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EFFECT OF SUPPLEMENTING DOUM (HYPHAENE THEBAICA) TO DIETS ON REPRODUCTIVE AND PRODUCTIVE TRAITS IN RABBITS

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ABSTRACT: The present work aimed to investigate the effect of supplementing different levels of doum in diets on fertilizing ability of bucks and fertility traits of Hy-Plus rabbit does. The study lasted five months. A total number of 272 Hy-Plus rabbits (64 males aged 3 months and 208 females aged 2.5 months) were used in the present work. Animals were divided into four comparable experimental groups (16 males and 52 females each). The first group was fed a commercial diet and kept untreated (control group), while the 2nd ,3rd and 4th groups (treated groups) were fed the same diet but supplemented with 250, 500 and 750 g doum / ton diet, respectively.

Results indicated that, age at first mating of Hy-Plus rabbit males significantly ($p \leq 0.05$) decreased, while weight at first mating and live body weight significantly ($p \leq 0.05$) increased due to fed diets supplemented with different levels of doum. Absolute and relative weights of testes; epididymis; sexual accessory glands and pituitary gland, as well as, scrotal circumference; testicular index and mating activity of Hy-Plus rabbit bucks increased significantly ($p \leq 0.05$ or 0.01) in descending order with diets supplemented with 750 and 500 g doum, respectively. Male and female sexual hormones significantly ($p \leq 0.01$) increased due to doum supplementation.

Conception and abortion rates, litter size and weight at birth and at weaning, as well as, bunny weight at birth and at weaning were significantly ($p \leq 0.05$ or 0.01) improved descending by supplementing 750 and 500 g doum, respectively.

Milk yield and composition and total preweaning mortality rates improved significantly ($p \leq 0.05$ or 0.01) by feeding rabbits on diets supplemented with doum.

Conclusively, it could be concluded that, supplementing doum to Hy-Plus rabbit diets caused significant improvement in fertilizing ability of bucks and fertility traits of does. It can be recommended that 500 g doum/ ton diet gave a good result for rabbits and equal to the high dose.

Keywords: rabbit- doum- Hyphaene thebaica- reproductive- fertility- milk.

INTRODUCTION

Reproductive aspects of rabbits play an important role in the success and profitability of rabbits breeding. The plane of nutrition given to an animal can affect libido and quality of semen produced (Togun and Egbunike, 2006). It also affects age of attaining puberty and stimulation of the hypothalamus indirectly to produce interstitial cell stimulating hormone that acts in the testicular tissue (Cogan et al., 2004).

Herbal preparations has been applied to boost wide range of primary health care delivery due to biochemical contents of plants in Africa and other parts of the world (Elujoba et al., 2005). Hyphaenethebaica belongs to the family Arecaceae commonly known as doum palm, Dum Nut or gingerbread tree. Roots, fruits and seeds of doum palm are used for the management of jaundice, intestinal colic, hematuria, inguinal hernia bilharzias, hypertension and sore eyes respectively in livestock. And also have been found to possess antioxidant property (Hsu et al., 2006) Phytochemicals are essential elements with protective effect that are required by humans and animals to sustain life. Recent researchers found that Phytochemicals can protect humans against diseases such as hypertension, cancer, diabetes and various forms of microbial infections (Di Carlo et al., 1993).

The level of leucocytes in blood is an important pointer to physiological and pathological status of an individual (Schalm et al., 1975). The concentration of these cells in blood can be increased or decreased by the ingestion of some medicinal plants (Ajagbonn et al., 1999). The unripe kernels of doum are edible; the shoots of germinated seeds are also eaten as a vegetable. Herb tea of doum is popular in Egypt and believed good for hypertension. Research on the fruit pulp has shown that it contains nutritional trace minerals, proteins and fatty acids, particular the nutritionally essential linoleic acid (Cook et al., 2000).

