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EFFECTS OF PARTIALLY REPLACING OF YELLOW CORN WITH DILL OR PARSLEY BY-PRODUCTS IN BROILER DIETS ON SOME PRODUCTIVE AND PHYSIOLOGICAL PARAMETERS

By

[1]M.S.Ragab; [2]Namra, M. M. M.; [1]Aly, M. M. M. and [2]Fathi. M. A.
[1]Pou. Dep., Fac. of Agric., Fayoum Univ., Egypt.
[2]Anim. Prod. Institute, Agric. Rese. Center, Ministry of Agric., Dokki, Giza, Egypt.

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ABSTRACT: *This study was carried out at the Poultry Research Station, El-Azab, Fayoum, Egypt during the period from June to August 2011. Chickens was initially fed a control diet for four days. The total number of the experimental birds (120 at five days of age) was divided into five treatments (24 birds each), each treatment contained three replicates of eight birds each.*

The experimental treatments were as follows:-

1- *Chicks fed the control diet (T1).*
2- *10% YC in T1 was replaced by dill by product.*
3- *20% YC in T1 was replaced by dill by product.*
4- *10% YC in T1 was replaced by parsley by product.*
5- *20% YC in T1 was replaced by parsley by product.*

Results obtained could be summarized in the following:

Chicks fed control diet had significantly higher LBW at 42 days, LBWG and GR during the period from 5 to 42 days of age (differences between chicks fed control diet and chicks fed partial replacing of YC by 10 or 20% dill by-product were not significant). Chicks fed partial replacing of YC by 10% parsley by-product had higher FI during the period from 5 to 42 days of age. No significant differences in FC, body temperature, respiratory rate, intestinal pH, total microflora count, blood parameters and chemical composition of broiler meat of broiler chicks fed partial replacing of YC by dill or parsley by-product. Chicks fed partial replacing of YC by 10% dill by-product had significantly better CPC, CCR and higher PI during the period from 5 to 42 days. Chicks fed partial replacing of YC by 10% parsley by-product had significantly higher total giblets% than the other treatments and control group. Chicks fed control diet had the higher MR value as compared with those fed other treatments. While, chicks fed partial replacing of YC by 10% dill by-product had the lower MR value being zero%. Economical efficiency (EEf) values was improved in chicks fed partial replacing of YC by 10% dill by-product as compared with those fed the control diet and other treatments.

It could be concluded, *that the dill by-product can be substituted up to 10% YC in Ross broiler diets reared in open houses under summer conditions of Egypt which had the best EEf values and can improve the productive performance of broiler chicks, moreover, reduce the harmful effects of the high temperature or any stressful conditions.*

INTRODUCTION

Poultry production has become one of the fastest growing industries in Egypt. Feeding cost is considered the most expensive item (60 to 70%) in the whole production process, and energy alone contributes about 70% of the feed cost *(Wilson and Bayer, 2000 and Saleh et al., 2004)*. Yellow corn (YC) production in Egypt is not adequate to supply poultry feed, so it depends on the use of imported YC. The key for successful process in poultry projects is through minimizing the feed cost and maximizing profit, could be achieved through the use of untraditional cheaper feed ingredients or improving utilization of common feeds by using some additives. In Egypt, about 48 thousands feddans were cultivated with medicinal and aromatic plants *(Agricultural Economics, 2005)*. For instance, by-products of some medicinal and aromatic plants (MAP) accumulated after preparation for exportation of some plants should cause an environmental pollution; in the meantime, they could be used as possible optional feed ingredients for poultry *(Emam, 2007)*.

Dill used as a condiment and flavorings and as a pickling spice. Often taken to relieve digestive problems and flatulence. Occasionally used to perfume cosmetics; medicinal oil distilled from leaves, stems and seeds, as well as its power to soothe crying babies, is widely used as a treatment for stomach and digestive troubles, and to cure insomnia and hiccups. The Ancient Greeks believed that carrying dill in the left hand could prevent epilepsy *(Richmond and Mackley, 2000)*. As a medicinal plant, dill has been used as an antispasmodic, carminative, diuretic, stimulant, and stomachic. It has also been used as a remedy for colic and insomnia and as a stimulant for lactation.

Parsley leaves, fresh, frozen or dried; roots dug in winter and dried; seeds when capsules are ripe could be used as feeding additives. The fresh leaves are rich source of manganese, chlorophyll, vitamins and calcium (Ca). The leaves, roots and seeds are diuretic, reduce the release of histamines and scavenge skin aging free radicals. Grown near roses, parsley improves their health and scent *(Richmond and Mackley, 2000)*. Parsley's volatile oils-particularly myristicin have been shown to activate the enzyme *glutathione-S-transferase*, which helps attach the molecule glutathione to oxidized molecules that would otherwise do damage in the body. Parsley has carminative, tonic and aperients action, but is chiefly used for its diuretic properties, a strong decoction of the root being of great service in gravel, stone, congestion of the kidneys, dropsy and jaundice *(Duke et al., 2009)*. The dried leaves are also used for the same purpose. Apiol is the effective components that represent approximately 21-80% of parsley essential oil *(Tisserand and Balacs, 1995)*. Chlorocompounds in parsley often show significant biological activities, e.g. antibiotic, antitumour, antiviral and pesticidal activities *(Holst and Engvild, 2000)*. Parsley was identified as a promising source of antioxidants to retard lipid oxidation in fish oil-enriched food products *(Jimenez et al., 2008)*. In this respect, Radish, rocket or parsley is a biennial or short-live perennial and contains the flavonoids such as appiin and luteolin, volatile oils like myristicin, apiole and B-phellandrene, fats as the furocoumarin bergapten, polyynes protein, sugars and vitamin A and C *(Leung and Foster, 1996)*.

