

## Effect of *Sesbania Sesban* (*Sesbania egyptiaca*) Supplementation on the Reproductive Performances of Baladi Sheep as Compared to Berseem (Egyptian Clover)

<sup>1</sup>H.A. Sabra, <sup>1</sup>S.G. Hassan and <sup>2</sup>M.I. Mohamed

<sup>1</sup>Department of Animal Reproduction and Artificial Insemination,  
Veterinary Research Division, National Research Center, Giza, Egypt

<sup>2</sup>Department of Animal and Poultry Production,  
Agricultural Research Division, National Research Center, Giza, Egypt

**Abstract:** The aim of the present investigation was to study the effect of feeding *Sesbania Sesban* (*Sesbania Egyptiaca*) on the reproductive performances of ewe lambs as comparing to Berseem (Egyptian clover). Two groups of ewe lambs were raised under the natural condition of Egypt and were fed on maintenance ration during the breeding season (Autumn). The first group (Control) was supplemented with 3 kg Meskawy Berseem / ewe daily and the second group was supplemented by 1/2 kg Sesban plants / ewe daily. The level of supplementation was calculated after chemical analysis of Sesban and Berseem samples. The reproductive performances were estimated and blood samples were collected for analysis of some plasma metabolites and assaying of progesterone. Results indicated that Sesban contain higher levels of crude protein and ether extracts than Berseem (3:1) as well as nitrogen free extract. The clinical examination of ewes revealed higher palatability toward Sesban than Berseem without symptoms of diarrhea, constipation or any changes in body temperature. Sesban supplementation increased the number of ewes exhibited estrus and lambing ewes. There was no difference in oestrous cycle and gestation lengths between Sesban and Berseem supplemented groups as well as progesterone concentration. Moreover, the plasma concentration of total protein, albumins and globulins were slightly higher and cholesterol and triglycerides were slightly lower in Sesban supplemented group than in Berseem group. It can be assumed that Sesban plant is suitable and safe for feeding and supplementing ewes during the reproductive cycle.

**Key words:** *Sesbania Egyptiaca* · Sheep · Reproduction · Blood metabolites

### INTRODUCTION

Soil salinity is a widespread problem, restricting plant growth and biomass production, especially in arid, semi arid and tropical areas.

Search for an adapted forages species for animal feed production under existing marginal lands and harsh conditions is needed to overcome severe feed shortage in Egypt [1]. *Sesbania sesban* (*Sesbania Egyptiaca*) has shown potential for forage production and can be included in grazing systems whereas it grows widely as a wild plant on marginal lands and salt affected soils in Egypt [2]. It can be planted in the desert as it does not need more water for irrigation and can grow on rainy water. *Sesbania sesban* contains high chlorophyll content [3] and absorbs more sodium, phosphorus and

magnesium from the soil which play as a good mechanism in alleviating the soil salts [4].

The chemical analysis of *Sesban* leaves revealed high nutritive value and total digestible nutrients [5] and high degradability [6] as well as low easily degraded fiber fractions [7]. Moreover, its protein content ranges from 25 - 30 % of dry matter with high nitrogen intake, high nitrogen retention and moderate faecal nitrogen making it a useful source of protein for ruminants [8].

*Sesbania sesban* supplementation in sheep increased dry matter and organic matter intake and digestibility as well as nitrogen retention in the body [9] and did not affect the rumen metabolites [7]. Its supplementation to natural grazing growing goats increased its body weight and fasted its growth rate [10]. In sheep, it was noted that ration supplementation by *Sesbania sesban*

up to 30 % improved feed intake, growth rate, onset of puberty and sexual development of male and female without adverse effect. During lactation the supplementation improved milk yield of ewes and growth rate of lambs [11]. Moreover, *Sesbania sesban* has antihelmenthic, antibiotic and immune potentiator effects [12]. It was noted that, some nutrients deficiencies in Berseem (the main Egyptian clover) as phosphorus and zinc due to its deficiency in the soil [13] affect to large extend the animal fertility, therefore the aim of the present investigation is to detect the effect of *Sesbania sesban* (*Sesbania Egyptiaca*) supplementation on the reproductive performances of sheep under the prevailing Egyptian conditions.

### MATERIALS AND METHODS

The present experiment was carried out during autumn under the natural environmental conditions of Egypt.

Two comparable groups of native Egyptian ewe lambs (n = 10) were used. They were examined for maturity and ovarian activity by using vasectomized ram and assaying its blood plasma for three successive weeks for progesterone. All animals were fed on maintenance ration (0.8 kg / ewe daily) composed of concentrated mixture (protein not less than 16 %) beside rice straw *ad libdium*.