A large number of plants have been screened as a viable source of natural antioxidants including tocopherols, vitamin C, carotenoids and phenolic compounds which are responsible for maintenance of health, and help the body to reduce oxidative damage and protection from coronary heart diseases and cancer (Yang et al., 2002; Kilani et al., 2008). Therefore there is a growing interest in the substances exhibiting antioxidant properties that are supplied to human and animal organisms as food components or a specific pharmaceutica. Hussein et al. (2011) evaluated the chemical composition and physicochemical properties of doum tea infusions. Furthermore, the antioxidant activities of these extracts were investigated by scavenging of 1,1 diphenyl-2-picrylehydrozyl (DPPH) radicals. The proliferation inhibition activities on some types of bacteria and yeast were also measured for evaluating the antimicrobial activity of doum tea infusions and their blends. The highest percentage of fiber was found in doum sample. The levels of most elements were high, the highest value of the content of total soluble solids (TSS).

The main objective of the present study was to evaluate some parameters related to reproductive and productive capabilities of Hy-Plus rabbits as influenced by supplementation of doum to the diet.

MATERIALS AND METHODS

The present study was conducted in an Industrial Rabbitry. The laboratory work was carried out in Animal Production Research Institute, Agriculture Research Center, Dokki, Giza, Egypt.

The ingredients and chemical composition of the pelleted diet to rabbits during experimental period are shown in Table 1.

Composition and chemical analysis of doum used in the experiment are shown in Table 2.

The experimental work

Two hundred and seventy two Hy-Plus rabbits (64 males aged 3 months, and 208

females aged 2.5 months) were used. Animals in each experiment were divided into four equal comparable experimental groups (16 males and 52 females each). The first group was kept untreated (control group) and fed a commercial diet covering the nutritional requirements of different physiological status of rabbits according to NRC (1977) recommendations, while the 2nd ,3rd and 4th groups (treated groups) were fed the same diet but supplemented with 250, 500 and 750 g doum/ ton feed, respectively. The study lasted five months and included two experiments as follow:

First, age and weight of rabbit males at first mating were recorded. At 5 months of age, three bucks from each group were randomly taken for slaughter after being fasted for 12 hours (Abd El-Monem, 1995). After complete bleeding, testes; epididymis; sexual-accessory glands and pituitary gland were weighed and relative weights of those organs were calculated according to the following formulae: relative weight of organ = organ weight/ live body weight (Fu-Chang et al., 2004). Scrotal circumference was measured as described by Boiti et al. (2005).

Testicular index (length × width × depth) was calculated in cubic centimeters as recorded by (Castellini et al., 2006; and El-Kholy et al., 2012).

Mating activity (frequency of mating within 20 minutes) of mature rabbit bucks was determined using sexually receptive does.

Second, experiment aimed to study the effect of supplementing different levels of doum to rabbit diet on fertility traits; milk yield and composition and preweaning mortality rate.

Regarding sexual hormones, during the 5th month of age, blood samples were taken from the marginal ear vein of six rabbit bucks and does per group weekly up to 4 weeks. Blood serum testosterone concentration of bucks and estradiol $17_{2\alpha}$ and progesterone levels of does were determined using RIA Kits (Immunotech, A Coulter Co., France) according to the manufacturer information.

Fertility traits

Natural mating was carried out by transferring each doe to the buck's cage to be mated and return back to its cage after mating. Palpation of all rabbit does was carried out 12 days post mating to determine pregnancy. Conception, abortion, kindling rates and litter size and weight at birth and bunny weight at weaning were recorded. Pre weaning mortality rates and milk yield per doe were estimated also during the suckling period. Milk yield was estimated after deprivation of pups from suckling their mothers at 8 a.m. daily, then the doe and her pups were weighed before and after suckling, the average of decrease and increase in doe and pup's weight, respectively, was used as the doe milk yield.

Milk samples were taken from nursing does individually within each experimental group, on the 21st day of lactating period (peak of milk production). A part of fresh milk sample was immediately analyzed to estimate milk protein, fat, lactose and ash, by using Milkoscan® analyzer-130 B, N. Foss Electronic-Denmark.

