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IMPACT OF FLAXSEED INCLUSION IN DAMASCUS GOAT'S RATION ON DIGESTIBILITY, SOME BLOOD PARAMETERS AND REPRODUCTIVE PERFORMANCE

[171]

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ABSTRACT

Feeding flaxseed to dairy animals improve milk production and reproductive performance. So, the objective of our study was to investigate effect of inclusion flaxseed in Damascus goat's ration on its reproductive performance. Twenty-four Damascus goats (31.40 ±0.50 kg weight and 2-3 years old) were divided into three groups (randomly, eight animals each). The basic diet of control group (T1) consisted of 56.67% concentrate feed mixture (CFM) and 33.33% Alfalfa hay, while the groups T2 and T3 supplemented with 10% full fat soya, 5% flaxseed + 5% full fat soya and 10% flaxseed, respectively. Inclusion flaxseed in goat's ration at rate of 5 and 10% resulted in significant increase in all nutrients digestibility, except nitrogen free extract digestibility (NFE) as well as the nutritive values as total digestible nutrients (TDN). Dry matter intakes (DMI) of the different experimental groups were comparable. Goats in T3 recorded the highest does conceived, twinning, conception and kidding rates % as well as total kids born, than other groups (T1 and T2). On the hand T3 recorded the lowest aborted does and barren does (Zero) compared to T1 and T2. Animals of T3 recorded significant higher of total protein, globulin, Albumin and urea concentration than T1 and T2. Concerning lipids profile, the animals of T3 recorded significant lower triglycerides, cholesterol and Low-density lipoprotein concentration than those of T1 and T2. While the animals of T3 recorded significant higher High-density lipoprotein concentration compared to T2 and T1. The body weight of does is not significantly affected by any of three treatments. In conclusion, flaxseed supplementations in Damascus goat's diets during the gestation period lead to improve total tract digestibility, reduced blood lipids and normalize renal and hepatic functions and improved its reproductive performance, especially those fed on diets containing 10% flaxseed.

Keywords: Flaxseed, Damascus goat, reproductive performance, digestibility, feed intake.

INTRODUCTION

Goats are characterized by the high ability to adapt with different environmental conditions and it is considered one of the most important animals after camels in arid and semiarid areas. Under such conditions the Damascus goat are considered the most important component of animal production economic for the Bedouin.

Flaxseed is a great source of essential fatty acids, which contains approximately 50%–70% of α-linolenic acid (ALA); it is a very rich plant source of omega-3 fatty acids **(Xu et al 2013)**. Therefor flaxseed is an excellent source of n-3 fatty acids. Scientists found that the utilization of essential fatty acids, especially n-3 fatty acids in ruminants feeding improves reproductive efficiency, **Salehi et al 2016** reported that diets contains ω-3 have positive effects on the development of the early embryo. **Ambrose et al (2016)** who reported that the improvement of fertility when animals fed on diets

supplemented with (ω-3) may be due to improvement in energy balance, increased production of steroid hormones (progesterone) which is essential for pregnancy maintenance, reduced release of prostaglandin (PGF2α) from the uterus, consequently establishment of pregnancy leading to decreased embryo mortality.

A few studies showed the effect of inclusion flaxseed in Damascus goat ration on its reproductive performance **(Sobhy et al 2015)**.

The main goal of this study was to investigate effect of inclusion flaxseed in Damascus goat ration on its reproductive performance.

MATERIALS AND METHODS

This experiment was conducted at the Mariout Research Station (30 km to Alexandria) and Animal Nutrition labs of the Desert Research Center (DRC) (Ministry of Agriculture and land reclamation) , El-Matarya , Cairo, Egypt.

The experimental animals, design and rations

Twenty-four Damascus goats (31.40 ±0.50 kg and 2-3 years) were divided into three groups (randomly, eight animals each). The experimental groups were fed on 90% basil diet (The basil diet consisted of 56.67% Concentrate feed mixture (CFM) and 33.33% Alfalfa hay)+ 10% full fat soya, 5% flaxseed + 5% full fat soya and 10% flaxseed for control groups T1, T2 and T3, respectively. Three experimental rations were formulated to cover goats requirements according to **(NRC 1981)**. The chemical composition of the feed ingreadents and the experimental rations are presented in **Table (1)**. Complete rations were offered twice daily at 7 am and 4 pm in quantities sufficient to allow free choice access to the ration, and animals have free access to clean fresh water. The experiment started 15 days befor mating period up to birth date. The animal weighed byweekly befor morning feeding and the orts were determined.