The aim of this experiment was to study the effects of partially replacing of YC) with dill or parsley by-products in Ross broiler diets reared in open houses under Egyptian summer conditions on growth performance, mortality rate, carcass parameters, bacteria enumeration, intestinal pH, blood serum parameters and economical efficiency.

MATERIALS AND METHODS

This study was carried out at the Poultry Research Station, El-Azab, Fayoum, Egypt during the period from June to August 2011. Chemical analyses were performed in the laboratories of the Poultry Research Station, Poultry Production Department, Faculty of Agriculture, Fayoum University according to the procedures outlined by **A.O.A.C. (1990).** The total number of the experimental birds (120 at five days of age) was divided into five treatments (24 birds each), each treatment contained three replicates of eight birds each.

The experimental treatments were as follows:-

1- Chicks fed the control diet (T_1).
2- 10% YC in T_1 was replaced by dill by product.
3- 20% YC in T_1 was replaced by dill by product.
4- 10% YC in T_1 was replaced by parsley by product.
5- 20% YC in T1 was replaced by parsley by product.

The dried dill by-product and parsley by-product, used in the present study were obtained from the Egyptian Organic Agriculture Company, Fayoum Governorate, Egypt. These by-products are abundant in Egypt (especially in Fayoum Governorate) after using their plants in different purposes. So, attention therefore should be drawn towards the use these by-products (some dried leaves and fine stalk) as untraditional poultry feed partially replacing YC as a main source of energy in broiler diets. Chemical composition of dill and parsley by-product used in the present study (on air dried basis) are shown in Table 1. The chicks were fed starter diet from five to 11 day, grower diet from 12 to 23 day, and finisher diet from 24 day to the end of the experiment at 42 day of age. Chicks were raised in electrically heated batteries with raised wire mesh floors and had a free access of feed and water.

Table (1): Chemical composition of dill by-product, parsley by-product, yellow corn and soybean meal used in the present study (on air dried basis).

Items	Dill by-product	Parsley by-product	Yellow corn	Soybean meal
Moisture %	9.30	7.80	3.20	10.0
Crude protein%	19.0	15.0	8.20	42.0
Ether extract %	2.50	2.20	2.50	1.90
Crude fiber%	21.7	21.7	1.50	4.50
Ash%	15.1	14.5	1.20	9.90
Nitrogen-free extract%	32.4	38.8	83.4	31.7
ME/Kcal	2384*	2479*	3350**	٢230**

* Calculated according to *Carpenter and Clegg (1956)* by applying the equation:
ME (Kcal/kg)= (35.3*CP%)+(79.5*EE%)+(40.6*NFE%)+199.

****** *NRC, 1994*

Batteries were placed into a room provided with a continuous light and fans for ventilation. Feed and water were supplied *ad libitum.* The experimental diets were supplemented with minerals and vitamins mixture, DL-methionine and L-Lysine HCl to cover the recommended requirements according to the strain catalog recommendations and were formulated to be iso-caloric and iso-nitrogenous. The composition and calculated chemical analyses of the experimental diets are shown in Table 2. Birds were individually weighed to the nearest gram at weekly intervals during the experimental period. At the same time, feed consumption was recorded and feed conversion (FC, g feed/g gain) and live body weight gain (LBWG) were calculated. Crude protein conversion (CPC) and caloric conversion ratio (CCR) were also calculated. Accumulative mortality rate was obtained by adding the number of dead birds during the experiment divided by the total number of chicks at the beginning of the experimental period.

Respiration rate and rectal temperature were determined at the end of the trial between 10:00 h and 11:00 h for each chicks. These parameters were taken in the morning rather than the afternoon to avoid being inside the house during the severe period of heat stress (12:00 to 2:00 h) to prevent making additional sources of stress on chicks. The respiration rate (breaths/min) was recorded by counting the flank movements per minute by using a hand counter. Body temperature was measured as a rectal temperature (°C) by using a clinical thermometer inserted into the rectum for 1 min at depth of approximately 3 cm.

At the end of the experimental period (42 days of age), slaughter tests were performed using three chicks around the average LBW of each treatment. Birds were individually weighed to the nearest gram, and slaughtered by severing the jugular vein. After four minutes bleeding time, each bird was dipped in a water bath for two minutes, and feathers were removed. After the removal of head, carcasses were manually eviscerated to determine some carcass traits, dressing% (eviscerated carcass without head, neck and legs) and total giblets% (gizzard empty, liver, heart and spleen). The eviscerated weight included the front part with wing and rear part. The abdominal fat was removed by hand from the parts around the viscera and gizzard, and was weighed to the nearest gram. The bone of front and rear were separated and weighed to calculate meat percentage. The meat from each part was weighed and blended using a kitchen blender. At the end of the growing period, individual blood samples were taken from three birds. The biochemical characteristics of blood were determined colorimetrically, using commercial kits.

At the time of slaughter test, 3 samples of ileum content for each treatment were taken. Total microflora of ileum content were enumerated. The pH of intestinal contents was directly measured by pH-meter. To determine the economical efficiency for meat production, the amount of feed consumed during the entire experimental period was obtained and multiplied by the price of one Kg of each experimental diet which was estimated based upon local current prices at the experimental time.

Statistical analysis of results was performed using the General Linear Models (GLM) procedure of the SPSS software *(SPSS, 1999)***,** according to the follow general model:

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

Where: Y_{ij}**:** observed value
μ: overall mean
Ti: treatment effect (i: (1 to 5).
eij: random error

Treatment means indicating significant differences (P≤0.01 and P≤0.05) were tested using Duncan's multiple range test *(Duncan, 1955).*

RESULTS AND DISCUSSION

Live body weight (LBW), live body weight gain (LBWG) and feed intake (FI):

Results presented in Table (3) show the effects of partially replacing of YC with dill or parsley by-products in Ross broiler diets on LBW, LBWG and FI.