Statistical analyses

Data were subjected to analysis of variance according to (Snedecor and Cochran, 1982) using the General Linear Model Program of SAS (2001). Duncan's new multiple range tests were used to test the significance of the differences among means (Duncan, 1955). Data presented as percentages were transformed to the corresponding arcsine values (Warren and Gregory, 2005) before being statistically analyzed

$Y_{ij}=\mu + \alpha_i + e_{ij}$

Where: Y_{ij} = Observation of the j^{th} rabbit in the treatment i; μ = Overall mean, common element to all observations; α_i = Effect of the treatments (i = 1, 2, 3 and 4); e_{ij}= Random error component assumed to be normally distributed.

RESULTS AND DISCUSSION

Reproductive parameter of bucks

Data presented in Table 3 indicated that, supplementing doum to Hy-Plus rabbit males diet significantly ($p\leq0.05$) decreased

their age at first mating compared to control, while weight at first mating significantly ($p \leq 0.05$) increased in treatment than control group, respectively. Absolute and relative weights of testes; epididymis; sexual accessory glands and pituitary gland of Hy-Plus rabbit bucks increased significantly ($p \leq 0.05$) due to feed diets supplemented with 250, 500 and 750 g doum/ ton.

Table 4 showed that, improvement in mating activity; scrotal circumference and testicular index of Hy-Plus rabbit bucks fed diets supplemented with 250, 500 and 750 g doum were significantly ($p \leq 0.05$ and 0.01) high as compared with those of un-supplemented diets.

Sexual hormones

Regarding sexual hormones of male and female represented by concentration of testosterone; estradiol $17_{2\alpha}$ and progesterone, high level of doum recorded a significant ($p \leq 0.01$) increase in descending order, due to diet supplemented with 750, 500 and 250 g doum, respectively (Table 5). These results are in agreement with those obtained by (Mariey et al., 2012).

These improvements in male performance and sexual hormones of treated rabbits may be due to improving of feed utilization as recorded by (Mariey et al., 2012; and Ali and Mervat Ghazal, 2013). Also, dietary inclusion of doum can partially offset the adverse effects of toxins on animal performance. As well as, the results obtained may be due to enhance immune function as a result of adding doum to the diet (Qureshi et al., 1995). This result was due to improved in spermatozoa that showed better results of motility and survivability which can be used as a good indicator of fertilizing ability. Also, emphasized the hypothesis that, rabbits fertility could be improved by stimulation of testicular androgen secretion induced by having diet contained doum, as observed by (Safaa Barakat and Rowida Riad, 2016). This result due to that, doum is a good antioxidants with strong 1, 1 diphenyl-2-picrylehydrozyl (DPPH) radicals-scavenging activity, as well as, the investigated extracts had good antimicrobial activity, especially against bacteria (Hussein et al., 1998; Sanchez-Moreno et al., 1999; and Dawidowicz et al., 2006). Doum is contain certain chemicals which are naturally toxic to bacteria, and many of literature has validated the antimicrobial activity of plant extracts, showing great potential especially against multidrug resistant bacteria (Pesewu et al., 2008; and Tasdelen et al., 2009). Also photochemistry of doum provides insight about phenolic compounds (Katsube et al., 2004; and Dimitrios, 2006). These phenolic compounds often exhibit a wide range of physiological activities that include antioxidant, antimutagenic, anticarcinogenic, antimicrobial, and anti-inflammatory properties (Baliga and Katiyar, 2006; and Heinonen, 2007).

Doe traits

Data presented in Table 6 showed that, Hy-Plus rabbit does fed diets supplemented with 750, 500 and 250 g doum using bucks treated with the same treatment, recorded conception and kindling rates; litter size and weight and bunny weight at birth and at weaning significantly ($p \leq 0.05$ or 0.01) better, and in descending order, than of those recorded by does fed un-supplemented diet. Also, it can be noticed that doum treatments recorded decrease in abortion and mortality rate than control group. It is apparent clearly from these results that, the fertilizing ability of rabbit semen treated with doum is better than control.

