The Effect of Feeding Rosemary and Marjoram on Reproductive Performance of Rabbit Does Under Sinai Conditions

Badawi, Lobna A. M. A.; E. O. A. Bakr; M. R. M. Mousa and M. A. Abdel Ghaffar*
Department of Animal and Poultry Production, Faculty of Environmental Agricultural Sciences, Arish University

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Abstract: This study was conducted to investigate the effects of dietary inclusion of different levels of Rosemary and Marjoram leaves on reproductive performance of rabbits. Forty eight New Zealand white (NZW) doe rabbits with initial body weight of 3.64 ± 0.035 kg and aged 7 months were assigned to one of six dietary groups (8 each).The 1st group was of control group, the 2nd and 3rd d groups were fed diets supplied with Rosemary dry leaves powder (1.5% and 3.0%, respectively), 4th and 5th groups were fed diets supplied with Marjoram dry leaves powder (1.5% and 3.0%, respectively), the 6th group was fed the basal diet supplemented with 1.5% Rosemary dry leaves powder plus 1.5% Marjoram dry leaves powder. The body weight of does at mating, pre-natal weights, gestation length and kindling rate were insignificantly affected by Rosemary and Marjoram leaves inclusion in diets. Adding 1.5% Marjoram to the diets of rabbit does recorded significantly (P≤0.05) higher litter size and weight at 7, 14, 21 and 28 days of age (weaning age) than untreated does. Bunny weight at 7, 14, 21 and 28 days of age increased in rabbits fed 1.5% Rosemary. Rabbits feed supplemented with 1.5% Rosemary, 1.5% Marjoram and their mixture (1.5% Rosemary and 1.5% Marjoram) increased in total milk yield at birth -7 days, birth -14 days, birth -21 days and birth -28 days compared with the control rabbit does.

Keywords: Rabbit does, rosemary, marjoram, reproductive performance

INTRODUCTION

There is global awareness about the shortage of animal protein supply in the developing countries. The production of ruminants such as cattle, sheep and goats have not been able to bridge the gap because of their long production generation intervals, feed and fodder shortages, poor genetic make–up as for production traits and disease incidence are among other factors.

Nowadays, there have been rising recognition on the virtues of role that can be played by rabbit production in these developing countries as a means of relieving animal protein shortage crises. The advantages of rabbits are largely attributable to their high rate of reproduction and quick and precipitous maturity, rapid growth rate, high genetic selection potential, efficient use of feed and land utilization, limited competition on humans foods and high quality nutritious meat (Lukfahr and Cheeke, 1991).

There are a large number of feed additives available for inclusion in rabbit's diets to improve their performance (Ewuola *et al.,* 2011). However, the use of chemical products especially (hormones and antibiotics), may cause unfavorable side effects. Moreover, there is evidence indicating that these products are currently considered as risky pollutants for human and may threaten their health on the long–run (Omer *et al.,* 2013).

Many efforts have been devoted on using the green natural materials and/or medicinal plants as feed additives to improve the efficiency of feed utilization and productive performance (Aboul-fotouh *et al.,* 1999) and these efforts are widely accepted. Several previous studies showed that adding medicinal plants and herbs to the diets of rabbits, chicks, sheep, cows or buffaloes improved their feed intake and nutrient digestibility (Mir *et al.,* 1998; Aboul-fotouh *et al.,* 1999 and EL-Ayek, 1999) feed conversion (Allam *et al.,* 1999; Aboul-fotouh *et al.,* 1999; Salem and El-Mahdy, 2001), body weight, body weight gain, growth performance and mortality rate (Ibrahim *et al.,* 2004, Ibrahim, 2005 and Tipu *et al.,* 2006), carcass traits (Evans and Pharm, 1975) and physical conditions of gut ecosystem (Guo, 2003)

Accordingly, the current study was carried out to evaluate the single and combined effects of Rosemary (*Rosmarinus officinalis* L.) and Marjoram (*Origanum majorana* L.) leaves on productive and reproductive performance of does rabbit under the prevailed circumstances of Sinai.

MATERIALS AND METHODS

The present study was carried out at rabbit research farm of Animal and Poultry Production Department, Faculty of Environmental Agriculture Science, Arish University. The geographical and climatic characteristics of this region (Long., 33.75E and Lat. 31.27N) is semi- arid with an average annual rain fall of about 94 mm and average ambient temperature of about 20.47°C.

