Egyptian Poultry Science Journal

http://www.epsaegypt.com

ISSN: 1110-5623 (Print) – 2090-0570 (On line)

REPRODUCTIVE PERFORMANCE OF RABBIT DOES PRODUCING LOW NUMBER OF WEANED KIDS TREATED WITH SOME DRIED HERBAL SEEDS.

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Received: 15/05/2015 Accepted: 05/06/2015

ABSTRACT: Forty five, 20 month old rabbit does of the 2^{nd} breeding season, having equal numbers of Bouscat, NZW and V-line breeds was equally divided into three experimental groups, each of them included 5 does of each breed. The does in the first group had an average 4-5 weaned kids per doe / parity and were considered normal producer rabbits under Assiut environmental conditions, while those in the second and third groups had a low average, 2-3 kids per doe /parity and were considered as the low producer does. The low producer does in the second group were maintained without any treatment and considered as the control group, while each low producer doe in the third group (treatment) was daily supplemented with 1.0g of dried herbal seeds in pelleted form. All rabbit does were individually housed in wire galvanized battery cages and raised under normal managerial and hygienic conditions. The achieved results showed no significant differences among the different breeds in number of mating per conception (NMPC/times), conception rate (CR/%), litter size at birth and weaning (LSB, LSW/kids) and pre weaning mortality (PWM/%).Regarding the treatment with dried herbal seeds (Gr3), the averages of NMPC (times), CR (%), LSB, LSW (kids) and PWM (%) and TMY (g) improved significantly than those in the control (Gr2). In contrast, they decreased significantly in LSB, LSW (kids) and PWM (%) and TMY (g) than those of the normal producer does (Gr1). Concerning the effect breed, no significant differences were found in total protein (TP/g/dl), albumin (Alb/g/dl), globulin (Glob/g/dl), aspartate aminotransferase (AST/µ/l) and alanine aminotransferase (ALT/µ/l) and prolactin hormone concentration (ng/ml).

Key Words: Milk , Production, , Economical Efficiency And Herbal Seeds.

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With regard to the treatment with herbal seeds, the averages of TP (g/dl), Alb (g/dl), Glob (g/dl), daily feed intake (g) and prolactin hormone concentration (ng/ml) in the treated does (Gr3) increased significantly (P<0.05) than those of the control (Gr2).
In general, it could be concluded that the treatment with tested dried herbal seeds had significantly improved almost most of the reproductive traits, milk yield, blood parameters, daily feed intake and prolactin hormone concentration (ng/ml) of Bouscat, NZW and V-line rabbit does. However, some of the studied criteria are still significantly fewer than that of the normal producer does (Gr1). The net revenue per each treated low producer rabbit doe (2-3 kids/ parity) with 1.0 g pelleted dried herbal seeds increased pronouncedly (213.66LE) than that of the untreated doe (132.78 LE) by about 60.0%

INTRODUCTION

The growth of sucklings depends to a great extent on the nursing capacity and the does milk yield (Eiben et al., 2006). In general, rabbit doe gives to suckle once a day in the early morning (Henaff and Jouve, 1988). The daily milk yield per doe depends on the practice of the adoption technique and the number of kids at birth (Casado et al., 2006).

The extract of some herbal seeds has been used as antibiotic substitutes in non-ruminant feeds (Yan et al., 2012), that may inhibit the fungal (Soliman and Badeaa, 2002) and bacterial adverse activities (Sağdiç and Özcan, 2003) and increase the secretion of pancreatic and intestinal enzymes (Costa et al., 2011a). The antimicrobial properties of many herbal medicinal seeds were found to be preferable than those of the chemical preparations (Costa et al., 2007).

Several herbs and spices are assumed to have beneficial effects on the body weight and milk secretion of rabbit does (Eiben et al., 2006 and El-Manylawi, 2009), through improving morphological and histological modifications of the gastrointestinal tract (Utiyama et al., 2006) and the efficiency of digestion and absorption of nutrients (Oetting et al., 2006a).

The fenugreek seeds were found to include some active substances as trigonelline, choline, vitamin C, galactomannan, steroid saponins and flavonoids that stimulate appetite and milk production (Petit et al., 1995). The potential effects of fenugreek could be achieved through their efficient properties including; the hypoglycemic and hypocholesterolemic (Rao et al., 1996), the anti-inflammatory and antipyretic effects (Ahmadiani et al., 2001), the antioxidant potential (Choudhary et al., 2001, McCarthy et al., 2001 and Suja et al., 2002) as well as the stimulating activities of pancreatic digestive enzymes and the liver secretion of bile acids (Platel and al., 2002).

Eiben et al., (2006) found that the supplementing fenugreek seeds at a level of 12g/kg diet improved (P<0.05) the litter weight gain and reduced the pre-weaning mortality in NZW rabbits at 1-21 days from birth. Similarly, Rekik and Bergaoui (2013) found that adding 2% fenugreek seeds to the breeder ration increased remarkably the doe milk yield (g) on 21th day of lactation period.

Regarding the fennel seeds, the results of many researchers indicated that they are rich in some essential minerals (sodium, potassium and sulfur) and volatile oils (Rosti et al., 1994). Also, the results of Sayed et al., (2007) indicated that the addition of fennel seeds in some proprietary mixtures increased the milk yield of lactating women.

Concerning the dill seeds, Howard et al., (1985) stated that they include some volatile oils as limonene, which are known for their antispasmodic, in addition to their stimulating affects on milk flow in nursing mothers and relieving the digestion problems and abdominal colic.