Results in Tables 7 and 8 indicated that, milk yield and composition (protein; fat; lactose and ash) were significantly ($p \leq 0.05$ or 0.01) better than control group, and in descending order due to diet supplemented with 750 and 500 then 250 g doum, respectively.

Finally improving fertility traits of rabbit does treated with doum can be attributed mainly to improve of semen quality, as recorded previously by (Ali and Mervat Ghazal, 2013). In this respect, Lavaraa et al. (2005) observed significant correlations between fertility rate of does and semen quality. Also, it can be due to doum contain Zn, Mn and copper, which have been reported in improving reproduction in males and females.

The improvement in litter traits proved that, doum treatments are capable to improve the milking ability of the rabbit does which is reflected in her ability to suckle her young till weaning, and significant decrease in mortality compared with the control. The milk available per kit may also have a pronounced effect on the mortality of young rabbits (Rommers et al., 2001; and Szendro et al., 2002). Besides that, the increase milk production may be due to increase in litter size at birth, where there was a positive correlation between the litter size at birth and milk yield (Lebas et al., 1997; and Rommers et al., 2001). Does will secrete more milk if litter size at birth is large (EL-Maghawry et al., 1993). This increase in milk production, is however, not entirely proportional to the needs of more suckling. There were a negative correlation between litter size and individual bunny weight. Therefore, one kit consumes less milk and so the individual weight will be low (Petersen et al., 1996). When both litter size and individual weight of suckling rabbits increase this could be only due to the high milk production of the doe. This could be explained our result in increasing the total litter weight and individual weight at birth and weaning and increase milk production in doum treatment than control. This is in agreement with Eiben et al. (2010).

The improvement in bunny survivability can be due to the improvement of does, which secret more milk subsequently the bunny weight and number get better compared to control group. Also improving the survivability can be due to transfer of active material in doum (Zn, Mn and copper) which can be used as antioxidant and antimicrobial to the milk of does to the bunny, so the bunny get healthy and its immune system improved and disease resistance increased which reflect on decreasing the mortality rate and improve the fertility rate, litter size and weight and individual weight, even at birth or at weaning. These result agree with that observed by Yang et al. (2002) and Kilani et al. (2008) who reported that doum have been screened as a viable source of natural antioxidants including tocopherols, vitamin C, carotenoids and phenolic compounds which are responsible for maintenance of health, and help the body to reduce oxidative damage and protection from diseases. Therefore, there is a growing interest in the substances exhibiting antioxidant properties that are supplied to human and animal organisms as food components or a specific pharmaceutical.

Conclusively, it could be concluded that: supplementing doum to Hy-Plus rabbit diets caused significant improvement in semen quality, fertilizing ability of bucks, fertility traits and milk yield of does. Also, it can be recommended 500 g doum/ton diet, where there were no significant differences between the 500 and 750 g doum / ton. Subsequently there is no need to the high level which increases the productive coast.

Table (1): The ingredients and chemical composition of the pellet diet fed to growing rabbits, during the experimental period

Ingredients	(%)	Vitamins & Minerals premix per Kilogram.	
Clover hay	30.00	Vit.A (IU)	10,000
Wheat bran	26.20	Vit.D3 (IU)	2000
Barley grain	23.00	Vit.E (IU)	5000
Soybean meal (44%)	16.00	Vit.K (IU)	2
Molasses	3.00	Vit.B1 (IU)	2
Lime stone	1.00	Vit.B2 (IU)	4
Sodium chloride	0.50	Vit.B6 (IU)	3
Vitamins & Mineral Premix	0.30	Vit.B12 (IU)	0.02
Total	100	Biotin (mg)	0.2
Calculated chemical composition **		Choline (mg)	1200
Crudeprotein (CP)%	16.72	Niacine (mg)	40
Ether extract (EE)%	2.95	Zn. (mg)	60
Crude fiber (CF)%	13.07	Cu. (mg)	0.1
Digestible energy (Kcal/Kg)	2490	Mn. (mg)	62
		Fe. (mg)	40
		Folic acid (mg)	1
		Pantothenic acid (mg)	15