#### Experimental Design:

- Control group (27.8 kg life body weight) was supplemented by three kg Meskawy Berseem (Egyptian clover) / ewe daily.
- Experimental group (26.2 kg life body weight) was supplemented by 1/2 kg *Sesban* forage / ewe daily (growing plants before flowering) after exclusion of roots and solid stems.

The maintenance ration and supplements were calculated according to the chemical compositions of nutrients and the life body weights of ewe according to Mohamed [14]. The fore system of feeding was run from the beginning of the breeding season (autumn till the early two months of gestation period).

Vasectomized ram was introduced to each group at the beginning of the breeding season for three weeks to detect the incidence of estrus and calculating the estrous cycle length [15]. The vasectomized ram was changed by painted fertile ram for another two weeks for fertilization.

**Collection of Samples and Analysis:** Samples of *Sesban* forage and Berseem were chemically analyzed and their nutrients were evaluated [14].

Blood samples (heparin zed) were collected weekly from each ewe by jugular veinpuncture during the estrus cycle and gestation period. Plasma were separated (x 1500 g at 4°C for 15 minutes) from blood tubes and kept at - 20°C until analysis of total proteins, albumins, urea, total lipids, cholesterol and triglycerides by using chemical kits (Pharma Diagnostic, Texas, USA) and estimated colorometrically by spectrophotometer.

Progesterone was assayed by radioimmunoassay [16] by using kits from diagnostic product corporation (Los Angles, USA). The assay had a minimum detectable level of 0.02 ng/ml with intra-assay coefficient of variations of 4.65 %.

Data were computed and statistically analyzed using student "t" test [17].

### RESULTS

The chemical composition of *Sesban* (Table 1) indicated that it contain higher levels of crude protein and fat and lower crude fiber content than in Berseem (dry matter basis).

Table 1: Chemical composition of *Sesbania sesban*(*Sesbania Egyptiaca*) and Meskawy Berseem(Egyptian clover).

Items	Forage basis			Dry matter basis		
	Sesban	Berseem	ratio	Sesban	Berseem	Ratio
Moisture %	68.37	80	-	-	-	-
Dry matter	32.63	20	1.6	-	-	-
Crude protein	7.55	2.82	2.7	23.86	10.5	2.3
Nitrogen free extract	11.5	6.98	1.6	36.39	34.68	1.1
Ether extract	2.09	0.91	2.3	6.60	4.06	1.6
Crude fiber	7.14	6.94	1	22.56	34.89	0.6
Ash	3.35	2.35	1.4	10.59	15.86	0.7

Table 2: Effect of Sesbania sesban supplementation compared to Berseem on live body gain.

Items	Sesban	Berseem
Initial live body weight (kg)	28.2±2.87	29.8±2.53
Net weight (kg)	30.6±2.74	32.8±3.84
Difference (kg)	2.4±1.02	3±0.63
Daily gain (kg)	0.090±0.030	0.080±0.020
Mean±S.D		

Table 3: Effect of Sesbania sesban supplementation compared to Berseem on ovarian activity of ewes

Items	Sesban	Berseem
Number of ewes shows oestrus onset	10/10	8/10
oestrous cycle length (day)	16.5±2.06	16.8±1.70
Progesterone concentration at oestrous day (ng/ml)	0.21±0.17	0.50±0.33
progesterone after 2 <sup>nd</sup> week of oestrous	1.51±0.30	1.50±0.49
Progesterone concentration after 3 <sup>rd</sup> week of oestrous	2.12±0.03	2.10±0.07
Mean±S.D		

Table 4: Effect of Sesbania sesban supplementation compared to Berseem on gestation of ewe lambs.

Items	Sesban	Berseem
No of mating ewe lambs	10/10	8/10
Gestation length (day)	167±2.92	168±7.72
Progesterone concentration (ng/ml) at 4 weeks pregnancy	2.63±0.53	2.46±0.62
At 5 weeks	2.83±0.20	2.73±0.97
No of lambing ewes	10/10	8/10
Mean±S.D		

Table 5: Effect of Sesbania sesban supplementation compared to Berseem on some blood plasma metabolites of cyclic ewe lambs

Plasma metabolites	Berseem	Sesban
Total protein g %	8.15±0.15	9.23±0.64
Albumins g %	5.82±0.29	6.01±0.57
Globulins g %	2.13±0.41	2.96±0.68
Urea mg %	22.8±3.4	25.5±1.4
Total lipids mg %	375.5±12.1	372.3±9.8
Cholesterol mg %	119.2±5.97	106.1±6.73
Triglycerides mg %	106.6±7.6	94.6±6.61
Mean±S.D		

The clinical examination of ewe lambs revealed that ewe lambs consumed Sesban with higher palatability than Berseem without symptoms of diarrhea, constipation, abortion or any change in body temperature.