Rosemary (*Rosmarinus officinalis* L.) and Marjoram (*Origanum majorana* L.) plants were collected from a private commercial farm located in North Sinai governorate. The leaves were harvested, air-dried under shade until the moisture of collected leaves reached 10%. The dry leaves were finally milled, sieved (1 mm mesh) and stored in a well tight polyethylene bags at room temperature 25°C.

Forty eight New Zealand white (NZW) doe rabbits with initial body weight of 3.64 ± 0.035 kg and aged 7 months during three parities from January to May were used in a complete randomized design experiment with six dietary treatment groups. The first group was control group fed a commercial diet without supplementation, second and third groups were fed the control diet supplied with Rosemary dry leaves powder (1.5% and 3.0%, respectively), the fourth and fifth groups were fed

*Corresponding author e-mail: ghaffarmahmoud@gmail.com

the control diet supplied with Marjoram dry leaves powder (1.5% and 3.0%, respectively), while the sixth group was fed the basal diet supplemented with 1.5% Rosemary dry leaves powder plus 1.5% Marjoram dry leaves powder.

Rabbits were fed commercial rabbit diet to cover their requirements according to NRC (1996). The formulation and chemical composition of commercial rabbit diet is shown in Table (1). Chemical analysis of diet was determined according to AOAC (2000).

Table (1): Ingredients of experimental diet used in this study

Ingredients %	Con. diet
Yellow corn	14
Barley grain	10
Wheat bran	27
Soybean meal 44%	12
Alfalfa hay	31.5
Molasses	3
Dicalcium P.	1.2
Calcium carbonate (lime stone)	0.6
Sodium chloride (salt)	0. 3
Premix	0.3
Methionine	0.1
Total	100
Calculated chemical composition	
Crude protein (CP)	17.38
Crude fiber (CF)	12.27
Ether extract (EE)	2.93
Digestible energy (Kcal/Kg)	2769.70

One kilogram of premix contain: vit. A 12000 000 IU, vit.D_3 2200 00 IU, vit. E 1000 mg, vit.K_3 2000 mg, vit. B_1 1000 mg, vit.B_2 4000 mg, vit.B_6 100 mg, vit. B_{12} 10 mg, pantothenic acid 3.33 g, biotin 33 mg, folic acid 0.83 g, choline chloride 200 g, Zn 11.79 g, Mn 5 g, Fe 12.5 g, Cu 0.5 g, I 33.3 mg, Se 16.6 mg and Mg 66.7 g.

Does were housed separately in individual wired cages (60 x 40 x 35 cm) and raised 100 cm from the concrete floor. Nest boxes (30 x 25 x 30 cm) were attached to the front sides of the cages five days prior to kindling and removed at 28 day of lactation (weaning age). All cages were equipped with feeders (made of galvanized steel sheets) and nipples (automatic drinkers). Feed and water were available ad-libitum during all experimental period.

Rabbits in all treatment groups were kept under similar managerial system and environmental conditions. Each doe was transferred to the cage of buck assigned for mating and returned back to her own cage after being mated and palpated for pregnancy 10 days after mating and those failed to conceive were returned back to the same mating buck to be remated within 12 hours, after kindling, litter size, litter weight and bunny weight were recorded. Bunny weight at birth, 7, 14, 21 and 28 (at weaning age) and daily gain weight up to weaning were also recorded. Body weight of does were recorded by weighing the does at the mating and pre-natal. Kindling rate % = [No. of kindled does/No. of bunnies born (including dead bunnies)] x 100.Gestation period from fertile mating to kindling was recorded. Daily milk yield for each doe was measured individually twice/day (every 12 hours) by difference in weight of the pups after and before suckling. Averages of daily milk yield and total milk yield during the sucking period were recorded.