** Calculated according to NRC (1977) for rabbits.

Table (2): Composition and chemical analysis of Doum used in the experiment

Items	%
Protein	6.45
Fat	4.89
Fiber	11.55
Total carbohydrate	72.89
Total Sugars	12.66
Reducing Sugars	1.99
None Reducing Sugars	10.67
Elements(mg/100g)	
Potassium	5.99
Calcium	92.24
Magnesium	1.31
Iron	1.95
Copper	1.82
Zinc	0.04
Manganese	0.09

Recorded by (Hussein et al., 2011).

Table (3): Age and weight at first mating, pituitary and some sexual organs weight of Hy-Plus rabbit males fed diets supplemented with different levels of Doum (Means ± SE)

Items	Doumlevels (g/ Ton)			
	(0.0) Control	(250) T_1	(500) T_2	(750) T_3
Age at first mating (Days)	179.3±5.6 [a]	157.4±4.3 [b]	151.2±3.2[bc]	148.2±3.9[c]
Weight at first mating (g)	3085.2±36.9 [c]	3151.8±33.8[bc]	3194.1±39.4[ab]	3228.9±38.5 [a]
Testes weight:				
Absolute (g)	5.83±0.19 [c]	6.41±0.22 [b]	7.14±0.22 [a]	7.31±0.26 [a]
Relative (%)	0.189±0.002 [c]	0.204±0.003[b]	0.223±0.004 [a]	0.227±0.005 [a]
Epididymis weight:				
Absolute (g)	0.954±0.006 [c]	0.997±0.009 [b]	1.038±0.010 [a]	1.059± 0.014 [a]
Relative (%)	0.031± 0.001 [c]	0.032± 0.001 [b]	0.032± 0.001 [a]	0.033±0.001 [a]
Sexual-accessory glands eight:				
Absolute (g)	3.38±0.09 [c]	3.61±0.12 [b]	3.87±0.11 [a]	3.94±0.13 [a]
Relative (%)	0.109±0.002 [c]	0.115±0.003 [b]	0.121±0.002 [a]	0.122±0.002 [a]
Pituitary gland weight:				
Absolute (g)	0.376 ± 0.004 [c]	0.389 ± 0.006 [b]	0.401 ±0.006[ab]	0.407± 0.007[a]
Relative (%)	0.012± 0.000 [c]	0.012± 0.000 [b]	0.013± 0.000 [a]	0.013± 0.001[a]

Means bearing different letter superscripts (a, b, c) within the same row are significantly ($p \leq 0.05$ or 0.01) different.

Table (4): Some parameters indicated fertilizing ability of Hy-Plus rabbit males fed diets with different levels of Doum (Means ± SE)

Items	Doumlevels (g/ Ton)			
	(0.0) Control	(250) T_1	(500) T_2	(750) T_3
Mating activity (no. of mating/ 20 minutes)	2.14±0.06 ^{c}	2.86±0.05 ^{b}	3.09±0.07 ^{a}	3.15±0.07 ^{a}
Scrotal circumference (Cm)	6.43±0.57 ^{c}	7.24±0.63^{bc}	7.83±0.79^{ab}	8.79±0.77 ^{a}
Testicular index (Cm^3)	5.35±0.38 ^{c}	6.19±0.51^{bc}	6.69±0.62^{ab}	7.46±0.64^{a}

Means bearing different letter superscripts (a, b, c) within the same row are significantly ($p \leq 0.05$ or 0.01) different.

