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EFFECT OF FEEDING DIETS CONTAINING DRIED LEFTOVER FOOD ON PRODUCTIVE PERFORMANCE OF RABBIT DOES

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SUMMARY

The present study was conducted on rabbit does to evaluate the effect of using dried leftover food on nutrients digestibility, productive performance and some blood parameters. Forty V-Line rabbit does were chosen at 1st and 2nd seasons (7-12 months of age). They were divided into 4 similar groups (10 does, each) according to their initial live body weight (3117.5g±102.5g), animals were fed four experimental diets containing 0, 10, 20 and 30% dried leftover food (DLF) for 120 days, and will be referred to as groups D1, D2, D3 and D4, respectively. Results indicated that the chemical composition of DLF was 14.96, 2.53, 7.34, 69.87 and 5.30% for CP, CF, EE, NFE and ash, respectively. The digestibility coefficients of DM, CP, CF, NFE, TDN and DCP were insignificant improved with increasing the level of DLF in diets. On the other hand OM and EE values were significantly improved with increasing the level of DLF up to 30% in their diets compared with that of control group. Post-natal weight, gestation length and number of mating were not significantly affected by increasing the level of DLF up to 30% in diets as compared to the control group. Litter weights were insignificantly higher with tested diet D4 at 7, 14 and 21 days compared with control one (D1). D4 had significant effect on increasing bunny weight gain than control group during the periods from birth to 14, 21 and 28 days. The mortality rate was decreased with tested diets (D2, D3 and D4) compared with the control group. Total milk yield, milk efficiency and milk yield from birth to7, 14, 21 and 28 days were insignificantly better with diets contained 10 up to 30% DLF, than that of control group. No significant differences among tested diets with respect to all blood metabolites except for urea and albumin which significantly decreased with increasing the level of DLF in diets. In conclusion DLF could be used in the feeding of rabbits does up to 30% with no adverse effect on general and productive performance.

Keywords: Rabbit does, leftover food, productive performance

INTRODUCTION

Rabbit's production plays an important socio-economic role in Egypt. They provide major opportunities for increased protein supply and income for small household farmers as well as well as the farm community. Furthermore, they have comparative advantages over ruminants in their faster rate of reproduction, growth and fertility. One of the main interesting points in rabbit production is how to achieve optimum growth rate. Growth in rabbit is mainly affected by the growth gain during suckling period especially during the first three weeks of life, so for a successful rabbit production, a great interest must be focused on the newborn bunnies especially during their suckling period, which directly affect on their growth rate later on in their life cycle.. Lactation can be used as an evaluating factor for the reproductive efficiency of the doe. Rabbit's milk yield varies according to a number of physiological, inherited and environmental factors (Lebas,1987) and Szendro *et al*., 2002). It increases gradually from the 1st week to reach its maximum at the 3rd week, then decreases there after (De Blas and Galvez, 1973,Khalil, 1993,El-Sayiad, 1994,Nasr,1994 and Ayyat *et al.,* 1995).Some factors effect on productive performance and milk yield of rabbit dams like diets quality, season of birth number of suckling bouts, dam body weight, litter size, sex of the suckling kids. Animal feed is the largest single cost item of livestock production, accounting for 60-85% (FEFAC, 2018) (depending on the farm species) of the total cost inputs/year (Lawrence *et al.,* 2008). Innovative feeding and nutrition practices have become increasingly important as livestock systems strive to become more efficient and sustainable (Luciano *et al.,* 2020). With the diminishing availability of farmland, climate change and the threat of declining water resources, livestock needs to meet the growing demand for food and feed by using fewer resources. The re-use of food losses as sustainable ingredients for feed formulations could represent a promising alternative to cereal grains for both monogastrics and ruminants, increasingly livestock sustainability and reducing the competition between animal and human nutrition (Pinotti *et al.,* 2021).In recent times the use of food waste in animal diets has gained considerable attention because of the increasing demand to cover the needs of human population and the high prices of conventional, arable based, animal feeds (Giamouri *et al.,*2021). Recycling Cafeteria food leftover into livestock feed ingredient have a potential to minimize livestock feed cost as well as protecting the environment against pollution derived from the leftover (Sim, 1998). The leached from cafeteria leftover has a potential to pollute the water, air and soil because of their high moisture content. Converting and recycling of leftover food into animal feed are very important because leftover food can contribute not only decreasing cost of feed ingredients, but also decreasing environmental pollution (Yang *et al.*, 2001and Lamesgin *et al.*, 2020).The selection of the most appropriate raw materials and the feed formulation are two factors that can influence efficiency indicators (Pinotti *et al*., 2019). There is a worldwide trend for waste reduction, including food waste reduction. This has led to an increase in the recycling and reuse of these products in the animal feed chain (Organization,2019). Food leftovers as a cereal substitution are an example, since they do typically not compete for land consumption with food production (Van Hal *et al.*, 2019). Several products that humans cannot eat could be suitable as livestock feed, e.g. co-products, food-waste and biomasses such as plant by-products (Pinotti *et al.*, 2020). This can include different types of food biomasses and edible material intended for human consumption, arising at any point in the food supply chain, such as that collected at restaurants, retail, or from household food scraps (Gustafsson *et al.*, 2013). The main target of this study was to investigate the effects of Cafeteria leftover food on productive performance, digestibility and some blood parameters of rabbits does.

