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REPRODUCTIVE AND PHYSIOLOGICAL RESPONSE OF NEW ZEALAND WHITE RABBIT DOES FED ON DISCARDED PALM FRONDS.

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This study carried out to determine the effects of substitution 25 and 50% of clover hay with discarded palm fronds (DPF) or biologically treated discarded palm fronds (Bio-DPF) in does diet on reproductive, physiological response and economic efficiency of New Zealand White (NZW) rabbit does. Twenty five New Zealand White (NZW) does aged 5 months weighting 3140± 26.55g were randomly distributed into 5 experimental treatments (5 does/ treatment). Experimental diets were as follows: diet 1: A control without substitution, while in the other diets contained 5 and 10% untreated and treated discarded palm fronds with Effective microorganisms (EM_1) to substitute 25 and 50% of clover hay of control diet.

Results could be summarized as follows: *Biological treatments was improved chemical composition of DPF which mainly CP content was markedly increased but CF was decreased. Inclusion of Bio-DPF in does diet affected significantly both daily feed intake and change in weight of does during gestation and suckling period compared with other treatments. Diets with Bio-DPF significantly ($P\leq 0.05$) achieved the best figures for litter size of and weights from birth up to weaning that in turn revealed significant ($P\leq 0.05$) decreased in mortality rate (%) as compared to group fed diet contain 50% DPF. Feeding the does on diets contained Bio-DPF significantly ($P\leq 0.05$) produced the highest milk yield.*

Data showed significantly increased in total protein and globulin with Bio-DPF. However, there were significantly decrease in the value of plasma cholesterol and total lipids for rabbits fed on 50%DPF and Bio-DPF. 6- It can be noticed that rabbits fed on the diets contained Bio-DPF had the best economic return compared to other treatments.

Conclusively*, it could be recommended to incorporate Bio-DPF of the rabbit doe diets to replace up to 50% of clover hay improve their reproductive, physiological traits and improve economic efficiency.*

Keywords: *Discarded palm fronds, rabbits, biologically, reproductive, physiological.*

Female reproduction is an interesting and attractive subject to study and preferred by many researchers as it is essential, important and beneficial for successful rabbits breeding. Litter size, birth weight and conception rate are so important economic traits in any productive animals. For great profit a special attention must be focused on these traits, so studying factors directly affecting them are so important and must be taken into consideration during breeding of any productive species (Mahmoud, 2013).Feeding cost is the most expensive item in animal production cycle and reached about 70% from the total cost of rabbit industry (EL-Sayaad, 2002). Rabbit's nutritionists are looking for developing feeding strategies capable of reducing digestive diseases and high mortality rate while enhancing body condition of reproducing does,therefore increasing their reproductive performances and increasing feed efficiency so lowering feeding and total production costs (Maertens, 2009). Data of fruit production yields several crop residues, including date palm leaves (fronds), inedible dates, date pits, pinne of date palm and mid rib of date palm are not utilized for human consumption. Several experiments by different investigators revealed that date stone meal could be included in rabbit diets (El- Manylawi and El-Banna, 2013).

Discarded palm fronds are poor in nutritive value for animals owing to their low protein, high fiber content and low palatability which limits their use in livestock feeding. To improve digestibility of these agricultural wastes, it is important to breakdown the linkages among cellulose, hemicelluloses and lignin by biological treatments. Recently, several works using biological treatments to improve nutritive value of by products by using EM_1 has been recommended as feed additives for poultry and ruminants to reduce heat stress, improving feed conversion and dressing percentage or working as a manipulating agent for agricultural by- products (Higa, 2002). $EM_1$is a product of EMRO Organization in Japan (EM_1 Research Organization, Inc., Takamiyagi Bldg. 2F, 2-9-2 Gameko, Ginowan-shi Okinawa, Japan. EM_1 is a combination of 70 to 80 different types of “good” and beneficial microorganisms contributing to the wide range of applications. The principal organisms of are usually five; photosynthetic bacteria (phototrophic bacteria), lactic acid bacteria, yeasts, actinomycets and fermenting fungi (Higa, 1993). Abdel-Aziz *et al.*, (2014) found that biological treatments are paralleled with decreased crude fiber and fiber fractions content with increased crude protein content. In animal nutrition El-Tahan *et al*., (2013) found that lambs fed ration 60% or 50% of the allowances from concentrate feed mixture +treated palm fronds grinded with *plureuerotus ostreatus* by apparel to higher live body weight than those fed ration allowances from concentrate feed mixture + palm fronds grinded and no significant differences in daily feed intake, weight gain and feed conversion. Moreover, Ali *et al*., (2017) found replacing 15% or 30% of berseem hay by biological treated conocarpus with fungi (*Trichoderma reesi*) or effective microorganisms (EM_1) in Baladi Black rabbit does diets, resulted in improve their reproduction performance without any adverse effect on physiological responses with high profitability under Egyptian conditions.