Data of doe rabbits were analyzed using general linear model procedure of SAS software (SAS Institute, 2004). Difference among treatment means were tested for significance using Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Approximate analysis of medicinal Plants:

Data presented in Table (2) showed the chemical composition of Rosemary (*Rosmarinus officinalis L.*) and Marjoram (*Origanum majorana L.)* used in this study. The analysis was carried out to illustrate the proportional content of crude protein (CP), ether extract (EE), crude fiber (CF), ash and nitrogen free extract (NEE) in this plants. The highest value of crude protein, crude fiber and ash were observed of Marjoram (12.27, 15.03 and 14.22%) while the lowest (5.91, 14.23 and 5.26%) were recorded of Rosemary. However, the highest value of ether extract and nitrogen free extract were recorded of Rosemary (6.83 and 67.77%) while, the lowest value (2.27 and 56.21%) were recorded of Marjoram.

Results showed that the value of CP in Rosemary was similar to those reported by Radwan (2003), Ghazalah and Ali (2008), Mohamed (2009) and Osman *et al.* (2010), but it was lower than this reported by Othman (2005). Values of EE, NFE and ash were higher than those reported by (Radwan, 2003; Ghazalah and Ali, 2008; Othman, 2005; Mohamed, 2009; Osman *et al.,* 2010).

In addition, value of CP in Marjoram was higher than those reported by Osman *et al.* (2010) and Ali (2014), but it was lower than those reported by Abaza (2001), Abdo *et al.* (2003) and Ahmed and Abdel-Ghany (2015). However, Ash value was lower than those values reported by Abdo *et al.* (2003) and Ahmed and Abdel-Ghany (2015), but it was higher than this reported by Abaza (2001), Osman *et al.* (2010) and Ali (2014). Moreover, value of EE and NFE was higher than those reported by (Radwan, 2003; Ghazalah and Ali, 2008; Othman, 2005; Mohamed 2009; Osman *et al.,* 2010). The chemical constituents of tested feed additives may vary according to processing of these plants, climatic conditions under which the seeds were grown and the kind of soil (Osman *et al.,* 2010).

Table (2):. Chemical analysis (%) of medicinal plants and the experimental diets

Items	DM	% On DM basis					
		OM	CP	EE	CF	NFE	ASH
Rosemary	89.96	94.77	5.02	9.23	21.71	58.81	5.23
Marjoram	89.82	91.38	13.22	3.21	19.07	55.88	8.62
Chemical composition of experimental diets given to NZW rabbits							
Control	90.53	91.40	17.38	2.93	12.26	58.83	8.60
Rosemary 1.5%	90.20	91.45	17.19	3.02	12.40	58.84	8.55
Rosemary 3%	89.58	91.50	17.01	3.20	12.54	58.75	8.50
Marjoram 1.5%	90.20	91.40	17.32	2.93	12.36	58.79	8.60
Marjoram 3%	90.50	91.40	17.26	2.94	12.46	58.74	8.60
Mixture	90.40	91.45	17.13	3.03	12.50	58.79	8.55

Body weight and kindling rate of doe rabbits:

Feeding diet supplemented with medicinal plants did not affect body weight of does at mating, pre- natal weights and gestation length (P>0.05) compared with the control group (Table 3). In contrary, kindling rate was increased in dose fed diet supplemented with Rosemary, Marjoram and their mixture groups (Table 9). The present results are in agreement with those obtained by Seleem *et al.* (2007) who found that adding 3% Marjoram (*Origanum majorana*) to the diets of rabbit does significantly (P≤0.05) increased kindling rate compared with untreated does. They found kindling rates for treated and untreated does to be 80.92 and 60.53%, respectively.

Table (3): Effect of dietary levels of natural feed additives on body weight at mating and pre-natal weights, gestation length and Kindling rate of New Zealand white rabbits.

Items	Experimental diets					
	Control	Rosemary		Marjoram		Mixture
		1.5%	3%	1.5%	3%	
Mating weight (kg)	3.27 ±0.066	3.23 ± 0.067	3.19 ± 0.077	3.32 ± 0.063	3.31 ± 0.076	3.32 ±0.059
Pre-natal weight (kg)	3.44 ± 0.055	3.55 ± 0.056	3.60 ± 0.061	3.45 ± 0.063	3.34 ± 0.065	3.22 ± 0.057
Gestation length (day)	30.40 ± 0.026	30.50 ± 0.025	31.00 ± 0.022	30.00 ± 0.030	30.10 ± 0.027	30.60 ± 0.028
Kindling rate (%)	77.50 ± 0.014	83.30 ± 0.020	87.0 ± 0.018	85.90 ± 0.023	80.10 ± 0.018	87.2 ± 0.033

