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Economic Value of Dried Tomato Pomace in Broiler Chickens Diets

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Abstract: This experiment was conducted to study economic value of Dried Tomato Pomace (DTP) in broiler chickens diets in the form of completely randomized design. For this purpose, 160 days old Ross 308 broilers were distributed into 16 floor pens and reared for 42 days. A basal diet was formulated according to NRC recommendations for starter (0-21 days) and grower (22-42 days) periods. Then, the basal diet was also, supplemented with 8, 16 and 24% DTP, resulting 4 dietary treatments were prepared including control group. The results showed that feed conversion ratio between treatments containing 8 and 16% of DTP compared to control group had no significant difference ($p>0.05$), but the highest (worst) feed conversion ratio were recorded for birds fed diets supplemented with 24% DTP ($p<0.05$). Comparison of the cost for 1 kg meat showed that the use of DTP up to 16% in diet reduce production cost.

Key words: DTP, economic value, broiler, diets, protein

INTRODUCTION

Despite all attempts to set the world population, problem in the human population explosion in developing countries is quite evident. This huge population needs to food and protein after oxygen. Broiler production in Iran developed very fast in the last two decades to become the most important sector in animal production. The major problems that face poultry production particularly broiler industry in Iran are the availability and the cost of feed ingredients. Exploitation of agricultural by-products may make a substantial contribution towards better and more economic feeding of poultry. In view of the shortage and the high costs of protein feeding-stuffs, some of these by-products such as DTP could provide part of the protein needed by poetry. In this respect, it is clear that the country's resources in such products need to be fully developed and thoroughly evaluated nutritionally. DTP one of wet tomato pomace is a mixture of tomato skin, pulp and crushed seeds that remain after the processing of tomato for juice, paste and/or ketchup. The proximate analysis shows that DTP may contain acceptable nutrients such as crude protein, crude fibre, diethyl ether extract, nitrogen free extract (Persia *et al*., 2003; King and Zeidler, 2004). The seed protein is rich in lysine and can supplement products that are deficient in this amino acid like cereals (Tsatsaronis and Boskou, 1975; Carlson *et al*., 1981; Liadakis *et al*., 1995). Be noted that the tomato pomace metabolizable energy content was 2130 kcal kg^{-1} (NRC, 1988). Manifold studies available about effect of DTP on performance and carcass characteristic broiler chickens (Dotas *et al*., 1999; King and Zeidler, 2004; Al-Betawi, 2005; Jafari *et al*., 2006), but there are limit information about the economic value of DTP in broiler chickens diets. Therefore, the purpose of this study was to investigate the economic value of using DTP in broiler diets.

MATERIALS AND METHODS

The experiment was carried out at the poultry research station, Ramin Research Institute, Faculty of Animal Science and Food industry, Ramin Agricultural and Natural Resources University. The experimental procedure was approved by the Animal Research Committee of the Ramin Agricultural and Natural resources University.

Chemical analysis: In this study, samples of DTP for chemical analysis transmitted to animal science group laboratory and analysis was performed according to AOAC (1984) methods (Table 1) and compared to other finding (Squires *et al*., 1992; Hassan and Sh, 2004; Hamza, 2001; NRC, 1994, 1988).

Birds, diets and statistical analysis: In this experiment, 160 broiler chickens of the commercial Ross 308 strain were used in a randomized completely design with 4 treatment, 4 replicates in each treatment and 10 birds/replicates and reared on the floor pens for 42 days. A basal deit was formulated as control according to NRC (1994), recommendations for starter (0-21 days) and

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Table 1: Chemical composition of tomato pomace (%)

	Nutrients							
References	DM	CP	CF	Ash	EE	NFE	Ca	P
This experiment	90.6	22.0	27.0	0.43	11.9	22.6	0.43	0.63
Squires *et al.* (1992)	93.7	18.8	31.0	3.60	12.2	28.0	0.41	0.54
Hassan and Sh (2004)	72.9	22.1	29.3	11.10	7.9	31.5	-	-
Hamza (2001)	92.2	22.7	32.4	5.60	12.3	26.3	-	-
NRC (1994)	92.0	23.0	26.0	6.00	-	-	0.43	0.59
NRC (1988)	92.0	23.5	26.4	7.50	10.3	-	0.43	0.60