Concerning treatment effect, the results indicated that significantly (P≤0.01) affected LBW at 23 and 42, while, there were insignificant effect on LBW at 5 and 11 days and LBWG during the all periods studied, except the period from 5 to 11 days of age (Table 3). Chicks fed partial replacement by 10% dill by-product and control diet had higher LBW at 23 and 42 days of age, respectively. Chicks fed control diet had higher LBWG during the period from 5 to 42 days of age (differences between chicks fed control diet and chicks fed partial replacing of YC by 10 or 20% dill by-product were not significant).

In conclusion, the experimental results indicated that dill by-product can be substituted in Ross diets up to 20% YC without any adverse effect on chicks LBW at 42 days and LBWG during the period from 5 to 42 days of age.

These results are in harmony with those obtained by *Ragab et al. (2007)* who demonstrated that quails fed diet containing parsley by-product replacing 16% YC + 0.1% kemzyme dry had higher LBW at 38 days of age and LBWG during the period from 10 to 38 days of age. Also, *Ibrahim (2005)* demonstrated that dill and parsley/or rocket (0.5 and 1%) or laurel (1%) supplementation significantly increased the absolute final LBW and LBWG of rabbits as compared with the control group. *Ragab (2012)* demonstrated that prickly pear peel can be used safely in YC based diets up to 30% partial replacing of YC for Hy-Line W-36 male chicks without any adverse effect on chicks LBW and LBWG. Conversely, *Bahnas et al. (2008 and 2009)* reported no significant differences in final LBW and LBWG of Japanese quail chicks fed different levels (0.25 and 0.50%) of parsley or peppermint as dried leaves with or without enzyme supplementation. Similar results were reported by *Ragab et al. (2010)* who found that no significant differences in final LBW of broiler chicks fed different levels (0.50 and 1.00%) of parsley dried leaves.

Data presented in Table (3) show that treatment effect significantly (P≤0.01) affected FI during all periods studied. Chicks fed partial replacing of YC by 10% parsley by-product had higher FI during the periods from 24 to 42 and 5 to 42 days of age. These results agree with the findings of *Ragab et al. (2007)* who indicated that the highest FI during the periods from 10 to 38 and 10 to 45 days of age were obtained by quails fed diet containing dill by-product replacing 16% YC. Moreover, *Bahnas et al. (2009)* indicated that feeding different levels of parsley as dried leaves (0.25 and 0.50%) and its by-product (0.50 and 1.00%) significantly affected FI value of Japanese quail chicks during the experimental period.

Feed conversion (FC), crude protein conversion (CPC) and caloric conversion ratio (CCR):

Results presented in Table (4) show the effects of partially replacing of YC with dill or parsley by-products in Ross broiler diets on FC, CPC and CCR. There were no significant differences in FC during the all periods studied except, period from 5 to 11 days of age. Chicks fed control diet had significantly (P≤0.01) worst FC during the period from 5 to 11 days of age, while, chicks fed partial replacement of YC by 10% dill by-product had better FC during the same period (Table 4).

These results agree with the findings of *Bahnas et al. (2008 and 2009)* who reported no significant differences in FC ratio of Japanese quail chicks fed different levels (0.25 and 0.50%) of parsley or peppermint as dried leaves with or without enzyme supplementation, while, they showed significant differences in FI. Likewise, *Osman et al. (2004)* found that replacing soybean meal by radish, rocket or parsley cakes up to 15% had no deleterious effects on FI of broilers during the whole growth period. Similarly, *Ibrahim et al. (2004)* demonstrated that 1.0% of dill or parsley seeds supplementation significantly increased the daily FI, but no significant differences in FC of rabbits as compared with the control group.

Concerning the treatment effect, significantly affected CPC and CCR during the periods from 5 to 11 ($P \leq 0.01$) and 5 to 42 days ($P \leq 0.05$). Chicks fed partial replacing of YC by 10% dill by-product had significantly better CPC and CCR during the periods from 5 to 11 and 5 to 42 days (Table 4). It can be concluded that dill by-product can be substituted in Ross diets up to 20% YC without any adverse effect on chicks CPC and CCR during the period from 5 to 42 days. Similar results were reported by *Ragab et al. (2007)* who found that quails fed diet containing parsley by-product replacing 8% YC + 0.1% kemzyme dry had the best FC and CCR values during the period from 10 to 38 days of age.

Growth rate (GR) and performance index (PI):

Results presented in Table (5) show the effects of partially replacing of YC with dill or parsley by-products in Ross broiler diets on GR and PI. Regarding the treatment effect, significantly ($P \leq 0.01$ and $P \leq 0.05$) affected GR and PI during the all periods studied except, GR during the period from 5 to 11 days of age. Chicks fed control diet had significantly higher GR during the period from 5 to 42 days (differences between chicks fed control diet and chicks fed partial replacing of YC by 10 or 20% dill by-product were not significant). Chicks fed partial replacing of YC by 10% dill by-product had significantly higher PI during the all periods studied (Table 5). The results of an experiment conducted by *Ragab et al. (2007)* who found that quails fed diet containing parsley by-product replacing 8% YC + 0.1% kemzyme dry had significantly higher PI during period from 10 to 38 days of age. *Ibrahim et al. (2004)* indicated that feeding rabbits on diets supplemented with 1.0% of dill or parsley seeds improved PI. Also, *Osman et al. (2004)* reported that using MAP in broiler and rabbits diets improved PI. Moreover, *Bahnas et al. (2009)* indicated that feeding different levels of parsley and its by-product with or without enzyme supplementation in growing Japanese quail diets insignificantly affected GR, PI, CPC and CCR values during the period from 10 to 38 days of age.