Litter size and weight:

Data presented in Table (4) showed the effect of medicinal plants on litter size at birth, 7, 14, 21 and 28 days (weaning). Results clearly indicated that litter size at birth was not significantly influenced by medicinal plants supplemented to doe diets. Rabbits fed diet supplemented with 1.5 % Marjoram achieved the highest (P≤0.05) litter size at 7, 14, 21 and 28 days (6.05, 6.00, 6.00 and 6.00, respectively) compared with control group (5.92, 5.83, 5.83 and 5.75, respectively). However, rabbits fed diets supplemented with 3 % Rosemary recorded the lowest (4.43, 4.43, 4.43 and 4.50) litter size at 7, 14, 21 and 28 days, respectively. These results are in agreement with Seleem *et al.* (2007) who found that adding 3% *Origanum majorana* (Marjoram) to the diets of rabbit does significantly

increased litter size at birth (7.3) compared with the untreated does (5.1). Also, Shehata *et al.* (2007) who reported that the number of a live kids/doe at birth were higher in (*Matricaria chamomila*) flower treated groups (2.11 & 2.23) compared with 1.97 for control group. In addition, El-Hammady and Abdel-Kareem (2015) observed an improvement in litter size at birth and at weaning of rabbits fed diet supplemented with 1.0 g herbal dried seeds, consisting of 50% fenugreek; 30% caraway and 10% of both fennel and dill than the control group.

Concerning litter weight (Table 4) demonstrated that the litter weight at birth, 7, 14, 21 d and 28 days (weaning) significantly (P≤0.05) increased (409.45, 834.65, 1361.30, 2021.00 and 2386.50 g, respectively) in group fed diet supplemented with 3% Marjoram compared to control (356.75, 648.92, 1028.25, 1537.70 and 1874.60 g, respectively). However, Rabbits fed diets supplemented with 3% Rosemary recorded the lowest litter weight (336.07, 573.86, 945.93, 1439.00 and 1831.70 g, respectively) at birth, 7, 14, 21 and 28 days, respectively. This result agreed with Seleem *et al.* (2007) who found that adding 3% *Origanum majorana* (Marjoram) to the diets of rabbit does significantly improved litter weight Moreover, Shehata *et al.* (2007) found that feeding (*Matricaria chamomila*) flower in Zaraibi does ration had positive effect on new born kids weight. In addition, Gaafar *et al.* (2014) indicated that doe rabbits fed diets supplemented with a combination of pumpkin and black seeds oils (2.5 g PS oil plus 2.5 g BS oil/kg diet) showed the better litter weight at birth, 7, 14, 21 and 28 days than those in control group.

Table (4): Effect of dietary levels of natural feed additives on litter size and weight and mortality of New Zealand white rabbits

