UTILIZATION OF SOME AGRO-INDUSTRIAL AND FOOD PROCESSING BY PRODUCTS AS A NON-TRADITIONAL FEED-STUFF IN BROILER DIETS

M.M.E. Mostafa, A.I. El-Faham; Nematallah*, G.M. Ali, N.M. El-Medany and S.A. Ibrahim

Department of Poultry Production, Faculty of Agriculture, Ain-Shams University, Cairo PB.11241, Egypt

****To whom all correspondence should be addressed. Email: nematallah1965@gmail.com.***

(Received 5/11/2020, accepted 26/12/2020)

SUMMARY

The mid rib of date palm (MRP), dry tomato waste (TW) and dry prickly pear peels (PPP) are annually represents about 40% of agro-industrial and food processing byproducts in Egypt, and considered as environmental pollutants, so, urgency needs to safely and proper utilized especially those contains some valuable nutrients, hence, one hundred and fifty unsexed Hubberd broiler chicks were used to evaluate the possibility of supplementation of broiler diets by 5 % (starter) and 10% (grower) of MRP, TW or PPP with 200 mg/kg diet of PBP (PhytaBexPlus® as multienzyme preparation) supplementation in all supplemented diets except the negative control ones. Concerning treatments included NCon (un - supplemented control diet), PCon (Control diet+ PBP), MRP + PBP, PPP +PBP and TW + PBP. At 35 days old, PBP didn't significantly affect daily weight gain but increased feed consumption, plasma globulin, and ALT of chicks, and reduced plasma total protein, albumin and A/G ratio. The MRP reduced WG and FC of chicks compared with TW or PPP. Feed conversion ratio didn't significantly affect by either PBP or byproduct type. Carcass characteristics didn't significantly affect by treatments except gizzard percent. This study recommended that, it could be included PPP or TW in broiler diets by levels 5% of starter diet or 10% of grower diet without any negative effect on performance, carcass characteristics or plasma constituents of chicks. While MRP supplementation with the same range caused a drop in WG and FI with significant effect on some essential plasma constituents of chicks. The rate of 200 mg/Kg diet of PBP which recommended by product guide may be not sufficient to appear a visual affect on broiler performance.

Keywords: *Food - byproducts; Broiler chicks; PhytaBex®; Performance; Carcass and Plasma.*

INTRODUCTION

In last decades, research workers in poultry nutrition field especially in desert and developed countries interested to investigate the possibility of inclusion of date palm tree wastes and fruit and vegetable processing by products (FVP) in different poultry diets as attempt to achieve valuable targets including; 1- Replacement of common poultry feedstuffs (yellow corn or soybean meal) with cheaper untraditional ones to reduce feed cost item especially, that the cost of feed ingredients approximately represents 60-70% of the total cost of intensive production of poultry (Van Eekeren et al., 2004); 2- To diminishing of environmental pollution with those byproducts through a proper and safely utilization.; 3- To reduce the competition between human and livestock for protein and energy sources. Among those investigated FVP; the processing wastes of Pea (Nagib et al., 2001), Guava (El-Deek et al., 2009), Prickly Pear (EL-Nagmy et al., 2001), Parsley and Dill (Bahnas et al., 2009 and Ragab et al., 2013), Potato (Ghazalah et al., 2002) or Tomato (Nagib et al., 2002).

In Egypt, the wastes of date palm (DPW), tomato (TW) and dry prickly pear peels (PPP) quantitatively represents, more than one third (30-40%) of whole agro-industrial and FVP byproducts, that contains a moderate and high dry matter content (DM), therefore, even so those contains certain anti-nutritional compounds and/or high fiber content, but it may contained a valuable nutrient elements for poultry.

Mid rib of date palm (MRP) is quantitatively produced with abundant amounts after the trimming of date palm tree besides as a waste parts of utilization of palm tree parts in numerous industries including palm wood, furniture, roof stock, bio - plastics, gypsum fiber boards, non-woven mats, rattan, bio-fuel

pellets, beat moss, and block- boards (FAO, 1993). The MRP subjected to investigation as a replacer for yellow corn in broiler diets by (El-Faham A.I. 2005) and (Ibrahim et al., 2013).

Tomato waste (TW) produced with excessive amounts by many food processing manufactories and composed of a mixture of skin, seeds and hard tissues of whole tomato fruit, this mixture, represents 10-30% of whole tomato and contains 22.7 to 26.8% CP and 3091 Kcal/kg ME (Nagib et al., 2002 and King and Zeidler, 2004). Moreover, it contains 13% more lysine than soybean protein and it is a good source of vit. A and B (Al-Betawi, 2005).

Prickly pears (Opuntia Spp. Cactaceae) have an intrinsic economic importance in many desert areas especially Middle East, which are produced it in abundant quantities (Ali, 2001 and EL-Nagmy et al., 2001). Prickly pear peel (PPP) consists basically of skin and seed of prickly pear fruit. The PPP contains 2.96 to 7.12% CP (Nebbache et al., 2009 and El-Kossori et al., 1998), 7.12% starch and 27.6% soluble carbohydrate (El-Kossori et al., 1998).