Body temperature, respiratory rate, intestinal pH and total microflora count:

Effects of partially replacing of YC with dill or parsley by-products on body temperature, respiratory rate, intestinal pH and total microflora count of Ross chicks are presented in Table (5). There were insignificant effects on body temperature, respiratory rate, intestinal pH and total microflora count. Numerically, chicks fed control diet had higher body temperature and respiratory rate as compared with other treatments, but differences were not significant (Table 5).

Generally, addition of dill or parsley by-product up to 20% of YC substitution% decreased body temperature and respiratory rate which had to increased resistance birds to heat stress.

Slaughter parameters%:

Results presented in Table (6) show the effects of partially replacing of YC with dill or parsley by-products in Ross broiler diets on slaughter parameters. Treatment effect showed insignificant affect on all slaughter parameters except, live body weight total giblets%. Chicks fed partial replacing of YC by 10% parsley by-product had significantly (P≤0.01) higher total giblets% than the other treatments and control group (Table 6). In this connection, *Ragab et al. (2007)* reported that quails fed diet containing peppermint by-product replacing 16% YC and diet containing peppermint by-product replacing 8% YC+ 0.1% kemzyme dry had significantly higher gizzard% and total giblets%. *Ibrahim et al. (2004)* demonstrated that 1% dill and parsley supplementation significantly increased dressing and total giblets% of rabbits as compared with the control group, however, it showed a significant decrease in abdominal fat weight. Also, *Ragab et al. (2010)* showed that birds fed control diet +1% parsley had the significant highest carcass weight after evisceration and dressing%. Moreover, *Bahnas et al. (2009)* indicated that feeding different levels of parsley and its by-product insignificantly affected slaughter parameters of Japanese quails. Similar results with prickly pear by-products supplemented with enzyme preparation were reported by *Ragab (2012).*

Blood parameters and chemical composition of broiler meat:

Results presented in Table (7) show the effects of partially replacing of YC with dill or parsley by-products in Ross broiler diets on blood parameters and chemical composition of broiler meat%. Treatment effect insignificantly affected all blood parameters studied and chemical composition of broiler meat. The experimental results indicated that dill or parsley by-product can be substituted in Ross diets up to 20% YC without any adverse effect on blood parameters of chicks and chemical composition of broiler meat. Similar results were observed by *Osman et al. (2004)* who found that replacing soybean meal by radish, rocket or parsley cakes up to 15% had no adverse effects on blood components. However, *Ragab et al. (2007)* reported the highest moisture and protein (the lowest fat%) value was observed for quails fed diet containing peppermint by-product replacing 8% YC, while those fed control diet + 0.1% kemzyme dry had the highest fat% (and consequently the lowest moisture and protein%).

Carcass part, were significantly affected (P≤0.01 and P≤0.05) on chemical composition of broiler meat%, breast part had higher moisture, protein and ash% than rear part, however, rear part had higher fat and NFE% than breast part (Table 7). This finding agreed with *Emam (2007)* who demonstrated that Japanese quail chicks fed different levels of parsley or peppermint as dried leaves with or without enzyme supplementation significantly affected moisture, protein and fat percentages of meat. **Ragab *et al.* (2010)** indicated that Ross broiler fed different levels (0.50 and 1.00%) of parsley dried leaves had higher moisture and ash.

Mortality rate (MR) %:

As shown in Table (8), results indicated that chicks fed control diet had the highest MR value being 8.33% during the whole experimental period as compared with those fed other treatments. While, chicks fed partial replacing of YC by 10% dill by-product had the lowest MR value being zero%. Results indicated that stressed broiler chicks diets supplemented with dill or parsley by-products reduced MR%. In this respect, *Ragab et al. (2007)* indicated that quails fed diet containing dill by-product replacing 8 and 16% YC had lower mortality (zero%). *Sabra and Mehta (1990)* used herbal plants as growth promoters in

broiler diets, they observed a pronounced improvement in their MR.

Economical efficiency (EEf):

Results in Table (8) show that EEf values during the period from 5 to 42 days of age was improved in chicks fed partial replacing of YC by 10% dill by-product as compared with those fed the control diet and other treatments. On the other hand chicks fed partial replacing of YC by 10% dill by-product had the best economical and relative efficiency values being 1.5485 and 110.03%, respectively when compared with chicks fed control diet. Whereas, chicks fed partial replacing of YC by 10% parsley by-product had the lowest corresponding values, being 1.016 and 72.19%, respectively. The relative efficiency varied between 72.19% to 110.03% which is of minor importance relative to other factors of production. In this respect, *Ragab et al. (2007)* demonstrated that quails fed diet containing parsley by-product replacing 16% YC gave the best economical and relative efficiency during the period from 10 to 38 days of age. *Osman et al. (2004)* reported that relative economical efficiency was improved by increasing the inclusion level of radish or parsley up to 15% by about 33.5% and 22.2%, respectively. Alao, *Ragab (2012)* found that Hy-Line W-36 male chicks fed diet containing partially replacing YC with 30% prickly pear peel + kemzyme dry gave the best EEf values. *Abd El-Latif et al. (2002); Al-Harthi (2002); Osman (2002); Abdo et al. (2003)* and *Soliman et al. (2003)* found that the inclusion of herbal feed additives in Japanese quail or broiler diets resulted in the least feed cost/Kg gain and the highest percent of economical efficiency as compared with control diet. However, *Ibrahim (2005)* noted that the economical efficiency% showed descending value for rabbit treatment groups which received 1% rocket, 1% laurel and 0.5% rocket, respectively as compared to the control group.