Estrous synchronization and mating

The estrous cycles of the does in each group were synchronized using double injections of prostaglandin F2α (Synchromate®, each 1ml contains 250 mg Cloprostenol, Coopers Co., Germany) 11 days between each other. After the second injection of Synchromate three Painted-breast (3 bucks) fertile males were introduced to females (one buck per 8 females) for five days and left with them for estrus detection and natural mating. Males were allowed to rotate among different experimental groups to avoid sire/group confounding effect. Estrus was checked continuously by observation of the paint marks on the female's rumps **(Farrag 2014)**.

Reproductive parameter

Serviced does: Number of nanny-goats mated.

Conceived does: Number of nanny-goats pregnant.

Barren does: Number of nanny-goats mated and don't pregnant.

Conception rates: (number of nanny-goats conceived / nanny goats mated) × 100.

Average litter size: (number of total born/ nanny-goats kidding).

Kidding rates: (number of nanny-goats kidding / nanny goats mated) × 100.

Digestibility trials

Digestibility trial was performed during late pregnancy (two month to the expected birth date) using fecal grab samples method **(Van Keulen and Young,1977).** The faeces were collected from all does directly from the rectum for three times daily (7.00, 14.00 and 18.00) for three consecutive days. Acid-insoluble ash was used as an internal marker to estimate fecal output and nutrient digestibility. The digestibility on coefficients of all nutrients was calculated according to the following formula **(Van Kulen and Young 1977)**

$$\textit{Digestibililty} = 100 - \frac{\%\textit{indicator in the feed}}{\%\textit{ indicator in the feces}}\ x\ \frac{\%\ \textit{nutrient in the feces}}{\%\ \textit{nutrient in the feed}}$$

Blood samples

Blood samples were taken from all experimental animals before morning feeding (two months to expected birth date). Blood samples were withdrawn from jugular vein into vacutainer tubes containing EDTA. The plasma were separated by centrifuging at 3000 rpm for 20 minutes and frozen at−20°C up to subsequent analysis. Blood plasma samples were analyzed using commercial kits.

Table 1. Chemical composition of feed ingredients and the experimental rations (% on DM basis)

Item	Flaxseed	Concentrate	Full fat soya	Alfalfa hay	T1	T2	T3
Dry matter	95.93	90.76	93.58	92.66	91.68	91.79	91.91
Organic matter	96.00	92.50	92.80	87.00	89.88	90.07	90.26
Crude protein	20.06	16.73	37.64	16.28	20.37	19.38	18.4
Ether extract	40.24	3.30	16.28	2.19	4.61	5.91	7.21
Crude fiber	28.55	13.16	10.23	30.83	20.46	21.43	22.40
Nitrogen Free Extract	7.20	59.30	28.60	37.80	44.44	43.35	42.25
Ash	4.00	7.50	7.20	13.00	10.12	9.93	9.74
Neutral detergent fiber	48.43	30.76	31.89	46.31	39.33	40.18	41.03
Acid detergent fiber	32.32	14.71	13.65	30.78	21.77	22.76	23.75
Acid-insoluble ash	0.73	1.64	0.48	5.20	2.96	2.97	2.98

Biochemical analysis of blood plasma

All plasma samples were analyzed for: total protein (TP) as described by **(Reinhold, 1953)**. Albumin (A) **(Doumas et al 1971)**. Globulin (G) was calculated by subtracting plasma albumin from plasma total protein. A: G ratio was calculated, urea according to the method of **Fawcett and Soctt (1960)**, creatinine according to **(Bartles et al 1972)**. Alanine amino transferase (ALT) and aspartate amino transferase (AST) (**Reitman and Frankel, 1957)**, alkaline phosphatase **(Belfield and Goldberg, 1971)**. Triglycerides (TG) **(Fassati et al 1982)**, cholesterol **(Richmond, 1973)**, high-density lipoprotein (HDL)-cholesterol by the method of **(Allain et al 1974)** . Low-density lipoprotein (LDL)-cholesterol (**Wieland and Seidel, 1983)**. All kits used were purchased from Human Co. (Germany) using Jen way spectrophotometers (UK).