All Sesban supplemented ewe lambs exhibited estrous signs compared to Berseem supplemented group (Table 3) without significant differences in oestrous cycle length or progesterone concentration during either follicular or luteal phases. The lambing rate was 10/10 versus 8/10 in Sesban and Berseem supplemented ewe lambs (Table 4).

The plasma concentrations of total proteins, albumins and globulins (Table 5) were slightly higher but cholesterol and triglycerides were slightly lower in Sesban supplemented ewe lambs than in Berseem supplemented ones.

## DISCUSSION

The chemical analysis of Sesban and Berseem in the present investigation revealed higher content of crude protein and ether extract and lower crude fiber in Sesban than in Berseem this give Sesban higher nutritive and economic values than Berseem . So, it can be considered Sesban forage or hay as a source of protein and energy to supplement their deficiencies in free grazing sheep flocks [8,14].

By clinical examination of experimental ewe lambs, it was shown that it consumed Sesban supplement with higher palatability than Berseem supplement. May be related to the adequate content of protein and energy, whereas, Dunn and Moss [18] stated that adequate protein in the ration increased the voluntary intake of feeds. Moreover, there were no pathological symptoms of diarrhea, constipation, impaction or any change in body temperature. In this respect it was recorded that Sesban has a high degradability reach to 92.7% [6] and low easy degraded fiber fractions and did not affect the rumen metabolites [7].

Also, results in this investigation revealed that supplementation of ewe lambs with Sesbania sesban, increased the daily weight gain than in Berseem [8, 19], may be due to the high nutritive value of Sesban.

Results also, revealed non adverse effect of Sesbania supplementation on estrous incidence , estrous cycle length, gestation length or progesterone concentration, similar results to Mekoy *et al.* [20] who noticed non significant effect of Sesbania supplementation on progesterone concentration during estrus or pregnancy, maybe due to the adequate amount of carbohydrate and protein in Sesban. In this respect it was discussed that energy deficiency can inhibit ovarian function at pituitary synthesis / release of gonadotropins and at ovarian

function in sheep [21]. Also, goats fed on low energy level showed reduced expression of estrous, conception, fecundity and twinning rates [22]. Also negative energy balance in twin lambing and milking ewes suppresses pulsatile LH secretion and reduces ovarian response to LH stimulation with decreased plasma glucose [23]. Moreover, negative energy balance reduces Insulin growth factor - 1 which is a critical to ovarian follicular development [24, 25].

Protein deficiency decreased the ovulation rate and increased the follicular atresia following luteolysis and seemed to be mediated at late stage of the oestrous cycle and follicular development [26]. Also, low protein in the ration predisposed to production of abnormal ova, a less favorable uterine environment, insufficient response of ovaries to gonadotropine / reduce gonadotropine secretion [27, 28]. Moreover, adequate protein in the ration increased the voluntary intake of feed [18] and increase growth rate. In comparing to the present investigation ,it is clear that all Sesban supplemented ewes, exhibited estrus as well as in Berseem supplemented ones. This explain that Sesban (growing plants before flowering) is safe for ovarian activity however, it was reviewed that it contain moderate amount of condensed tannins [29]. The high content of protein and energy of Sesban reflected positively on the functional corpus luteum, oestrus cycle and gestation lengths as well as progesterone and its concentration did not differ than Berseem supplemented ones. Moreover, the nutritive value of Sesban reflected positively on blood metabolites of total protein, albumin, globulins and urea which were slightly higher in Sesban supplemented animals than in Berseem supplemented ones.

This explain that Sesban is a good source of digestible proteins and explain its immunity effect [12]. Moreover, the result showed higher content of ether extract in Sesban than in Berseem with lower blood content of total lipids, triglycerides and cholesterol, this explain the advantage of digestibility and assimilation of Sesban in animal body. So, we can suggest that Sesban can be used in fattening animals for producing high quality meat (low in fat and cholesterol) but this need more investigation.

It can be concluded that *Sesbania sesban* (*Sesbania Egyptiaca*) is a good source of protein and safe for sheep production and reproduction and it can be recommended to cultivate it during summer in Egypt to substitute Berseem (the winter crop).

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