It could be concluded that the dill by-product can be substituted up to 10% YC in Ross broiler diets reared in open houses under summer conditions of Egypt had the best EEf values and can improve the productive performance of broiler chicks (zero% MR), moreover, reduce the harmful effects of the high temperature or any stressful conditions.

Table (2): Composition and analyses of the experimental diets.

Items%	Starter (5-11 days)					Grower (12-23 days)					Finisher (24-42 days)				
	Control	DBP [1] %		PBP [2] %		Control	DBP [1] %		PBP [2] %		Control	DBP [1] %		PBP [2] %	
		10.00	20.00	10.00	20.00		10.00	20.00	10.00	20.00		10.00	20.00	10.00	20.00
Yellow corn, ground	54.00	48.60	43.20	48.60	43.20	57.00	51.30	45.60	51.30	45.60	62.00	55.80	49.60	55.80	49.60
Soybean meal	30.60	29.98	29.43	30.35	30.22	25.66	25.08	24.46	25.51	25.29	22.08	21.38	20.74	21.86	21.71
Corn glutein meal	9.18	8.94	8.63	8.32	7.38	9.91	9.58	9.30	8.94	8.00	8.68	8.37	8.04	7.65	6.58
Dill or parsley by product	0.00	5.40	10.80	5.40	10.80	0.00	5.70	11.40	5.70	11.40	0.00	6.20	12.40	6.20	12.40
Calcium carbonate	1.55	1.55	1.55	1.55	1.55	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.35
Sodium chloride	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vit. and Min. premix[3]	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Monocalcium phosphate	1.70	1.74	1.76	1.76	1.78	1.52	1.54	1.57	1.54	1.59	1.40	1.45	1.47	1.45	1.47
Vegetable oil[4]	1.70	2.46	3.23	2.67	3.65	3.41	4.22	5.02	4.43	5.46	3.57	4.45	5.33	4.69	5.81
DL–Methionine	0.28	0.31	0.35	0.33	0.37	0.19	0.23	0.27	0.24	0.29	0.11	0.15	0.19	0.16	0.21
L-Lysine HCl	0.39	0.42	0.45	0.42	0.45	0.31	0.35	0.38	0.34	0.37	0.21	0.25	0.28	0.24	0.27
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Calculated analysis[5]:															
Crude protein	23.50	23.50	23.50	23.50	23.50	22.00	22.00	22.00	22.00	22.00	20.00	20.00	20.00	20.00	20.00
Ether extract	3.86	4.59	5.32	4.80	5.76	5.57	6.34	7.11	6.56	7.57	5.76	6.60	7.44	6.85	7.94
Crude fiber	2.31	3.37	4.43	3.37	4.45	2.14	3.26	4.38	3.27	4.40	2.04	3.25	4.47	3.27	4.50
Calcium	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.85	0.85
Available phosphorus	0.50	0.50	0.50	0.50	0.50	0.45	0.45	0.45	0.45	0.45	0.42	0.42	0.42	0.42	0.42
Methionine	0.70	0.71	0.73	0.72	0.74	0.60	0.62	0.64	0.62	0.64	0.49	0.50	0.52	0.51	0.53
Methionine+Cystine	1.09	1.09	1.09	1.09	1.09	0.97	0.97	0.97	0.97	0.97	0.83	0.83	0.83	0.83	0.83
Lysine	1.44	1.44	1.44	1.44	1.44	1.25	1.25	1.25	1.25	1.25	1.05	1.05	1.05	1.05	1.05
ME, kcal./Kg	3010.1	3010.0	3010.1	3010.1	3010.2	3175.4	3175.3	3175.0	3175.0	3175.1	3225.2	3225.1	3225.2	3225.1	3225.2
Cost (£.E./ton)[6]	2443.2	2427.3	2414.2	2431.8	2412.8	2443.1	2429.2	2415.0	2426.4	2411.8	2304.5	2289.3	2271.1	2285.8	2265.2
Relative cost [7]	100.00	99.35	98.81	99.53	98.76	100.00	99.43	98.85	99.32	98.72	100.00	99.34	98.55	99.19	98.29

[1] Yellow corn was replaced by dill by product [2] Yellow corn was replaced by parsley by product [3] Each 3.0 Kg of the Vit. and Min. premix manufactured by Agri-Vet Company, Egypt and contains : Vit. A, 12000000 IU; Vit. D_3 2000000 IU; Vit. E, 10 g; Vit. K_3, 2.0 g; Vit. B1, 1.0 g; Vit. B2, 5 g; Vit. B6, 1.5 g; Vit. B12,10 mg; choline chloride, 250 g; biotin, 50 mg; folic acid, 1 g; nicotinic acid , 30 g; Ca pantothenate, 10 g; Zn, 50 g; Cu,10 g; Fe, 30 g; Co, 100 mg; Se, 100 mg; I, 1 g; Mn, 60 g and anti-oxidant, 10 g, and complete to 3.0 Kg by calcium carbonate. [4] Mixture from 75% soybean oil and 25% sunflower oil. [5] According to *NRC, 1994* except yellow corn, soybean meal, dill by product and parsley by product were analysis before start the experiment (table 1). [6] According to the local market price at the experimental time. [7] Assuming the price of the control group equal 100.

Table (3): Effects of partially replacing of yellow corn (YC) with dill or parsley by-products in broiler diets on live body weight (LBW, g), live body weight gain (LBWG, g) and feed intake (FI, g).