MATERIALS AND METHODS

This study was carried out at El-Gemmaiza Animal Production Research Station, El-Gharbia Governorate, belonging to Animal Production Research Institute (APRI), Agriculture Research Center (ARC), Ministry of Agriculture, Egypt, and the chemical analysis was carried out at laboratories of APRI, ARC.

Preparation of dried leftover food:

Leftover food (DLF) was collected from Hotels in Cairo Governorate in fresh state (approximately 75% moisture), that consisted of beans, grains, rice, pasta, bread, cooked vegetables, some fruits and … etc. then directly minced after collection, sun air dried under shade until the moisture reached about 10% and stored in a well tight bags at room temperature 25°C.

Experimental animals and feeding:

Forty V-Line rabbit does were chosen at 1st and 2nd seasons, (7-12 months of age) and divided into 4 similar groups (10does/group) according to their initial live body weight (3117.5g±102.5g). The experimental period, extended for three parities from November, 2020 to March, 2021. Group D1 was fed the basal diet (control), while groups D2, D3 and D4 were fed their diets which included dried leftover food (DLF) at percentages of 10, 20 and 30%, respectively to evaluate the utilization of DLF in feeding rabbit does. The experimental diets were formulated to be iso-nitrogenous (~17% CP) and iso-caloric (~ 2500 Kcal DE/Kg diet). All diets were pelleted and contained adequate levels of nutrients to satisfy the nutrients requirements of rabbits according to Agriculture Ministry Decree (1996). Does of each group were housed separately in individual galvanized wire batteries and raised 100 cm from the concrete floor. Nest boxes (30 x 25 x 30 cm) were attached to the front sides of the cages five days prior to kindling and removed at 28 days of lactation (weaning age) in a well-ventilated building (natural through the window) and offered the experimental pelleted diets at *ad libitum*. Fresh water was available at all times from automatic drinkers with nipples for each cage. Urine and feces dropped from cages on the floor were cleaned every day in the morning. All does were observed daily, kept under the same managerial, hygienic and environmental conditions, and vaccinated against common diseases. Each doe was transferred to the cage of buck assigned for mating and returned back to her own cage after being mated and palpated for pregnancy at10 days after mating and those failed to conceive were returned to the same mating buck to be remated within 12 hours, after kindling, litter size, and litter weight were recorded. Bunny were weighted at 7, 14, 21 and 28 days (at weaning age) and daily gain weight up to weaning were also recorded. Body weights of does were recorded at kindling. Gestation length from fertile mating to kindling was estimated. Milk yield for each doe was measured individuallyat7, 14, 21 and 28 days by difference in weights of the pups and doe after and before suckling. Averages of daily milk yield and total milk yield during the sucking period were measured. Feed intake was weekly recorded during the experimental period. The experimental diets were manufactured at Atmida factory. Samples of the diets, DLF and feces were analyzed for crude protein (CP%), crude fiber (CF%), ether extract (EE%) and ash% according to the methods of A.O.A.C. (1996). Ingredients of the experimental diets are presented in Table (1). Also, chemical analysis of dried leftover food (DLF) and experimental diets are presented in Table (2).