Analytical methods

Feeds and feces samples were subjected to proximate chemical analyses (crude protein (CP), crude fiber (CF), ether extract (EE) and Ash) according to **AOAC (2000)**, while nitrogen free extract (NFE) was calculated by difference. Neutral detergent fiber (NDF), acid detergent fiber (ADF) were determined in sequential proceedures of **Van Soest et al (1991)**, analysis using Ankom 200 (Ankom Technology Corp., Fairport, NY) filter bag technique.

Statistical analysis

The data were statistic analyzed using the statistical analysis system **(SAS 2006).** Separation among means was carried out according to Duncun Multiple Range test **(Duncan 1955).** Data of body weight changes, digestibility and some blood parameters were statistically analyzed according to the following model: $Y_{ij} = \mu + T_i + e_{ij}$, Where y_{ij} = represents observation, μ=: the overall mean, T_i = effect of treatment (experimental group), e_{ij}: experimental error.

RESULTS AND DISCUSSION

Digestibility

Inclusion flaxseed in goat's ration at rate of 5 and 10% resulted significant increase in all nutrients digestibility except nitrogen free extract digestibility (NFE) as well as the nutritive values as total digestible nutrients (TDN) **Table (2)**. Where the animal of T3 (received 10 % flaxseed) recorded significantly (P>0.01) higher DM, OM, CP, EE, CF, NDF and ADF digestibility and TDN value than those of T2 (received 5 % flaxseed+ 5 % full fat soy) and T1 (received 10 % full fat soy). Also the animals of T2 recorded significantly higher nutrient digestibility than T1 except for crude protein and ADF digestibility. However no significant (P= 0.1103) differences were detected among the three experimental treatments in NFE digestibility. This may be attributed to effect of flaxseeds inclu-

sion, which it is characterized by a small, flat and oval-shaped (2×5 mm), consequently, it has a higher possibility of escaping from mastication as well as increased its passage rate from the rumen. Moreover, the flaxseed fat contents is protected by the seed coats which gives a partial protection against microbial attack or limits the effects of oil on ruminal microbes or both, leading to negligible effect on the digestion of fibers while promoting feed intake and increase the energy content of the diet **(Syed et al 2012 , Kim et al 2004).** In addition, flaxseeds are sources of unsaturated fatty acids which, usually, have better digestibility compared to saturated fatty acids **(Palmquist and Mattos 2006)**.

Petit (2003) reported that cows fed formaldehyde-treated flaxseed had the greatest digestibility of ADF and NDF which would have contributed to increasing DM digestibility. Also **Gonthier et al (2004)** reported that an increase in digestibility of OM and fiber with a supplement of 3.5 to 4% extruded flaxseed oils to a grass and corn silage based diet. However, **Machmüller et al (2000)** and **Wachira et al (2002)** found that inclusion 6.7% and 10.5% flaxseeds in lambs and sheep rations did not significantly affect on digestibility. Also, **Paula et al (2014)** found that inclusion of oilseeds in Saanen goat diets did not significantly affect digestibility of dry matter (DM), organic matter, crude protein, neutral detergent fiber and total digestible nutrients, however, diets containing oilseeds recorded higher values of ether extract digestibility and lower values for total carbohydrates.

Contradicting with these results, dry matter and OM digestibility were decreased for the three supplemented diets (crude flaxseed, extruded flaxseed, flaxseed oil), this difference was due to a decrease in NDF digestibility **(Martin et al 2008).** Also, **Martin et al (2008)** reported that when they supply dairy cow diets with 5.7% flaxseed oils reduced OM and fiber digestibility.