Items	LBW, g (age/days)				LBWG, g (age period/days)				FI, g (age period/days)			
	5	11	23	42	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42
D1	115.50	171.19	677.85^{AB}	1663.1^{A}	55.69	542.67^{AB}	942.57^{A}	1549.5^{A}	100.3^{A}	1157.2^{A}	2297.9^{AB}	3555.4^{AB}
D2	115.52	170.33	727.21^{A}	1653.9^{A}	54.81	565.50^{A}	923.69^{AB}	1539.3^{A}	73.33^{B}	1178.7^{A}	2101.4^{B}	3353.4^{BC}
D3	115.79	169.05	597.71^{C}	1526.2^{AB}	53.26	439.11^{C}	956.64^{A}	1412.6^{AB}	93.10^{A}	1042.2^{B}	2351.4^{A}	3486.8^{AB}
D4	115.41	167.52	643.95^{BC}	1433.5^{B}	52.11	494.72^{BC}	788.53^{BC}	1316.4^{B}	91.05^{A}	1054.9^{B}	2497.1^{A}	3643.1^{A}
D5	115.43	167.29	629.57^{BC}	1390.4^{B}	51.86	474.44^{C}	745.06^{C}	1273.0^{B}	77.95^{B}	1047.3^{B}	2051.1^{B}	3176.3^{C}
±SEM[1]	3.19	4.03	24.09	59.45	1.88	22.47	46.42	58.94	3.68	9.63	83.71	87.18

D1: Chicks were fed the control diet
D2: 10% YC in D_1 was replaced by dill by-product
D3: 20% YC in D_1 was replaced by dill by-product
D4: 10% YC in D_1 was replaced by parsley by-product
D5: 20% YC in D_1 was replaced by parsley by-product
A,.. C, values in the same column within the same item followed by different superscripts are significantly different ($P \leq 0.01$).
[1] Pooled SEM

Table (4): Effects of partially replacing of yellow corn (YC) with dill or parsley by-products in broiler diets on feed conversion (FC), crude protein conversion (CPC) and caloric conversion ratio (CCR).

Items	FC (age period/days)				CPC (age period/days)				CCR (age period/days)			
	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42
D1	1.85^{A}	2.21	2.47	2.3	0.43^{A}	0.46	0.49	0.47^{ab}	5.56^{A}	6.69	7.98	6.61^{bc}
D2	1.35^{B}	2.15	2.47	2.3	0.32^{B}	0.47	0.49	0.43^{b}	4.05^{B}	6.83	7.96	6.35^{c}
D3	1.79^{A}	2.45	2.46	2.5	0.42^{A}	0.54	0.49	0.50^{a}	5.38^{A}	7.79	7.92	7.29^{ab}
D4	1.80^{A}	2.26	3.02	2.7	0.42^{A}	0.50	0.60	0.51^{a}	5.43^{A}	7.17	9.74	7.52^{a}
D5	1.53^{B}	2.26	2.88	2.5	0.36^{B}	0.50	0.58	0.47^{ab}	4.60^{B}	7.17	9.29	6.96^{abc}
±SEM[1]	0.09	0.11	0.18	0.11	0.02	0.02	0.04	0.02	0.27	0.33	0.57	0.29

D1: Chicks were fed the control diet
D2: 10% YC in D_1 was replaced by dill by-product
D3: 20% YC in D_1 was replaced by dill by-product
D4: 10% YC in D_1 was replaced by parsley by-product
D5: 20% YC in D_1 was replaced by parsley by-product
a, …c, and A,.. B, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to c; $P \leq 0.01$ for A to B). [1] Pooled SEM

Table (5): Effects of partially replacing of yellow corn (YC) with dill or parsley by-products in broiler diets on growth rate (GR), performance index (PI), body temperature (C°), respiratory rate, intestinal pH and total microflora count (10^4 cfu/g).

Items	GR (age period/days)				PI (age period/days)				Body temperature (C°)	Respiration rate (breaths/min)	Intestinal pH	Total microflora count (10^4 cfu/g)
	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42				
D1	0.39	1.24^{A}	0.79^{B}	0.81^{A}	9.57^{B}	34.5^{a}	69.2^{ab}	37.7^{ab}	41.88	53.67	6.78	1.18
D2	0.38	1.25^{A}	0.77^{B}	0.80^{A}	13.9^{A}	36.3^{a}	76.1^{a}	41.8^{a}	41.37	51.83	6.87	1.58
D3	0.38	1.11^{B}	0.91^{A}	0.79^{AB}	9.97^{B}	26.2^{b}	67.7^{ab}	33.3^{b}	41.63	49.83	6.99	2.20
D4	0.37	1.17^{B}	0.75^{B}	0.76^{BC}	10.3^{B}	32.3^{ab}	52.3^{b}	31.0^{b}	41.43	52.83	6.87	1.38
D5	0.37	1.16^{B}	0.73^{B}	0.75^{C}	11.5^{B}	29.6^{ab}	52.6^{b}	31.5^{b}	41.70	47.50	6.97	1.43
±SEM[1]	0.01	0.02	0.03	0.01	0.74	2.39	5.91	2.50	0.29	3.45	0.05	0.51

D1: Chicks were fed the control diet
D2: 10% YC in D_1 was replaced by dill by-product
D3: 20% YC in D_1 was replaced by dill by-product
D4: 10% YC in D_1 was replaced by parsley by-product
D5: 20% YC in D_1 was replaced by parsley by-product
a, …b, and A,.. C, values in the same column within the same item followed by different superscripts are significantly different (at P≤0.05 for a to b; P≤0.01 for A to C). [1] Pooled SEM

Table (6): Effects of partially replacing of yellow corn (YC) with dill or parsley by-products in broiler diets on slaughter parameters%.