The MRP (mid rib of date palm) and TW contains a high fiber percent that up to 34.95% in MRP (El-Faham et al., 2013 and Ibrahim et al., 2013), and 26.3 - 32.46% in TW according to (Nagib et al., 2002) and (King and Zeidler, 2004). No anti-nutritional factors were reported of MRP or TW for poultry. The PPP contains relatively high fiber content (14.33% according to (EL-Nagmy et al., 2001), besides some alkaloid compounds which may have a relative anti-nutritional effect on tested animals (EL-Kholy, 1999). Both factors are limiting the inclusion of the three types of wastes in poultry rations.

Although MRP apparently have low nutritive value according to its chemical analysis (low ME, low TDN and high fiber content) compared with both TW and PPP, but (El-Faham, 2005) and (Ibrahim et al., 2013) reported that MRP could be included in broiler diet only up to 5% level of whole diet without any negative effect on chick performance, but the reason still unknown, while they suggested that MRP may somewhat contains unknown growth promoter compounds. This level could be up to 10-15%with supplementation of enzyme preparation (Allzyme) according to (El-Faham et al., 2013). Very little research workers compared between unconventional nutrient sources supplemented with enzyme preparation as a replacer for dietary yellow corn in of broiler diet. The objective of this study was carried out to investigate the effect of MRP, TW or PPP inclusion in diet with enzyme preparation on broiler chick performance, carcass traits and blood plasma constituents.

MATERIALS AND METHODS

Pretreatment of tested wastes*:* Each tested waste was pretreated before adding to experimental diets as follow; the mid rib of date palm (MRP) was collected from El-Wadi El-Gedid Governorate – Egypt, as byproduct of trees trimming and date collection and processing. A quantity of tomato waste (TW) was brought from food processing factory. Peels of prickly pears (PPP) were collected from sellers. Then the raw MRP was crashed in special hammer mill to 1.0 mm in size, while both raw TW and PPP were spread on a clean floor for sun drying. After complete dryness which produced dried tomato waste (TW) and dried prickly pears peels (PPP) materials were grounded in hummer mill to 1.0 mm in size without any special treatments and stored until formulating the experimental diets. Proximate analysis according to (AOAC, 1990) was done on samples of MRP, PPP and TW. The ME content of each material was calculated on the basis of its chemical composition according to (Carpenter and Clegg, 1956).

Birds management**:** During the experimental period which lasted 5 weeks, a total number of 150 unsexed day-old Hubberd broiler chicks were fed on commercial starter diet (23% CP and 3100 Kcal ME) during the first week of age to minimize the maternal effect, then it randomly distributed into 5 starter dietary treatments from 7 to 21 day of age and into 5 grower experimental diets from 22 to 35 day of age. Starting from 7 day-old, chicks were reared on 10 floor pens, and randomly allocated to five treatments of 30 chicks each in two replicates (15 chicks per replicate) until the end of experiment at 35 days old. Feed and drinking water were available ad libitum for chicks which subjected daily to 22 h. light and 2 h. darkness along the experimental period.

Experimental treatments: Experimental diets were formulated to cover the standard requirements of nutrients for broiler chicks according to (NRC, 1994). The PBP (PhytaBex Plus® as a commercial enzyme preparation) was added to each supplemented diet by 200g / Ton diet, according to its manufacturer Guide, hence, the periodical experimental diets included; NCon (Control diet without enzyme), PCon (control diet + PBP), MRP + PBP, PPP + PBP and TW+PBP. Composition and calculated analysis of experimental diets are shown in Table (1).

Table (1): Composition and calculated analysis of the experimental diets.

Item	Experimental diets							
	Starter (7-21 days old)				Grower (8035 days old)			
	Control*	MRP-PBP**	PPP+PBP	TW+PBP	Control*	MRP-PBP**	PPP+PBP	TW+PBP
Ingredients (%):								
Yellow corn	54.5	49.5	49.5	49.5	57.5	47.5	47.5	47.5
Soybean meal 44%	33.0	33.0	33.0	33.0	28.0	28.0	28.0	28.0
Corn gluten meal	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
MRP	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
PPP	0.000	0.00	0.00	0.00	0.00	0.00	10.00	0.00
TW	0.00	0.00	5.00	0.00	0.00	0.00	10.00	0.00
Soybean oil	2.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00
Mono-Ca Phos.	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Ca	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Carbonate	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Premix***	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Salt	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
DL-Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
HCl Lysine	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Calculated chemical analysis:								
Crude protein %	22.90	22.70	23.70	22.93	21.05	20.47	22.50	20.92
ME (Kcal/kg)	2986	2853	2954	2958	2168	2903	3106	3113
Crude fiber %	1.86	3.33	3.42	2.47	1.79	15.16	4.91	3.00
Calcium % Av.	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98
Phosphorus %	0.50	0.50	0.50	0.50	0.49	0.48	0.48	0.48
Lysine %	1.29	1.27	1.27	1.27	1.16	1.14	1.14	1.14
Methionine %	0.59	0.58	0.58	0.58	0.57	0.55	0.55	0.55
Meth. + Cystein %	0.98	0.96	0.96	0.96	0.92	0.89	0.89	0.89

**NCon= negative control diet (un-supplemented control), PCon= control diet + 200g PBP/ton diet.*

***composition of commercial multienzymes (PhytaBex Plus): Each 1 kg. contains : Xylanase =10000000 IU, Cellulase = 500000 IU, β- Glucanase = 500000 IU, β-Mannanase = 800000 IU, Phytase = 5500000 IU, and α-Amylase = 100000 IU. Corn starch food grade taken as a carrier up to 1 Kg.*