Items	at	Experimental diets					
		Control	Rosemary		Marjoram		Mixture
			1.5 %	3 %	1.5 %	3 %	
Litter size	Birth	6.17 ± 0.34	6.00 ± 0.41	6.00 ± 0.41	6.45 ± 0.27	6.21 ± 0.32	5.94 ± 0.2
	7 days	5.92^{a} ± 0.36	5.38^{ab} ± 0.37	4.43^{ab} ± 0.29	6.05^{a} ± 0.28	5.07^{ab} ± 0.49	5.44^{ab} ± 0.26
	14 days	5.83^{a} ± 0.3	5.33^{ab} ± 0.36	4.43^{b} ± 0.29	6.00^{a} ± 0.31	4.93^{ab} ± 0.51	5.70^{ab} ± 0.20
	21 days	5.83^{ab} ± 0.39	5.33^{abc} ± 0.36	4.43^{c} ± 0.29	6.00^{a} ± 0.29	6.00^{bc} ± 0.49	5.11^{abc} ± 0.18
	Weaning (28d)	5.75^{ab} ± 0.35	5.48^{abc} ± 0.36	4.50^{c} ± 0.33	6.00^{a} ± 0.29	4.85^{bc} ± 0.48	5.11^{abc} ± 0.18
litter weight (gm.)	Birth (a total)	356.75^{ab} ± 27.56	376.29^{ab} ± 24.84	336.07^{b} ± 20.89	409.45^{a} ± 14.83	370.86^{ab} ± 23.51	386.39^{ab} ± 17.00
	7 days	648.92^{bcd} ± 30.11	748.14^{ab} ± 43.15	573.86^{d} ± 38.65	834.65^{a} ± 24.40	610.36^{cd} ± 51.50	692.78^{bc} ± 24.66
	14 days	1028.25^{c} ± 46.30	1236.29^{ab} ± 70.73	945.93^{c} ± 71.59	1361.30^{a} ± 45.89	959.14^{c} ± 83.50	1107.39^{bc} ± 42.97
	21 days	1537.70^{c} ± 59.04	1873.70^{ab} ± 102.41	1439.00^{c} ± 122.02	2021.00^{a} ± 71.70	1430.40^{c} ± 117.1	1642.9^{bc} ±73.05
	Weaning (28)	1874.60^{b} ± 69.83	2320.20^{a} ± 142.19	1831.70^{b} ± 167.15	2386.50^{a} ± 98.58	1765.10^{b} ± 144.86	2013.80^{ab} ± 106.77
Mortality rate	Birth -7 days	03.10^{b} ± 0.02	6.20^{b} ± 0.02	19.30^{a} ± 0.063	8.11^{b} ± 0.03	24.00^{a} ± 0.0^{4}	8.12^{b} ± 0.03
	Birth -14 days	5.60^{c} ±0.02	7.00^{c} ±0.02	21.00^{ab} ±0.07	9.00^{c} ±0.07	24.00^{a} ± 0.04	12.00^{bc} ± 0.03
	Birth -21 days	6.00^{c} ±0.02	7.00^{c} ±0.02	22.00^{ab} ±0.07	9.00^{c} ±0.03	24.00^{a} ± 0.04	13.00^{bc} ± 0.03
	Birth -28 days	7.00^{b} ±0.02	7.00^{b} ±0.02	22.00^{a} ±0.07	7.00^{b} ±0.04	24.00^{a} ± 0.05	13.00^{bc} ± 0.03

[a, b, and c]: means within the same row with different superscripts are significantly different (P<0.05).

Concerning mortality rate results in Table (4) indicated that increasing the Rosemary or Marjoram up to 3% in rabbits diets significantly (P<0.05) increased the mortality rate compared with the control group and other treatments. In contrary El-Khilany *et al.* (2009) indicated that feeding laying hens on diets supplemented with karkade (*Hibiscus sabdariffa*) seed decreased (P≤0.05) mortality rate. However, Mukhtar (2009) showed that feeding karkade seed to broiler chicks showed no effect on the mortality rate of chicks. In addition, Ocak *et al.* (2008) found that feeding diets supplemented with thyme (*Thymus vulgaris*) leaves, mortality was lower in birds fed the thyme diets than in birds fed control diets for the entire growing period in broilers. The increase of rabbit pre-weaning mortality was associated with an increase in litter size at birth and reduction of remating interval period, although doe milk yield appeared to be the most important factor in this respect. Thus, all factors which may decrease doe rabbit milk (nutrition, management of the rabbitry, climatic conditions and doe diseases), increase preweaning mortality (Rashwan and Marai, 2000).

Mean bunny body weight gain:

Feeding the doe rabbits on Rosemary, Marjoram and their mixture supplementation increased (P≤0.05) mean bunny weight at 7, 14, 21 and 28 days (weaning) except at birth compared with control group (Table, 5). Rabbits fed diets supplemented with 1.5% Rosemary had the highest mean bunny weight (143.54, 238.37, 363.08 and 431.14) at 7, 14, 21 and 28 days, respectively. However, the control group recorded the lowest mean bunny weight values (111.68, 181.14, 271.48 and 333.51g), respectively.

Feeding doe rabbits on diets supplemented with 1.5% Rosemary significantly (P≤0.05) increased bunny weight gain than control group (79.33, 174.16, 298.86 and 366.93 g/day) during the periods from birth -7 days, birth -14 days, birth -21 days and birth -28 days respectively. However, rabbits fed control diet without any supplemented achieved the lowest bunny weight gain (53.20, 122.69, 213.03and 275.06 g/day) as presented in Table (5). These results agreed with El-kholy *et al.* (2012) who found that the doses of Black Baladi rabbit supplemented with 1000 g cinnamon (*Cinnamomum zeylanicum*) powder had significantly (P≤0.05) higher bunny weight at birth and at weaning than the control group. The improvement in bunny weight gain may be attributed to increased feed intake and feed conversion and, milk yield, and to enhancement in the metabolism of essential and volatile oils included in medicinal plants (Evans and Pharm, 1975).