Items	Live body weight (g)	Slaughter parameters%								Intestinal length, cm
		Total giblets	Abdominal fat	Breast meat	Rear meat	Carcass weight after evisceration	Dressing	Bursa	Thymus	
D1	1783.0^{a}	6.19^{B}	2.17	69.08	77.23	61.92	68.11	0.06	0.10	106.0
D2	1685.0^{ab}	5.37^{C}	1.05	81.08	77.29	63.77	69.14	0.08	0.10	79.50
D3	1303.5^{c}	5.50^{C}	1.03	65.70	68.18	61.94	67.44	0.20	0.27	81.00
D4	1504.5^{bc}	6.83^{A}	1.36	69.70	78.24	63.10	69.94	0.15	0.16	97.00
D5	1449.0^{c}	5.46^{C}	1.48	67.43	74.66	64.67	70.13	0.14	0.19	89.50
±SEM[1]	57.7	0.15	0.37	2.75	1.91	1.00	0.99	0.04	0.03	8.72

D1: Chicks were fed the control diet
D2: 10% YC in D_1 was replaced by dill by-product
D3: 20% YC in D_1 was replaced by dill by-product
D4: 10% YC in D_1 was replaced by parsley by-product
D5: 20% YC in D_1 was replaced by parsley by-product
a, …c, and A,.. C, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to c ; $P \leq 0.01$ for A to C). [1] Pooled SEM

Table (7): Effects of partially replacing of yellow corn (YC) with dill or parsley by-products in broiler diets on some blood parameters and chemical composition of broiler meat (on dry mater basis).

Items	Blood parameters							Chemical composition of broiler meat%				
	White blood cells count (10^3/mm^3)	Red blood cells count (10^6/mm^3)	Hemoglobin (g/dL)	Hematocrit (HCT)%	Mean corpuscular volume (MCV) μ^2	Mean corpuscular hemoglobin (MCH) µµg	Mean corpuscular hemoglobin concentration (MCHC)%	Moisture	Protein	Fat	Ash	NFE
Treatments:												
D1	12.85	2.60	11.60	38.25	148.00	44.80	30.30	5.36	60.93	30.60	2.83	0.28
D2	14.35	2.16	9.60	31.50	146.00	44.50	30.55	5.34	60.93	30.55	2.92	0.27
D3	15.95	2.36	10.90	34.65	147.00	46.25	31.50	5.33	60.93	30.56	2.88	0.30
D4	13.95	2.09	9.40	31.90	152.50	45.00	29.45	5.34	60.89	30.60	2.85	0.33
D5	15.50	2.38	10.50	34.85	147.00	44.20	30.15	5.41	60.92	30.54	2.83	0.30
±SEM[1]	0.63	0.21	0.91	2.96	3.17	1.02	0.74	0.04	1.90	2.09	0.22	0.06
Carcass part:												
Breast	---	---	---	---	---	---	---	5.39^{a}	64.21^{A}	26.96^{B}	3.25^{A}	0.20^{B}
Rear	---	---	---	---	---	---	---	5.32^{b}	57.63^{B}	34.18^{A}	2.48^{B}	0.39^{A}
±SEM	---	---	---	---	---	---	---	0.02	0.10	0.01	0.02	0.01

D1: Chicks were fed the control diet **D2:** 10% YC in D_1 was replaced by dill by-product

D3: 20% YC in D_1 was replaced by dill by-product **D4:** 10% YC in D_1 was replaced by parsley by-product

D5: 20% YC in D_1 was replaced by parsley by-product

a, …b, and A,.. B, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to B). [1] Pooled SEM

Table (8): Effects of partially replacing of yellow corn (YC) with dill or parsley by-products in broiler diets on mortality rate and economical efficiency (EEf).

Items	Mortality rate				
	D1	**D2**	**D3**	**D4**	**D5**
Total number of chicks at the beginning of Experiment	24	24	24	24	24
Number of dead birds	2	0	1	1	1
Mortality %	8.33	0.00	4.17	4.17	4.17
Economical efficiency (EEf)					
a_1	0.10030	0.07333	0.09310	0.09105	0.07795
b_1	244.32	242.73	241.42	243.18	241.28
$a_1 \times b_1 = c_1$	24.505	17.799	22.476	22.142	18.808
a_2	1.1572	1.1787	1.0422	1.0549	1.0473
b_2	244.31	242.92	241.5	242.64	241.18
$a_2 \times b_2 = c_2$	282.72	286.33	251.69	255.96	252.59
a_3	2.2979	2.1014	2.3514	2.4971	2.0511
b_3	230.45	228.93	227.11	228.58	226.52
$a_3 \times b_3 = c_3$	529.55	481.07	534.03	570.79	464.62
$(c_1+c_2+c_3)=c_{total}$	836.77	785.20	808.19	848.89	736.01
d	1.5495	1.5393	1.4126	1.3164	1.273
e	1300.0	1300.0	1300.0	1300.0	1300.0
d x e=f	2014.4	2001.1	1836.4	1711.3	1654.9
$f- c_{total} = g$	1177.6	1215.9	1028.2	862.4	918.9
g/ c_{total}	1.4073	1.5485	1.2722	1.0160	1.2485
r	**100.00**	**110.03**	**90.40**	**72.19**	**88.71**