The caraway seeds were found to contain large amounts of vitamins and essential elements, such as vitamin B complex, calcium, potassium, magnesium, silicon, zinc, iodine, copper, cobalt and iron, which are important in relieving the muscle cramps, including the smooth muscles of gastrointestinal tract and uterine (Thakur et al., 2009). Also, the results of (De Martino et al., 2009) revealed that the caraway oil exhibited high antioxidant activity due to the presence of monoterpene alcohols, linalool, carvacrol, anethole and estragol, flavonoids and other polyphenolic compounds.

The aim of the present study was to evaluate the impact of daily supplementing Bouscat, NZW and V-line rabbit does, having low litter size and small weaned kids (2-3/doe/ parity), with 1.0 g of some herbal seeds on their reproductive performance, milk yield and some blood parameters of throughout three successive parities.

MATERIALS AND METHODS

This study was performed at the Experimental Farm of Poultry Production Department, Faculty of Agriculture, Assiut University during the period from September, 2009 to April, 2010.

Experimental animals and management:

Forty five healthy does including equal numbers of Bouscat, NZW and V-line, 20 months old (2nd breeding season), with averages body weights representing the tested breeds ranging from 2800 to 3300g.

All does were classified into three equal groups; each included 5 Bouscat, 5 NZW and 5 V-line. The rabbit does in the 1st group had adequate number 4-5 weaned kids per parity/doe were considered as the normal producer rabbits (Gr1), while those in the second and third groups had an average of 2-3 weaned kids per doe/parity and were considered as the low producer does.

The does in the 2nd group were maintained without any treatment and considered as the control (Gr2), while each doe in the treated group (Gr3) was daily supplemented with 1.0g of dried herbal seeds in pelleted form allover the experiment (98 days).

All dose were individually placed in galvanized battery cages (50L×50W×40H), daily exposed to 16 continuous lighting hours and fed ad-libitum on a basal breeder ration, covering the needed requirements, according to A.O.A.C., (1995). The chemical composition of the breeder ration and the air dried herbal seeds are presented in Table 1.

The Digestible energy was determined by using the equation of Fekte and Gippert (1986) as follows: DE = 4253 – 32.6 (CF %) – 144.4 (Ash%).

All does in the first and second groups were fed on the same breeder ration without any supplementation, while those in 3rd group were daily treated on individual basis with 1.0g herbal dried seeds supplement, consisting of 50% fenugreek; 30% caraway and 10% of both fennel and dill.

The experiment lasted 98 days including 14 days before only the first mating in addition to the last 14 days of pregnancy as well as 14 days directly after kindling allover three successive parities. Fresh tap water was available all the time. All does were mated directly after weaning i.e. on the 28th day of the previous kindling.

Preparation of the pelleted dried herbal seeds:

Adequate percentages of the above mentioned herbal seeds as present in the Herbana gelatin capsule (50% fenugreek, 30 caraway, 10% fennel and 10% dill) were thoroughly mixed with 1.0% starch liquid as adhesive material, minced, air dried and cut into small pieces, each of 1.0g.

Studied traits:

1- Reproductive traits: They included the number of mating's per conception (NMPC/times): number of mating's per doe to conceive, conception rate (CR/%): the ratio of does conceived to the total mated females multiplied by 100, litter size at birth (LSB/kid): number of born kids, litter size at weaning (LSW/kid): number of alive kids at weaning and the pre weaning mortality (PWM/%): number of died kids from birth to weaning all born kids x100.

2- Daily milk yield/ doe (g):

It was estimated and recoded three times weekly during the four successive weeks of the lactation period by using the weight-suckle-weight technique after removing the born kids from their dams at 12 hours before suckling, according to McNitt and Lukefahr (1990). The total milk yield (TMY/g) was estimated as the sum of milk production during the 1^{st}, 2^{nd}, 3^{rd} and 4^{th} weeks of lactation period, respectively.

3- Body weight (g) and daily feed intake (g): Initial and final body weights were weighed and recorded, feed intake (g) for each rabbit doe was weighed and recorded weekly.

4- Some blood parameters:

Blood samples were collected at 8.0 am from the marginal ear vein per each doe in dry clean centrifuge tubes on the 14^{th} day of lactation period. Thereafter, blood serum was separated by centrifugation at 3000 rpm for 15 minutes and kept in a deep freezer at (-20°C) until analysis. Total protein (g/dl) and Albumin (g/dl) were determined by using colorimetric commercial kits according to Armstrong and Corri (1960) and Doumas et al., (1971), respectively. Globulin values were determined by subtracting the albumin values from the corresponding total protein values.

5- Liver enzymes: The activity of both of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) was assayed according to the method described by Reitman and Frankel (1957).

6- Hormonal assay: The concentration of the prolactin hormone was determined by Elias using coated-tube kits, Diagnostic products Corporation, Los Angeles, USA).

Statistical analysis: Data were analyzed by the least square analysis of variance using the General Linear Models procedure of the statistical analysis model (SAS, 1998) as follows:

$Yij = \mu + B_i + T_j + B_iT_j + e_{ij}$

Where: Y_{ij}= the individual observation

μ= Overall mean

B_i= Effect of breed (i = 1, 2 and 3)

Tj= Effect of treatment (j = 1, 2 and 3)

BT_{ij} = the fixed effect of interaction between breed and treatment;

Eij=Random error component assumed to be normally distributed. Significant differences between treatment means were determined by using Duncan's new multiple ranges test (Duncan, 1955).

