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Productive Performance, some Rumen Parameters and Blood Profiele of Zaraibi does Fed Rations Containing Sesbania Sesban Seeds a New and High Source of Protein during Late Pregnancy and Suckling Periods

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ABSTRACT

This work was carried out to investigate the effect of using Sesbania seeds (SS) (treated and untreated) to partially substitute concentrate feed mixture (CFM) protein in rations of pregnant goats during the late pregnancy and suckling periods and its influence on production performance of Zaraibi does and their new born kids. The impact on some metabolic parameters (rumen and blood) as well as economic efficiency was also tested. Twenty five Zaraibi does in the 2th, 3nd and 4th seasons of lactation (weighing on average 35.88 kg) were used. The animals were divided according to their body weight into five similar groups (5 each), to study effect of using Sesbania seeds as a source of protein at levels of 0.0% (G1), 10% (G2) and 20% (G3) from CFM protein. Sesbania seeds were treated (TSS) by socking and roasting and used at the same levels (10 and 20%) in G4 and G5, respectively. The obtained results showed that the daily dry matter intake tended to decrease with increasing level of Sesbania seeds in goats' rations. The same trend was observed with treated Sesbania seeds (TSS). The clear decrease in DM intake as g/h and g/kgw$^{0.75}$ with increasing level of Sesbania seeds even after being treated might indicate that some anti-nutrional factors remained in the seeds. On the other hand, the daily DM intake expressed as BW% and g/kg w $^{0.75}$ during suckling period was higher than that consumed during the late pregnancy period in all treatments. This may be attributed to the increased rumen size of the animals after parturition and being free of the graved uterus stress on the rumen. In the sametime, the highest value of water consumption as l/h, ml/kgw$^{0.75}$and ml/gDM intake was recorded with G5 then G4;whereas, the lowest value was found in G1. The effect of the tested experimental rations on both pH value and ammonia-N concentrations was not significant with each sampling time. Ruminal total VFA's concentrations during all hours post-feeding were the highest with G4,while the lowest values were detected with G3,and the differences were significant among intervals of sampling. Ruminal microbial protein was significantly higher with G4 then G3 at 2 and 4 hrs. post-feeding. The effect of the tested rations during late pregnancy and suckling periods indicated that most hematological parameters tended to decrease during the last pregnancy period then in suckling period and the differences were only significant in values of Hb, RBC's, MCHC ,lymphocytes, and platelets. During the late pregnancy period, the concentrations of creatinine and thyroid hormones significantly increased compared with during the suckling period. Calcium, phosphorus and manganiseium were higher during suckling periods compared withlate periods. The live body weight (LBW) of does increased to the maximum before parturition and recorded the highest values then sharply decreased (post-parturition) to the minimum at day 90th (weaning) in all groups. The does given Sesbania seeds during the last two month of pregnancy gave born kids with heaver weight at the birth and weaning then those fed control, the highest values were recoded with G5,the differences were significant. The obtained data showed that the still birth cases were noticeable higher in G1 compared with the other groups. The highest litter size was recorded with G5 and the lowest with G2, but, G1, G3 and G4 recorded medium value. The highest value of daily body gain (DBG) was recorded with G5 followed by G4, while G1 recorded the lowest. Accordingly, out put measured as kilograms produced per doe was better with G5 followed by G4 and lastly the G1. The obtained data indicated that the mortality cases decreased with increasing Sesbania seeds level in goat's rations. Generally, the economic efficiency was improved with Sesbania seeds rations compared with control. This had a good economic return on the herd of Zaraibi goats.

Keywords: Sesbania seeds- Zaraibi does- Rumen parameters- Blood parameters- Productive performance- Economic efficiency.

INTRODUCTION

Nutrition is a major factor affecting the physiological and metabolic status of farm animals. In Egypt, there is a wide gap between the available feedstuff and farm animal's requirements. During summer season, green forages with reasonable protein contents are not adequately available.Many attempts were carried out to introduce some green forages or seeds containing higher protein content such as *Sesbania sesban* and *Erthrin indica* (Soliman *et al*., 1997 and Pugalenthi *et al*. 2004). Legume seeds are valuable sources of protein, oil, carbohydrates, minerals and vitamins. They are playing an important role in human nutrition mainly in developing countries (Mohamed and Rangappa, 1992 andYanez*et al*., 1995). Many studies (Hossain and Becker, 2001; Hossain *et al*. 2002 and Pugalenth*et al*. 2004) indicated that Sesbania seeds contain high level of crude protein (29 to 33% of DM). Thus, legumes such as *Sesbania sesban* seeds constitute an important feed stuff and are an economic source of protein in the diets as reported by Kumar *et al.* (1991) and Pugalenthi *et al.* (2004).Hossain *et al*. (2002) studied the effect of different treatments such as soaking in water for 24hrs. Soaking + autoclaving at 121°Cfor 30 min., autoclaving and dry heating at 130°C for 1 hr. The study indicated that the treatment such as soaking + autoclaving was the most effective treatment for reducing the anti - nutrients (total phenols, tannins, phytic acid, saponin and trypsin inhibitor) levels in different Sesbania seeds. Therefore, the aim of this work was to evaluate the effect of using *Sesbania sesban* seeds (treated or untreated) to partially substitute CFM protein in rations of pregnant goats during the late pregnancy and suckling periods and their influences on production performance of Egyptian Zaraibi does and their new born kids and in turn the impact on some metabolic parameters (rumen and blood) and economic efficiency.