Therefore, the objectives of the present study were to investigate the effects of dietary inclusion of untreated or biologically treated discarded palm fronds by effective microorganisms (EM_1) on reproductive, physiological traits and feed cost of rabbit does.

MATERIALS AND METHODS

The experimental work of this study carried out at Poultry Research Station, in Kafr EL- Sheikh Governorate, Animal Production Research Institute, Agricultural Research center .The biological treatment, analysis of samples and discarded palm fronds were carried out at the Laboratories of By-Products Research Department, Animal Production Research Institute. Discarded palm fronds were obtained from Luxor governorate, Egypt. The EM_1 is a product of EMRO Organization in Japan (EM_1 Research Organization, Inc., Takamiyagi Bldg. 2F, 2-9-2 Gameko, Ginowan-shi Okinawa, Japan). EM_1 is a combination of 70 to 80 different types of "good" and beneficial microorganisms contributing to the wide range of applications. The principal organisms of are usually five; photosynthetic bacteria (phototrophic bacteria), lactic acid bacteria, yeasts, actinomycets and fermenting fungi (Higa, 1993).

Preparation of palm fronds

Palm fronds from each crop residue were sun dried until complete drying and five ground to pass through 0.1 mm screen was soaked in tab water until moisture content reached to 60-70% followed by soaking in boiled water for 2 hours according to Balasubramanya and Kathe (1996) to decrease contamination.

Biological treatment

Hundred kilo grams of Palm fronds were cooled to room temperature and until moisture reached 65-70%,then 5% EM_1 and 5% El-mofeed were dissolved in 90 L of water and mixed with Palm fronds under air condition and package into polyethylene bags and left for three weeks (Shahin *et al*., 2012).

Treatments and Animals

Twenty five New Zealand White (NZW) does at 5 months of age with average weight 3140 ± 26.55 g were housed separately in individual wired-cages. Mating was achieved by 5 adult New Zealand White bucks aged 6 months with good fertility records. Bucks were fed on control diet. All rabbits were kept under the same managerial and hygienic conditions and housed in metal battery cages supplied with separated feeders. Diets were offered *ad-libitum* and fresh water was available all times from automatic nipple drinkers.

Five experimental diets were formulated, including the control diet without discarded palm fronds while, the other tested diets have discarded palm fronds (DPF) and biologically treated discarded palm fronds (Bio-DPF) at 25 or 50% replacement of clover hay 5.00 or 10.00% in basal diet as shown in Table 1. The ingredients of diets formulation and its chemical composition are presented in Table 1. All the experimental diets were formulated according to (Agriculture Ministry Decree, 1996).The digestible energy (DE kcal /kg) of discarded palm fronds and clover hay were calculated according to the equation of Cheek (1987). Neutral detergent fibre (NDF), acid detergent fibre (ADF) and detergent lignin (ADL) were determined by method of Van Socest (1982).

Reproductive performance

For does, the change in live body weight during gestation period was calculated as the difference between the live body weight at kindling and body weight post-partum, while the change in live body weight during suckling was calculated as the difference between the live body weight at the end of suckling period (at weaning) (28 days post-partum) and the body weight post-partum. Suckling kids were allowed to eat the same diet as their mother and were weaned at 35days of age. Lactating rabbit does (five / group) were used to measure milk production. Rabbit does were separated from their kids after parturition and controlled suckling was applied. To prevent free nursing, does were placed in cages next to the nest box. Litter sizes (LS) of kits were kept constant throughout lactation. Milk production was estimated daily from weight loss of rabbit does after suckling (Mohamed *et al*., 2016).Milk production was assessed at 7^{th}, 14^{th}, 21^{st} and 28^{th} day of lactation. Kids were separated from their mothers to prevent suckling for a period of 24 hours before samples collection in the morning. Body weight and weight gain of kids were measured at birth and at weaning. Mortality rate (MR) during lactation for kids was calculated as:

$$\text{MR of kids} = \frac{\text{Number of the kids born alive - Number of the kids at weaning}}{\text{Number of the kids born alive}} \text{X } 100$$

Blood measurement

Individual blood samples were taken at 9.00 am from the marginal ear vein and collected in 5 ml. heparinized test tubes and centrifuged at 3000 r.p.m for 20 minutes then plasma were transferred and stored in deep freezer at approximately -20ºC till the time to determine total protein (Gornal *et al*., 1949), albumin (Doumas and Waston, 1971), transaminase (AST, aspartate aminotransferase and ALT, alanine aminotransferase), Reitman and Frankel (1957), total lipids (Zollner and Kirsch, 1962), total cholesterol (Richmond, 1973), creatinine (Schirmeister, 1964) and urea (Fawcett and Scott, 1960).