RESULTS AND DISCUSSIONS

Reproductive traits of does affected by breed, treatment and their interaction:

A- Effect of breed:

As shown in Table (2), the differences in all studied criteria between the different breeds were insignificant. These results are in agreement with those of Ghosh et al., (2008), which revealed that the averages of kids born alive in soviet Chinchilla does insignificantly improved than their corresponding of NZW does. The achieved results are also in harmony with those of Iraqi et al., (2007). Similarly, Safaa et al., (2008), who found no significant differences were detected between breeds in number born alive, litter size at weaning, litter weight born alive and litter weight at weaning during lactation period.

B- Effect of treatment: The averages of NMPC/times, CR/%, LSB, LSW/ kids and PWM% improved significantly for rabbit does received dried herbal seed pellets (Gr3) than those of the control (Gr2). However, this improvement, the averages of LSB, LSW/ kids and PWM% in Gr3 are still significantly less than their corresponding values in normal producer does (Gr1). The increased conception rate as well as the decreased pre weaning mortality rate could be attributed to the increased secretion of estrogen hormone and the activated mammary glands, which stimulated the milk secretion and increased its production. These results are in agreement with those of El-Hammady and Abdel-Kareem (2014), who found that the averages of NMPC/times, CR/% and PWM% improved insignificantly in Bouscat rabbit does supplemented with both of herbana capsules and the same constituents of dried herbal seeds in pelleted form than those of the control group. Similarly the findings of Rashwan, (1998), revealed that the averages of CR, LSB, LS21 days and LS28 days in NZW does fed a diet contained 12g/kg fenugreek increased insignificantly than those of the control group. The author added that the PWM/% decreased significantly from birth up to 21 days after kindling.

Table (2): Reproductive performance in rabbit does affected by breed, treatment and their interaction (Mean±SE).

C- Effect of interaction:

The obtained results showed insignificant differences in all reproductive studied criteria (NMPC, CR, LSB, LSW/kids and PWM of rabbit does) because of the interaction between breed and treatment. They are also in harmony with those of Tůma et al., (2010), who found insignificant interactions, except between the season and parity order on the service number of pregnancy and litter size, were significant. Also, Toson (2000) found that the effect of interaction between mating system and mating period was significant on number of services per conception and pre weaning mortality.

Daily milk yield (g) of does affected by breed, treatment and their interaction:

A- Effect of breed:

The averages of total milk yield (g) for NZW and V-line rabbit does exceeded significantly (P<0.001) those of Bouscat. This significant superiority in milk yield between the tested breeds during the lactation period reflected the increased milk consumption of the growing kids in addition to the increasing requirements of developing embryos of the new advancing pregnancy. These results are in agreement with those of Khalil, (1999), who found that averages of TMY (g) from birth up to weaning amounted 3482; 3383.0; 3111.0 and 3512.0g for NZW, Gabali (G), NZW×G and G×NZW, respectively.

B- Effect of treatment: The highest values of total milk yield (g) were recorded for low producer does, treated daily with 1.0 g dried herbal seeds on individual basis (Gr3), since they increased significantly (P<0.001) than those of the untreated does (Gr2). The obtained increased milk yield of the treated does could be attributed to the pronounced efficiency of the lactogenic promoting factors found in the fat of fenugreek seeds, which stimulates the mammary glands to secrete and produce more milk yield. These results are in agreement with those of Rekik and Bergaoui (2013), which revealed significant increase in the milk production of does treated with 2% fenugreek during two weeks before weaning than that of the control does.

C- Effect of interaction:

There was a significant interacting effect on the total milk yield (0-28days), which reflects the increased milk consumption of the growing kids. These results are in agreement with those of El-Hammady and

Abdel-Kareem (2014), who found a significant interacting effect (breed× treatment) on the total milk yield from birth up to weaning during the breeding season.

Blood parameters in rabbit does affected by breed, treatment and their interaction:

A-Effect of breed:

Data presented in Table 5 showed no significant effects on all studied traits due to the breed effect during three successive parities.

B- Effect of treatment: The averages of total protein (g/dl), albumin (g/dl) and globulin (g/dl) in does treated with dried herbal seeds (Gr3) increased significantly ($P<0.05$) than those of the untreated does in the control (Gr2). The increased total protein may be attributed to the nature of the genetically makeup, which is of important diagnostic significance through the protein's contribution and involvement in the enzymes, hormones and antibodies as well as in keeping the osmotic pressure balance, maintaining the acid-base balance, and as a nutritional reserve source for the body's tissues and muscles. These results are in agreement with the findings of Ibrahim et al., (2000), who found that the averages of total protein (mg/dl) in NZW rabbit does treated with 200g fenugreek green forage increased significantly than that of the control group.

C- Effect of interaction: It had no significant effects on all blood studied traits.

Liver enzymes (AST and ALT/ µ/l) in female rabbits affected by breed, treatment and their interaction:

Data presented in Table 5 showed no significant effects on all studied traits due to breed, treatment and their interaction.

Prolactin hormone concentration (ng/ml) in rabbit does affected by breed, treatment and their interaction:

A- Effect of breed:

From data presented in Table 5, it could be noticed that the averages of PRL (ng/ml) hormone in and NZW and V-line does increased relatively but insignificantly than that of Bouscat does. These results are in agreement with those of El-Hammady and Abdel-Kareem (2014), who found that the average PRL (ng/ml) hormone in Moshtohor doe increased insignificantly than that of Gabali does.