Digestion trials:

Four digestibility trials were carried out to determine the nutrients digestibility and feeding values of the experimental diets. A total number of 12 males of rabbits were taken randomly (3 males/group) and allotted in different treatments. Rabbits were housed individually in metabolic cage to facilitate the collection of all droppings throughout the digestibility trials. Each trial lasted for 26 days; the first three weeks were as a preliminary period, followed by 5 days for feces collection. Rabbits were fed twice daily at 8.00 and 16.00 hr, water was offered freely. Feed intake was daily recorded and quantitative collection of feces was started 24 hours after offering the daily feed, sprayed with 2% boric acid for trapping any ammonia released, then oven dried at 60oC till constant weight, finely ground and stored for chemical analysis. Digestion coefficients of nutrients and feeding values were calculated according to Abou-Raya (1967).

Table 1. Ingredients and calculated composition of the experimental diets (as fed)

Items	Experimental diets %			
	D1	D2	D3	D4
Ingredients (%):				
Dried leftover food (DLF)	0	10	20	30
Clover hay	32	32	32	32
Yellow corn	8	5	2	2.6
Barley	22	21	20	11
Soybean meal	17.3	17	16.7	16.4
Wheat bran	13.9	8.2	2.5	1.2
Molasses	4	4	4	4
DL-Methionine	0.1	0.1	0.1	0.1
Vitamins & minerals mixture1	0.5	0.5	0.5	0.5
Salt	0.5	0.5	0.5	0.5
Limestone	1.2	1.2	1.2	1.2
Di-Calcium phosphate	0.5	0.5	0.5	0.5
Total	100	100	100	100

1-Supplied per Kg of diet: 12000 IU Vit. A; 2200 IU Vit.D3; 10mg Vit.E; 2.0 mg Vit.K3; 1.0 mg Vit.B1; 4.0 mg Vit.B2; 1.5 mg Vit.B6; 0.0010mg Vit.B12; 6.7 mg Vit. Pantothenic acid;6.67 mg Vit. B5; 1.07mg Biotin; 1.67 mg Folic acid; 400 mg Choline chloride; 22.3 mg Zn;10 mg Mn; 25 mg Fe; 1.67 mg Cu; 0.25mg I; 0.033 mg Se and 133.4 mg Mg.l D1=group that fed the basal diet (control). D2, D3 and D4=groups that fed the basal diet included dried leftover food (DLF) at rate of 10, 20 and 30%, respectively.

Blood parameters:

Individual blood samples were collected from does at the end of feeding trial from the ear veins in dry clean centrifuge tubes containing few drops of heparin solution and centrifuged at 4000 r.p.m for 15 min. to separate blood plasma, and then stored at -20°C ±1 until the time of analysis to estimate some blood parameters. Various chemical parameters were calorimetrically determined using commercial kits; following the same steps as described by manufactures. Total proteins was measured as described by the Biuret method according to Armstrong and Carr (1964); albumin was assayed according to Doumas *et al*. (1971); globulin was calculated by subtracting the albumin value from total proteins value. Urea and creatinine were measured according to Berthelot (1959)and Faulkner and King (1976),respectively. Liver functions were assessed by measuring the activities of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) according to Reitman and Frankel (1957).

Statistical analyses:

Data were analyzed using the general linear models procedure of SAS (2004). The difference between means was tested). by Duncan's Multiple Range Test (Duncan, 1955

The used model was: $Y_{ij=}\ \mu+T_i+e_{ij}$

where: Y_{ij}= the observation of ij, μ= overall mean of Y_{ij}. T_i= effect of i^{th} treatments. e_{ij} = the experimental random error.