****each 3 kilogram of the premix contains the followings: 12000000 I.U. VIT. A, 2000000 I.U. VIT. D3, 10000 mg. VIT. E, 2000 mg. VIT. K3, 1000 mg. VIT. B1, 5000 mg. VIT. B2, 1500 mg. VIT. B6, 10 mg. VIT. B12, 10000 mg. Ca D – Pantothenate, 30000 mg. Niacin, 1000 mg. Folic acid, 50 mg. Biotin, 250000 gm. Choline Chloride, 60000 mg. Mn, 50000 mg. Zn, 30000 mg. Iron, 10000 mg. Cu, 1000 mg. Iodine and 100 mg. Se , where $CaCo_3$ taken as a carrier.*

Statistical analysis: data of performance, carcass traits and plasma constituents were statistically analyzed using SAS software (SAS, 1995) with one way analysis procedure. The difference between means was separated using Duncan's multiple range test (Duncan, 1955) at significance level $P \leq 0.05$. The statistical model performed as follow:

$$Yij = \mu + Ti + Eij$$

Where: Yij = the experimental observation, μ = overall mean, Ti= the effect of the dietary treatment and Eij = random error.

RESULTS AND DISCUSSION

Chemical analysis of experimental tested wastes: Results of proximate analysis (on dry weight basis) of MRP, PPP and TW used in this research in comparison of yellow corn (YC) was summarized in Table (2). The experimental data showed that TW was the highest in crude protein content (22.77%) while MRP was the lowest (2.69%) and PPP and YC in the middle (8.5 and 5.54%). Even so, the three wastes had a higher fiber content than those found in corn (2.20%), but, PPP contained the lower fiber content (13.42%) while MRP and TW had a higher fiber values (34.95 and 32.46%, respectively). The metabolizable energy (ME) was calculated to be 695, 2850 and 2991 Kcal/Kg in MRP, PPP and TW on basis of its chemical composition according to (Carpenter and Clegg, 1956), respectively. The ME

content of MRP equaled approximately half or less of both TW and TW and PPP content, while YC had the highest ME value (3350 Kcal/Kg). However, although the relative wide difference in chemical analysis of the three experimental material, concerning study focused on evaluate the possibility of dietary corn replacement with any of the three types of tested material supplementation in broiler diets as a common and cheaper alternative.

Table (2): Chemical composition of experimental MRP, TW and PPP.

Item (%)[#]	Experimental byproducts		
	MRP	PPP	TW
Dry matter	88.10	84.76	92.28
Crude protein	2.69	5.54	22.77
Crude fiber	34.95	13.42	32.46
Ether extract	2.98	3.35	12.83
Crude Ash	6.71	14.39	5.62
ME Kcal/kg[##]	695	2850	2991

[#]Determined chemically by the Central Lab and Feed Analysis Lab of poultry production department, Faculty of agric, Ain Shams University, Egypt.
[##]calculated according to (10).

Effect of experimental treatments on chick performance: Performance parameters of experimental chicks through different experimental periods are showed in Table (3). The results referred to, that NCon group significantly exhibited the lowest values for DWG during starter period compared with experimental groups including PCon treatment. Moreover that , during the grower and overall period (7-35 days old), no significant differences ($P \geq 0.05$) were raised between NCon, PCon, TW +PBP or PPP+PBP treatments, while the MRP+PBP group significantly recorded the lowest values for both periods.

Table (3): Effect of different experimental treatments on chick performance.

Items	Experimental Treatments					
	NCon	PCon	MRP+PBP	PPP+PBP	TW+PBP	Sig[#].
Daily weight gain (g.):						
7-21days old	30.81^{c}	33.15^{ab}	32.74^{b}	34.81^{a}	33.26^{ab}	*
22- 35days old	55.01^{a}	55.97^{a}	42.16^{c}	51.61^{ab}	51.09b	*
7-35 days old	40.49^{a}	42.28^{a}	36.51^{b}	41.53^{a}	40.39^{a}	**
Daily feed consumption (g):						
7-21days old	50.40^{b}	53.89^{a}	53.50^{a}	54.31^{a}	54.01^{a}	*
22- 35days old	112.7^{b}	125.8^{a}	106.9^{b}	122.4^{a}	123.0^{a}	*
7-35 days old	75.34^{b}	82.66^{a}	74.86^{b}	81.57^{a}	81.82^{a}	*
Feed conversion ratio g feed /g gain:						
7-21days old	1.63	1.63	1.63	1.56	1.62	NS
22- 35days old	2.05	2.25	2.54	2.39	2.42	NS
7-35 days old	1.86	1.95	2.05	1.96	2.03	NS

*[#a,b,c] Means within the same row with different superscript letters are significant1y differed. Sig. = Significance, *= P≤0.05, NS= not significant.*

Supplementation of control diet with PBP significantly increased daily feed consumption of chicks compared to un - supplemented group (NCon) through all experimental periods. Chicks received diet contained MRP+PBP recorded the lowest value of DWG for overall period. Additionally, it significantly consumed more daily feed during starter period. Interestingly, neither the waste type nor enzyme preparation (PBP) supplemented to experimental diets were significantly affected feed conversion ratio of chicks at any experimental period or overall period.