B- Effect of treatment: The averages of PRL (ng/ml) in low the treated does (Gr3) and normal producer does (Gr1) increased significantly ($P<0.001$) than that of the low producer does (Gr2). The increased concentrations of PRL (ng/ml) could be attributed to the suckling effect and to the increased number of weaned bunnies, which amounted 4.87 and 4.15 kids in the low treated does (Gr3) and normal producer does (Gr1) versus 2.80 kids in the low producer untreated does (Gr2). The achieved pattern of prolactin behavior is in harmony with that found by Ahmed, Nagwa et al., (2004).

C- Effect of interaction:

There were no significant interacting effects (Breed×treatment) on prolactin hormone (ng/ml).

Daily feed intake of rabbit does affected by breed, treatment and their interaction.

A- Effect of breed:

As shown in Table 4, the averages of daily feed intake (g/doe) for NZW and V-line breeds during the periods of preparation, pregnancy and lactation as well as the total feed intake (g) increased significantly than their corresponding values for Bouscat does. The increased daily feed intake (g) of NZW and V-line rabbit does may be attributed to the higher litter size coincided with its increasing nutritional requirements. These results are in agreement with those of El-Hammady and Abdel-Kareem (2014), who found that the average of daily feed intake for Moshtohor rabbit does increased significantly than that of the Gabali.

B- Effect of treatment: The averages of feed intake (g/doe) for low producer treated dose (Gr3) during the periods of preparation, pregnancy and lactation as well as the total feed intake (g) increased significantly($P<0.05$) than those of the low untreated does (Gr2).

The increased feed intake (g) of the treated rabbit does may be attributed to the initiative effects of herbal seeds, since these additives can stimulate the appetite and excite the olfactory nerves and taste buds of the does, which lead to increased feed consumption. These results are in agreement with those of Ibrahim (2005), who found that the feed utilization of rabbits administered with 0.5% dill significantly improved than that of the untreated group.

C- Effect of interaction: There was a significant interacting effect (Breed×treatment) on the feed intake during the preparation period and total feed intake (g). This difference in feed intake (g) could be attributed to the suckling effect and the increased number of weaned bunnies of the treated as compared with the untreated does. These results are in agreement with the findings of Toson (2000), who found that the effect of interaction between mating system and mating period was significant on feed intake of rabbit does.

To determine the economical effect of supplementing rabbit does of the second breeding season, which had low litter size at weaning ranged from 2-3kids/ doe during the 1st breeding season, with pelleted dried herbal seeds (1.0 g/doe/day) in three successive parities of the present experiment, a comparison based on the total costs of food consumption and the PDHS supplements and the outcome (revenue) from saling the weaned kids may indicate the net revenue per doe.

From data presented in table (7), it could be easily observed that the net revenue for each treated low producer rabbit doe (2-3 kids/ parity/doe) with 1.0 g pelleted dried herbal seeds for 98 days during three successive parities (211 days) increased pronouncedly (213.66 LE) than that of the untreated doe (132.78 LE) by about 60.0%

CONCLUSION

The achieved results could be concluded as follow:

1- Supplementing the low producer rabbit does, 20 months old in the 2nd breeding season, which had a low number of 2-3 weaned kids in their first season, with 1.0 g dried herbal seeds improved significantly most of the reproductive traits than those of the untreated does.

2- The significant decrease of the pre weaning mortality (%) due to the daily treatment of each low producer doe with 1.0g of dried herbal seeds in pelleted form could be easily attributed to their significantly increased milk yield, which covered to great extent the nutritional requirements of the increased born kids.

3- The net revenue per each treated low producer rabbit doe (2-3 kids/doe/parity) with 1.0 g pelleted dried herbal seeds for 98 days during three successive parities (211 days) increased pronouncedly (213.66 LE) than that of the untreated doe (132.78LE) by about 60.0%

Table (1): Chemical composition of the basal ration and air dried herbal seeds.

Constituents→ Items↓	Crude protein %	Ether extract %	Crude fiber %	Ash %	Nitrogen free extract %	Kcal/kg DE
Basal ration	18.00	2.22	12.44	7.8	55.0	2721.2
Dried herbal seed	18.20	5.00	13.00	7.5	50.5	2746.2

Table (2): Reproductive performance in rabbit does affected by breed, treatment and their interaction