Table (5): Sexual hormones concentration of Hy-Plus rabbit males fed diets with different levels of Doum (Means ± SE)

Sexual hormo.ne	Doumlevels (g/ Ton)			
	(0.0) Control	(250) T_1	(500) T_2	(750) T_3
Testosterone concentration (ng/ ml)	5.62±0.09 ^{c}	5.81±0.08 ^{b}	5.98±0.09^{ab}	6.04±0.09 ^{a}
Estradiol $17_{2\alpha}$ (pg/ ml)	27.12±0.82 ^{c}	27.87±1.14^{bc}	29.19±1.22^{ab}	30.81±1.37 ^{a}
Progesterone (pg/ ml)	0.714±0.031 ^{c}	0.729±0.037^{bc}	0.798±0.041^{ab}	0.841±0.032 ^{a}

Means bearing different letter superscripts (a, b, c) within the same row are significantly ($p \leq 0.05$ or 0.01) different.

Table (6): Fertility traits of Hy-Plus rabbit does fed diets with different levels of Doum

Items	Doumlevels (g/ Ton)			
	(0.0) Control	(250) T_1	(500) T_2	(750) T_3
No. of inseminated does	44	44	44	44
No. of pregnant does	24	29	33	35
Conception rate (%)	54.5 ^{d}	65.9 ^{c}	75.0 ^{b}	79.5^{a}
Abortion rate (%)	4.5 ^{a}	2.3 ^{b}	00.0 ^{c}	00.0 ^{c}
No. of kindled does	22	28	33	35
Kindling rate (%)	50.0 ^{d}	63.6 ^{c}	75.0^{b}	79.5 ^{a}
Litter size at birth (No.)	5.8±0.4 ^{c}	6.7±0.4 ^{b}	8.1±0.7 ^{a}	8.8±0.5 ^{a}
Bunny weight at birth(g)	42.8±1.4	42.3±1.9	42.5±2.2	41.9±1.7
Litter weight at birth (g)	248.2±21.2^{c}	283.4±20.9^{b}	344.3±25.6^{a}	368.7±29^{a}
Litter size at weaning (No.)	5.0±0.3 ^{d}	6.1±0.4 ^{c}	7.8±0.3^{b}	8.5±0.2 ^{a}
Bunny weight at weaning (g)	694.2±21.3^{c}	758.3±24.7^{b}	801.6±24.4^{ab}	814.6±29.5 ^{a}
litter weight at weaning (g)	3471.0±86.5^{d}	4625.6±93.1^{c}	6252.5±87.7 ^{b}	6924.1±99.9 ^{a}
Pre weaning ** Mortality rate (%)	13.8±1.9 ^{a}	8.9±1.4 ^{b}	3.7±0.2 ^{c}	3.4±0.2 ^{c}

Means bearing different letter superscripts (a, b, c, d) within the same row are significantly ($p \leq 0.05$ or 0.01) different.

** Pre weaning mortality rate was calculated individually according to the following equation: Litter size at weaning – Litter size at birth / Litter size at weaning X 100

Table (7): Milk yield (g) of Hy-Plus rabbit does fed diets with different levels of Doum (Means ± SE)

Period (Days)		Doumlevels (g/ Ton)			
From	**To**	**(0.0) Control**	**(250) T_1**	**(500) T_2**	**(750) T_3**
Birth	7	454.6±27.2^{c}	536.4±29.4^{b}	589.2±34.6^{ab}	611.7±33.0 ^{a}
8	14	627.3±31.6 ^{c}	719.5±31.8 ^{b}	785.4±35.2^{ab}	831.2±38.1 ^{a}
15	21	761.2±34.3 ^{c}	874.9±39.4 ^{b}	963.8±38.4 ^{a}	1021.4±44.2^{a}
22	28	542.9±28.4 ^{c}	631.7±30.3 ^{b}	677.3±31.9^{ab}	701.5±37.5 ^{a}
29	35	421.6±25.2 ^{c}	517.2±30.2 ^{b}	565.3±30.8^{ab}	617.4±34.1^{a}
Total milk yield (g)		2807.6±72.9 ^{d}	3279.7±84.0 ^{c}	3581.0±94.7 ^{b}	3783.2±96.2 ^{a}

Means bearing different letter superscripts (a, b, c, d) within the same row, or (a, b, c, d)) within the same column are significantly ($p \leq 0.05$ or 0.01) different.