The positive effect of PBP on DWG and daily feed consumption during the starter period which represents of the significant difference between both NCon and PCon treatments could be interprets on two axis which are; during the starter period, the enzyme mixture (PBP) may improve feed consumed by

chick, causing a positive response for DWG besides it might reduce intestinal viscosity, consequently improves the digestibility and absorption of essential nutrients of dietary feedstuffs, as reported by (Squires et al., 1992). Our result suggested that during the starter period, the PBP may improve the digestibility and absorption of essential nutrients such carbohydrate, protein and phosphorus of dietary corn, soybean meal and fiber content of control diet, especially that contained mixture of exogenous enzymes which hydrolyzed fibers (Cellulase, β-Glucanase, β- Mannanase and Xylanase), carbohydrates (α-Amylase), polypeptides (protease) and released phosphorus from phosphorus phytate molecule (phytase).

Those two results also completely agreed with (Iyayi and Davies, 2005) who documented that weight gain and feed consumption of chicks were significantly increased with enzyme supplementation (Avizyme) through 8-28 days old. Although it conversely with (Nadeem et al., 2005) who reported that, although, supplementation of broiler diet with enzyme preparation (Rovabio) caused a significant increase in feed consumption from the period of 0-28 days old but it failed to causing any significant difference in weight gain between treated and untreated chicks.

However, our study suggested that, positive effect of multienzymes preparation (PBP) on weight gain and feed intake of chicks during the starter period may be attributed to that the quantitative lacks of endogenous enzyme released of intestinal tract of chicks through the first weeks of age. This result is completely agreed with (Iji et al., 2001) and (Meng and Slominski, 2005), where they reported that the effect of exogenous enzymes (commercial enzyme preparations) on feeding value of major ingredients is often based on their effect in young chicks less than 2 weeks of age. Physiologically, they attributed this to the fact in newly hatched chicks where the enterocyte cells in small intestine is poorly developed, limiting the bird's digestion and absorption ability. Besides, during this maturation period (2wks old), the gut lacks the competency to fully digest feedstuffs and absorb smaller molecules, because a lack of brush – enzymes, inadequate maintenance of absorption mechanisms and low surface area caused by immature villus high (Van Leeuwen, 2004). Hence the exogenous enzyme supplementation enhanced digestibility and absorption of nutrients during this stage. The same result showed by (Maiorka et al., 2002) and (Tavernari, 2008) who attributed that to the immature digestive system of broilers at this age. It is known that after hatching, the broiler digestive system is anatomically complete, but its functional digestion and absorption capacities are still immature, with low secretion of endogenous enzymes especially pancreatic enzymes, which rise as feed consumption and bird age increase.

Although, PBP supplementation caused a significant increase in feed consumption for all treatments (except the MRP+PBP group), but the improvement effect of PBP through the grower and overall period for BW and DWG which cleared from the non significant values between NCon and PCon, may be attributed to that as age of chicks progress above starter period, the experimental PBP(200g/ ton diet) quantitatively unable to improving the degrading, digestibility or utilization of basic dietary nutritional elements in gastrointestinal tracts for all diets including the control diet per se. Hence, supplementation of present experimental diets with PBP above 200g / ton during grower period may change this result, but this suggestion needs to further study. The same result completely agreed with what indicated by (Bedford, 1997) and (Iyayi and Davies, 2005), included that, as the bird age and the fiber level in the diet increased, more enzyme is needed in the diet for optimal break down of the fiber components. In accordance with this observation, it may well be that a given level of enzyme adequate at the starter phase is too low for optimum performance at the older phases. The same result may be applied for other nutrients such protein, carbohydrates, lipids or minerals.

Considering the waste type effect on chick performance, it is cleared from Table (3) that the MRP group as compared with TW and PPP groups, recorded the lowest values for DWG and non significant difference for feed conversion ratio, and this appeared during the grower and overall periods. This may be attributed to the higher content of MRP of fiber and its lower content of crude protein and ME. While each one of the two wastes own one a feature compared with MRP, where the TW have a higher protein content (22.77% vs. 2.69% for MRP and 5.54% for PPP), while PPP have a lower fiber content (13.42% vs. 34.95% for MRP and 32.46% for TW). Our study suggests that the main reason of this negative effect of the nature and chemical analysis of fiber of MRP compared with those of PPP and TW. In addition that, the fibers of TW and PPP may be easily degraded or hydrolyzed (by endogenous and/or exogenous

enzymes) compared with MRP. Our suggestion is agreed with (Mateos et al., 2012), who indicated that unconventional feedstuffs that easiest in fiber degradation improved bird performance compared with those contains more complicated fiber contents using of oat hull, soy hull or sugar beet pulp as a dietary fiber sources.

Effect of experimental treatments on carcass characteristics (Table 4) shows the effect of experimental treatments on carcass characteristics of slaughtered chicks 35 days old. It is clear that the PBP supplementation or experimental material type didn't have any significant effect on carcass weight or other carcass traits as a percent of body weight, except for the gizzard percentages which recorded the higher significant value for chicks received control or MRP+PBP diets compared with the other groups.

Table (4): Effect of different dietary treatments on carcass characteristics of broiler chicks at 35 days old.