Traits → Breed/ Treatment ↓		NMPC (time)	Conception rate (%)	Litter size at birth (kid)	Litter size at weaning (kid)	Pre weaning mortality (%)
Effect of breed						
Bouscat		$2.04^{a}\pm0.10$	$73.88^{a}\pm2.62$	$4.911^{a}\pm0.21$	$3.911^{a}\pm0.21$	$20.362^{a}\pm1.84$
NZW		$2.00^{a}\pm0.12$	$73.33^{a}\pm3.21$	$5.177^{a}\pm0.23$	$3.955^{a}\pm0.21$	$23.604^{a}\pm1.16$
V-line		$2.02^{a}\pm0.11$	$74.44^{a}\pm2.80$	$5.022^{a}\pm0.14$	$3.955^{a}\pm0.15$	$21.246^{a}\pm1.56$
p-value		0.9579	0.9582	0.4764	0.9704	0.1448
Effect of treatment						
Normal producer	(Gr1)	$1.87^{b}\pm0.13$	$78.33^{a}\pm3.33$	$6.088^{a}\pm0.19$	$4.866^{a}\pm0.18$	$20.072^{b}\pm0.93$
Low producer	Control (Gr2)	$2.40^{a}\pm0.09$	$63.33^{b}\pm2.33$	$4.066^{c}\pm0.12$	$2.800^{c}\pm0.11$	$31.136^{a}\pm1.30$
	Treatment (Gr3)	$1.80^{b}\pm0.08$	$80.00^{a}\pm2.19$	$4.955^{b}\pm0.12$	$4.155^{b}\pm0.12$	$16.145^{c}\pm1.34^{c}$
p-value		0.0002	0.0001	0.0001	0.0001	0.0001
Effect of interaction						
	Normal (Gr1)	2.00±0.23	75.00±5.97	6.200±0.39	5.000±0.37	19.354±1.63
Bouscat	Control (Gr2)	2.40±0.13	5.00±3.27	3.800±0.20	2.600±0.21	31.578±2.72
	Treatment (Gr3)	1.73±0.11	81.66±2.95	4.733±0.11	4.133±0.19	12.676±2.87
	Normal (Gr1)	1.80±0.26	80.00±6.54	6.133±0.34	4.866±0.40	20.658±1.52
NZW	Control (Gr2)	2.40±0.13	60.00±3.27	4.200±0.31	2.800±0.20	33.333±1.27
	Treatment (Gr3)	1.80±0.20	80.00±5.00	5.200±0.26	4.200±0.26	19.230±1.27
	Normal (Gr1)	1.80±0.20	80.00±5.00	5.933±0.15	4.733±0.18	20.225±1.79
V-line	Control (Gr2)	2.40±0.21	65.00±5.34	4.200±0.10	3.000±0.16	28.571±2.85
	Treatment (Gr3)	1.86±0.13	78.33±3.33	4.933±0.24	4.133±0.21	16.217±2.31
p-value		0.2905	0.7940	0.7344	0.7883	0.4235

A-c Means with different superscripts in the same column are significantly different ($P\leq0.05$).

* $P \leq0.05$; ** $P \leq 0.01$; *** $P\leq0.001$; NS = $P \geq 0.05$; Sig = significance.

Table (3): Milk yield (g) of rabbit does affected by breed, treatment and their interaction ((Mean±SE).

Traits→ Breed/ Treatment↓		**1st week (g)**	**2nd week (g)**	**3rd week (g)**	**4th week (g)**	**0-21day (g)**	**Total (0-28day)**
Effect of breed							
Bouscat		71.1^{a}±1.9	80.0^{b}±2.4	104.1^{b}±3.9	69.9^{b}±3.1	85.1^{b}±2.6	2275.8^{b}±74.5
NZW		73.7^{a}±2.1	83.1^{ab}±2.2	109.3^{a}±3.7	77.0^{a}±1.7	88.7^{a}±2.4	2401.5^{a}±58.6
V-line		72.4^{a}±1.4	85.8^{a}±2.1	110.5^{a}±3.5	74.9^{a}±2.1	89.6^{a}±2.1	2406.0^{a}±56.0
p-value		0.2834	0.0145	0.0341	0.0057	0.0166	0.0031
Effect of treatment							
Normal producer (Gr1)		78.9^{a}±0.8	93.8^{a}±1.1	135.1^{a}±2.2	83.7^{a}±1.5	102.6^{a}±1.1	2739.8^{a}±30.4
Low producer	Control (Gr2)	59.0^{a}±1.3	66.5^{c}±1.5	82.5^{c}±1.6	57.0^{b}±1.9	69.3^{c}±1.3	1855.0^{c}±30.2
	Treatment(Gr3)	79.3^{a}±1.2	88.7^{b}±1.5	106.4^{b}±1.7	81.1^{a}±1.5	91.5^{b}±1.3	2488.4^{b}±32.9
p-value		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Effect of interaction							
Bouscat	Normal (Gr1)	79.6±0.9	93.4±2.1	134.0±4.7	84.0±2.6	102.3±2.0	2737.0±58.9
	Control (Gr2)	55.0±1.8	60.4±1.1	76.6±1.4	43.0±0.4	64.0±0.5	1645.0±10.1
	Treatment (Gr3)	78.7±1.8	86.3±2.7	101.7±2.1	82.7±2.8	88.9±1.9	2445.3±54.8
NZW	Normal (Gr1)	79.0±1.7	92.0±1.6	135.2±3.3	83.0±2.6	102.1±1.8	2724.4±54.4
	Control (Gr2)	60.0±3.0	69.0±3.1	84.0±4.0	68.0±2.3	71.0±2.9	1967.0±46.4
	Treatment (Gr3)	82.0±2.8	88.3±3.3	108.7±2.8	80.0±2.8	93.0±2.7	2513.0±73.5
V-line	Normal (Gr1)	78.0±1.3	96.0±2.1	136.0±3.8	84.0±2.6	103.3±1.7	2758.0±46.9
	Control (Gr2)	62.0±1.3	70.0±2.8	87.0±1.4	60.0±2.2	73.0±1.7	1953.0±39.8
	Treatment (Gr3)	77.3±1.6	91.5±1.9	108.7±3.6	80.7±2.2	92.5±1.6	2506.9±39.8
p-value		0.1155	0.3222	0.7184	0.0001	0.2697	0.0071

A-c Means with different superscripts in the same column are significantly different (P≤0.05).