Table (5): Effect of dietary levels of natural feed additives on mean bunny weight gain of New Zealand White rabbits

Items	at	Experimental diets					
		Control	Rosemary		Marjoram		Mixture
			1.5 %	3 %	1.5 %	3 %	
Mean bunny weight (gm.)	Birth (a total)	58.45 ±4.27	64.21 ±2.47	58.47 ±4.36	64.42 ±2.17	60.39 ±3.41	65.15 ±2.18
	7 days	111.68^{c} ±5.22	143.54^{a} ±5.40	130.72^{ab} ±4.22	141.44^{ab} ±5.41	125.26^{bc} ±6.47	129.30^{ab} ±4.33
	14 days	181.14^{c} ±9.41	238.37^{a} ±7.90	214.56^{ab} ±8.61	232.82^{a} ±9.86	200.99^{bc} ±7.75	215.66^{ab} ±6.07
	21 days	271.48^{c} ±13.31	363.08^{a} ±12.79	324.18^{ab} ±14.76	346.56^{ab} ±16.05	306.27^{bc} ±13.06	321.98^{ab} ±9.76
	Weaning (28d)	333.51^{c} ±13.78	431.14^{a} ±12.22	404.78^{ab} ± 18.87	406.88^{ab} ±18.33	374.82^{c} ±14.65	393.60^{ab} ±15.98
Bunny weight gain (gm.)	Birth -7 days	53.20^{b} ±4.12	79.33^{a} ±4.73	72.2^{a} ±4.00	77.0^{a} ±5.03	64.87^{ab} ±6.11	64.15^{ab} ±4.76
	Birth -14 days	122.69^{c} ±9.15	174.16^{a} ±7.73	156.09^{ab} ±8.47	168.40^{a} ±9.70	140.60^{bc} ±8.32	150.51^{ab} ±6.38
	Birth -21 days	213.03^{c} ± 13.79	298.86^{a} ±12.46	265.71^{ab} ±14.83	282.14^{ab} ±15.73	245.87^{bc} ±14.06	256.82^{ab} ±10.18
	Birth -28 days	275.06^{c} ±14.81	366.93^{a} ±11.76	346.30^{ab} ±20.34	342.46^{ab} ±17.88	314.42^{bc} ±15.69	328.44^{ab} ±16.12

$^{a, b, and\ c}$: means within the same row with different superscripts are significantly different (P<0.05).

Milk yield traits:

Data in Table (6) showed that there were significant (P<0.05) differences in milk production for doe rabbits fed diets supplemented with medicinal plants during suckling period.

Does rabbits fed 1.5% Rosemary, 1.5% Marjoram and mixture 1.5% Rosemary +1.5% Marjoram had the highest (P≤0.05) values of total milk yield during the birth -7 days, birth -14 days, birth -21 days and birth -28 days compared with the control rabbit does. The best values for the period from birth to 28 were recorded with 1.5% Marjoram (5405.70 g) followed with 1.5% Rosemary (5370.33 g) the lowest (3646.08 g) one recorded in the control group. The present results are in agreement with Seleem *et al.* (2007) who found that adding 3% Marjoram (*Origanum majorana*) to the diet of rabbit does significantly increased milk yield/ doe compared with untreated does. In addition, Chiofalo *et al.* (2012) found that Rosemary (*Rosmarinus officinalis*) extract supplementation to dairy ewes affected (P<0.05) milk yield, and quantitative production of protein and casein, lactose and fat in their milk.

The improvements of Rosemary on milk yield may be attributed to "bio-functional compounds" which positively affected milk and alleviated the stress associated with lactation in animals (Chiofalo *et al.,* 2012). Medicinal plants possess a lactogenic activity with a favorable enhancement ability in increasing serum prolactin level which is the principal lactogenic hormone secreted by anterior pituitary (Okasha *et al.,* 2008; Gaya *et al.*, 2009).