Carcass Characteristics	NCon	PCon	MRP+PBP	PPP+PBP	TW+PBP	Sig.
Live body weight (g)	1486	1499	1483	1645	1463	NS
Carcass wt. (g.)	1051	1038	1043	1146	1021	NS
Carcass (%)	70.72	69.23	70.3	69.68	69.78	NS
Abdominal Fat (%)	0.88	1.14	0.87	1.01	0.68	NS
Liver (%)	2.14	2.33	2.20	2.05	2.29	NS
Gizzard (%)	1.74^{a}	1.31^{b}	1.65^{a}	1.54^{ab}	1.57^{ab}	*
Heart (%)	0.43	0.44	0.34	0.41	0.47	NS
Giblets (%)##	4.32	4.09	4.19	4.00	4.34	NS

*#a,b Means within the same row with different superscript letters are significant1y differed. Sig. = Significance, *= P≤0.05, NS= not significant.*

##Giblets = Liver + Gizzard + Heart

The significant effect of MRP on gizzard percent may be attributed to that MRP used in this study more roughly and needed to more grinding before adding it in experimental diet and nature feed and composition tend to change of carcass characteristics and their percentages this agreed with (Iyayi and Davies, 2005) who reported a similar result with palm kernel meal supplementation in broiler diet. The basic suggested reason for significant high value for gizzard of both control groups is not clear yet. With noting that the averages of gizzard percent statistically significant, but the superscript letters of mean values tended to be non significant for all groups. However, the non significant effect of PBP or waste type on most carcass traits is agreed with (Abbas et al., 1998) and (Iyayi and Davies, 2005) using multi enzyme preparation (Kemzyme). But in our study it may be attributed to that quantity of PBP supplemented to diet is insufficient for manifest this effect.

Effect of experimental treatments on plasma constituants: The effect of different dietary treatments on main plasma components of broiler chicks at 35 days old are showed in Table (5). By comparing values of NCon and PCon groups, the total protein (TP) of chick plasma didn't significantly affect by PBP supplementation. On the level of tested byproducts; both PPP and TW recorded the higher values compared with MRP treatment.

Different dietary treatments significantly affect plasma Albumin value. TW has the highest value compared to other treatments, whereas, MRP treatment recorded the lowest values and close to control. Treatments of TW and CON+PBP showed the lowest plasma Globulin values among treatments other treatments. Although plasma Globulin was lower with TW treatment, but, it recorded the highest A/G ratio among byproduct treatments, additionally, PPP and CON+PBP have the highest A/G ratio than other treatments that mean, these by-products improved the birds' immunity.

Statistically, different experimental treatments didn't significantly affect total cholesterol of chick plasma, but numerically TW and MRP have the lowest values for cholesterol concentration. So, those productions decreased lipid metabolism .

Regarding liver function indicators in plasma; AST concentrations have not significantly affected by different dietary treatments and the lowest values were showed for birds that fed on the MRP + PBP treatment. On the other hand, PPP pand TW have been closed values for birds that fed on control diet. Although, ALT concentrations significantly differed among different treatments, and birds fed PCON have the lowest concentrations compared with other treatments

Table (5). Effect of different experimental treatments on plasma constituents of broiler chicks at 35 days old.

Plasma constituents	NCon	PCon	MRP+PBP	PPP+PBP	TW+PBP	Sig#.
Total Protein (g/dl)	5.84^{b}	6.14^{ab}	5.73^{b}	7.20^{a}	7.30^{a}	*
Albumin (g/dl)	1.54^{bc}	2.47^{ab}	1.38^{c}	2.98^{a}	3.42^{a}	*
Globulin (g/dl)	4.30^{a}	3.66^{c}	4.35^{a}	4.22^{ab}	3.88^{bc}	*
A/G ratio	0.358^{b}	0.674^{a}	0.317^{b}	0.706^{a}	0.881^{a}	*
Cholesterol(mg/dl)	196.5	201.0	166.0	200.0	152.0	NS
ALT(RFU/dl)	31.1^{b}	24.2^{c}	47.4^{a}	32.7^{b}	33.0^{b}	*
AST(RFU/dl)	46.0	42.8	28.4	37.8	38.3	NS

*#a,b Means within the same row with different superscript letters are significant1y differed. Sig. = Significance, *= P≤0.05, NS= not significant.*
*** Lipid metabolism.*

The higher values for total protein of chick plasma recorded for PPP or TW treatments compared with MRP treatment may be due to that; compared with MRP; the higher content of protein of PPP. This result agreed with (Corzo *et al*., 2011), who reported that broiler chicks received diet, contained 20.2% CP showed a significant higher TP in plasma by 8% than those fed 18.9% CP diet at 42 day-old. The same result documented by (Corzo *et al*., 2009) and (Hernández et al., 2012) and they attributed that to the deficiency of amino acids ingested by the birds. A confirmed result for our suggestion was documented by (Mahdi and Heidariniya, 2011) when they showed a non significant effect of high fiber safflower seed meal (15-19% fiber content) in broiler diet up to 20% level on total protein of chick plasma at 42day-old using a stable protein content of all experimental diets. In our study, the non significant differences between the control and MRP+PBP treatments of total protein values may be somewhat confused this suggestion.

Since, the Albumin, Globulin and A/G ratio of plasma taken as parameters interest to body immunity, The higher A/G values recorded for PPP or TW compared with MRP, suggested to that high fiber content diet or inclusion of high fiber by products in broiler diet may negatively affect immune parameter of broiler plasma represents in A/G ratio, this result agreed with (Apata, 2010). The same result recorded by (El-Katcha *et al*., 2014) with increasing wheat grain in broiler diets.