* P ≤0.05; ** P ≤ 0.01; *** P≤0.001; NS = P ≥ 0.05; Sig = significance.

Table (4): Blood parameters of rabbit does affected by breed, treatment and their interaction (Mean±SE).

Breed Traits→	**/Treatment↓**	**Total protein (g/dl)**	**Albumin (g/dl)**	**Globulin (g/dl)**	**Alb/Glob (ratio)**
Effect of breed					
Bouscat		$6.88^{a}\pm0.08$	$4.12^{a}\pm0.04$	$2.76^{a}\pm0.08$	$1.50^{a}\pm0.07$
NZW		$7.00^{a}\pm0.07$	$4.03^{a}\pm0.06$	$2.97^{a}\pm0.09$	$1.45^{a}\pm0.07$
V-line		$7.09^{a}\pm0.07$	$4.16^{a}\pm0.07$	$2.93^{a}\pm0.10$	$1.54^{a}\pm0.08$
p-value		0.1409	0.3270	0.2729	0.4684
Effect of treatment					
Normal producer	(Gr1)	$6.97^{a}\pm0.05$	$4.08^{ab}\pm0.05$	$2.88^{ab}\pm0.07$	$1.47^{a}\pm0.05$
Low producer	Control (Gr2)	$6.76^{c}\pm0.08$	$4.02^{b}\pm0.06$	$2.73^{b}\pm0.12$	$1.66^{a}\pm0.10$
	Treatment (Gr3)	$7.25^{b}\pm0.07$	$4.21^{a}\pm0.05$	$3.03^{a}\pm0.08$	$1.46^{a}\pm0.06$
p-value		0.0001	0.0534	0.0390	0.1290
Effect of interaction					
	Normal (Gr1)	6.84±0.10	4.03±0.04	2.81±0.07	1.44±0.03
Bouscat	Control (Gr2)	6.64±0.14	4.07±0.05	2.55±0.17	1.77±0.18
	Treatment (Gr3)	7.18±0.17	4.27±0.09	2.91±0.16	1.55±0.12
	Normal (Gr1)	6.98±0.09	4.11±0.15	2.87±0.18	1.56±0.14
NZW	Control (Gr2)	6.74±0.13	3.92±0.10	2.82±0.19	1.52±0.13
	Treatment (Gr3)	7.29±0.09	4.08±0.06	3.21±0.09	1.28±0.04
	Normal (Gr1)	7.10±0.06	4.13±0.04	2.97±0.08	1.41±0.05
V-line	Control (Gr2)	6.90±0.15	4.06±0.16	2.84±0.26	1.69±0.20
	Treatment (Gr3)	7.28±0.13	4.30±0.12	2.98±0.16	1.54±0.14
p-value		0.9463	0.6837	0.8366	0.4688

A-c Means with different superscripts in the same column are significantly different ($P\leq0.05$).

* $P \leq 0.05$; ** $P \leq 0.01$; *** $P\leq0.001$; NS = $P \geq 0.05$; Sig = significance.

Table (5): Liver enzymes (µ/l) and PRL (ng) hormone concentration of rabbit does affected by breed, treatment and their interaction.

Traits→ Breed/treatment↓		Liver enzymes AST (µ/l)	Liver enzymes ALT (µ/l)	Prolactin hormone (ng/ml)
Effect of Breed				
Bouscat		$24.37^{a}\pm0.27$	$18.66^{a}\pm0.29$	$2.82^{a}\pm0.09$
NZW		$24.82^{a}\pm0.22$	$18.26^{a}\pm0.40$	$2.87^{a}\pm0.11$
V-line		$24.51^{a}\pm0.27$	$19.16^{a}\pm0.32$	$2.99^{a}\pm0.08$
p-value		0.4521	0.1833	0.3672
Effect of treatment				
Normal producer (Gr1)		$24.86^{a}\pm0.15$	$18.81^{a}\pm0.31$	$2.78^{a}\pm0.09$
Low producer	Control (Gr2)	$24.13^{a}\pm0.28$	$18.15^{a}\pm0.32$	$2.57^{b}\pm0.08$
	Treatment (Gr3)	$24.71^{a}\pm0.29$	$19.12^{a}\pm0.38$	$3.35^{a}\pm0.08$
p-value		0.1051	0.1220	0.001
Effect of interaction				
Bouscat	Normal (Gr1)	25.00±0.16	18.80±0.54	2.83±0.12
	Control (Gr2)	23.60±0.62	18.00±0.33	2.63±0.16
	Treatment (Gr3)	24.53±0.45	19.20±0.57	3.02±0.19
NZW	Normal (Gr1)	24.60±0.27	18.40±0.52	2.67±0.23
	Control (Gr2)	24.60±0.40	17.60±0.70	2.43±0.14
	Treatment (Gr3)	25.26±0.45	18.80±0.86	3.51±0.12
V-line	Normal (Gr1)	25.00±0.33	19.25±0.60	2.83±0.12
	Control (Gr2)	24.20±0.42	18.85±0.55	2.64±0.13
	Treatment (Gr3)	24.33±0.62	19.38±0.54	3.51±0.06
p-value		0.4083	0.9809	0.1498

A-c Means with different superscripts in the same column are significantly different ($P\leq0.05$).

[*] $P \leq0.05$; ** $P \leq 0.01$; *** $P\leq0.001$; NS = $P \geq 0.05$; Sig = significance.

Table (6): Daily feed intake (g) of rabbit does affected by breed, treatment and their interaction.