Table 2: Ingredient composition and calculated analysis of diets

	Starter diets DTP (%)				Grower diets DTP (%)			
Ingredients	0	8	16	24	0	8	16	24
Corn	57.2	56.7	50	44.1	62.6	63.6	58	49
Soybean meal	29.9	27.8	25	24	24.2	19.5	14	15
Tomato pomace	0	8	16	24	0	8	16	24
Wheat bran	5	0	0	0	5	0	0	0
Fish meal	3	3	3	3	5.1	6.1	6.8	5.1
Soybean oil	1.2	1	2.2	3.5	1.7	1	2	3.8
Oister shell meal	1	1.1	1.1	1.1	1.3	1.3	1.3	1.4
DCP	1.3	1.1	0.9	0.73	0.86	0.39	0	0
Vit and min perimix	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
DL-methionine	0.16	0.17	0.20	0.26	0.09	0.07	0.07	0.15
L-lysine	0.26	0.16	0.14	0.16	0.22	0.08	0.03	0.11
$NaHCO_3$	0.14	0.17	0	0	0.11	0	0	0
Salt	0.13	0.18	0.20	0.20	0.14	0.18	0.20	0.19
Coccidiostat	0	0	0	0	0.05	0.05	0.05	0.05
Total	100	100	100	100	100	100	100	100
Nutrient content								
ME (Kcal kg^{-1})	2850	2850	2850	2850	2950	2950	2950	2950
Crude protein (%)	20.48	20.48	20.48	20.48	18.44			
Crude fiber (%)	3.88	5.38	7.21	9.04	3.6	4.9	6.7	8.6
Cost (Rail)	4980	4840	4810	4830	4790	4550	4490	4620

Vitamin and mineral provided per kg of diet: Vitamin A, 360000 IU; Vitamin D_3, 800000 IU; Vitamin E, 7200 IU; Vitamin K_3 800 mg; Vitamin B_1, 720 mg; Vitamin B_9, 400 mg; Vitamin H_2, 40 mg; Vitamin B_2, 2640 mg, Vitamin B_3, 4000 mg; Vitamin B_5, 12000 mg; Vitamin B_6, 1200 mg; Vitamin B_{12}, 6 mg; Choline chloride, 200000 mg, Manganese, 40000 mg, Iron, 20000 mg; Zinc, 40000 mg, copper, 4000 mg; Iodine, 400 mg; Selenium, 80 mg

grower (22-42 days) periods. The required amount of unusual feedstuff under study was added to the basal diet so that in addition to the control treatment, three dietary experimental treatments containing 8, 16 and 24% DTP were prepared (Table 2). During the experiment, water and feed were given to the birds *ad libitum* also, base of economic value was the cost for 1 kg broiler meat at the end of experiment, calculations are given:

$$Cf = \frac{(a \times a') + (b \times b')}{a + b}$$

$$C_M = FCR \times C_f$$

Where:

C_f, C_M = Cost of 1 kg feed in 0-42 days and cost of 1 kg meat, respectively

a, a' = Total feed consumption and cost of 1 kg feed in starter period, respectively

b, b' = Total feed consumption and cost of 1 kg feed in starter period, respectively

FCR = Feed Conversion Ratio

All data were analyzed using the One-Way ANOVA procedure of SAS® (1998) for analysis of variance. Significant differences among treatments were identified at 5% level by Duncan (1955) multiple range tests.

RESULTS AND DISCUSSION

One of the major problems facing poultry industry particularly broiler production in Iran as well as in most development countries is the availability and cost of feed ingredients. This study is intended to examine the potential use of some unusual feed resources that obtained from agro-industrial by-products such as DTP, which could be used in poultry feeding.

The effect of experimental treatments in broiler chickens diets on cost production in whole period (0-42 days) is given in Table 3. DTP to use in diets significantly influence the feed conversion ratio of broiler chicken ($p<0.05$). In the other hand, treatment contain 24% DTP had the worst feed conversion ratio due to high fiber content. Buchanan *et al.* (2007), Al-Betawei (2005),

Table 3: Effect of inclusion DTP in broiler diets on cost kg^{-1} meat production in whole period (0-42 days)

DTP (%)	FCR ($g\ g^{-1}$)	Feed (rial)	Meat (Rial)	Meat (%)
		----------Cost kg^{-1}----------		
0	1.91[b]	4834.70	9234.27	100.0
8	1.97[b]	4618.00	9097.60	98.5
16	1.94[b]	4563.00	8988.02	97.3
24	2.30[a]	4673.25	10748.47	116.3

[a,b]Means in each column with different superscripts are significantly different ($p<0.05$)

Malathi and Devegowda (2001) and Bedford (2000) have observed the negative effects of fiber on performance of broiler chickens. As shown in Table 3, the cost kg feed decreased with increasing DTP in diets in compared with control group. The cost/kg feed of treatment containing 16% DTP was lowest, due to the low price of DTP in diet containing 24% had the highest cost in comparison to another diets containing DTP, this diet was low metabolizable energy that compensated by soybean oil (with high cost), therefore, this diet was the most expensive among the other diets containing DTP. In case of cost feed and feed conversion ratio, diets containing 8 and 16% DTP were the best for cost per kg meat production. Finally, using DTP up to 16% in broiler chicks diets had the positive effect on economic value of production.

CONCLUSION

Based on the results of this experiment, at inclusion DTP up to 16% in broiler chickens diets reduce production cost.

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