On the other hand, although T3 recorded for the highest CP digestibility followed by T2 then T1, T1 recorded the significantly (P=0.0001) highest digestible crude protein content followed by T2 while T3 recorded significantly the lowest DCP **(Table 2)**. These may be due to effect of ration CP concentration which T1 recorded the highest CP content (20.37) in total ration followed by 19.38 % for T2 and 18.40 for T3 **Table (1)**.

The significantly higher CP digestibility for Flaxseed groups may be explained by that the protein in flaxseed is a matrix surrounds the fat droplets leading to protection of the protein from deterioration in the rumen, therefore, greater availability of protein in the intestinal tract, thus increasing its digestibility **(Khorasani et al 1992)**.

Table 2. Digestibility of nutrients during the gestation period.

Item	T1	T2	T3	SE	P
Dry matter	64.53^{c}	67.79^{b}	71.22^{a}	0.000	<.0001
Organic matter	69.39^{c}	72.71^{b}	75.11^{a}	0.364	<.0001
Crude protein	81.28^{b}	81.86^{b}	84.19^{a}	0.631	0.0088
Ether extract	76.25^{c}	82.28^{b}	89.64^{a}	1.511	<.0001
Crude fiber	32.04^{c}	39.25^{b}	51.70^{a}	1.376	<.0001
Neutral detergent fiber	41.71^{c}	45.70^{b}	52.20^{a}	0.456	<.0001
Acid detergent fiber	32.47^{b}	36.33^{b}	39.35^{a}	1.454	0.011
Nitrogen Free Extract	80.43	83.84	81.08	1.157	0.1103
Nutritive value					
Digestible Crude protein	16.55^{a}	15.86^{b}	15.49^{c}	0.122	<.0001
Total Digestible Nutrients	66.77^{c}	71.57^{b}	75.87^{a}	0.325	<.0001

Feed intake

Although, dry matter intake (DMI) of the different experimental groups were comparable, the animals fed on rations contained flaxseeds (T2 and T3) recorded higher TDNI compared with those fed on the control diet (T1) at different stages (flushing, early gestation and late gestation period, Table (3). This may be attributed to the significantly higher nutrients digestibility recorded for T2 and T3 compared to T1 **(Table 2)**.

The same trend for DMI was observed by **Mohammed et al (2011)** when they found that no significant effect was observed in dry matter intake (DMI) due to inclusion sunflower, flaxseed, or canola seeds in dairy cows rations. Also, **Ward et al (2002)** and **Gonthier et al (2005)** found that inclusion 3.25% and 12.6% flaxseeds in dairy cows rations did not significantly affect on DMI. On the contrary, **Silva et al (2010)** reported a reduction in dry matter intake was observed when feeding lactating goats on oilseeds.

On the other hand, the animals of T1 recorded higher crude protein intake (CPI) and digestible crude protein (DCPI) compared to T2 and T3 (**Table 3)**. This may be due to that T1 recorded significantly higher CP and DCP content compared to T2 and T3 **(Tables 1 and 2)**.

Table 3. Feed intake for Damascus goats during the gestation period

Item	Flushing period			Early gestation			Late gestation		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Dry matter intake, g/h/d	1014.47	1015.64	1016.81	1012.86	1014.15	1015.44	1375.14	1376.90	1378.66
Total Digestible Nutrients intake, g/h/d	677.36	726.91	771.49	676.29	725.84	770.45	918.19	985.47	1046.04
Crude protein intake, g/h/d	201.80	193.01	184.22	204.34	194.67	185.00	280.06	266.87	253.69
Digestible Crude protein intake, g/h/d	164.03	158.01	155.11	166.09	159.37	155.77	227.63	218.48	213.60

Reproductive performance

The presented data of **Table (4)** showed the effect of the experimental treatments on animal's reproductive performance. The data indicated that doses in T3 ration recorded the highest does conceived, twinning, conception and kidding rates % as well as total kids born, than other groups (T1 and T2). On the other hand the group of T3 recorded the lowest aborted does and barren does compared to T1 and T2. These results could be attributed to effect of flaxseed which contains about 50%–70% α-linolenic acid (ω-3) **(Xu 2013).** In this connection, **Mattos et al (2004)** reported that dietary fatty acids that related to ω-3 increases the size of the corpus luteum, size of the large dominant follicle and increases progesterone (P4) secretion consequently, reduce ovarian and endometrial synthesis of prostaglandin F2α (PGF2 α), and lead to establishment of pregnancy as well as reduced embryonic mortality. In this connection **Ambrose et al (2016)** reported an improvement in fertility of animals fed on diets supplemented with ω-3 and they suggested that may be due to improvement in energy balance, increased production of steroid hormones (progesterone) which is essential for pregnancy maintenance, reduced release of prostaglandin **(PGF2α)** from the uterus, consequently establishment of pregnancy leading to decreased embryo mortality.