Economic efficiency

The economic efficiency of experimental diets was calculated as the ratio between net revenue and cost of feed consumed according to Soliman *et al*., (2012).

Statistical analysis

Data from all response variables were analysed using General Linear Models (GLM) procedure of SAS Institute (2004). The statistical model used was as follows:

$$Yij = \mu + Ti + eij$$

Where: μ= Overall mean of Yij,, Ti = Effect of treatment, i = (1,…,5), eij = Experimental random error.

Variables having a significant F-test were compared using Duncan's multiple range test (Duncan, 1955).

Table 1.Ingredients and chemical composition of experimental diets.

Ingredients	Control	DPF		Bio-DPF	
		25%	50%	25%	50%
Soybean meal (44% CP)	24.50	24.50	25.30	24.50	25.30
Barely grain	23.00	23.00	22.00	23.00	22.00
Clover hay	20.00	15.00	10.00	15.00	10.00
DPF	----------	5.00	10.00	-------	--------
Bio-DPF	---------	---------	----------	5.00	10.00
Yellow corn	15.00	15.00	15.00	15.00	15.00
Wheat bran	10.49	10.19	10.20	10.19	10.20
Molasses	3.00	3.00	3.00	3.00	3.00
Di calcium phosphate	2.37	2.67	2.86	2.67	2.86
Lime stone	0.70	0.70	0.70	0.70	0.70
DL-Methionine	0.34	0.34	0.34	0.34	0.34
Sodium Chloride (NaCl)	0.30	0.30	0.30	0.30	0.30
Premix*****	0.25	0.25	0.25	0.25	0.25
Anticoccidia(Diclazuril)	0.05	0.05	0.05	0.05	0.05
Total	**100**	**100**	**100**	**100**	**100**
Calculated analysis%[1]					
OM%	89.79	89.57	89.35	88.70	88.45
CP%	18.84	18.39	18.25	18.47	18.38
CF%	10.43	10.92	11.42	10.72	11.04
EE%	2.23	2.16	2.08	2.17	2.12
NFE%	58.29	58.10	57.60	57.34	56.91
Ash%	10.21	10.43	10.65	11.30	11.55
DE(kcal/kg)	2688.8	2677.2	2665.2	2680.6	2675.8
Calcium	1.21	1.20	1.21	1.23	1.22
Total phosphorus	0.84	0.87	0.91	0.88	0.91
Methonine	0.62	0.61	0.61	0.61	0.61

* ***Each per 1 kg diet:*** *6000 IU Vit. A; 900 IU, Vit.D_3; 40 mg, Vit. E; 2.0 mg, Vit. K_3; 2.0 mg Vit., B_1; 4.0 mg , Vit. B_2; 2.0 mg, Vit. B_6; 0.010 mg, Vit. B_{12}; 5.0 mg, Vit. PP; 10.0 mg Vit., B_5; 0.05 mg, B_8; 3.0 mg, B_9; 250 mg, Choline; 50.0 mg, Fe;50.0 mg, Zn; 8.5 mg Mn; 5.0 mg Cu; 0.20 mg I, and 0.01 mg Se.*

[1] *According to Feed composition for animal and poultry feed stuff used in Egypt (2001).*

RESULTS AND DISCUSSION

Chemical composition of DPF and Bio-DPF compared to clover hay.

As shown in Table (2), chemical analysis of DPF and Bio-DPF compared with clover hay revealed that CP (3.68, 5.47*vs.* 12.00%), CF (40.21, 36.34 *vs.* 31.00), DE (1648.8, 1768.01 *vs.* 1972.2 K cal/kg), EE (0.85, 1.20 *vs.* 2.10%),

Table 2. Chemical analysis of DPF and Bio-DPF compared to clover hay on DM basis.

Items	DPF	Bio-DPF	Clover hay
DM%	89.03	89.74	83.62
Chemical analysis% (on DM basis)			
OM%	94.13	92.97	88.94
CP%	3.68	5.47	12.00
CF%	40.21	36.34	30.00
EE%	0.85	1.20	2.10
NFE%	49.39	49.96	44.84
Ash%	5.87	7.03	11.06
DE(kcal/kg)*	1648.8	1768.01	1972.2
Cell wall constituents:			
NDF	65.21	59.23	55.11
ADF	41.30	31.54	42.00
ADL	8.54	8.03	18.43
Hemicellulose	23.91	27.69	13.11
Cellulose	32.76	23.51	23.57

DPF**:** discarded palm fronds , Bio-DPF: Biologically treated discarded palm fronds.
* DE (kcal/g) = 4.36 -0.0491x NDF, Where NDF% = 28.924+0.657x CF% (according to Cheeke, 1987).
NDF: Neutral detergent fiber, ADF: Acid detergent fiber, ADL: Acid detergent Lignin
Hemi cellulose: NDF-ADF; Cellulose: ADF-ADL.