Table (6): Effect of dietary levels of natural feed additives on milk yield and milk conversion of New Zealand White rabbits

Items	at	Treatments					
		Control	Rosemary		Marjoram		Mixture
			1.5 %	3 %	1.5 %	3 %	
Milk yield (gm.)	Birth -7 days	451.50^{b} ±19.81	761.00^{a} ± 42.01	489.50^{b} ± 50.66	870.80^{a} ± 48.78	584.50^{b} ±42.79	733.44^{a} ± 48.31
	Birth -14 days	1141.58^{c} ±65.85	1970.00^{a} ±100.71	1236.50^{bc} ± 106.27	2196.60^{a} ±92.31	1463.50^{b} ±117.79	1903.61^{a} ±84.91
	Birth -21 days	2511.83^{d} ±133.02	4347.00^{ab} ±170.82	2617.00^{dc} ±159.45	4370.50^{a} ±191.96	3143.50^{c} ±193.85	4154.89^{b} ±141.56
	Birth -28 days	3646.08^{c} ±133.02	5370.33^{a} ±208.05	4542.00^{ab} ±203.73	5405.70^{a} ±204.73	4103.50^{ab} ±207.95	5229.78^{a} ±219.76

$^{a, b, and c}$: means within the same row with different superscripts are significantly different (P<0.05).

CONCLUSION

Based on the foregoing results, it could be concluded that diets supplemented with 1.5% Rosemary or Marjoram leaves could be used efficiency in feeding New Zealand white does without adverse, under North Sinai conditions.

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تأثير التغذية علي الحصالبان والبردقوش علي الأداء التناسلي لأمهات الأرانب تحت ظروف سيناء

لبني علي بدوي ، السيد عثمان عبد النبي بكر ، محمد رضا موسي ، محمود احمد عبد الغفار

قسم الإنتاج الحيواني والداجني – كلية العلوم الزراعية البيئية بالعريش – جامعة العريش – مصر

أجريت هذه الدراسة لتقييم تأثير إضافة الأوراق الجافة لنباتي حصالبان والبردقوش علي الخصائص الإنتاجية والتناسلية في إناث الأرانب النيوزيلندي الأبيض تحت ظروف شمال سيناء. تم تجميع هذه النباتات من مزارع خاصة بمحافظة شمال سيناء ثم تم تجفيفها وطحنها وإضافتها لعلائق الأرانب. ٤٨ أم نيوزلندي ابيض عمر ٧ شهور (متوسط وزن ٣.٦٤ ± ٠.٠٣٥ كجم) قسمت عشوائيا إلى ست معاملات (٨ أرانب في المجموعة). المجموعة الأولى غذيت علي عليقة مقارنة دون إضافات أما المجموعة الثانية و الثالثة تغذت على نفس العليقة ولكن مضافاً إليها ١.٥% و٣% من أوراق نبات الحصالبان أما المجموعة الرابعة والخامسة تغذت علي العليقة الكنترول مضاف إليها ١.٥% و٣% من أوراق نبات البردقوش بينما غذيت المجموعة السادسة علي خليط من نباتي الحصالبان والبردقوش لدراسة تأثير هذه النباتات على بعض معدلات الأداء الإنتاجية و التناسلية لأرانب النيوزيلندي البيضاء. أظهرت النتائج إلي عدم وجود أي تأثير معنوي علي كل من الوزن عند التلقيح ووزن ما قبل الولادة و مدة الحمل. معدل الولادات ازدادت في المجموعات التي غذيت علي الحصالبان والبردقوش والخليط مقارنة بالكنترول. زاد كل من عدد المواليد ووزن المولود عند ٧، ١٤، ٢١ يوم وعند ٢٨ يوم في المجموعة المغذاة علي ١.٥% نبات البردقوش. وزن الخلفات في البطن عند الميلاد و ٧ و ١٤ و٢١ و ٢٨ يوم في الأرانب المغذاة علي عليقة مضاف إليها ١.٥% نبات الحصالبان. زادت كمية اللبن في المجموعات المغذاة علي علائق مضاف إليها ١.٥% نبات البردقوش و ١.٥% نبات الحصالبان والخليط بينهما.