Besides that, the significant increase of A/G ratio associated with PCon compared with NCon treatment suggested that PBP may be having a positive effect on the immunity of chicks. This result agreed with (Safaa, 2013) using Zado® enzyme preparation. Although, the wide difference between the two studies being in the level of experimental enzyme preparations supplemented in diets (4% Zado vs. 0.2% of PBP in our study). While (Lee *et al*., 2010) and recent study of (El-Katcha *et al*., 2014) indicated that enzyme preparation didn't significantly affect Albumin or A/G levels of chick plasma.

The numerical reduction in plasma total cholesterol associated with TW and MRP in present study suggesting that due to inhibition of lipid biosynthesis in plasma and adipose tissues explained the reduction of abdominal fat of these treatments than other treatments (Table 3) where TW and MRP numerically have the lowest values for abdominal fat percentages. The wide range of the difference between the cholesterol values (152.0 to 201.0 mg/dl) of the five experimental groups might be will give a different statistical result using a large number of plasma samples. However, this result concerning

cholesterol level of plasma is agreed with (El-Katcha *et al.*, 2014) and (Lee et al., 2010), but it in contrast to (Zarghi and Golian, 2009) who documented a higher level of plasma cholesterol with chick received diet supplemented with 500 ppm of enzyme mixture.

CONCLUSION

It could be concluded that included PPP or TW in broiler diet within the range of 5% of starter and 10% of grower, without any negative effect on WG, FCR, carcass characteristics or blood parameters of chicks. While MRP supplementation with the same levels caused a drop in WG and FI and some changes in essential plasma components. The level of 200 g of PhytaBexPlus / ton diet which suggested by the product guide may be not sufficient to appear any marked effects on broiler chicks especially performance traits during the grower period and for plasma constituents of broiler chicks.

ACKNOWLEDGMENTS

It's pleasure to me to thanks all my friends in department of poultry production, Faculty of Agriculture, Ain Shams University, Egypt.

REFERENCES

Abdel-Daim M.M., M.A. Abd Eldaim and M.M. Mahmoud (2014). Trigonella foenum-graecum protection against deltamethrin-induced toxic effects on hematological, biochemical, and oxidative stress parameters in rats. Can. J. Physiol. Pharmacol. 92 (8): 679-685.

Abbas, W., S.H. Khan and M. Sarwar1(998). Sunflower oil meal as a substitute for soybean meal in broiler rations with or without multienzymes (KEMZYME). Paki Vet. J., 18 (3):124-129.

Al-Betawi, N.A. (2005). Preliminary study on tomato pomac as unusual feedstuff in broiler diets. Pak. J. of Nutr. 4: 57-63.

Ali, A.M. (2001). Replacing yellow corn with peels of prickly pear in quail ration in North Sinai. Egypt. Poult. Sci., 21: 963-975.

AOAC (1990). Association of Official Analytical chemist. Official Method of Analysis. 15th ed-Arlington, USA.

Apata, D.F. (2010). Effect of terminalia catappa fruit meal fermented by Aspergillus niger as replacement of maize on growth performance, nutrient digestibility, and serum biochemical profile of broiler chickens. Biotechnology Research International. V. 2011, Article ID 907546, p. 1-6.

Bahnas, M.S., M. S. Ragab, N.E.A. Asker and R.M.S. Emam (2009). Effect of using parsley or its by-product with or without enzyme supplementation on performance of growing Japanese quail. Egypt. Poult. Sci. 1:241-262.

Bedford, M.R. (1997). Reduced viscosity of intestinal digesta and enhanced nutrient digestibility in chickens given exogenous enzymes. In: Enzymes in poultry and swine nutrition. IDRC Publication, 154 pp.

Carpenter ,K.J. and Clegg K.M. (1956). The metabolizable energy of poultry feedstuffs in relation to their chemical composition. J. Sci. Food Agr. 7:45-51.

Corzo A., R. E. Loar, M.T. Kidd and S.C. Burgess (2011). Dietary Protein Effects on Growth Performance, Carcass Traits and Expression of Selected Jejunal Peptide and Amino Acid Transporters in Broiler Chickens. Revista Brasileira de Ciência Avícola. Vol. 13 :139-146.

Corzo, A., R. E. Loar, and M. T. Kidd (2009). Limitations of dietary isoleucine and valine in broiler chick diets. Poult. Sci. 88:1934–1938.

Duncan, D.B. (1955). Multiple range and Multiple F tests. Biometrics, 11:142.

El-Deek , A.A., M.A. Asar, S. M. Hamdy and A. A. Abdalla (2009). Utilization of Guava by-products in broiler finisher diets. Egypt. Poult. Sci. 29: 53-75.

El-Faham A.I. (2005). The effect of using date palm waste (Mid rib of date palm) as ingredients in broiler diets. J. Agric. Sci. Mansoura Univ., Egypt. 30 (9): 5103-5114.

El-Faham A.I., S.A. Ibrahim, Nematallah G.M. Ali, M. E. Mohamed and M.KH. Ekramy (2013). Effect of date palm waste and some feed additives on growing chick performance. Egyp. J. Nutr. and Feeds. 16 (2): Special Issue: 381-390.