NFE content (49.38, 49.96 *vs*. 44.84%), NDF (65.21, 59.23 *vs.* 55.11%), ADF (41.30, 31.54 *vs.* 42.00%), ADL (8.54, 8.03 *vs.* 18.43%). Hemi cellulose (23.91, 27.69*vs.* 13.11%) and cellulose (32.76, 23.51*vs.* 23.57).The chemical composition of untreated discarded palm fronds has similar trend that reported by El- Tahan *et al*., (2013) found that palm fronds grinded content 3.25% CP, 42.14% CF, 0.77% EE, 69.35% NDF, 42.92% ADF and 10.61% ADL.Also El-Bordeny and Abdel-Azeem (2007) found that palm tree leaves content 7.02% CP, 0.96% EE, 28.21% CF, 54.02% NFE and 9.80% Ash. Ibrahim *et al.*, (2013) found that mid ribe of data palm contained 2.69% CP, 34.95% CF, 2.98% EE, 41.70% NFE, 4.31% ADL, 43.47% ADF and 57.82%NDF.This result is confirmed by Villas-Boas *et al.,* (2002) who reported that biological treatment is used for increasing the nutritional value of many by-products because they have significant concentrations of simple carbohydrates such as mono and disaccharides. While, crude fibre content was reduced because microorganisms depend on this material as carbon source for growth and formation the microbial protein. Increasing ash content may be attributed to the growth or degradation of organic matter of discarded palm fronds by microorganism. Reduction in NFE could be related to the consumption of carbohydrates by the microorganism as energy sources for their growth and multiplication. Abdel-Aziz *et al.,* (2014) who found that biological treatments are paralleled with decreased crude fibre and fibre fractions content with increased crude protein content.

Performance of rabbit does during gestation period

Results of the effect of DPF and Bio-DPF on the performance of does during gestation period are presented in Table (3). The gestation length, total feed intake, mating weight and gestation weight haven't significantly affected by different treatments. Inclusion of Bio-DPF in does diet affected significantly both daily feed intake and change in weight of does during gestation period compared with other treatments. The does fed 25 and 50% Bio-DPF diets were recorded the highest feed intake value 5.6077 and 5.395kg, respectively. The does fed on 25 and 50% Bio-DPF during gestation period were recorded the highest change in weight +138.67g and+31.33g, respectively. On the other hand, feed intake did not differ significantly with fed on DPF diets compared to control diet and also change in weight did not differ significantly with fed on 25 % DPF does during gestation period. However, change in weight during gestation period significantly decreased with fed on 50% DPF diets as compared with other treatments.

The regular increase in body weight at this phase could be due to the active growth of the embryos at this stage. These results revealed that does can tolerate using Bio-DPF up to 50% substitution for clover hay during the gestation period (30 days) without adverse effects. In this respect, Ali *et al*.,(2017) reported that replacing 15% and 30% of berseem hay by biological treated conocarpus with EM_1 in rabbit does diet resulted in significantly($P \leq 0.05$) had higher weights for pregnancy and consumed more feed intake than those fed the other untreated diets. These results agree with Xiccato *et al.*, (2004) who reported increasing in BW, FI and milk production of rabbit does with using balanced fibrous dietary diets. That, diets included balanced nutrients composition especially in the domain of fibrous components gave a highest performance possible in term of production or feed efficiency (Gidenne, 2000; Fortun-Lamothe and Gidenne, 2003).

Table (3). Performance traits of rabbit does as affected by feeding DPF or Bio-DPF during gestation period.