MATERIALS AND METHODS

This study was conducted at El-Serw Experimental Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. Twenty five lactating Zaraibi does in the 2nd, 3rd and 4th seasons of lactation, and weighing on average 35.88 kg were used. The animals were divided according to their body weight into 5 similar groups (5 each), to study effect of using Sesbania seeds as a source of protein at levels of 0.0 (G_1), 10 (G_2), and 20% (G_3) from CFM protein. Sesbania seeds were treated by soaking in water for 24hrs.and roasting in an oven at 145 °Cfor 24hrs. according to Yikal*et al*. (2014) then used at the same levels of 10 and 20% from CFM protein in G_4 and G_5, respectively . Each group of animals was housed in a semi-roofed yard

(4x3x5 m). The animals were in the late pregnancy period (4th month of pregnancy) and continued for 90days after kidding (weaning of kids). Animals were weighed at the beginning and the reafter at two-week intervals. The animals were fed two weeks as a transition period on the same rations before the start of the experiment al work. The nutrients requirements were calculated according to NRC (1981) of dairy goats. The amount of concentrate feed mixture and corn silage were offered at 50:50 ratio as reported by Ahmed and El-Kholany (2012) on dairy goats. Animals were fed the assigned ingredients as a mixed ration. The concentrate feed mixture (CFM) used contained undecortecated cotton seed meal (25%), yellow corn (43%), wheat bran (25%), molasses (3.5%), lime stone (2%), common salt (1%) and minerals mixture (0.5%). The chemical composition of the tested ingredients was determined (Table1), water was available at all times and drinking water was measured for each group (ml/ day). Diets were offered twice daily at 8.0 am and 3.0 pm and any refused amounts were daily recorded. Proximate chemical analysis of the feeds was carried out according to A.O.A.C. (1995). Rumen fluid samples were taken from 3 animals of each experimental group using stomach tube before feeding (0 time) and 2, 4 and 6 hrs .post-feeding at the end of feeding trials. The samples were filtered through 3 layers of gauze and pH was immediately measured by a pH meters. Ammonia nitrogen (NH_3-N) concentration was determined according to the method of Conway (1957). Microbial protein was determined according to Schultz and Schultz (1970). Whereas total volatile fatty acids (VFA's) were determined according to the technique described by Warner (1964). Changes of live body weight were recorded individually for the does and their kids every two weeks. Litter size (kids/ doe), kidding rate (litter size x 100) and mortality rate also were calculated. Blood samples were taken once during last month of pregnancy and the first month of lactation from 3 does of each group via the jugular vein just before feeding (0 time). Whole blood was immediately used for hematological estimations. Other blood samples were centrifuged at 4000 rpm for 20 minutes; separated serum was used for enzymes and hormone determination while the other part was frozen at -20 ºCuntil the other biochemical analysis. Commercial kits were used for all blood measures except globulin which was calculated by differences. Economic efficiency was calculated as total output / total in put a ccording to the local prices (where 1 ton CFM cost 3800 L.E., CS cost 500L.E. and 1 ton Sesbania seeds cost 1000 L.E., while kg live body weight of Zaraibi goats' kidswas 35L.E.). Data were statistically analyzed using SAS (2003), the significant differences among means were assigned according to Duncan (1955).

RESULTS AND DISCUSSION

Chemical composition of *Sesbania sesban* seeds:

The chemical composition of feed ingredients in Table1 indicated that *Sesbania sesban* (SS) contained 92.75% DM, 31.20 % CP, 7.32% CF, 5.30 % EE, 52.58 % NFE and 3.6%ash. Similar results were observed with treated Sesbania seeds (TSS) as shown in Table1. The chemical composition obtained in this study is nearly similar to that obtained by Pugalenthi *et al*. (2004) and Hossain and Becker (2001) with different Sesbania seeds. In a recent study, El-Kholany *et al.* (2013) reported that Sesbania seeds contained 31.9% CP, 5.30% EE, 52.63% NFE, 7.31 % CF and 3.57% ash on DM basis. In the same year, Arekemase *et al*. (2013) stated that Sesbania seeds were rich in all essential nutrients such as protein, energy, minerals and vitamins. It is worth noting that Sesbania seeds contain almost double CP content that of CFM and nearly 3 folds of CS .The reverse was true for CF contents.

Table 1.Chemical analysis of feed ingredients

Items	Feed ingredients on dry matter basis						
	DM	OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture, CFM	91.10	93.95	15.0	15.75	3.40	59.80	6.05
Sesbania sesban seeds, SS	92.75	96.40	31.20	7.32	5.30	52.58	3.60
Treated sesbania sesban seeds, TSS	93.30	96.80	31.85	7.20	5.10	52.65	3.20
Corn silage, CS	33.50	91.0	9.10	28.70	3.18	50.02	9.00
Experimental rations :							
50% CFM +50% CS (G1)	63.30	92.80	12.10	21.73	3.35	55.62	7.20
46% CFM +51% CS +3% SS (G2)	62.45	92.72	12.40	22.60	3.41	54.31	7.28
42% CFM +52% CS +6% SS (G3)	61.55	92.68	12.60	22.65	3.46	53.97	7.32
46% CFM +51% CS +3% TSS (G4)	62.57	91.83	12.35	22.70	3.40	53.38	8.17
42% CFM +52% CS +6% TSS (G5)	61.73	92.80	12.70	22.65	3.45	54.00	7.20

Daily feed intake and water consumption:

During late pregnancy period, daily feed intake as g/kgw0.75tended to decrease (being 110.52, 106.81 and 105.80) with increasing level of *Sesbania sesban* seeds (0, 10and 20%) in goats' rations (G1, G2 and G3, respectively). The same trend (Table 2) was observed with treated *Sesbania sesban* seeds (TSS) in G4 and G5 (being 105.57 and 103.72 g/kgw 0.75, respectively).The corresponding values of feed intake as % BW were 4.53, 4.36, 4.34, 4.30 and 4.23 for G1, G2, G3,G4 and G5, respectively. The clear decrease in DM intake as g/h, g/kgw0.75 and % BW with increasing level of *Sesbania sesban* seeds (even after being treated) might indicate that some anti-nutritional factors still remained in seeds. The same trend was observed also by El-Kholany *et al*. (2013) using *Sesbania sesban* seeds in rations of growing Zaraibi kids. On the other hand, the daily DM in take expressed as BW% and g/kg0.75 during suckling period was higher than that consumed during the late pregnancy period in all treatments as shown in Table 2. This may be attributed to the increased rumen size of the animals after parturition and being free of the graved uterus stress on the rumen. It may be also attributed to the higher requirements for milk production during suckling period (Ahmed *et al.,* 2001 and Shehata *et al.,* 2007a).