RESULTS AND DISCUSSION

Chemical composition:

Approximate chemical analysis of DLF was within the normal range that widely recorded in the literature and presented in Table (2). Results showed that, DLF had reasonable values of protein, EE, ash and nitrogen free extract and low content of crude fiber. The present values are comparable to those reported by Yinnesu and Mamuye (2015) who reported that Chemical Composition (DM bases) Cafeteria left-over meal contained DM 90.4%, CP 17.46%, EE 2.35%, Ash 3.76%, CF 1.33%, Ca 2.03% and ME Kca/Kg 3807.46. Also findings here are similar to those obtained by Ravi and Saikia (2017)who reported that chemical composition of kitchen waste contained 18.85-20.94% DM, 17.59-21.43%CP, 2.14-6.10% CF and 8.7-13.42% EE. Phillip *et al.* (2020) who reported that chemical composition of DLF was contained 15.87%, CP. The value of CP is close to the range that reported by Kim (1995) who recorded that the approximate analysis of leftover foods was 20-28% for CP, 10-14% for EE, 2-4% CF and 6-12% for ash when its moisture content was below 5%. While, Cho *et al*. (2004) showed that the chemical composition of DLF was 93.70% DM, 20.62% CP, 9.99% EE, 8.87% CF and 13.67% ash. The differences of chemical composition of DLF depends on the proportions of its composition as citric, vegetable, cereal, and processed food waste (Fausto-Castro *et al*., 2020). Lamesgin *et al.* (2020)showed that chemical composition of fermented cafeteria food leftover (FCFL) contained 11.72% CP, 0.58% CF, 8.66% EE, 4.9% ash and 4170.74 ME (Kcal/kg DM).Generally, DLF is rich in most nutrients and could be used as an effective ingredient and mostly considering it as a good feedstuff in the diets of rabbit does, with high nutritive value in terms of DE. Therefore it is suggested that dried leftover food can be interesting alternative for rabbits, without neglecting the sanitary aspects involved.

Chemical analysis of the experimental diets are presented in Table (2). Results of chemical composition showed slight differences among experimental diets (D1 up to D4) in percentages of (OM and CP), with slightly decrease D1 up to D4. The highest value (14.6%) of CF was found with D1 (control group) with gradually decreasing from D1 to D4. On the other hand, the percentages of EE, NFE and ash gradually increased from D1 to D4 with highest values withD4. The chemical composition of tested diets appeared to be within the normal range as that published in the literatures.

Table 2. Chemical composition (%) of the experimental diets of rabbit does (on DM basis)

Items	OM	CP	CF	EE	NFE	Ash	*DE
Dried leftover food (DLF)	94.70	14.96	2.53	7.34	69.87	5.30	2858
Experimental diets							
D1	93.35	19.53	14.60	2.57	56.65	6.65	2500
D2	93.31	19.50	13.95	2.90	56.96	6.69	2504
D3	93.27	19.45	13.30	3.23	57.29	6.73	2508
D4	93.08	19.40	12.84	3.73	57.11	6.92	2501

*Calculated according to Cheeke (1987).

Nutrients digestibility and feeding values:

Digestion coefficients and feeding values of tested diets are presented in Table (3). Results revealed that the digestibility coefficients of some nutrients and feeding values did not significant affected by increasing the level of DLF up to 30% in diets, while OM and EE values were significant with higher mean only with D4 that having either DLF at 30% level. The addition of DLF by the three levels led to an insignificant improvement in the digestibility of most nutrients in comparison with those of control group (D1). Those results agreed with Chae *et al.* (2000) who reported that CP and EE digestibility were increased with increasing levels of dried food waste in the diets of pigs. The high CP content of Kitchen food wastes may be enhancing the efficiency of gut micro flora such as proteolytic bacteria and cellulytic bacteria which leads to increase nutrients digestibility (Dawson *et al.* 1990). Meanwhile, pigs fed diets consisted of dried Cafeteria leftover showed higher DM digestibility (Almeida *et al.*2014) and higher CF and EE digestibility (Amene *et al.* 2016), may be due to the existence of soluble components in dried Cafeteria leftover or exposed food to heat treatment during cooking which increase food digestibility. Also, Phillip *et al.* (2020) showed that most nutrient digestibilities and feeding values were improved with increasing level (up to 50%) of dried leftover food in lambs rations. Recently, Helal *et al.* (2021) who reported that the highest OM, CP and EE digestibility were recorded in rabbits fed on a diet containing 30% Kitchen food wastes, while the lowest was observed in 40% group compared with the tested group.