Items	Control	DPF, %		Bio-DPF, %		SEM	Sig.
		25	50	25	50		
Gestation length (days)	30.66	30.33	30.33	30.00	30.00	0.33	NS
Total feed intake (kg/doe)	4.387	4.637	4.4320	5.6077	5.395	0.13	NS
Daily feed intake (kg/doe)	143.10^{b}	154.09^{b}	147.73^{b}	186.92^{a}	177.87^{a}	4.87	**
*__Mating weight (g) doe__	3166.6	3155.0	3136.67	3125.0	3116.67	26.55	NS
**__Gestation weight (g) doe__	3286.33	3277.3	3251.00	3263.67	3248.33	13.91	NS
***__Change in weight (g)__	119.73^{b}	122.33^{b}	114.33^{c}	138.67^{a}	131.33^{a}	2.46	**

DPF: discarded palm fronds ,Bio-DPF: Biologically treated discarded palm fronds.
a , b-- Means in the same row with different superscripts are significantly different (P<0.05).
NS: Not significant, **:(P<0.01).
**Mating weight (g) doe is live body weight at post partum.*
***Gestation weight (g) doe is live body weight at kindling.*
****Change in weight (g) = Gestation weight (g) - Mating weight (g).*

Performance of rabbit does during suckling period

Results in Table (4) indicated that total feed intake, mating weight and, suckling weight were not significantly affected by the different treatments However, daily feed intake and change in weight of the doe were significantly affected by the different experimental treatments. Also, mean values of daily feed intake during suckling period showed significant increase for does fed diets containing 25%Bio-DPFcompared with the DPF. However, daily feed intake showed no significant differ for does fed diets containing 50%Bio-DPF and DPF compared with control group. On the other hand, change weight with does fed Bio-DPF highest more change weight-135.7gand-139.10compared with the control group. Although, change weight with does fed 50% DPF lowest more change weight. However, Inclusion DPF at level 25% for does not significant differ in change weight compared with control group and other does fed Bio-DPF. These results were in agreement with Ali *et al*., (2017) who found that improvement in rabbit does performance in lactation period and increased feed intake when rabbits fed diets contained treated conocarpus with fungus or EM_{1}.

Table (4). Performance of rabbit does as affected by feeding DPF or Bio-DPF during suckling period.

Items	Control	DPF, %		Bio-DPF, %		SEM	Sig.
		25	50	25	50		
Total feed intake (kg/doe)	6.4967	6.3967	6.2400	6.7367	6.5067	0.11	NS
Daily feed intake (kg/doe)	232.03^{ab}	228.42^{b}	222.80^{b}	240.57^{a}	232.35^{ab}	2.04	**
***Mating weight (g) doe**	3166.60	3116.67	3136.67	3125.00	3155.00	26.55	NS
****Suckling weight (g) doe**	3060.50	3000.00	3069.1	2989.00	3015.90	31.28	NS
*****Change in weight (g)**	-106.1^{b}	-116.67^{ab}	-67.57^{c}	-135.7^{a}	-139.10^{a}	7.39	**

DPF: discarded palm fronds ,Bio-DPF: Biologically treated discarded palm fronds.
a ,b--- Means in the same row with different superscripts are significantly different(P<0.05)..
NS: Not significant and **:(P<0.01).
**Mating weight (g) doe is live body weight at post partum.*
***Suckling weight)(g) doe is live body weight at the end of suckling period.*
****Change in weight (g) = Suckling weight (g) - Mating weight (g) .*

Productive traits of kids

Productive traits of kids as affected by different experimental treatments are presented in Table (5). Inclusion of Bio-DPF in doe diets significantly increased litter size at birth (total alive), weaning, litter weight at birth, litter weight at weaning, total litter gain, kid weight at birth and daily weight gain of kid compared with group fed diet contain 50% DPF. Although, litter size at birth, weaning, litter weight at birth and kid weight at birth litter weight at weaning, total litter gain and daily weight gain of kid not significantly affected by the different treatments with does fed DPF as compared to control group except daily weight gain of kids insignificantly increased with 25% DPF compared with rabbits fed 50% DPF. Although, litter weight at weaning, total litter gain were significantly decreased with does fed 50% DPF compared with other treatments. However, kids weight at weaning and total weight gain of kid were not affected by different treatments. Diets with Bio-DPF significantly ($P\leq$ 0.05) achieved the best figures for litter size of and weights from birth up to weaning that in turn revealed significant ($P\leq$ 0.05) decreased in mortality rate (%) as compared to group fed diet contain 50% DPF. However, mortality rate (%) were significant ($P\leq$ 0.05) increased with doe fed 50% DPF compared with the rest of experimental treatments. Ali *et al*., (2017) found that rabbits fed

Table (5). Productive traits of kids as affected by feeding DPF or Bio-DPF.