Table 2. Average daily dry matter intake (DM) by Zaraibi does* during the two experimental periods (late pregnancy and suckling)

Items	Groups				
	G1	G2	G3	G4	G5
Daily DM intake (g/h) during late pregnancy					
From CFM	810	730	650	730	650
From Sesbania seeds	0.00	39	78	38.5	77
Corn silage	797	800	804	795	803
Total DM intake	1607	1569	1532	1563.5	1530
DM intake, % BW	4.53	4.36	4.34	4.30	4.23
DM intake, g/kgw$^{0.75}$	110.52	106.81	105.80	105.57	103.72
Roughage: concentrate ratio (R/C)	50 : 50	51 : 49	52 : 48	51 : 49	52 : 48
Daily DM intake (g/h) during suckling period					
From CFM	850	785	693	780	690
From Sesbania seeds	0.00	39	78	38.5	77
Corn silage	835	850	852	845	850
Total DM intake	1685	1674	1623	1663.5	1617
DM intake, % BW	5.02	4.92	4.91	4.89	4.83
DM intake, g/kgw$^{0.75}$	121.05	118.89	117.86	118.15	116.16
Roughage: concentrate ratio (R/C)	50 : 50	51 : 49	52 : 48	51 : 49	52 : 48

*** Group feeding**

Water consumption:

Data of water consumption of Zaraibi does during pregnancy and suckling periods are presented in Table 3. The daily water consumption noticeably affected as a result to using of Sesbania seeds in both untreated (G2 and G3) and treated (G4 and G5). The highest value of water consumption as l/h, ml/kgw$^{0.75}$ and ml/g DM intake was recorded with G5 (5.80, 393 and 3.79, respectively) then G4 (5.75, 388 and 3.68, respectively) than that detected with control group (G1).Thus, the water consumption was higher with increasing level of Sesbania seeds in rations of Zaraibi does during pregnancy and suckling periods, especially in both TSS groups (G4 and G5). This result indicates a direct relationship between voluntary water and milk yield in dairy goats as reported by Ahmed *et al*. (2001) and El-Kholany (2004) using Kochia and sesbania in dairy goats' rations. In this respect, El-Kholany *et al*. (2013) found that the values of water consumption as ml/ g DM intake was higher (3.11, 3.21, 3.34 and 3.36) with increasing level of Sesbania seeds in goats' rations (0, 10, 20 and 30%, respectively).

Table 3. Daily water consumption by Zaraibi does* during the two experimental periods (late pregnancy and suckling)

Items	Groups				
	G1	G2	G3	G4	G5
During late gestation					
L / head / day	4.95	5.41	5.53	5.75	5.80
Ml /kg BW	139	150	157	158	160
Ml / kgw$^{0.75}$	340	368	381	388	393
Ml / g DM intake	3.08	3.45	3.61	3.68	3.79
During suckling period					
L / head / day	6.25	7.23	7.40	7.60	7.65
Ml /kg BW	186	212	224	224	228
Ml / kgw$^{0.75}$	449	384	537	539	549
Ml / g DM intake	3.71	4.32	4.56	4.57	4.73

***Group feeding**

Rumen fermentation parameters:

Rumen fluid parameters as effects by dietary treatments are presented in Table 4. The minimum pH values and the maximum NH_3-N values were recorded 4 hrs. post-feeding. The same trend was observed by Ahmed *et al*. (2001) and El-Emam *et al*. (2014). The effect of the tested experimental rations on both pH values and ammonia-N concentrations was not significant within each sampling time. However, ruminal NH_3-N concentration post-feeding tended to decrease as a result to using Sesbania seeds, especially G_4 (21.10, 22.00and 20.42 mg/100ml during 2, 4 and 6 hrs .,respectively). Moreover, the effect of using Sesbania seeds on ruminal total volatile fatty acids (VFA's) post-feeding was significant. In the same time, rumen total VFA's concentrations during the all hours post-feeding (2, 4 and 6 hrs.) were the highest with G_4 (11.24, 12 and 11.32 meq/ 100ml, respectively), while the lowest values were detected with G_3 (10.50, 11.02 and 10.45, respectively) and the differences were significant among intervals of sampling. Similarly, ruminal microbial protein was not significant different among the five treatments at zero time and was significantly ($P<0.05$) higher with G_4 then G_3 at 2 and 4 hrs. post-feeding. The obtained data indicated also that the highest values of microbial protein (0.350, 0.586, 0.596 and 0.490g/ 100 ml), and the lowest values of ruminal NH_3-N (17.05, 21.10, 22.00 and 20.42mg/100ml) were recorded with G_4 at all hours (0, 2, 4 and 6hrs., respectively). The present finding is in agreement with those reported by El-Kholany *et al*. (2013). Who observed also some noticeable and positive effects on ruminal protein, total VFA's concentrations and proportions of individual VFA's% as a result to using *Sesbania sesban* seeds in rations of growing kids, whereas the differences in both ruminal pH values and NH_3-N concentrations were not few.

Table 4. Effect of experimental rations on rumen fermentation parameters of dairy Zaraibi goats.