El-Ghamry A.A., M.A. Al-Harthi and Y.A. Attia (2005). Possibility to improve rice polishing utilisation in broiler diets by enzymes or dietary formulation based on digestible amino acids. Arch Geflugelk 69, 49-56.

El-Katcha M. I., A. Mosaad, S. Hany, .F. El-Kaney and El-Sayed .R. Karwarie (2014). Growth Performance, Blood Parameters, Immune response and Carcass Traits of Broiler Chicks Fed on Graded Levels of Wheat Instead of Corn Without or With Enzyme Supplementation. Alexandria Journal of Veterinary Sciences, 40:95-111.

EL-Kholy, K.F. (1999). The use of some non-conventional feed sources in fish nutrition. Ph.D. Thesis. Dept. of Animal Prod. Fac. of Agric., Cairo Univ Egypt.

El-Kossori, R. L., C.Villaume, , E. El-Boustani, , Y. Sauvaire, , and L. Mejean (1998). Composition of pulp, skin and seeds of prickly pears fruit (Opuntia ficus-indica sp.). Plant Foods for Human Nutrition, 52(3), 263–270.

EL-Nagmy K. Y., A. M. Ali and M. S. Abdel-Malak (2001). The effect of using some untraditional feedstuffs on the performance of Japanese quails in north Sinai. Egyp. Poult. Sci. 21: 701-717.

FAO (1993). Food and Agriculture Organization of the United Nations Rome. Book of Date Palm Products. By W.H. Barreveld. Italy, Chapter 5.

Ghazalah, A. A., M. R. El-Abbady, A. I. Labib, H. I.Aly, Kout ElKloup and M. El- Sayed (2002). The use of fungi to upgrade and evaluate the nutritive value of potato waste in broiler diet. Egypt. Poult. Sci. 22(4):931-951.

Hernández, F,. M. Lopez, S. Martinez ,M. D. Megias ,P. Catala and J. Madrid (2012). Effect of low-protein diets and single sex on production performance, plasma metabolites, digestibility, and nitrogen excretion in 1-to 48-day-old broilers. Poult. Sci. 91:683-692.

Ibrahim S.A., Nematallah G.M. Ali, El-Faham A.I., M.E. Mohamed and E. M.Khalifa (2013). Effect of using date palm waste on performance, carcass characteristics and economic efficiency of Gemaza growing chicks. Egyp. J. Nutr. and Feeds. 16 (2): Special Issue: 309-318.

Iji, P.A., A. Saki and D.R. Tivey (2001). Body and intestinal growth of broiler chicks on a commercial starter diet. 1. Intestinal weight and mucosal development. Br. Poult. Sci., 42: 505-513.

Iyayi E.A. and B. I. Davies (2005). Effect of Enzyme Supplementation of Palm Kernel Meal and Brewer's Dried Grain on the Performance of Broilers. International Journal of Poultry Science 4 (2): 76-80.

King AJ and G. Zeidler (2004). Tomato pomace may be a good source of vitamin E in broiler diets. California Agriculture 58 (1): 59 - 62.

Lee, S. Y., J.S. Kim, J. M. Kim and B. A. Kang (2010). Effects of multiple enzyme (ROVABIOMax) containing carbohydrolases and phytase on growth performance and intestinal viscosity in broiler chicks fed corn wheat-soybean meal based diets. Asian- Australasian Journal of Animal Sciences. 23: 1198-1204.

Mahdi M., A. Hassanabadi and A. Heidariniya (2011). Effects of Safflower Seed on Performance, Carcass Traits and Blood Parameters of Broilers. Res. J. of Poult Sci.V.4 (2):18-21.

Maiorka A, Macari M, Furlan RL, Gonzales E. (2002). Fisiologia aviária aplicada a frangos de corte. Jaboticabal: FUNEP-UNESP. p. 113-124.

Mateos GG, Jiménez-Moreno E, Serrano MP, Lázaro P. (2012). Poultry response to high levels of dietary fiber sources varying in physical and chemical characteristics. Journal of Applied Poultry Research; 21-159-174.

Meng, X., and A. Slominski (2005). Nutritive value of corn, soyabean meal, canola meal, and peas for broiler chickens as affected by a multicarbohydrase preparation of cell wall degrading enzymes. Poult. Sci. 84:1242–1251.

Nadeem M. A., M. I. Anjum, A. G. Khan and A. Azim (2005). Effect of dietary supplementation of non – starch polysaccharide degrading enzymes on growth performance of broiler chicks. Pak Vet. J., 25(4):183-188.

Nagib, A.M., S.H. Mekkawy, O.M. Abd El-Fatah and R.G. Hamza (2001). Effect of using irradiated Pea waste in broiler diets supplemented with enzyme preparation on growth performance and digestibility. Egyp. Poul. Sci. 21(4): 883-900.

Nagib, A.M., S.H. Mekkawy, O.M. Abd El-Fatah and R.G. Hamza (2002). Effect of diets containing irradiated tomato waste supplemented with enzyme preparation on growth performance and digestibility of broiler chicks. Egyp. Poult. Sci. 22(3): 727- 743.

Nebbache S., C. Abdelwaheb, C. Rabah1 and B. Ahcene (2009). Chemical composition of Opuntia ficus-indica (L.) fruit. Afr. J. of Biotec. V. 8 (8):1623-1624.