Items	Control	DPF, %		Bio-DPF, %		SEM	Sig.
		25	50	25	50		
Litter size at birth (total born)	7.33	7.33	6.09	8.33	8.00	0.33	NS
Litter size at birth (total alive)	6.39[ab]	6.40[ab]	5.84[b]	7.16[a]	7.24[a]	0.20	**
Litter size at weaning	5.52[a]	5.27[ab]	4.32[b]	6.27[a]	6.16[a]	0.22	**
Litter weight at birth (g)	412[ab]	403[b]	340[b]	540[a]	538[a]	25.99	**
Litter weight at weaning (g)	2500[b]	2499[b]	1861.92[c]	3135[a]	2983[ab]	138.1	*
Total litter gain (kg)/doe	2.143[b]	2.096[b]	1.521[c]	2.594[a]	2.445[a]	0.10	**
Kid weight at birth (g)	64.47[ab]	62.96[ab]	58.33[b]	75.41[a]	74.30[a]	2.39	**
Kid weight at weaning (g) (28 day)	452.89	474.19	431.00	500.00	484.25	10.31	NS
Total weight gain of kid (g)	388.42	411.23	372.67	424.59	409.9	13.11	NS
Daily weight gain of kid (g)	13.87[ab]	14.68[a]	13.31[b]	15.16[a]	14.63[a]	6.30	**
Mortality% of kids [from birth (total alive till weaning)	13.61[b]	17.65[b]	26.02[a]	12.43[b]	14.91[b]	1.60	**

DPF:discarded palm fronds , Bio-DPF: Biologically treated discarded palm fronds.
a, b--- Means in the same row with different superscripts are significantly different ($P<0.05$).
NS: Not significant, **:($P<0.01$).

conocarpus + EM1 and with 15 or 30 % conocarpus with *Trichodermareesi* significantly (P≤ 0.05) increased litter size and weights from birth up to weaning and significantly (P≤0.05) increased litter daily weight gains. Additionally, large litter size post-reported that the effects may evoke great tactile stimulation of teats and indirectly enhance milk secretion through increased prolactin release (Lukefahr*et al*., 1983).Also, these results has discussed by Szendro*et al*., (2002) who reported that the milk production available per kid may be have a pronounced effect on the mortality of young rabbits. Besides that, decrease of mortality rate may be reflecting an increase of milk quality with treated diets by biological treatments. Moreover decreasing in mortality rate for young rabbits belong to treated groups during suckling period may be due to increase milk yield (Table 4). Drummond *et al*., (2000) found that rabbit kids with high birth weight was grew faster and weight level increased stable over the 3 weeks. The obtained improvement of the growth performance and the milk production with groups fed Bio-DPF might be due to the decreasing of anti nutritional factors (cellulose and hemi cellulose) and biologically treated palm fronds grinded was high content of exogenous enzymes, amino acids, and other secondary metabolites, like vitamins as a result of microorganism activity in diets contained Bio-DPF which improved the growth performance and the milk production.

Effect of dietary treatments on milk yield

Results presented in Table (6) showed that the effect of DPF and Bio-DPF on milk yield. Does fed dietary inclusion of Bio-DPF recorded significantly the highest milk yield during four weeks of lactation compared with the other groups. However, the does fed higher included level 50% DPF recorded great depression in milk yield during the four weeks period. The mean value of milk yield during four weeks showed the same trend as weekly recorded values of milk yield.

This improvement may be due to that does in those treatments consumed insignificantly the highest feed intake during suckling period which reflected on milk yield. These results are agreement with Ali *et al*., (2017) found that feeding the rabbit does on diets contained 15% conocarpus + EM1 and with 15 or 30 % conocarpus with *Trichodermareesi* replacement of berseem hay significantly ($P \leq 0.05$) gave the highest milk yield. Al-Suwaiegh and Yousef (2017) found that goats fed 30% urea treated palm leaves replacement of clover hay significantly higher in milk yield compared with other group. Gaafar *et al*., (2014) reported that during lactation, milk production was greater in does fed on fibrous dietary diets. Also, results confirm that generally, rabbit's milk yield showed gradual increase until 21^{th} day of lactation; afterwards it decreases by next 10 days (Lukefahr *et al*., 1983 and Chrastinova *et al.*, 1997). Also, EL-Sayaad (1994) reported that the increasing in the litter size seemed to induce stimulation for mammary glands to produce high milk quantity. However, Abo-El-Ezz *et al*., (1981) mentioned that inconsistent in milk yield increased by increasing the litter size.

Furthermore the obtained results of milk yield explained the highest loss in body weight for does fed Bio-DPF, whereas does produced the largest amount of milk yield lost more weight.

Table 6. Effect of feeding DPF or Bio-DPF on milk yield of does (g/d).