Also, **Petit et al (2002b)** reported that feeding flaxseed to dairy animals increased milk production and reproductive function. Indeed, feeding 10.4% of whole flaxseed to dairy cows would positively effects on the establishment of pregnancy leading to decreased embryonic mortality **(Petit and Twagiramungu, 2006)**.

Table 4. Reproductive performance for Damascus goats

Item	T1	T2	T3
Does serviced	8	8	8
Does conceived	6	6	8
Does aborted	1	2	0
Barren does	2	2	0
Does Kidding	5	4	8
Twinning , case	3	2	4
Total born	8	6	12
Average litter size	1.60	1.50	1.50
Conception rate, %	75	75	100
Kidding rate, %	62.5	50	100

Blood parameter

It is clearly indicated that animals of T3 recorded significant higher of total protein, globulin and urea concentration than T1 and T2, also T2 was significant higher than T1 **(Table 5)**. Also the animals of T3 recorded significant higher albumin concentration compared to T1 with no significant difference between T1 and T2. These results pointed to that animals of T3 and T2 were higher protein metabolism (anabolism and catabolism) than T1. These may be due to 1) Effect of inclusion flaxseed in animals of T2 and T3, which flaxseed contains high concentration of essential fatty acids especially ω-3 **(Simopoulos 2002 and Xu et al 2013)**. Packaging of the fat with seed shell may be protected the polyunsaturated fatty acids against ruminal bio-hydrogenation, consequently it not negatively affect rumen function **(Kim et al 2004).** The protection action of flaxseed essential fatty acids on rumen protozoa, may have indirectly increased microbial protein availability in the intestine **(Matsumoto et al 1991)**. Oilseeds have been shown to increase secretion and activity of pancreatic enzymes, enhancing digestion and absorption of proteins in the small intestine and associated efficiency of protein utilization **(Mir et al 2000)**. Flaxseed could, contribute to increase flow of N to the small intestine, because of its greater by pass of protein and of its effect on the ruminal protozoa population.

The increase flow of N could decrease the requirement for dietary protein due to the associated improvement in the efficiency of dietary N use. This could lead to lesser N losses in feces and urine **(Petit et al 2005)**. 2) The animals of T3 and T2 recorded higher fertility and twining rate compared to T1. In this connection, several studies have shown that plasmatic concentrations of thyroidal hormones are increased because increased energy consumption in some animal's species, this indicates an increase in metabolism in pregnancy especially in twins **(Davidson and Chopra 1979; Blum et al 1980 and Dauncey et al 1983).**

Table 5. Effect of feeding experimental rations on some blood biochemical parameters of Damascus goats

Item	T1	T2	T3	SE	P
Total protein, g/dl	7.11^{b}	7.00^{b}	8.74^{a}	0.204	<.0001
Albumin, g/dl	3.71^{b}	3.78^{ab}	4.08^{a}	0.113	0.0680
Globulin, g/dl	3.40^{b}	3.22^{b}	4.66^{a}	0.262	0.0020
Albumin/Globulin	1.17	1.23	0.91	0.108	0.1080
Urea, mg/dl	61.05^{b}	63.17^{b}	70.77^{a}	2.193	0.0130
Creatinine, mg/dl	0.93^{a}	0.93^{a}	0.61^{b}	0.062	0.0020
Total lipids, mg/dl	856.12	805.34	776.04	38.445	0.3480
Cholesterol, mg/dl	223.09^{a}	213.58^{b}	196.51^{c}	2.568	<.0001
Triglycerides, mg/dl	123.1^{a}	117.25^{b}	98.38^{c}	2.000	<.0001
High-density lipoprotein, mg/dl	39.06^{b}	31.17^{b}	66.59^{a}	2.822	<.0001
Low-density lipoprotein, mg/dl	195.04^{a}	185.12^{a}	170.03^{b}	4.393	0.0020
Alkaline Phosphatase, IU / L	129.76	124.76	108.55	8.165	0.1830
Aspartate aminotransferase, Units / ml	42.89	40.67	38.57	2.050	0.3510
Alanine aminotransferase, Units / ml	15.61	15.52	15.26	0.274	0.6535