Items	Hours	Groups G1	G2	G3	G4	G5
pH values	0	7.10±0.03	7.12±0.03	7.80±0.06	7.06±0.00	7.08±0.11
	2	6.70±0.04	6.70±0.06	6.80±0.05	6.67±0.03	6.65±0.05
	4	6.56±0.05	6.50±0.07	6.55±0.05	6.50±0.07	6.52±0.04
	6	6.67±0.04	6.70±0.06	6.70±0.06	6.60±0.05	6.65±0.08
NH_3-N (mg/100ml)	0	18.32±0.35	19.02±0.33	17.90±0.32	17.05±0.30	18.42±0.30
	2	21.50±0.16	22.30±0.45	22.30±0.43	21.10±0.40	21.30±0.44
	4	22.45±0.46	23.0±0.40	23.40±0.41	22.00±0.20	22.34±0.52
	6	20.70±0.45	21.45±0.43	21.70±0.42	20.42±0.41	20.60±0.45
TVF's (meq/100ml)	0	9.03±0.27	9.08±0.25	8.87±0.27	9.12±0.29	9.10±0.27
	2	$10.70±0.16^{b}$	$10.72±0.16^{b}$	$10.50±0.15^{b}$	$11.24±0.18^{a}$	$10.90±0.17^{ab}$
	4	$11.24±0.18^{c}$	$11.36±0.19^{c}$	$11.02±0.03^{c}$	$12.00±0.11^{ab}$	$11.60±0.10^{bc}$
	6	$11.00±0.01^{b}$	$11.04±0.02^{b}$	$10.45±0.08^{c}$	$11.32±0.15^{a}$	$11.10±0.12^{ab}$
Microbial protein (g/100ml)	0	0.345±0.01	0.330±0.001	0.325±0.006	0.350±0.300	0.330±0.010
	2	$0.557±0.009^{bc}$	$0.568±0.007^{bc}$	$0.542±0.010^{c}$	$0.586±0.007^{a}$	$0.572±0.007^{ab}$
	4	$0.567±0.10b^{c}$	$0.570.±010^{bc}$	$.535±0.007^{c}$	$0.596±0.009^{a}$	$0.580±0.009^{ab}$
	6	0.455±0.007	0.460±0.008	0.442±0.010	0.490±0.009	0.470±0.009

a-c:Means in the same row with different superscripts differ significantly at P<0.05.

Hematological parameters:

Data of hematological parameters of does fed different experimental rations during late pregnancy and suckling periods are presented in Table 5. The results indicated that most hematological parameters tended to decrease during the last pregnancy period then in the suckling period and the differences were only significant in Hb, RBC's, MCHC, lymphocytes, and platelets. concerning the effect of experimental treatments, the obtained results indicated that the values of most hematological parameters were low with G_1 (control) compared with the other groups. The highest value of Hb was recorded with G_5 (11.40 g/dl) followed by G_4 (11.35 g/dl) and the lowest values were recorded with G_1 (10.75 g/dl). The same trend was also observed with values of MCHC and platelets.

Table 5. The effect of experimental rations on some hematological parameters of Zaraibi does during the late pregnancy and suckling periods.

Items		Hb (g/dl)	Hct (%)	RBC's ($x10^3$ /ul)	MCV	MCH (Pg)	MCHC (%)	WBC's ($x10^3$ /ul)	Lymphocytes (%)	Monocytes (%)	Platelets ($x10^3$ /ul)	Neutrophils (%)
G1		10.75	35.30	13.52	20.85	8.02	31.65b	10.30	49.70b	2.80	390b	45.30
G2		11.00	35.13	13.50	21.25	8.21	34.30ab	10.28	53.65a	2.75	412ab	41.90
G3		11.05	34.50	13.90	19.80	7.95	31.40b	10.02	51.89ab	2.55	398ab	43.70
G4		11.35	35.05	14.06	22.85	8.80	35.75a	10.00	54.90a	2.35	428a	41.20
G5		11.40	34.07	14.12	22.43	8.50	34.20ab	10.05	54.20a	2.50	420ab	42.05
SEM		0.34	0.93	0.25	0.58	0.83	0.55	0.38	1.21	0.43	9.9	1.31
Significant.		NS	NS	*	NS	NS	*	NS	*	NS	*	NS
Pregnancy		10.77b	34.48	13.44	20.25	8.20	32.44b	10.22	52.42	2.84	397	43.86
Suckling		11.11a	34.70	13.95a	20.44	8.41	34.04a	10.10	55.03	2.56	425	42.10
SEM		0.24	0.70	0.18	0.42	0.25	0.40	0.26	1.21	0.45	9.9	1.31
Significant.		*	NS	*	NS	NS	*	NS	*	NS	*	NS
Pregnancy	G1	10.44	35.56	12.96	20.90	8.0	30.77	10.32	48.60	3.00	379	46.25
	G2	10.40	35.21	13.10	21.11	8.10	33.45	10.30	52.65	3.00	401	42.70
	G3	10.75	34.34	13.55	19.90	7.80	30.75	10.15	50.40	2.80	390	44.85
	G4	11.00	33.80	13.70	19.75	8.70	34.90	10.12	55.30	2.75	410	42.30
	G5	11.25	33.50	13.90	19.60	8.40	33.35	10.20	55.15	2.65	405	43.20
Suckling	G1	10.06	35.37	13.35	20.80	8.30	32.13	10.27	50.60	2.75	402	44.30
	G2	10.60	35.02	13.80	21.35	8.40	34.60	10.22	56.65	2.65	424	40.50
	G3	11.35	34.70	13.95	19.90	7.25	31.90	9.95	53.30	2.50	410	44.50
	G4	11.70	34.30	14.20	20.15	8.80	36.57	9.90	57.40	2.50	450	40.20
	G5	11.85	34.10	14.45	20.00	8.60	35.00	9.95	57.20	2.40	440	41.0
SEM		0.48	1.4	0.36	0.84	0.50	0.80	0.52	2.42	0.90	19.80	2.62
Significant.		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

a, b : Means in the same columan for each category with different superscripts are significantly different at P<0.05.