Items	Control	DPF, %		Bio-DPF, %		SEM	Sig.
		25	50	25	50		
1st week	75.21^{bc}	79.32^{b}	65.61^{c}	95.11^{a}	90.23^{a}	3.09	**
2nd w eek	119.11^{ab}	121.38^{ab}	98.76^{b}	139.31^{a}	136.70^{a}	4.82	**
3rd week	130.38^{b}	135.11^{ab}	114.62^{b}	151.43^{a}	149.00^{a}	4.82	**
4th week	121.12^{ab}	124.34^{ab}	100.60^{b}	135.32^{a}	133.11^{a}	4.86	**
Milk yield (g/d)	111.45^{ab}	115.04^{ab}	94.89^{b}	130.29^{a}	127.26^{a}	3.59	**

DPF:discarded palm fronds , Bio-DPF: Biologically treated discarded palm fronds.
a, b--- Means in the same row with different superscripts are significantly different (P<0.05).
NS: Not significant, **:(P<0.01).

Blood biochemical analysis

As shown in Table 7, the recorded results showed that adding Bio-DPF to doe rabbit diets significantly increased concentrations of total protein compared to other treatments, and significantly increased concentrations of globulin with adding Bio-DPF and 25 DPF. Despite decreased albumen/globulin ratio with Bio-DPF and 25% DPF compared to 50% DPF group. These results indicated that inclusion Bio-DPF in does diet might be improve rabbit immunity and protein supply to milk production compared with other treatments. Adding the DPF and Bio-DPF to doe rabbits diet did not affect on the activities of AST, ALT enzymes, albumin, creatinine and urea compared to control group which suggest that those treatments haven't adverse effect on liver and kidney functions. Total cholesterol and total lipids were significantly affected by experimental treatments. However, total cholesterol and total lipids were not affected by using DPF but total lipids significantly decreased by using 25%Bio-DPF diet. In this respect, El-Bordeny and Abdel-Azeem (2007) found that replacing clover hay by palm tree leaves caused insignificant increase in serum total proteins and albumin concentrations compared to the control. El-Bordeny and Abdel-Azeem (2007) found rabbits group received a diet with 36% palm tree leaves recorded the lowest value (P≤0.05) of total lipids concentration compared to the other experimental groups which received 12 or 24% palm tree leaves. Also, they found insignificant differences were observed in total cholesterol and AST between the different experimental groups, control group recorded the highest value (P≤0.05) of ALT activity followed by the group received 24% then 36% palm tree leaves, while the lowest value was that of the

Table 7. Effect of feeding DPF or Bio-DPF on blood biochemical analysis.

Items	Control	DPF, %		Bio-DPF, %		SEM	Sig.
		25	50	25	50		
Total protein (g/dl)	4.14[b]	4.42[b]	3.97[b]	5.72[a]	5.28[a]	0.26	**
Albumin (g/dl)	2.25	2.47	2.16	2.74	2.63	0.09	NS
Globulin (g/dl)	2.13[c]	2.72[b]	2.05[c]	3.12[a]	2.95[ab]	0.11	**
Albumin / Globulin ratio	0.92[b]	0.90[b]	1.05[a]	0.87[b]	0.89[b]	0.02	*
ALT(U/L)	39.10	35.80	34.69	31.04	29.75	1.87	NS
AST(U/L)	37.28	33.00	31.59	28.12	25.37	1.84	NS
Total cholesterol, mg/ dl	333.00[a]	324.04[a]	276.21[b]	317.40[a]	263.67[b]	8.59	**
Creatinine, mg/ dl	1.59	1.53	1.29	1.35	1.25	0.05	NS
Urea-N, mg/ dl	31.33	29.35	28.62	25.66	20.82	2.05	NS
Total Lipids (mg/dl)	184.33[a]	170.00[ab]	152.33[bc]	162.73[bc]	144.33[c]	4.38	**

DPF: Discarded palm fronds , Bio-DPF: Biologically treated discarded palm fronds.

a, b--- Means in the same row with different superscripts are significantly different ($P<0.05$). NS: Not significant, **:($P<0.01$) and *:($P<0.05$).

group received 12% palm tree leaves. Abd- El Ghany *et al*., (2016) found that cholesterol and total lipid were significantly (P≤ 0.05) lower in rabbits fed biologically conocarpus by EM_1 as compared with untreated one.

Economic efficiency

The economic efficiency (%) of the present experimental treatments was calculated based upon input-output analysis of the total feeding cost/doe and the prevailing selling price of the litter/doe at weaning (Table 8).

The present results indicate an increase of total and net relative revenue for rabbits fed on diets contained Bio-DPF compared to other treatments. it can be noticed that rabbits fed the diets contained 25 or 50% Bio-DPF were achieved the highest economical efficiency (1.077 and 1.053) and relative economical efficiency (127.79 and 127.65) followed by rabbits fed 25% DPF and the least was the rabbits fed 50% DPF. These results are in harmony with those of Ali *et al*., (2017) who reported that replacing 15% and 30% of berseem hay by biological treated conocarpus with fungus or EM_1compared to those untreated in rabbit's does diet resulted in better economical efficiency (%).

