6. SUMMARY AND CONCLUSION

The present work was carried out at Gizerat EL-Sheir Poultry Research Station, Animal Production Research Institute, Agricultural Research Center, Egypt, to study the effect of different dietary WWH, WHL, PBP and CPP levels on broiler chicks performance. The chemical analysis were undertaken at the laboratories of the same institute.

A total number of 567 one day old Arbor Acres broiler chicks were used in this study. Chicks were randomly distributed into 21 groups, each containing 27 chicks in 3 replicates with 9 chicks each. Chicks were fed thirteen starter diets from 1day to 4 weeks of age (starting period), after which birds were switched to be fed on thirteen finisher diets during the finishing period (4-7 weeks of age). Starter and finisher diets were nearly isonitrogenous and isocaloric. The CP contents were between 21.25 and 21.85% for starter diets; 18.15 and 18.59% for finisher ones, and ME values ranged between 2970 and 2990 Kcal/Kg starter diets; 3015 and 3040 Kcal/Kg finisher diets. The starter and finisher diets included three levels (5,10 and 15%) of each of WWH plants, WHL, PBP and CPP, to replace a part of yellow corn and soybean meal in the control rations. Each starter diet was assigned to one group of chicks at random during the starting period, then chicks of this group were switched to the respective finisher diet during the finishing period. Except that chicks received 5% of the tested feed (WWH plants, WHL, PBP or CPP) during the starting period were divided into three sub-groups during the finishing period and fed finisher diets containing 5, 10 and 15% of the respective tested feed, respectively.

At the termination of the experimental period (7 weeks of age), representative samples of chicks were randomly chosen for slaughter test and blood constituents.

Results of this study could be summarized as follows:

Water Hyacinth.

Chemical analysis and amino acid contents

1- The average chemical analyses of WH leaves were 8.03, 22.77, 17.16, 2.91, 14.37 and 44.78% for DM, CP,CF,EE ash and NFE, respectively. The respective values of WH stems were 4.72, 12.46, 24.24,1.68, 20.63 and 41.00%, and that of WH roots were 8.35, 10.32, 17.43, 1.25, 30.20 and 40.80%.

2- Average mineral contents of WH leaves were 1.41, 0.56, 0.97, 0.41, 1.99, 1.21 and 0.04% for Ca, P, Na, Fe, K, Mg and Mn, respectively. The respective percentages of WH stems were 1.49, 0.48. 1.84, 0.24, 1.76, 1.29 and 0.06%, and that of WH roots were 1.64, 0.43, 1.42, 1.86, 0.62, 1.53 and 0.22%.

3- Results of amino acid contents showed that cystine was the first limiting amino acid for whole WH plant, WH leaves and WH stems, while arginine, methionine + cystine and arginine were the second limiting amino acid for whole WH plant, WH leaves and WH stems, respectively. Methionine + cystine, arginine and methionine + cystine were the third limiting amino acid in the same order.

Factors affecting chemical composition.

1- Results of the effect of season (6 months) on the chemical composition of different parts (leaves, stems and roots) showed that WH plant parts had almost higher CP values in winter months than in summer ones.

2- Location (three different locations) greatly affected the chemical composition of the different parts of WH plant, and the differences were significant ($P< 0.01$ and $P< 0.05$).

3- Chemical composition of WH plants revealed that leaves, in general, had the highest CP, EE and NFE contents and the lowest CF and ash values compared with the other parts of WH plant (stems or roots). Whereas, roots contained the highest ash and the least CP, EE and NFE contents compared with leaves and stems However, stems had the highest CF content.

4- Data concerning the effect of water course (canals and ditches) on the chemical composition of the different parts of WH plants showed that WH plant parts in canals had higher CP, EE and NFE contents and lower CF and ash values compared with those in ditches.

However, the differences in chemical composition (CP, CF, EE, ash or NFE contents) of WH plant parts (leaves, stems or roots) due to either season (month), location, plant parts or water course effects were mostly significant.

Chick performance.

1- Averages of LBW and BWG of chicks mostly decreased as dietary level of either WWH or WHL increased during the different experimental periods. The differences in both LBW and BWG between chicks fed the control diet and those fed different dietary WHL levels were almost not significant. Similar results were obtained with different WWH levels, except for 10% and 15% WWH during the starting period and 15, 15% WWH during the finishing and entire periods.

2- Feed intake increased with increasing the level of WWH and WHL in the diet and the differences were significant in most cases during the different experimental period. However, the differences in FI between chicks fed the control diet and those fed either 5% WWH or 5% WHL were not significant at all periods of the experiment.