As for lymphocytes, G_4 recorded the highest value (54.90%); whereas, the lost value was recorded with G_1 (49.70%) and the differences were significant. Moreover, neutrophils and monocytes cells were reduced as a result to addition of Sesbania seeds, especially in G_4 and G_5 compared with the control (G_1).Similar results were observed by Maged (2004) and Shehata *et al*. (2004) with sheep and goats; in this respect, Abdelhamid *et al*. (2002) observed that adding some medicinal herbs (thyme, safflower, ginger, black cumin and garlic) increased lymphocytes present in blood and consequently improved immunity of the animals. Moreover, Tawfik*et al*. (2005) reported that some hematological parameters such as Hb, MCHC and lymphocytes were significantly increased as a result to adding of chamomile flowers as medicinal herbs to aflatoxins contaminated diet .In general, the obtained data indicated that all estimated values for measured parameters were within the normal range as reported by Ahmed *et al*. (2008) and Sadek (2011).

Biochemical parameters:

Biochemical parameters data of does fed experimental rations during the late pregnancy and suckling periods are presented in Table 6. During the late pregnancy period, the concentration of creatinine and thyroid hormones of T3 and T4 significantly increased compared with those that obtained during the suckling periods. The

same trend was observed with serum urea-N, triglyceride and activities of serum AST and ALT ;whereas, blood glucose as well as serum calcium, phosphorous and manganese concentrations were higher during suckling period compared with late pregnancy period. Similar results were given by Ahmed (1999)who showed that serum protein, globulin, creatinine, total lipids, cholesterol and magnesium as well as thyroid hormones (T3 and T4) concentrations were higher during the last month of pregnancy than in the lactation months. The same study reported that activities of serum AST and ALT increased with the adverse pregnancy especially during the last month. Hafez *et al* (1983) observed that activities of serum AST and ALT were higher with the advance of pregnancy especially during the last week with buffaloes. The same authors reported that enzymatic activity (AST& ALT) decreased after parturition. In the present study, the values of total protein tended to increase in animals given the two high levels of *Sesbania sesban* seeds (G_4, and G_5) and the differences were not significant. The highest value of globulin was recorded with G_5 (2.95 g/dl) followed by G_4 (2.90 g/dl) then G_3 (2.84 g/dl), G_2 (2.66 g/dl) and lastly G_1 (2.50 g/dl) and the differences were significant .Similar results were observed by Tawfic*et al.* (2005)and Maged (2012) .Mohamed *et al.* (2003) observed that the supplementations of rosemary showed a significant elevation in alpha-1 and beta- 2- globulin .The same authors observed that serum concentrations of total protein, alpha-1, alpha- 2, beta-2 and gamma-2 globulin were significantly higher as a result to the presence of chamomile flowers (500mg/kg LBW/d) in ewes rations. Finally, Maged (2012) reported that serum protein and globulin concentrations improved while, the concentration of cholesterol and activity of ASL and ALT were reduced as a result of using *Sesbania sesban* seeds in goat's rations and the significant effect was clear in G_4 and G_5 only. Generally, the obtained values are within the normal range reported by Jain (1986) (hematological parameters) and Kaneko (1989) (for biochemical parameters) for healthy goats and in line with the finding of El-Kholany *et al.* (2013) when used Sesbania seeds in kids' ration.

Table 6. The effect of experimental rations on some biochemical blood parameters of Zaraibi does during the late pregnancy and suckling periods

Items		TP	ALP	globulin	creatine	Urea-N	Choloste.	T.G.	AST	ALT	T3	T4	glucose	calcium	phosphorus	manganese
G1		6.15	3.65	2.5	0.99^{a}	55.30	53.95	62.30	93.50^{b}	23.90^{a}	119.20	6.80	59.30	9.50	4.25^{b}	2.80
G2		6.13	3.47	2.66^{ab}	0.95^{a}	53.80	52.10	59.90	89.20^{ab}	21.30^{ab}	123.10	6.70	61.35	9.42	4.40^{b}	2.86
G3		6.30	3.46	2.84^{ab}	0.97^{a}	54.60	55.20	63.05	90.10^{ab}	22.80^{ab}	119.70	6.65	60.02	9.60	4.70^{ab}	2.70
G4		6.45	3.55	2.90^{a}	0.87^{b}	52.30	51.50	59.04	87.20^{a}	20.30^{b}	126.35	6.63	62.70	9.75	5.20^{a}	2.90
G5		6.40	3.45	2.95^{a}	0.90^{ab}	53.06	52.01	61.05	86.80^{a}	20.50^{b}	127.50	6.62	63.08	9.67	5.00^{a}	2.75
SEM		0.16	0.13	0.11	0.04	1.25	1.17	1.63	1.85	1.20	7.10	0.46	1.13	0.32	0.15	0.17
Significant		NS	NS	*	*	NS	NS	NS	*	*	NS	NS	NS	NS	*	NS
pregnancy		6.13b	3.35	2.79^{b}	0.93^{a}	54.40	58.82	62.40	90.48	22.9	160.99^{a}	7.40^{a}	59.27	9.17^{b}	4.32^{b}	2.39^{b}
Suckling		6.45a	3.60	2.86^{a}	0.75^{b}	53.92	53.13	58.27	89.09	22.88	85.98^{b}	5.95^{b}	63.11	10.04^{a}	4.99^{a}	3.20^{a}
SEM		0.12	0.09	0.07	0.04	1.22	1.51	1.82	2.48	1.03	5.0	0.33	2.75	0.24	0.10	0.12
Significant		*	NS	*	*	NS	NS	NS	NS	NS	**	*	NS	*	**	**
	G1	5.92	3.52	2.40	1.02	56.06	59.00	63.70	94.60	24.40	156.00	7.78	60.75	9.05	4.00	2.40
	G2	5.90	3.40	2.50	1.00	54.75	58.00	61.20	90.21	22.80	159.60	7.35	58.33	9.03	4.10	2.51
pregnancy	G3	6.10	3.35	2.75	0.92	55.00	61.30	64.40	91.30	23.40	156.65	7.20	57.67	9.22	4.35	2.20
	G4	6.35	3.25	3.10	0.85	53.10	57.80	60.35	88.40	21.90	165.30	7.35	59.60	9.30	4.60	2.53
	G5	6.40	3.22	3.18	0.87	53.10	58.02	62.30	78.90	22.00	167.40	7.30	60.00	9.25	4.57	2.30
	G1	6.42	3.85	2.57	0.88	55.10	55.00	59.30	92.30	23.03	82.35	5.75	57.33	10.02	4.55	2.95
	G2	6.45	3.53	3.92	0.75	55.45	54.61	57.30	89.00	22.30	86.70	6.15	62.30	9.75	4.75	3.30
suckling	G3	6.33	3.62	2.71	0.80	53.63	52.35	60.35	90.07	22.40	81.75	6.08	64.20	10.15	4.98	3.15
	G4	6.57	3.51	3.06	0.68	52.40	51.65	56.00	87.20	22.90	89.40	5.88	65.40	10.20	5.40	3.40
	G5	6.50	3.48	3.02	0.65	52.60	52.00	58.40	86.90	22.85	89.70	5.90	66.33	1010	5.30	3.20
SEM		0.24	0.19	0.14	0.08	2.43	3.02	3.64	4.96	3.06	9.99	0.66	5.50	0.47	0.21	0.23
significant		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