Traits→ Breed/Treatment↓		Prepared (g)	Pregnancy (g)	Lactation (g)	Daily feed intake (g)	Total feed intake /doe (g)
Effect of breed						
Bouscat		139.28^{b}±2.5	195.36^{b}±3.3	241.59^{b}±4.3	192.07^{b}±2.9	40528.74^{b}±321.1
NZW		143.03^{ab}±1.7	206.61^{a}±3.1	259.39^{a}±4.3	203.01^{a}±2.6	42835.90^{a}±268.9
V-line		145.47^{a}±1.6	210.74^{a}±3.3	260.50^{a}±4.9	205.57^{a}±2.9	43376.24^{a}±325.6
p-value		0.0163	0.0001	0.0001	0.0001	0.0001
Effect of treatment						
Normal producer (Gr1)		149.57^{a}±1.1	219.72^{a}±2.2	277.62^{a}±1.9	215.64^{a}±1.3	45500.30^{a}±282.5
Low producer	Control (Gr2)	130.19^{b}±1.3	182.37^{c}±2.3	217.16^{c}±2.9	176.57^{c}±1.6	37257.24^{c}±347.4
	Treatment (Gr3)	148.03^{a}±2.0	210.62^{b}±2.7	266.69^{b}±2.8	208.45^{b}±1.7	43983.34^{b}±359.6
p-value		0.0001	0.0001	0.0001	0.0001	0.0001
Effect of interaction						
Bouscat	Normal (Gr1)	151.35±1.6	213.45±4.3	266.57±1.2	210.46±1.7	44407.46±364.1
	Control (Gr2)	124.00±1.5	173.02±1.9	206.60±4.9	167.87±1.9	35421.87±412.7
	Treatment (Gr3)	142.50±5.1	199.60±4.5	251.60±3.9	197.90±2.5	41756.90±337.4
NZW	Normal (Gr1)	150.92±2.7	220.11±4.0	282.80±3.9	217.94±3.1	45986.94±365.8
	Control (Gr2)	132.57±2.4	187.05±3.0	226.88±5.3	182.17±2.7	38438.17±374.5
	Treatment (Gr3)	145.59±2.0	212.68±5.1	268.24±3.1	208.92±1.3	44082.58±277.7
V-line	Normal (Gr1)	146.42±1.1	225.60±2.5	283.51±2.1	218.51±1.0	46106.51±220.1
	Control (Gr2)	134.00±2.1	187.02±5.4	218.00±3.7	179.67±2.4	37911.67±316.9
	Treatment (Gr3)	156.00±1.1	219.60±3.1	280.00±4.6	218.53±1.9	46110.53±419.1
p-value		0.0010	0.7400	0.0962	0.0151	0.0151

A-c Means with different superscripts in the same column are significantly different ($P \leq 0.05$).

[*] $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$; NS = $P \geq 0.05$; Sig = significance.

Table (7): Reproductive performance of untreated (Gr2) and treated (Gr3) rabbit does having low weaned kids with 1.0g dried herbal seeds on economical basis.

	Treated vs No treated → Traits ↓	Normal	Low producer doe	
			Untreated (UDHS)	Treated (DHS)
	Initial body weight (g)	3225.0	2965.0	2975.0
	Final body weight (g)	3366.7	3075.0	3233.3
	litter size at birth/ doe/party	6.09	4.07	4.95
	Total litter size at birth/ doe in 3 successive parities	18.27	12.21	14.85
	Weaned kids/doe/party	4.87	2.80	4.15
	Total weaned kids/doe in 3 successive parities	14.61	8.4	12.45
	Relative difference (%)	172.59	100	148.39
	Total milk yield/doe/parity (kg)	2.74	1.85	2.49
	Total milk yield/doe in 3 successive parities (kg)	8.22	5.56	7.46
	Relative difference (%)	147.84	100	134.17
Economical comparison (LE) between untreated and treated does with PDHS based on the costs of consumed ration and PDHS and the income from saling the weaned kids for breeding.				
Costs/LE	Total feed consumption /doe in 3 successive parities (kg).	45.50 kg × 3.2LE* = 145.6 LE	37.26kg × 3.2LE* = 119.22 LE	43.98 kg × 3.2LE* = 140.74 LE
Costs/LE	Consumed pelleted herbal seeds /doe in 3 successive parities.	-	-	98 days × 0.20 LE** 19.6 LE
Costs/LE	Total costs of consumed feed and supplemented PDHS/ doe in 3 successive parities.	145.6 LE	119.22	160.34
	Relative difference (%)	122.12	100	134.49
Revenue /doe in 3 successive parities/LE	Weaned kids/doe in 3 successive parities.	14.50	8.4	12.47
Revenue /doe in 3 successive parities/LE	Bunny price at weaning / LE (For breeding).	30.0A	30.0A	30.0A
Revenue /doe in 3 successive parities/LE	Revenue of total saled weaned kids/ doe in 3 successive parities/LE	14.50 × 30.0ALE = 435.0 LE	8.4 × 30.0ALE = 252.0 LE	12.47 × 30.0ALE = 374.0 LE
	Relative difference (%)	172.6	100	148.4
	Net revenue / doe in 3 successive parities/LE	289.4	132.78	213.66
	Relative difference (%)	217.9	100	160.9
	Difference %	+117.9	0	+ 60.9

DHS= Dried herbal seeds, UDHS= untreated dried herbal seeds, * Price of one kg feed = 3.2 LE, ** Cost of one pelleted dried herbal seeds (1.0g) = 0.20LE. A = Price of weaned bunny for breeding / LE. PDHS = Pelleted dried herbal seeds.