Table 3. Digestibility coefficients and feeding values of experimental diets

Experimental diets	Digestibility %						Feeding values %	
	DM	OM	CP	CF	EE	NFE	DCP	TDN
D1	64.85	67.43b	67.39	44.20	76.98b	73.00	13.16	65.42
D2	65.71	68.30ab	69.01	44.77	78.60b	73.29	13.46	66.58
D3	66.35	68.56ab	69.36	45.06	79.21b	73.14	13.49	67.14
D4	68.06	70.16a	70.17	45.25	83.29a	74.90	13.61	69.19
±SE	±1.14	±0.678	±1.02	±1.67	±1.11	±1.35	±0.243	±1.61

a and b means in the same column with different superscripts are significantly ($P \leq 0.05$) different.SE=standard error.

Mating weight, post-natal weight, gestation length and number of mating:

Mating weight, post-natal weight, gestation length and number of mating are shown in Table (4). Results revealed that body weight of does at mating did not affect significantly by tested diets. Also, post-natal weight, gestation length and number of mating had insignificant effect by increasing the level of DLF up to 30% in diets. The present results are in agreement with those obtained by Ajayi *et al.* (2005) they, reported that high conception rate in rabbits fed maize-milling waste based diets compared to control diet. Also, length of gestation period of does in different treatment groups fed unautoclaved maize milling waste was not significantly effected.

Table 4. Mating weight, post-natal weight, gestation length and number of mating as affected by feeding experimental diets

Items	Experimental diets			
	D1	D2	D3	D4
Mating weight (g)	3118.00±100.7	3015.00±100.7	3220.00±100.7	3200.00±100.7
Post-natal weight (g)	3388.00±63.36	3372.76±64.45	3313.85±68.06	3313.46±68.06
Gestation length (day)	31.43±0.159	31.57±0.159	31.57±0.159	31.73±0.159
No. mating	1.90±0.201	1.67±0.201	1.80±0.201	1.97±0.201

SE=standard error.

Litter size, litter weight and Mortality rate:

Litter size, litter weight and Mortality rate of rabbit does are presented in Table (5). Results clearly indicated that litter size at birth was not significantly influenced by DLF substitution in doe diets. Rabbit does fed diet substitution with 20% DLF achieved the highest litter size at 28 days compared with control group. These results are in agreement with Mahmoud (2013a)showed that both male and female birth weight as affected by their litter size, obtained data showed a reverse relationship between the litter size and birth weight. Concerning litter weight (Table 5) demonstrated that the litter weight at 7, 14, 21 and 28 (weaning) days insignificantly increased compared to control. However, Rabbits fed control diet (D1) recorded the lowest litter weight at weaning (1347.92g) while, D3 had the highest mean values of litter weight at weaning(1491.74g). These results are in agreement with Ramesh *et al.* (2012)who reported that the litter size at birth did not differ that much among the groups, at weaning more number of piglets weaned in swill fed group. Concerning mortality rate, results in Table (5)indicated increase in the DLF up to 30% substitution in rabbits diets which showed significant ($p<0.05$)decrease in the mortality rate compared with the control group and D4, from birth to 7 days. On the other hand, the experimental groups had insignificant effect on mortality rate from birth to 14, 21 and 28 days with lowest values in D3. Ramesh *et al.* (2012) found that pre-weaning mortality of piglets was lowest in pigs maintained on 50 % swill fed group. Ranjan (2000) who also noticed significantly lower pre- weaning mortality in pigs maintained on hostel waste (14.29 %) than other groups ranging from19.87 to 21.56 %.

It was inferred that feeding of hostel waste to gilts both during gestation and lactation not only increased the litter size at weaning, but also improved the survival rate of suckling piglets.

Table 5. Effect of Experimental diets on litter size, litter weight and mortality rate of rabbit does