However, there are no significant differences in albumin: globulin ratio among the different experimental groups. Creatinine as a good indicator of renal function, recorded comparable levels for T1 and T2 and the both treatments were (P = 0.002) higher concentration than T3 **(Table 5)**. This could be attributed to the body stress as a result to pregnancy. The values of creatinine in this study are lies within the normal range (0.6-1.1 mg/dl) as reported **Bartles et al (1972)**.

Concerning lipids profile, the animals of T3 recorded significant lower triglycerides, cholesterol and Low-density lipoprotein concentration than those of T1 and T2. And T2 was significant lower triglycerides and cholesterol than T1 **(Table 5)**. But the Animals of T3 recorded significant higher High-density lipoprotein concentration compared to T2 and T1 with no significant difference between T1 and T2. The significantly increment of high-density lipoprotein (HDL) for animals of T3 may be due to the reduced levels of Triglycerides (TG), Cholesterol and Low-density lipoprotein (LDL), this is consistent with **Youssef et al (2016)** who reported that inclusion flaxseed powder 10, 20% in diet of male Albino Rats led to decrease in serum cholesterol, triglycerides, low density lipoprotein, but increased high density lipoprotein. These findings could be explained according to the fact that flaxseeds contains 53% α-linolenic acid (ω-3) that inhibits the synthesis of very low density lipoprotein cholesterol (LDL-cholesterol) and triglycerides in the liver. These results agree with **Harris et al (1997)** who found that feeding whole flaxseed increased blood concentrations of ω-3 fatty acids, while decreased the omega 6- fatty acid ratio in blood **(Petit, 2002a and Pan et al 2012).** While no significant differences were found in total lipids (T.L) among T1, T2, and T3.

Alkaline Phosphatase, alanine aminotransferase and aspartate aminotransferase showed insignificant differences among the studied animals groups. These findings indicated a healthy hepatic function. In accordance with the current results, **Nudda et al (2013)** they reported that when inclusion extruded linseed to grazing lactating goats can enhance milk fat profile, without harming liver and kidneys, this is very important for animal health status. Hepatic lipid accumulation decreased in transition dairy cows **(Petit et al 2007)**, when the source of dietary fat was rich in alpha-linolenic acid (18:3 n-3), for example flaxseed.

Body weight changes of the does

The body weight of does is not significantly affected by any of three treatments **Table (6)**. This may be due to that dry matter intake (DMI) of different experimental groups are comparable so the body weight of does is not differed. These results are in accordance with results of **Paula et al (2014)** who reported that oilseeds such as (flaxseed, sunflower and canola) did not affect the average daily gain and feed conversion for saanen goats.

Table 6. Body weight change for Damascus goats during gestation period

Item	T1	T2	T3	TIME	SE	P
	Flushing period					
Initial Body Weight, Kg	31.11	31.18	31.91	20	1.744	0.937
Final Body Weight, Kg	31.87	31.98	32.79	20	1.702	0.917
Body Weight Change, Kg	0.76	0.80	0.88	20	0.120	0.784
	Early gestation period					
Initial Body Weight, Kg	32.65	33.06	33.60	90	1.703	0.925
Final Body Weight, Kg	35.56	36.24	37.65	90	1.873	0.726
Body Weight Change, Kg	2.91	3.18	4.05	90	0.693	0.487
	Late gestation period					
Initial Body Weight, Kg	37.28	37.28	39.55	60	2.169	0.669
Final Body Weight, Kg	44.38	46.87	49.33	60	2.954	0.463
Body Weight Change, Kg	7.10	9.59	9.78	60	1.823	0.485
	Birth period					
Initial Body Weight, Kg	48.25	48.88	49.26	5	3.657	0.983
Final Body Weight, Kg	40.17	41.48	43.09	5	3.526	0.868
Body Weight Change, Kg	-8.71	-7.40	-6.17	5	0.967	0.459