D1: Chicks were fed the control diet
D2: 10% YC in D_1 was replaced by dill by-product
D3: 20% YC in D_1 was replaced by dill by-product
D4: 10% YC in D_1 was replaced by parsley by-product
D5: 20% YC in D_1 was replaced by parsley by-product
a_1, a_2 and a_3 …….average feed intake (Kg/bird) during the periods of starter, grower and finisher, respectively**.**
b_1, b_2 and b_3 …..… price / Kg feed (P.T.) during the periods of starter, grower and finisher, respectively (based on
average local market price of diets during the experimental time).
c_1, c_2 and c_3 …….. Feed cost (P.T.) during the periods of starter, grower and finisher, respectively.
Total feed cost (P.T.) = $c_{total} = c_1+c_2+c_3$
Average LBWG (Kg/ bird) d
Price / Kg live weight (P.T.) e…….…(according to the local market price at the experimental time).
Total revenue (P.T.) = d x e = f
Net revenue (P.T.) = $f - c_{total} = g$
Economical efficiency = (g / c_{total}) ……(net revenue per unit feed cost).
Relative efficiency r……...(assuming that economical efficiency of the control group (1) equals 100).
of the control group (1) equals 100).

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الملخـــص العـــربي

تأثير الاستبدال الجزئي للأذرة الصفراء بمخلفات الشبت أو البقدونس في علائق بداري التسمين علي بعض الصفات الإنتاجية والفسيولوجية

[١]مني سيد رجب، [٢]محمد مصطفي محمود نمرة، [١]محمود محمد محمد علي، [٢]محمد أحمد فتحي
[١]كلية الزراعة - قسم الدواجن – جامعة الفيوم- مصر
[٢]مركز البحوث الزراعية- معهد بحوث الإنتاج الحيواني- الدقي- الجيزة- مصر

تم إجراء التجربة في محطة بحوث الدواجن بالعزب بالفيوم – معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – وزارة الزراعة بالدقي – مصر خلال الفترة من شهر يونيه إلى أغسطس لسنة ٢٠١١. غذيت الكتاكيت عمر يوم ولمدة ٤ أيام علي عليقة الكنترول وتم توزيع 120 كتكوت غير مجنس (سلالة روس) بصورة عشوائية إلى خمس معاملات (٢٤ طائر/معاملة) كل معاملة مقسمة إلي ثلاثة مكررات (٨ طائر/مكرر). وكانت المعاملات التجريبية كما يلي:

١- غذيت الكتاكيت علي عليقة المقارنة.
٢- استبدال ١٠% من الأذرة الصفراء في عليقة ١ بمخلفات الشبت.
٣- استبدال ٢٠% من الأذرة الصفراء في عليقة ١ بمخلفات الشبت.
٤- استبدال ١٠% من الأذرة الصفراء في عليقة ١ بمخلفات البقدونس.
٥- استبدال ٢٠% من الأذرة الصفراء في عليقة ١ بمخلفات البقدونس.

وتم تلخيص النتائج المتحصل عليها كما يلي :

الكتاكيت المغذاة علي عليقة المقارنة كانت الاعلي في وزن الجسم الحي عند ٤٢ يوم والزيادة في وزن الجسم ومعدل النمو خلال الفترة من ٥ إلي ٤٢ يوم من العمر (الاختلافات غير معنوية بين الطيور المغذاه علي عليقة المقارنة والمغذاة علي الاستبدال الجزئي للأذرة الصفراء بـ ١٠ أو ٢٠ % مخلفات الشبت أو البقدونس). الطيور المغذاة علي الاستبدال الجزئي للأذرة الصفراء بـ ١٠% مخلفات بقدونس كانت الأعلي في استهلاك الغذاء خلال الفترة من ٥ إلي ٤٢ يوم من العمر.لم يكن هناك أي تأثير معنوي علي معامل التحويل الغذائي، درجة حرارة جسم الكتاكيت، معدل التنفس، pH الأمعاء، العدد الكلي للميكروفلورا، قياسات سيرم الدم، التركيب الكيماوي للحم بداري التسمين المغذاه علي الاستبدال الجزئي للأذرة الصفراء بمخلفات الشبت أو البقدونس. كان للكتاكيت المغذاة علي الاستبدال الجزئي للأذرة الصفراء بـ ١٠ مخلفات شبت أحسن كفاءة تحويل البروتين والطاقة وأعلي معامل أداء إنتاجي خلال الفترة من ٥ إلي ٤٢ يوم من العمر. الطيور المغذاة علي الاستبدال الجزئي للأذرة الصفراء بـ ١٠% مخلفات بقدونس كانت أعلي أحشاء مأكولة عند مقارنتها بالمغذاه علي المعاملات الاخري ومجموعة المقارنة. الكتاكيت المغذاة علي عليقة المقارنة كانت الأعلي في نسبة النفوق عند مقارنتها بالمعاملات الاخري، بينما المغذاه علي الاستبدال الجزئي للأذرة الصفراء بـ ١٠ مخلفات شبت كانت الأقل في نسبة النفوق (صفر%). تحسنت الكفاءة الاقتصادية والنسبية للكتاكيت المغذاة علي الاستبدال الجزئي للأذرة الصفراء بـ ١٠% مخلفات شبت عند مقارنتها بالمغذاه علي المعاملات الاخري ومجموعة المقارنة.

يمكن التوصية بأنه يمكن الاستبدال الجزئي للأذرة الصفراء بـ ١٠%مخلفات شبت في علائق بداري التسمين (روس) المرباه في مساكن مفتوحة تحت ظروف الصيف المصري والتي كان لها أحسن كفاءة اقتصادية ونسبية ويمكن أن تحسن من الأداء الإنتاجي، علاه علي خفض التأثير الضار عند تعرض الطيور لارتفاع درجة الحرارة أو لأي ظروف غير مواتية.