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االملخص العربى

الأداء التناسلي لإناث الأرانب المنتجة لعدد قليل من الخلفة عند الفطام والمعاملة ببعض بذور النباتات الطبية.

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لأداء التناسلي لإناث الأرانب المنتجة لعدد قليل من الخلفة عند الفطام والمعاملة ببعض بذور النباتات الطبية.
استخدم في هذه الدراسة ٤٥ من إناث الأرانب عمر ٢٠ أسبوع في موسمها الإنتاجي الثاني ، متضمنة أعداد متساوية من البوسكات ، النيوزيلاندى والـ V-line ، والتي تم تقسيمها إلي ثلاث مجموعات متساوية. ولقد اشتملت المجموعة الأولي علي الإناث المنتجة للعدد الطبيعي من الخلفة عند الفطام والذي يتراوح من ٤-٥ خلفة وعليه فقد اعتبرت المجموعة الطبيعية (Normal) تحت الظروف البيئية بأسيوط، بينما اشتملت كلتا المجموعتين الثانية والثالثة على الإناث ضعيفة الإنتاجية والتي تراوح متوسط عدد خلفتها عند الفطام من ٢-٣ خلفه / أنثي/ بطن (خلال الموسم الإنتاجي الأول)، وعليه فقد اعتبرت كلتا المجموعتين منخفضة الإنتاج. و لقد تم الإبقاء علي المجموعة الثانية بدون معاملة والتي اعتبرت مجموعة الكنترول (المقارنة)، بينما عوملت كل أنثي بالمجموعة الثالثة بـ ١ جم من بذور النباتات الطبية المجففة (٥٠٪ حلبة ، ٣٠٪ كراوية، ١٠٪ شبت و ١٠٪ شمر) والمصنعة في صورة محببات.
ولقد تم إسكان جميع الأرانب علي أساس فردي في أقفاص بطاريات مجلفنة و رعايتها تحت ظروف بيئية وصحية متماثلة. ولقد أوضحت النتائج المتحصل عليها عدم وجود فروق معنوية في عدد مرات التلقيح اللازمة للإخصاب(مرة)، معدل الإمساك (٪)، عدد الخلفة عند الميلاد والفطام (خلفة) و معدل نفوق الخلفة قبل الفطام (٪) بين الأنواع المختلفة.
وبخصوص المعاملة ببذور النباتات الطبية المجففة (محببات) كما في المجموعة الثالثة (Gr3) فقد تحسنت معنويا متوسطات كلا من عدد مرات التلقيح اللازمة للإخصاب (مرة)، معدل الإمساك (٪) وعدد الخلفة عند الميلاد والفطام (خلفة) و معدل نفوق الخلفة قبل الفطام (٪) وكمية اللبن الكلية الناتجة (جم) عن مثيلاتها في مجموعة الكنترول (Gr2) ، بينما انخفضت فقط معنويا متوسطات كلا من صفات عدد الخلفة عند الميلاد والفطام (خلفة) ، معدل نفوق الخلفة قبل الفطام (%) وكمية اللبن الكلية الناتجة (جم) عن مثيلاتها بمجموعة الإنتاج العادية (Gr1). وبخصوص تأثير النوع علي مقاييس الدم لم توجد أي فروق معنوية بين الأنواع المختلفة لصفات البروتين الكلي (جم/ديسيلتر)، الألبيومين (جم/ديسيلتر) و الجلوبيولين (جم/ديسيلتر) وكذلك إنزيمات الكبد و هرمون البرولاكتين (نانو جرام/مل).
وفيما يتعلق بالمعاملة ببذور النباتات الطبية المجففة ، فقد ازدادت معنوياً متوسطات البروتين الكلي (جم/ديسيلتر)، الألبيومين (جم/ديسيلتر) و الجلوبيولين (جم/ديسيلتر) و كمية الغذاء اليومي المستهلك (جم) في الإناث المعاملة (Gr3) عن مثيلاتها فى الكنترول (Gr2).
وبصفة عامة يمكن أن نخلص إلي أن المعاملة ببذور بعض النباتات الطبية المجففة (محببات) قد أدت إلي تحسن معنوي في معظم الصفات التناسلية التي تم دراستها ، إنتاج اللبن ، مقاييس الدم ، معدل استهلاك الغذاء اليومي ، هرمون البرولاكتين في أرانب البوسكات النيوزيلاندى والـ V-line تحت الظروف البيئية السائدة بأسيوط.
ومع ذلك فان بعض الصفات التي تم تناولها بالدراسة فلا تزال تقل معنويا عن مثيلاتها في الإناث ذات الإنتاج الطبيعي (Gr1).
وجدير بالذكر أن متوسط صافى العائد الإقتصادى لأنثى الأرانب ضعيفة الإنتاجية (٢-٣ خلفه / بطن) والتي عوملت يوميا بواحد جم من مخلوط بذور النباتات الطبية المجففة (PDHS) قد ازداد بوضوح بقيمة (٢١٣،٦٦ جنيه) عن مثيله (١٣٢،٧٨جنيه) للإناث غير المعاملة اى بحوالي ٦٠%.

مفاتيح البحث:
الأداء التناسلي ، إنتاج اللبن ، المقاييس الفسيولوجية ، إناث الأرانب و النباتات الطبية.