Table (8): Milk composition of Hy-Plus rabbit does fed diets with different levels of Doum, and naturally mated (Means ± SE)

Milk composition	Doum levels (g/ Ton)			
	(0.0) Control	**(250) T_1**	**(500) T_2**	**(750) T_3**
Milk Protein (%)	11.03±0.21 ^{b}	11.31±0.18 ^{b}	12.28±0.25 ^{a}	12.57±0.23^{a}
Milk fat (%)	16.11±0.32^{c}	17.64±0.33^{ab}	17.89±0.31 ^{a}	18.34±0.33 ^{a}
Milk lactose (%)	3.78±0.06 ^{d}	3.99±0.08 ^{c}	4.38±0.08 ^{b}	4.57±0.09 ^{a}
Milk ash (%)	3.65±0.04 ^{c}	3.83±0.04 ^{b}	4.08±0.07 ^{a}	4.14±0.06 ^{a}

Means bearing different letter superscripts (a, b, c, d) within the same row are significantly ($p \leq 0.05$ or 0.01) different.

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الملخص العربى

تأثير اضافة الدوم للعلائق على الصفات التناسلية والإنتاجية فى الأرانب

مرفت نبيل غزال[١]؛ صفاء عطايا بركات[١]؛ وائل على حسن على[١]؛ رويدا محمد رياض[٢]

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تهدف تلك الدراسة لتقييم تأثير إضافة مستويات مختلفة من الدوم فى العلائق على القدرة الإخصابية فى ذكور الأرانب والصفات الإخصابية فى إناث أرانب النيوزلندى الأبيض، استمرت الدراسة لمدة 5 شهور، أجريت على ٢٧٢ أرنب هاى بلس (٦٤ ذكر عمر ٣ شهور و ٢٠٨ انثى عمر ٢،٥ شهر)، قسمت الأرانب على ٤ مجاميع تجريبية (١٦ ذكر - ٥٢ انثى لكل مجموعة) المجموعة الأولى غذيت على عليقة تجارية غير معاملة (كنترول) بينما المجاميع الثانية والثالثة و الرابعة غذيت على نفس العليقة مع إضافة ٢٥٠، ٥٠٠، ٧٥٠جم دوم / طن عليقة على التوالى.

النتائج المتحصل عليها تشير إلى أن العمر عند أول تلقيحة لذكور الأرانب هاى بلس انخفض معنوياً عند مستوي (٠،٠٥) بينما الوزن عند أول تلقيحة و وزن الجسم الحى ازداد معنوياً عند (٠،٠٥) كما ازداد معنوياً وزن الخصيتين المطلق والنسبى والغدد التناسلية والغدد النخامية ومحيط scrotal- testicular index و النشاط التزاوجى لذكور الأرانب هاى بلس مع إضافة الدوم بنسبة ٥٠٠، ٧٥٠ جم على التوالى وكذلك الهرمونات الجنسية للذكور والإناث.

فيما يتعلق بمعدلات الحمل والإجهاض وعدد ووزن الخلفة عند الميلاد والفطام بالإضافة لوزن الأرنب الواحد عند الميلاد والفطام تحسن معنويا بإضافة ٥٠٠، ٧٥٠ جم دوم على التوالى وتحسن إنتاج اللبن و إنخفض النفوق قبل الفطام بالتغذية على علائق مضاف إليها الدوم .

نستخلص أن إضافة الدوم لعلائق أرانب هاى بلس أدى إلى تحسن معنوى فى القدرة الإخصابية للذكور والصفات التناسلية والانتاجية فى الإناث. و من هذا يوصى بإستخدام ٥٠٠ جم/ طن عليقة أرانب حيث انها تتساوى نتائجها مع المعاملة الأعلى.