a, b : Means in the same column for each category with different superscripts are significantly different at P<0.05.

Body weight changes of does:

Table 7 presents changes in live body weight (LBW) of Zaraibi goats during late pregnancy and suckling periods. There were no significant (P>0.05) differences among treatments for any interval. The main initial LBW (at the 4th month of gestation)was approximately equal in all groups and ranged from 35.87 to 35.90kg. The LBW of does increased to the maximum before parturition and recorded the highest values (ranged from 44.30 to 47.10kg) then sharply decreased (post-parturition) to the minimum at day 90th (weaning) in all groups (35.60 to 37.20kg). The same trend was observed by Ahmed and El-Kholany (2012) with Zaraibi does during the late pregnancy and lactation periods. Devendra (1979) recorded a decline in body weight of high milk yielding goat during the first month post-partum.In another study on Zaraibi does duringlate pregnancy and lactation periods, Shehata *et al.* (2007a) observed that the LBW of does increased to the maximum before parturition (end of pregnancy) and recorded the highest values (ranged from 55.7 to 58.8kg) then sharply decreased post-parturition to the minimum in suckling period .Similar results were observed also by El-Shinnawy *et al.* (2010) with Rahmani ewes during the late pregnancy and suckling periods. The obtained results indicated that LBW tended to increase by using Sesbania seeds especially with G5 (47.10kg) during the last month of pregnancy compared withG1 (44.30kg). The same trend was reported by Maged (2012).However, considerable improvements in daily weight gain, feed conversion ratio and feed intake were obtained when phytogenic were included in the feed of different species of farm animals (Steiner, 2010 and Maged, 2012).

Productive performance:

The present study indicated that does given Sesbania seeds during the last two months of pregnancy gave born kids with heaver weight at the birth and weaning than those fed control group, and the highest values were recorded with G5 (1.95 and 10.75kg, respectively), and the differences were significant as shown in Table 8.

Table 7. Live body weight changes of Zaraibi does during late pregnancy and suckling periods.

Days	Groups				
	G1	G2	G3	G4	G5
Initial weight at 90 days of pregnancy	35.90	35.90	35.88	35.87	35.87
at 120 days of pregnancy	39.10	39.70	39.88	40.47	41.27
at 150 days of pregnancy (last month of pregnancy)	44.30	45.00	45.88	46.37	47.10
Weight at kidding	35.60	35.70	37.50	37.20	37.10
at 30 days post kidding	34.20	34.30	35.40	35.60	35.50
at 60 days post kidding	33.00	33.40	35.00	35.10	35.20
at 90 days post kidding at (weaning)	31.90	32.50	34.20	34.50	34.70
at 90 days as % of weight at kidding	89.61	91.04	91.20	92.74	93.50

Table 8. Body weight changes (Mean ± standard error) of born Zaraibi kids as affected by the experimental rations

Items	Groups				
	G1	G2	G3	G4	G5
At 0 days (at birth)	1.65±0.09b	1.70±0.10ab	1.75±0.09ab	1.90±0.10a	1.95±0.11a
At 15 days	3.15±0.17	3.42±0.18	3.52±0.15	3.60±0.19	3.65±0.20
At 30 days	4.36±0.21b	4.80±0.21ab	4.90±0.20ab	5.15±0.23a	5.22±0.30a
At 45 days	5.80±0.22b	6.15±0.30ab	6.18±0.23ab	6.60±0.31a	6.70±0.32a
At 60 days	7.24±0.20	7.60±0.21	7.70±0.22	7.85±0.33	7.90±0.35
At 75 days	8.35±0.22b	8.85±0.23ab	8.97±0.26ab	9.40±0.40a	9.50±0.43a
At 90 days (at weaning)	9.35±0.26b	9.98±0.025ab	10.15±0.30ab	10.60±0.45a	10.75±0.48a

a, b: Means in the same column for each category with different superscripts are significantly different at P<0.05.