NRC (1994). National Research Council. Nutrient Requirements of Poultry, 9th rev. ed. National Academy.

Ragab, M.S., M.M.M. Namra, M.M.M.Aly, and M.A.Fathi (2013). Effects of partially replacing of yellow corn with Dill or Parsley by-products in broiler diets on some productive and physiological parameters. Egyp. Poult. Sci.33(1):221-238.

Safaa H.M. (2013). Influence of Dietary Enzymes Prepared at Ensiling (ZADO®) from Hatch to 42 Days of Age on Productivity, Slaughter Traits and Blood Constituents in Broiler Chickens. International Journal of Poultry Science 12 (9): 529-537.

SAS (1995). JMP Statistics and Graphics Guide.Version 3.1.SAS Institute, Cary, NC.

Squires, W., E.C. Naber and V.P. Toelle (1992). The effect of heat, water, acid and alkali treatment of tomato canner wastes on growth, metabolizble energy value and nitrogen utilization of broiler chicks. Poult. Sci., 71(3): 522-529.

Tavernari F.C., L.F.T. Albino, R. L. Morata, W.M. Dutra Jonior, H.S. Rostagno, and M.T.S Viana (2008). Inclusion of Sunflower Meal, With or Without Enzyme Supplementation, in Broiler Diets. Braz. J. of Poult. Sci. 10(4): 233 – 238.

Van Eekeren N., A. Maas, H.W. Saatkamp. and M. Verschuur (2004). Small-scale poultry production in the tropics (3rd Ed.) Agromisa Foundation, Wageningen.

Van Leeuwen, P. , J. M. Mouwen, J. D. van der Klis, and M. W. Verstegen (2004). Morphology of the small intestinal mucosal surface of broilers in relation to age, diet formulation, small intestinal microflora and performance. Br. Poult. Sci., 45:41–48.

Zarghi, H. and A. Golian (2009). Effect of triticale replacement and enzyme supplementation on performance and blood chemistry of broiler chickens. J. Anim. Vet. Advan., 8(7): 1316-1321.

الاستفادة من بعض المخلفات الزراعية والصناعات الغذائية كمواد علف غير تقليدية في علائق دجاج اللحم

محمد مصطفى السيد مصطفى، أحمد إبراهيم سليمان الفحام ، نعمة الله جمال الدين محمد على ، نبيل محمد المدني و سيد عبدالرحمن إبراهيم

قسم إنتاج الدواجن- كلية الزراعة- جامعة عين شمس- القاهرة- مصر.

أجريت تجربة لإختبار مدى إمكانية استخدام جريد النخيل (MRP) وقشور التين الشوكي (PPP) ومخلفات تصنيع الطماطم (Tw) كمخلفات متوفرة تحت الظروف المحلية كبديل جزئي للذرة الصفراء في علائق دجاج اللحم.

استخدم في التجربة 150 كتكوت (هيرد) غير مجنس عمر يوم لدراسة إمكانية استخدام (MRPY, PPP, Tw)) بمعدل 5% في عليقة البادئ و10% في عليقة النامي مضاف إليهم 200 ملجم/ كجم علف من المستخلص الإنزيمي PBP (فيتابكس بلس) كبديل للذرة الصفراء لتكوين 5 معاملات غذائية كالآتي:

- كنترول سالب (عليقة بدون إضافات إنزيمية)
- كنترول موجب (عليقة كنترول + إضافة إنزيمية PBP)
- معاملة أولى (جريد نخيل + إضافة إنزيمية PBP)
- معاملة ثانية (قشور تين شوكي + إضافة إنزيمية PBP)
- معاملة ثالثة (مخلفات طماطم + إضافة إنزيمية PBP)

استمرت التجربة 35 يوم وفي نهايتها تم ذبح 6 طائر من كل معاملة لدراسة صفات الذبيحة وبلازما الدم

أهم النتائج:

- إضافة المستخلص الإنزيمي (PBP) إلى عليقة الكنترول لم يؤثر على معدلات النمو أو كفاءة التحويل الغذائي ولكن زاد معنوياً من استهلاك العلف وكذلك خفض معنوياً % للقانصة.
- سجلت مجموعة جريد النخيل أقل القيم في معدلات النمو اليومي واستهلاك العلف وأسوأ كفاءة تحويل غذائي وأعلى % للقانصة بالمقارنة بالمعاملات المختلفة.
- مجموعة قشور التين الشوكي أو مخلفات الطماطم لم تؤثر على معدلات النمو اليومي أو كفاءة التحويل الغذائي وكذلك صفات الذبيحة ولكن زاد معنوياً استهلاك للعلف بالمقارنة بمجموعة الكنترول.
- صفات بلازما الدم تأثر معنوياً بالمعاملات المختلفة إلا أن مستوى الكولسترول وAST لم يتأثر وسجلت مجموعة جريد النخيل أقل القيم في Total Protein, Albumin, A/G ratio, AST وأعلى القيم في Globulin و ALT بمقارنة بالمعاملات المختلفة.

الخلاصـــة

إمكانية استبدال الذرة الصفراء في علائق دجاج اللحم بمعدل 5% في البادئ و10% في النامي بقشر التين الشوكي أو مخلفات الطماطم مدعماً بالمستخلص الإنزيمي بدون تأثيرات سلبية على الأداء الإنتاجي وصفات الذبيحة وبلازما الدم.