Items	Experimental diets			
	D1	D2	D3	D4
Litter size at:				
Birth	7.07±0.409	6.03±0.409	6.12±0.432	6.04±0.440
7 days	5.58±0.380	5.08±0.396	5.42±0.396	5.52±0.404
14 days	5.12±0.369	4.39±0.384	4.83±0.376	4.52±0.384
21 days	4.36±0.364	4.18±0.388	4.78±0.380	4.36±0.388
28 days (Weaning)	4.13±0.360	4.18±0.376	4.61±0.367	4.14±0.376
Litter weight (gm) at:				
Birth	384.83±23.69	377.59±23.69	380.00±25.01	378.40±25.51
7 days	651.15±44.37	632.50±46.19	647.08±46.19	654.35±47.18
14 days	907.20±63.86	907.83±66.58	908.33±65.18	910.00±66.58
21 days	1095.20±70.85	1095.91±75.53	1107.39±73.87	1137.27±75.53
28 days (Weaning)	1347.92±105.33	1370.91±110.01	1491.74±107.59	1436.67±112.60
Mortality rate at:				
Birth -7 days	22.27a±3.82	18.13ab±3.97	13.69ab±3.97	9.30b±4.06
Birth -14 days	27.52±4.72	25.79±4.93	24.28±4.82	24.34±4.93
Birth -21 days	37.28±4.69	30.56±5.00	25.43±4.89	29.69±5.00
Birth -28 days	41.18±4.67	30.56±4.88	28.13±4.77	32.42±4.88

a and b means in the same row with different superscripts are significantly ($P\leq0.05$) different.SE=standard error.
Mortality rate= (Litter size at birth- litter size at weaning) / Litter size at birth*100.

Average bunny weight and bunny weight gain:

Aver**age** bunny weight and bunny weight gain are shown in Table (6). Feeding the does on diets containing DLF increased significantly ($P<0.05$) mean bunny weight at birth, 14and 21 days compared with control group. Does fed diet which contained 30% DLF had the highest mean bunny weight at 14, 21 and 28 days. However, the control group recorded the lowest mean bunny weight values at birth, 7, 14 and 28 days. Feeding does on diets containing 30% DLF significantly ($P<0.05$) increased bunny weight gain than control group during the periods from birth to 14, 21 and 28 days. However, rabbits fed control diet achieved the lowest bunny weight gain as presented in Table (6), the obtained results may be due to D4 group had the highest average of total milk yield which lead to improve bunny weight and bunny weight gain. This finding was supported by Sinha (1989) who also observed faster growth in pigs maintained on kitchen waste as compared concentrate fed group. The higher growth rate in pigs maintained completely on kitchen waste played a significant role in meeting the requirement of growing animals (Raju *et al*., 2004).

Table 6. Effect of experimental diets on average bunny weight and bunny weight gain

Items	**Experimental diets**			
	D1	**D2**	**D3**	**D4**
Bunny weight (gm)at:				
Birth	54.78b±8.33	82.43a±8.33	63.64ab±8.79	63.46ab±8.97
7 days	117.39±6.03	132.05±6.28	120.97±6.28	126.27±6.41
14 days	176.57b±8.81	216.42a±9.18	197.26ab±8.99	216.86a±9.18
21 days	256.19ab±15.50	278.48ab±16.52	245.64b±16.16	303.32a±16.52
28 days (Weaning)	331.96±16.42	346.11±17.15	340.02±16.78	382.75±17.56
Bunny weight gain (gm) at:				
Birth -7 days	61.50±5.72	69.94±5.84	57.34±5.84	63.20±5.97
Birth -14 days	120.15b±8.57	153.94a±8.76	133.63ab±8.57	153.78a±8.76
Birth -21 days	199.08ab±15.48	216.07ab±16.17	182.29b±15.81	239.95a±16.17
Birth -28 days	262.03b±17.03	283.70ab±17.79	276.67ab±17.40	319.61a±18.20

a and b means in the same row with different superscripts are significantly ($P< 0.05$) different.SE=standard error.

Milk yield traits:

Total milk yield, milk efficiency and milk yield at different periods are shown in Table (7). Data showed that there were no significant differences in milk production for doe rabbits fed diets with DLF during the suckling period. Does fed on diet containing 30% DLF had the highest values of total milk yield and average milk yield during the periods from birth to 7,14, 21 and 28days compared to the control diet. Those results may be due to the improvement of digestion coefficients of D1up to D4. The present results are in agreement with Mahmoud (2013b) showed that milk yield differed according to the sex of the suckling pups, it was higher significantly in male kids versus female kids, also it increased significantly by increasing the litter size of the suckling kids. In general, leftover food could be used in diets in all animals, poultry and fish, Al-Ruqaie (2007) showed that the extruded leftover food could be used to prepare least cost diet for Nile tilapia. Oliyad *et al.* (2020) reported that the DCFL can be safely included up to 15% in the broiler diets by replacing maize grain in smallholder poultry settings for improved and sustainable food security of the poor community. Ravi and Saikia (2017) suggested that kitchen waste could be utilized as an alternative economic feed for pigs without neglecting sanitary measures involved. Fermented cafeteria food left-over (FCFL) in birds rations up to 50% has indicated improvement in feed intake and growth performance of the birds. Hence, FCFL is an important source of feed for birds in reducing feed cost leading to maximizing the net return. This could also have great role in minimizing competition for cereal grains between poultry and human being (Lamesgin *et al.,* 2020).