Reproductive performance:

Reproductive performance parameters of Zaraibi does fed the tested experimental rations are summarized in Table 9. The obtained data showed that the still birth cases were noticeably higher in G1 (16.7%) compared with the other groups. These results are in accordance with those of Shehata *et al.* (2007b), who reported that the still birth cases were lower as a result to using chamomile flowers in goat rations during the late pregnancy period. The same authors found that the percentage of still birth cases were reduced (30, 23, and 20%) with increasing chamomile levels (0, 5, and 10g/ 100 kg BW/d, respectively) in pregnant goats' rations. From Table 9, it seems that incidence of twins parturition was high in Zaraibidoes; hence, the kidding rate or litter size was high too. Litter size ranged from 2.20 to 2.80 without differences among treatments. The highest litter size was recorded with G5 (2.80) and the lowest (2.20) with G2; but G1, G3 and G4 recorded medium value (2.40).Similar estimates for litter size were obtained by Shehata *et al.*(2007a), while Abdelhamid *et al.* (1999b) found that litter size ranged from 2.25 to 2.42 when fed clays supplemented rations. The highest value of daily body gain (DBG) was recorded with G5 (97.7 g) followed by G4 (96.6 g), while G1 recorded the lowest (85.3 g). Similar results were observed by Mirza and Mushtag (2006), Shahzad *et al*. (2010) and Khalifa *et al*. (2013).Accordingly, output measured as kilograms produced per doe was better with G5 followed by G4 then and lately the control group. Those positive effects may be attributed to the effect of the used Sesbania seeds that were treated by soaking and roasting on average body gain at birth and weaning as reported by Shehata *et al*.(2007b). They stated that output measured as kilograms produced per doe per year improved significantly due to chamomile supplement. Similar results were observed byMaged (2012) with using some other medicinal herbs in goats' rations during late pregnancy and suckling periods.As for mortality cases of born kids, the obtained data indicated that the mortality cases decreased (5, 3, 2, 1 and 1 case) with increasing Sesbania seeds treatments in goats' rations as showed in Table 9.Thus, the percentage of mortality recorded the highest values in control group (41.6%) then G2 (27.27%), G3 (18.18%) followed by G4 (8.33%), whereas mortality rate was (7.14%) in G5. Similar results were observed by El-Hosseiny *et al.*(2000) who observed that using medical herbs such as chamomile flowers in doe diets reduced mortality rate by 6.67 to 13.33% for other medicinal herbs.

Table 9. The effect of experimental treatments on productive performance of Zaraibi does.

Items	Groups				
	G1	G2	G3	G4	G5
No. of does	5	5	5	5	5
Single kidding No.	1	1	1	1	0
Twins kidding No.	1	2	1	1	1
Triple kidding No	3	2	3	3	4
Quadratic kidding No.	0	0	0	0	0
Born kids	12	11	12	12	14
Still birth cases	2	1	1	0	1
Alive kids at 0 days	10	10	11	12	13
Alive kids at 15 days	9	10	11	12	13
Alive kids at 30 days	9	9	11	11	13
Alive kids at 45 days	8	9	11	11	13
Alive kids at 60 days	7	8	10	11	13
Alive kids at 90days	7	8	10	11	13
Litter size	2.40	2.20	2.40	2.40	2.80
Kidding rate%	240	220	240	240	280
Average birth weight, kg	1.65±0.09b	1.70±0.10ab	1.75±0.09ab	1.90±0.10a	1.95±0.11a
Average weaning weight, kg	9.33±0.26b	9.98±0.25ab	10.15±0.30ab	10.60±0.45a	10.75±0.43a
Daily body weight	85.3±4.41b	92.00±1.85ab	93.3±1.88ab	96.6±2.51a	97.7±2.45a
Kg kids born/ doe	4.63±0.40	4.76±0.39	4.67±0.45	5.11±0.55	5.26±0.60
Kg kids weaned / doe	29.24±1.92b	30.70±2.80ab	29.68±1.85ab	30.72±2.90a	3.98±2.55a
Mortality of kids , No.	5	3	2	1	1
Mortality of kids, %	41.60	27.27	18.18	8.33	7.14
Economic efficiency	0.87	0.94	0.97	0.99	1.02

a, b : Means in the same column for each category with different superscripts are significantly different at P<0.05.

Economic efficiency:

Economic efficiency (EE) estimated as price of gained weight divided by cost of feed consumed for that gain, was calculated and presented in Table 9. Economic efficiency was noticeably higher (0.87, 0.94, 0.97, 0.99 and 1.02%) with increasing Sesbania seeds levels (0, 10, 20 %from CFM protein) in does' rations G1,G2, G3,G4 and G5, respectively. Similar results were observed by Zeid and Ahmed (2004) and Ibrahim *et al.* (2007) using medicinal herbs in small ruminant rations. Generally, the EE was improved by about 8, 11, 14 and 17 % with Sesbania seeds rations (G2, G3, G4 and G5, respectively) compared with G1 (control).Accordingly, legumes such as Sesbania seeds constitute an important feedstuff and are an economic source of protein in the diets as reported by Kumar *et al*. (1991) and Pugalenth*et al*. (2004).

CONCLUSION

It could be concluded that using *Sesbania sesban* seeds in Zaraibi does' rations during late pregnancy and suckling periods had a positive role in improving daily DM intake, some metabolic parameters and performance, without any adverse effect on blood profile or general health. This improvement was reflected on born kid's performance and production robust kids at weaning and consequently reducing mortality rate for born kids. Accordingly, output measured as kilograms kids produced per doe per year was improved due to the treatments. This had a good economic return on Zaraibi goat sherd.