CONCLUSION

Flaxseed supplementation in Damascus goat's diets during the gestation period, resulted in: improved total tract digestibility, reduced blood levels of cholesterol, triglycerides and normalize renal and hepatic functions, suggesting higher absorption of omega-3 fatty acids in animals especially those fed diets containing 10% flaxseed. Moreover, supplementing goats diets with flaxseed improved its reproductive performance.

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تأثير إضافة بذرة الكتان في علائق المعز الدمشقي علي الهضم وبعض قياسات الدم والأداء التناسلي

[171]

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تغذية بذور الكتان للحيوانات الحلابة لا تعطي مستويات عالية من إنتاج اللبن فحسب، بل تحسن أيضًا الأداء التناسلي ؛ لذا كان الهدف من هذه الدراسة هو بحث تأثير إدراج بذرة الكتان الكاملة في علائق المعز الدمشقي (الشامي) علي أدائها التناسلي. حيث تم تقسيم 24 أنثي ماعز معز دمشقي (متوسط الوزن 31.40±0.50 كجم، ومتوسط العمر 2–3 سنوات) إلى ثلاث مجموعات (معاملات) (ثماني عنزات في كل مجموعة). وكانت العلائق تتكون من 56.67٪ علف مركّز (CFM) و33.33٪ دريس البرسيم الحجازي، على أن يضاف للمجموعة الضابطة (T1) 10% فول الصويا كامل الدسم و المجموعة الثانية (T2) 5٪ بذور الكتان الكاملة + 5٪ فول الصويا كامل الدسم، أما المجموعة الثالثة يضاف لها 10% بذرة الكتان الكاملة. أظهرت النتائج أن إدراج بذور الكتان الكاملة في علائق المعز الدمشقي بنسبة 5 و 10٪ أدت إلى زيادة معنوية في هضم جميع العناصر الغذائية وكذلك مجموع العناصر الغذائية المهضومة (TDN) باستثناء هضم (NFE). كانت كمية المادة الجافة المأكولة (DMI) للمجموعات التجريبية المختلفة متقاربة. سجلت معز المجموعة T3 أعلى معدلات فى كل من الحمل والتوأمة والإخصاب، وكذلك مجموع الجداء المولودة مقارنة بالمجموعات الأخرى (T1 و T2). ومن جهة أخرى فإن المجموعة (T3) سجلت أدنى مستوى في نسبة الإجهاض وعدد الحيوانات التي لم تلقح مقارنة بالمجموعات الأخرى (T1 و T2). الحيوانات في المجموعة T3 سجلت أعلى مستوى في كلاً من البروين الكلي والجلوبيولين، الألبيومين واليوريا في بلازما الدم مقارنة بحيوانات المجموعات الاخرى (T1) و(T2). وفيما يتعلق بالدهون في الدم، سجلت حيوانات المجموعة (T3) انخفاضًا كبيرًا في نسبة الدهون الثلاثية والكولسترول وتركيز البروتين الدهني منخفض الكثافة (LDL) عن تلك الموجودة في T1 و T2. وكان T2 أكثر انخفاضًا في الدهون الثلاثية والكولسترول من T1. كما سجلت حيوانات T3 نسبة تركيز عالية من البروتين الدهني عالي الكثافة مقارنة بحيوانات المجموعات الاخرى (T1 و T2). وكذلك وزن الجسم لم يتأثر بشكل ملحوظ بأي من المعاملات الثلاثة. وفي الختام، فإن مكملات بذور الكتان في وجبات المعز الدمشقي خلال فترة الحمل تؤدي إلى تحسين الهضم الكلي، وتقليل نسبة الدهون في الدم وتحسين أدائها التناسلي خاصة تلك التي تغذت على علائق تحتوي على 10٪ من بذور الكتان.

الكلمات الدالة: بذرة الكتان، المعز الدمشقى، الأداء التناسلي، الهضم، المأكول

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