Table 7. Effect of different experimental diets on total milk yield, milk efficiency and average milk yield of rabbit does

Items	**Experimental diets**			
	D1	**D2**	**D3**	**D4**
Total milk yield (gm)	2974.90±191.09	2953.18±199.59	3032.26±195.20	3094.29±204.29
Milk efficiency	0.446±0.022	0.481±0.023	0.501±0.023	0.456±0.024
Milk yield (gm) at:				
Birth -7 days	695.29±49.34	698.54±51.36	702.92±51.36	735.00±52.46
Birth -14 days	871.40±64.13	879.78±66.86	881.25±65.45	885.43±66.86
Birth -21 days	952.40±75.29	956.36±80.26	961.39±78.50	971.59±80.26
Birth -28 days	391.46±41.08	395.91±42.90	449.78±41.96	455.00±43.91

SE=standard error.

Blood parameters:

Results of blood parameter of rabbit does fed the experimental diets are presented in Table (8). Data revealed that the levels of DLF in diets had insignificant effect on the concentrations of some blood parameters (total proteins, globulin, AST, ALT and creatinine). The blood parameters are intimately related to metabolism and influenced by the external environment including feeding, climate and management. The concentration of total protein was slightly decreased with increasing the level of DLF up to 30%in diets. These slightly decreases in plasma total protein and albumin concentrations may be due to indirect response to protein quality and protein intake of DLF. The insignificant effects of dietary treatments on most serum metabolites may be due to the adequacy of nutrients especially CP. Excessively serum total protein and albumin have been reported to be directly responsive to protein intake and quality (Onifade and Abu, 1998).The obtained results are in agreement with those recorded by Mousa *et al.* (2018) who reported that duck fed dried leftover food (10, 20 and 30%) decreased total serum protein, albumin and globulin values. The AST and ALT values were insignificantly (within normal range) increased with increasing the level of DLF up to 30% in tested diets. In general, the enzymes are intimately related to metabolic processes which in turn, are easily and often influenced by the external environment including feeding practice, climate and all other factors of management (Young *et al.*, 1969).Urea and albumin were significant(P<0.05) slightly affected by the tested diets. The obtained results are in agreement with those recorded by Chen *et al.* (2007) reported that chickens fed dehydrated food waste product (0, 5, 10, or 20%) increased (P<0.05) serum AST with the increase in dehydrated food waste product (DFWP). Furthermore Phillip *et al.* (2020) showed that lambs fed DLF had no significant effects on the concentrations of blood parameters. However, Hassanien *et al.* (2020) recorded that the level of DLF (20% and 40%) had no significant effects on the concentrations of blood cow calves parameters (total protein, globulin, cholesterol, AST, ALT, urea and creatinine) except for albumin that increased significantly only with 40% DLF-ration compared with control one. Also, Giamouri *et al.* (2021) reported that broilers were fed on diet containing 15% food waste residues from hotels for 42 days, no major differences were seen for hematological parameters.

Table 8. Effect of experimental diets on blood parameters of rabbit does

Item	**Experimental diets**				**±SE**
	D1	**D2**	**D3**	**D4**	
Total protein, g/dl	6.61	6.60	6.50	6.48	±0.100
Albumin, g/dl	3.58a	3.55ab	3.40ab	3.37b	±0.054
Globulin, g/dl	3.03	3.05	3.10	3.11	±0.077
AST, IU/L	12.73	12.83	12.87	12.97	±0.330
ALT, IU/L	7.67	7.72	7.80	7.87	±0.236
Urea, mg/dl	23.78a	23.63a	22.30b	22.14b	±0.186
Creatinine, mg/dl	1.12	1.11	1.08	1.07	±0.026

a and b means in the same row with different superscripts are significantly (P<0.05) different. SE=standard error.