Table (8). Effect of feeding DPF or Bio-DPF on economic efficiency.

Items	Control	DPF, %		Bio-DPF, %	
		25	50	25	50
Price/kg diet	4.50	4.41	4.42	4.21	4.24
Total feed consumed doe/gestation period/kg	4.38	4.63	4.43	5.60	5.63
Total feed consumed doe/suckling period/kg	6.49	6.39	6.24	6.73	6.50
Total feed cost /doe (LE)	48.91	48.59	47.16	51.90	50.41
Litter size at weaning	5.52	5.27	4.32	6.27	6.16
Total revenue/Litter at weaning (LE)[1]	89.25	89.59	73.44	106.59	104.72
Net revenue/doe (LE)[2]	40.34	41.00	26.28	54.69	54.31
Economical efficiency (LE)[3]	0.824	0.8437	0.577	1.053	1.077
Relative economical efficiency	100	102.39	67.62	127.79	127.65

DPF: Discarded palm fronds , Bio-DPF: Biologically treated discarded palm fronds.
[1]*Total revenue = Litter size 17 assuming that the selling price of each rabbit at weaning was 17 LE .*
[2]*Net revenue/ rabbit doe (LE) = Total revenue/ Litter at weaning- Total feed cost / rabbit doe.*
[3]*Economic efficiency = Net revenue/ rabbit doe/ Total feed cost / rabbit doe (LE).*

Conclusively, it could be concluded from the present study that replacing 25 or 50% of clover hay by biological treated discarded palm fronds with effective microorganisms (EM_1) in rabbit does diets, resulted in improve their reproductive and physiological responses without any adverse effect.

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الأستجابة الأنتاجية والفسيولوجية للأمهات لأرانب النيوزيلاندى الأبيض المغذاه على جريد النخيل المجروش .

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أجريت هذة التجربة لدراسة تأثير إستخدام ٢٥ أو ٥٠% جريدالنخيل المجروش(DPF)او معامل بيولوجيا (Bio-DPF)إحلال من دريس البرسيم على الصفاتالتناسلية والفسيولوجية لأمهات الأرانب النيوزيلاندي الابيض و الكفاءة الأقتصادية. تم تقسيم ٢٥ أم نيوزيلاندي أبيض عمر ٥ اشهر بمتوسط وزن٣١٤٠ ± ٢٦,٥٥جم الى (٥ أم لكل معاملة). وكانت العلائق التجربية كالتالى: العليقة الأولى وهى عليقة كنترول بدون إحلال بينماتحتوى العلائق الأخرى على ٥ و١٠% إحلال من العليقة من جريدالنخيل المجروشمعامل او غير معامل ب(EM_1)(٢٥ أو ٥٠% من دريس البرسيم).

يمكن تلخيص النتائج كما يلى:

المعاملة البيولوجيه حسنت من التركيب الكيميائي لجريدالنخيل المجروش حيث حدث إرتفاع فى محتواه من البروتين الخام و إنخفاض الآلياف الخام. كما وجد تأثير معنوى فى كلا من المأكول اليومى والتغير فى وزن الجسم أثناء فترة الحمل والرضاعة عند إحلال جريدالنخيل المجروش المعامل بالمقارنة بالمعاملات الاخرى.

وجد تحسن معنوى فى عدد ووزن الخلفات من الولادة حتى الفطام وهذا أدى الى انخفاض معنوى فى النسبة المئوية للنفوق مع العلائق التى تحتوى على جريدالنخيل المجروشالمعامل.

وجود تحسن معنوى فى كمية اللبن عند تغذية الأرانب على علائق تحتوى على جريدالنخيل المجروشالمعامل.

أظهرت النتائج ايضا وجود زيادة معنوية فى البروتين الكلى و الجليوبولين مع الأرانبالمغذاه على جريدالنخيل المجروش المعامل. بينما وجد نقص معنوى فى كوليسترول والليبيدات الكلية مع الأرانب المغذاه على ٥٠% جريدالنخيل المجروش المعامل والغير المعامل.٦- أشارت النتائج الى أن المجموعات التى غذيت على جريدالنخيل المجروش المعامل حققت أعلى كفاءة إقتصادية بالمقارنة مع المعاملات الأخرى .

التوصية: أشارت النتائج إلى إن إستبدال جريدالنخيل المجروش المعامل بيولوجيا محل دريس البرسيم فى علائق أمهات الأرانب حسن من الأداء التناسلى والفسيولوجى للأرانب بلأضافة الى تحسين الكفاءة الأقتصادية.

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