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الأداء الإنتاجي وقياسات سائل الكرش وصورة الدم للماعز الزرايبي المغذاة علي علائق تحتوي علي بذور السيسبان كمصدر جديد ومرتفع في محتوي البروتين أثناء فترتي الحمل المتأخر والرضاعة

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يقوم هذا العمل علي دراسة تأثير استخدام بذور السيسبان(المعالجة وغير المعالجة) لتحل جزئيامحل بروتين مخلوط العلف المركز في علائق الماعز العشار خلال الحمل المتأخر وفترة الرضاعة، وتأثيرها على الأداء الإنتاجيفي الماعز الزرايبي ومواليدها،وتأثيرها علي بعض القياسات الميتابوليزمية (الكرش والدم) والكفاءة الاقتصادية. تم استخدام عدد خمسة وعشرين منأمهات الماعز الزرايبي في المواسم الثاني والثالث والرابع للحليب، وكانت أوزانهم ٣٥.٨٨ كجم في المتوسط. وقد تم تقسيم الحيوانات حسب وزن الجسم إلى مجموعات مماثلة (٥ لكل مجموعة) لدراسة تأثير استخدام بذور السيسبان كمصدر للبروتين عند مستويات ٠.٠ (مج١) ، و ١٠ (مج٢) و ٢٠ % (مج٣) من بروتين العلف المركز. وقد تم معالجة بذور السيسبانعن طريق النقع والتحميص، واستخدامها على نفس المستويات السابقة (١٠ و ٢٠٪) في مج٤ و مج٥، على التوالي. حُسبت الاحتياجات الغذائية تبعاللـNRC (١٩٨١) للماعز الحلاب. أظهرت النتائج أن كمية المادة الجافة اليومية المأكولة قد انخفضت مع زيادة مستوى بذور السيسبان في علائق الماعز (مج١، مج٢، مج٣ على التوالي). ولوحظ نفس الإتجاه مع بذور السيسبان المُعاملة في مج٤ و مج٥.الانخفاض الواضح في تناول المادة الجافة(كجم / رأس و جم لكل حجم جسم تمثيلي)مع زيادة مستوي بذور السيسبان (حتى بعد معالجتها) يشير إلى أن بعض العوامل المثبطة للتغذية مازالت موجودة في البذور.ومن ناحية أخرى ، كان المأكول منالمادة الجافة اليومي (المُعبر عنه بوزن الجسم ٪ أو كجم/ كجم حيز جسم تمثيلي) خلال فترة الرضاعة أعلى من المأكول خلال فترة الحمل المتأخرة في جميع المعاملات. يُعزى ذلك إلى زيادة حجم الكرش في الحيوانات بعد الولادة، وعدم وجودالإجهاد الناتج من الحمل في الرحم على الكرش.سجلت أعلى قيمة لاستهلاك المياه (كلتر / رأس أو مل / كجم حيز جسم تمثيلي و مل / جم مادة جافة مأكولة) مع مج٥ ثم مج٤، في حين كانت أقل قيمة مع مج١. تأثير المعاملات التجريبية المختبرة على كل من قيمة الأس السالب لتركيز أيون الهيدروجين، وتركيزات نيتروجين الأمونيالم تكن معنويةفي كل العينات. اجمالي تركيزات الأحماض الدهنية الطيارة في كل الساعات بعد التغذية كانت أعلاها مع مج٤، بينما كانت أقل قيم مع مج٣. وكانت الاختلافات كبيرة بين فترات أخذ العينات. وكان البروتين الميكروبي في الكرش أعلى بشكل ملحوظ مع مج٤ثم مج٣ في الساعات الثانية والرابعة بعد التغذية. العلائق المختبرة أثناء كلا من فترتي الحمل والرضاعة أظهرت أن معظم القياسات الهيماتولوجية تميل إلى الانخفاض خلال فترة الحمل الأخيرة ثم في فترة الرضاعة، وكانت الفروق معنوية فقط مع كلا من قيم الهيموجلوبين، وكرات الدم الحمراء، الخلايا الليمفاويةوالصفائح الدموية وتركيز هيموجلوبين كرات الدم الحمراء. زادت تركيزات الكرياتينين وهرمونات الغدة الدرقية بشكل ملحوظ خلال فترة الحمل المتأخرة مقارنة بأثناءفترة الرضاعة. كان الكالسيوم والفوسفور والمنجنيز أعلى خلال فترة الرضاعة مقارنة مع فترة الحمل المتأخر. زادوزن الجسم الحي للعنزات إلى الحد الأقصى قبل الولادة وسجل أعلى القيم ثم انخفض بشكل حاد (ما بعد الولادة) إلى الحد الأدنى في اليوم الـ ٩٠ (يوم الفطام) في جميع المجموعات. العنزات (الأمهات) التى تناولت بذور السيسبان خلال الشهرين الأخيرين من الحملأعطت ولادات وزنها عالي عند الميلاد، وكذلك كانت أوزانها مرتفعة عند الفطام، وكانت أعلي الأوزان مع مج٥، وكانت الاختلافات معنوية.حالات الولادة النافقة كانت أعلى في مج١ مقارنة بالمجموعات الأخرى. تم تسجيل أكبر حجم بطن (عدد الأجنة في البطن) مع مج٥، وكانت أقلها مع مج٢، وسجلت المجموعات مج١، مج٣، مج٤ قيما متوسطة.تم تسجيل أعلى قيمة لزيادة وزن الجسم اليومي مع مج٥ بعدها مج٤، بينما مج١ سجلت أقل قيمة. وعليه كان الوزن النهائي مُقاسا بالكيلوجرامات التي يتم إنتاجها لكل عنزة أفضل مع مج٥ ثم مج٤ وأخيرا مج١. حالات الوفاة قد انخفضت مع زيادة معدلات بذور السيسبان في علائق الماعز. ولقد تم تحسين الكفاءة الاقتصادية مع التغذية علي العلائق المضاف لها بذور السيسبانمقارنة مع الكنترول.

الكلمات الدالة: بذور السيسبان –الماعز الزرايبي –قياسات الكرش – قياسات الدم - الأداء الإنتاجي - الكفاءة الاقتصادية.