CONCLUSION

In conclusion, dried leftover food could be used in feeding of rabbit does up to 30% of their diets with no adverse effect on productive performance and therefore may help in solving the problem of feed shortage and decrease the cost of feeding.

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تأثير العلائق المحتوية علي بقايا الطعام المجفف علي الأداء الإنتاجي لأمهات الأرانب

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تم توزيع ٤٠ من أمهات الأرانب سلالة V-Lineعند عمر ٧-١٢ شهر عشوائيا إلى ٤ مجموعات متساوية "١٠ أمهات /مجموعة" وفقًا لوزن الجسم الحي "٣١١٧.٥جم ± ١٠٢.٥جم "وتم تغذيتها بالعلائق التجريبية لمدة ١٢٠ يوم ، وذلك لتقييم مدي الاستفادة من بقايا الطعام في تغذية الأمهات وأثارها على هضم العناصر الغذائية والأداء الإنتاجي وكذلك بعض قياسات الدم .تم تغذية الأرانب علي العلائق التجريبية التي تحتوي على ٠، ١٠، ٢٠، ٣٠٪ من بقايا الطعام المجفف من إجمالي العليقه المأكولة للمجموعات د١، د٢، د٣، د٤ على التوالي .تم تكوين الأربعة علائق تبعا لمقررات وزارة الزراعة "١٩٩٦". أشارت النتائج إلى احتواء التركيب الكيماوي لبقايا الطعام المجفف على ١٤.٩٦، ٢.٥٣، ٦٩.٨٧، ٧.٣٤ و٥.٣% لكل من البروتين خام والألياف خام والدهن خام والكربوهيدرات الذائبة والرماد على التوالي .تحسنت معاملات الهضم لمعظم العناصر الغذائية والقيمة الغذائية للعلائق بشكل ضئيل مع زيادة مستوى بقايا الطعام المجفف في النظام الغذائي، بينما تم تحسين قيم معاملات الهضم للمادة العضوية و الدهن خام بشكل ملحوظ مع زيادة مستوى بقايا الطعام المجفف حتي مستوي ٣٠% في العليقة "د٤" مقارنة بمستوى العليقة الكنترول "د١". لم يتأثر وزن الجسم ووزن ما بعد الولادة وطول مدة الحمل وعدد مرات التلقيح معنويا بزيادة مستوى بقايا الطعام المجفف حتى ٣٠% في العلائق مقارنة مع مجموعة الكنترول .كان حجم المواليد ومتوسط وزن الأرانب أعلى معنوياً مع العلائق التجريبية المختبَرة "د٤" في عمر ٧، ١٤، ٢١، ٢٨ يوماً على التوالي مقارنةً بمجموعة الكنترول "د١". لوحظ نفس الاتجاه بين العلائق التجريبية مع زيادة وزن المواليد ووزن الأرانب خلال الفترات من الولادة ١٤ يوماً والولادة ٢١ يوماً والولادة ٢٨ يوماً على التوالي .انخفض معدل الوفيات مع العلائق التجريبية المختبرة "د٢، د3، د٤" مقارنة مع مجموعة الكنترول .كان إجمالي إنتاج الحليب وكفاءة الحليب وإنتاج الحليب عند الولادة ٧ أيام والولادة ١٤ يوماً والولادة ٢١ يومًا والولادة ٢٨ يومًا أفضل بكثير مع العلائق التجريبية التي تحتوي على ١٠ حتى ٣٠% بقايا الطعام المجفف، من تلك الموجودة في المجموعة الكنترول .لا توجد فروق معنوية بين المعاملات فيما يتعلق بجميع قياسات الدم باستثناء اليوريا والألبومين اللذين انخفضا بشكل طفيف مع زيادة مستوى بقايا الطعام المجفف في العلائق التجريبية .تخلص النتائج إلي انه يمكن استخدام بقايا الطعام المجفف في تغذية أمهات الأرانب بنسبة تصل إلى 30٪ مع عدم وجود تأثير سلبي على الأداء الإنتاجي.