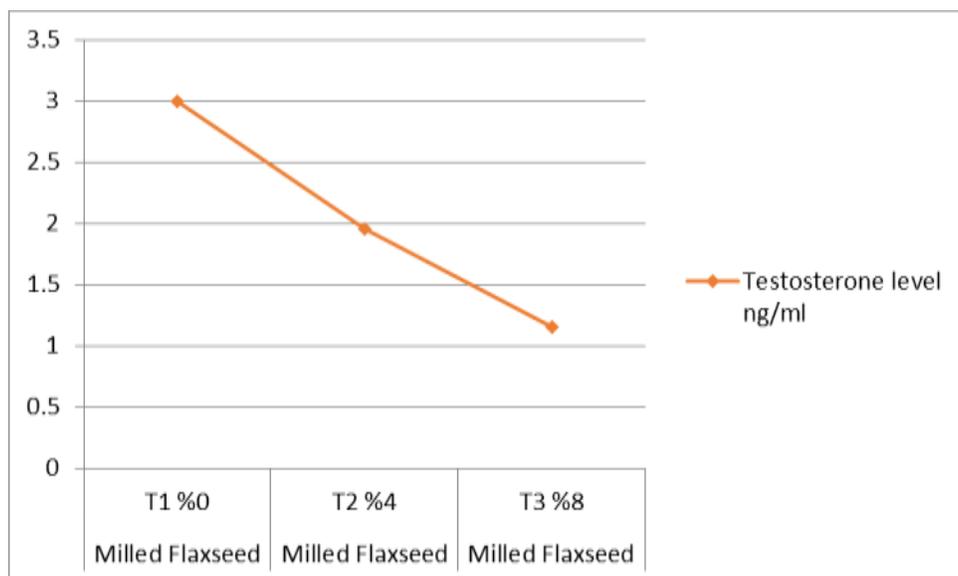


Figure 1. Change of Testosterone levels in Karadi Male Lambs

Experimental data showed that there were no significant differences in Testosterone levels ($p \geq 0.05$) for all treatment T1, T2 and T3, the levels in blood serum (mean \pm SD) were 3.000 ± 1.555 , 1.950 ± 2.333 and 1.150 ± 1.061 respectively for Karadi male lambs (Figure 1). Nevena *et al.*, (2016) recorded higher values of Testosterone levels (6.36 ± 0.65) in the same ages (5 month) which was close to the results of this study. Blood Testosterone concentrations are related to age (Silva, 2000), season of the year (Delgadillo and Chemineau, 1992), protein intake (Azevedo, 2005) and luteinizing hormone (LH) pulse frequency (Muduuli *et al.*, 1979).

Correlation coefficients of some macro mineral (Sodium, Potassium, Chloride and Phosphorus) in blood serum of Karadi male lambs are presented in Table (2). The relationships between macro minerals in this study were investigated that sodium is not significantly correlated with each potassium, chloride and phosphorus, and this is in agreement with values that reported by El Zubeir *et al.*, (2005) who stated non-significant correlation between sodium, potassium and phosphorus.

Table 2: Correlation coefficients of sodium, potassium, chloride and phosphorus in blood serum.

Macro minerals	Na mmol/L	K mmol/L	Cl mmol/L	P mg/dL
Na mmol/L	1.000			
K mmol/L	0.467 ^{n.s}	1.000		
Cl mmol/L	0.867 ^{n.s}	0.467*	1.000	
P mg/dL	-0.210 ^{n.s}	-0.600 ^{n.s}	-0.142 ^{n.s}	1.000

n.s. not significant, * $P \leq 0.05$

Potassium is significantly correlated with chloride ($r = 0.467$, $P \leq 0.05$) but not correlated with phosphorus. Yasmin *et al.*, (2010) reported that there were significant correlation coefficient values between macro elements (Na, K and P) with Na which is considered a good predictor of values of these minerals.

Conclusions:

In view of the results given in the text, the following conclusions could be drawn, that there was no effect of milled flaxseed on all macro minerals and Testosterone level in lambs for all treatments, and in terms of the correlation coefficients (r), Cl was positively and significantly correlated ($P \leq 0.05$) with K.

Recommendations:

The usage of the milled flaxseed levels in feed intake within normal physiological limits, could led to variation in some macro minerals' concentration, and also it can also affect the levels of testosterone hormone in blood male Karadi lambs.

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تأثير مستويات مختلفة من مسحوق بذور الكتان على بعض معادن الكبرى ومستويات التيستوستيرون في سيرم الدم لذكور الحملان الكرادي

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الملخص

الهدف من الدراسة الحالية هو تحديد تأثير مستويات مختلفة من مسحوق بذور الكتان في تركيز بعض المعادن الكبرى (الصوديوم، (Na) والفسفور، (P) والبوتاسيوم، (K) والكلورايد، (Cl) ومستوى التيستوستيرون في ذكور الحملان الكوردية. في هذه الدراسة استخدم (6) ذكور حملان كرادي ذات وزن حي 26-30 كغ، ويتراوح عمرها من 4 إلى 5 شهور)، والتي تم شراؤها من مصدر محلي موثوق، وضع كل حمل منعزلاً بشكل إفرادي في بوكس (1.5 x 1 م)². استخدم ثلاث معاملات من مسحوق بذور الكتان، مع التغذية الاختيارية لكل (6) ذكور من الحملان. في بداية التجربة تم توزيع الحملان بشكل عشوائي على ثلاث معاملات (T) بحيث تتضمن كل معاملة اثنان من الحملان، لتلقي إما معاملة الشاهد (T1) التي لا تحتوي على مسحوق بذور الكتان (MF)، و T2 التي تحتوي على 4% من (MF)، T3 التي تحتوي على 8% من (MF). قدم لجميع الحملان يوماً حصة متساوية من العلف المركز (3% من وزن الجسم) خلال الفترة من 2014/11/10 إلى 2015/01/13. جمعت عينات الدم من الوريد الوداجي، وأشارت النتائج إلى التأثير الغير المعنوي لمسحوق بذور الكتان في سيرم الدم من المعادن الكبرى (P، Na، K، Cl). ترواحت قيم معامل الارتباط بين جميع الصفات بين (-0.600 إلى +0.467)، وكانت قيم معامل الارتباط غير معنوية بين المعادن الكبرى، في حين كان الارتباط إيجابياً ومعنوي (r= 0.467, P ≤ 0.05) ما بين K و Cl. إن استخدام مسحوق بذور الكتان في العلائق ضمن الحدود الفسيولوجية الطبيعية يمكن أن يؤثر في تركيز بعض المعادن الكبرى ويمكن أن يؤثر أيضاً في مستوى هرمون تيستوستيرون في دم حملان الذكور الكرادي.

الكلمات المفتاحية: الكتان، المعادن الكبرى، تيستوستيرون، حملان الكرادي.