3- The best feed conversion values (g feed / g gain) during the starting period were recorded by chicks fed the control diet followed by those fed either 5% WWH or 5% WHL, with no significant differences between these treatments.

Carcass traits and blood constituents.

The dietary WWH and WHL levels had no significant effects on all carcass traits and blood constituents of broiler chicks at 7 weeks of age.

Pea By Products

Chemical analysis and amino acid contents

1- The dried PBP had, on average, 14.56% CP, 0.86% EE, 20.62% CF, 4.81% ash, 59.15 % NFE, 0.82% Ca and 0.38% P.

2- According to chick requirements for amino acids, arginine was the first limiting amino acid in PBP, while, methionine + cystine and methionine were the second and third limiting ones, respectively.

Chick performance.

1- Both LBW and BWG averages of broilers almost decreased with increasing the dietary PBP level during all the experimental periods. Chicks fed 15% PBP recorded the lowest LBW and BWG values. The differences in either LBW or BWG averages between chicks fed the control diet and those fed up to 10% PBP were mostly non-significant during all the experimental periods.

2- Feed intake of broiler chicks tented almost to increase with increasing dietary PBP level during all the experimental periods. The differences in FI between chicks fed the control diet and those fed 5% PBP were not significant at the starting period. Whereas, the diffrences in FI of the control and different PBP dietary levels were not significant, except for the level of 15, 15% PBP at the finishing period and the level of 10, 10% and 15, 15% PBP at the entire period.

3- Increasing the dietary level of PBP had detrimental effect on feed conversion values of broiler chicks. The best feed conversion values were recorded by chicks of the control diet, while the poorest ones were achieved by those fed 15% PBP during all the experimental periods. The differences in fed conversion values between chicks fed the control diet and those fed 5% PBP at starting period were not significant. Whereas, the differences between values of the control diet and those of all experimental treatments were not significant except for 15, 15% PBP during the finishing period and 5, 15% PBP, 10, 10% PBP and 5, 15% PBP during the entire period.

Carcass traits and blood constituent.

The level of dietary PBP used in this study had no significant effects on neither carcass traits nor blood constituents of broiler chicks at 7 weeks of age.

Citrus Pulp.

Chemical analysis and amino acid contents.

1- Averages of chemical composition of CPP were 6.16, 2.58, 9.99, 3.31, 77.96, 0.90 and 0.39% for CP, EE, CF, ash, NFE, Ca and P, respectively.

2- Methionine + cystine were the first limiting amino acid in CPP, while lysine and arginine were the second and third limiting ones, respectively.

Chick performance.

1- Increasing the dietary CPP level had an adverse effect on both LBW and BWG of broiler chicks at all experimental periods and the adverse effect was more pronounced at the level of 15% during starting, finishing and entire periods.

2- Average amounts of feed consumed by chicks increased with increasing dietary CPP level. The differences in FI due to dietary CPP level effects were almost non-significant except for the 15% CPP level which recorded always the highest ($P< 0.05$) amount of FI during finishing and entire periods.

3- The best feed conversion values during all the experimental periods were recorded by chicks of the control diet followed by those fed 5% CPP level, with no significant differences between the two treatments. Increasing the dietary CPP level had a detrimental effect on feed conversion values. The poorest values ($P< 0.05$) were recorded by chicks fed the 15% CPP level during all the experimental periods.

Carcass traits and blood constituents.

The differences in both carcass traits and blood constituents of broiler chicks at 7 weeks of age due to dietary CPP level effects were always non-significant.

Economical Evaluation

1- From the economical point of view, WWH could be incorporated in broiler diets at the level of 5% at both starting and finishing periods, whereas, WHL could be used up to 10% dietary level at the starting and finishing periods.

2- The dietary 5% PBP level showed the best economical efficiencey values at the starting period, while up to 15% PBP could be used successfuly in broiler diets at the finishing period.

3- Among the CPP treatments, the 5, 5% CPP level recorded the best relative economical efficiency value.

Nutritional Evaluation.

1- The TDN values for WWH, WHL, PBP and CPP were 44.80, 46.64, 43.72 and 39.22%, respectively.

2- The ME values were 1.827, 2.277, 2.324 and 1.560/ Kcal/ gm DM for WHH, WHL, PBP and CPP, respectively.

Conclusion:

It is possible to use successfully WWH, WHL, PBP and CPP in broiler diets at levels up to 5, 10, 5 and 5%, respectively without adverse effect on the performance, carcass traits, blood constituents and economic efficiency of broilers.