

Using Possibilities of Dried Tomato Pomace in Broiler Chicken Diets

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Abstract

In this research it was investigated the effects of the dried tomato pomace in broiler chicken diets on their fattening performances. A total of 96 day-old ROSS-508 broiler chicks in both sexes were used in this trial. All the birds were randomly distributed into 4 trial groups which were fed ad-libitum with diets (22 % CP and 3011 Kcal/kg ME starter diets for 0-3 wks of age and 20 % CP and 3125 Kcal/kg ME finisher diets for 4-6 wks of age) containing different levels of dried tomato pomace as follows: 0% (control), 5 %, 10 % and 15 %, respectively. In conclusion it was suggested that dried tomato pomace can be used as a feed ingredient in broiler chicken diets with a level of 5 %.

Key words: Broiler, dried tomato pomace, fattening performance

Kurutulmuş Domates Posasının Etlik Piliç Rasyonlarında Kullanım Olanakları

Özet

Bu araştırmada kurutulmuş domates posasının etlik piliç rasyonlarında kullanımının besi performansı üzerine olan etkileri incelenmiştir. Araştırmada kullanılan her iki cinsiyetten ROSS-508 genotipindeki toplam 96 adet günlük civciv, 4 deneme grubuna rasgele dağıtılmışlardır. Gruplardaki hayvanlar sırasıyla % 0 (kontrol), % 5, % 10 ve % 15 düzeylerinde kurutulmuş domates posası olacak şekilde, 0-3 haftalar arasında % 22 HP ve 3011 Kcal/kg ME içeren başlangıç rasyonu ve 4-6 haftalar arasında % 20 HP ve 3125 Kcal/kg ME içeren bitiş rasyonu ile serbest olarak yemlenmişlerdir. Sonuç olarak, kurutulmuş domates posasının etlik piliç rasyonlarında alternatif bir yem hammaddesi olarak % 5 düzeylerinde kullanılabilmesi önerilebilir.

Anahtar sözcükler: Etlik piliç, kurutulmuş domates posası, besi performansı

Introduction*

As well-known, feed expenditures had a considerable percentage of costs in livestock production, especially up to 75-80 % for poultry production. Therefore in the last years it was investigated alternative feed resources. Various pomaces from food industry by-products were used an alternative feed ingredient in ruminant and poultry diets.

In Turkey, it was produced 8,5 million metric ton tomato in 2000 (Anonymous 2000).

A noteworthy partial of this amount were consist of idle tomato pomace. In Isparta province of Turkey, tomato pomace was a discarded material until a near past. Nevertheless it was started using of tomato pomace as a feed resource in ruminant nutrition in last years. In the same way food industry by-products such as tomato and apple pomaces were used in ruminant and poultry diets in Turkey and whole world in last years (Yannakopoulos and Christaki, 1992; Squires *et al.* 1992; Karabulut 1999; Yıldız and Dikicioğlu 1999).

Nutritional values of fresh and dried tomato pomace were given in Table 1.

Table 1. Nutritional values of fresh and dried tomato pomace

Composition (%)	Dried (Çapçı et al., 1995)	Ensiled (Çapçı et al., 1995)	Dried (in this research)
Dry matter	95.50	26.04	91.90
Crude protein	16.89	4.68	17.32
Ether extracts	11.07	3.24	8.65
Crude fiber	34.33	9.37	30.54
Nitrogen free extractives	30.35	7.78	31.25
Crude ash	2.86	0.87	4.14

It was reported by Squires *et al.* (1992) that tomato pomace could be used in broiler chicken diets up to level of 20 %. Furthermore it was also reported by Squires *et al.* (1992) using of dried tomato pomace (only separated tomato seeds) in broiler chicken diets were caused an extended shelf life for broiler meats, because of alpha-, beta-, gamma- and delta-tocopherols in tomato pomace cause an antioxidant effect.

In this research it was investigated effects and using possibilities of the dried tomato pomace in broiler diets on their fattening performances. It was also purposed a contribution to the scientific literature, because of there is no sufficient knowledge about effects of the tomato pomace in broiler diets on their fattening performance.

Material and Methods

A total of 96 day-old broiler chicks (ROSS-508) in both sexes were used in this research. All the birds were replaced into battery cages at first day as 4 birds per cage. Overall the trial cage house was illuminated 24 h continuously. All the birds were randomly divided into 4 groups (each group consists of 6 replicates). Groups were constituted for tomato pomace levels of diets as follows: 0 % (control), 5 %, 10 % and 15 %. All the birds in groups were fed ad-libitum with diets during first three wks and 4-6 wks of age, 22 % CP and 3000 Kcal/kg ME and 20% CP and 3125 ME Kcal/kg, respectively.

Fresh tomato pomace was obtained from a private enterprise in Isparta province and dried in natural conditions. Chemical composition of dried tomato pomace used in this research was given in Table 2. Afterwards dried tomato pomace was grinded and diets were prepared.

Table 2. Chemical composition of dried tomato pomace

Chemical Composition	Dried Tomato Pomace
Dry matter, %	91.90
Crude protein, %	17.32
Ether extracts, %	8.65
Crude fiber, %	30.54
Crude ash, %	4.14
Starch, %	2.50
Sugar, %	3.16
ME (Kcal/kg)	1681.00

Third and sixth week live weights were measured individually, feed consumptions and feed conversion

rates were determined for each replicate by a 0.1 g sensitivity electronic scale. Dry matter, crude protein, crude fat and crude ash contents were analysed by Weende method, and crude cellulose content was analysed by Lepper method (Bulgurlu and Ergül, 1978). All the collected and recorded data was entered to the PC softwares (Minitab for Windows v. 12.2 and MSTAT-C), then statistically evaluated and interpreted by variance analysis method (Düzgüneş *et al.* 1983). If the differences were statistically significant, means were compared by Duncan's Multiple Range Test.

Ingredients and calculated compositions of the starter and finisher diets used in this research were given in Table 3 and Table 4, respectively.

Results

Live Weights

Measured live weights at the end of the third and sixth wks of age were given in Table 5.

It was observed that especially 10 and 15 % dried tomato pomace levels in both ages resulted lower live weight than control group ($P < 0.01$). However there is no significant difference between control and 5 % dried tomato pomace supplemented diet groups.

Feed Consumption and Feed Conversion Ratio

Cumulative feed consumptions per bird and feed conversion ratios for 0-3 and 4-6 wks of age were given in Table 6 and Table 7, respectively.

It was observed that there is no significant difference between groups fed with diets contain different levels of dried tomato pomace for either cumulative feed consumption per bird or feed conversion ratio during 0-3 and 4-6 wks of age ($P > 0.05$).

Discussion

In last decades there are a lot of researches on using of food industry by-products (such as pomaces) in ruminant nutrition accompanied with development in Turkish food industry. But there is no sufficient report in scientific literature using these by-products as an alternative resource in poultry nutrition because of juicy structure of them. It is well known that pomaces especially dried tomato pomace was used in poultry nutrition. It was observed in this research increased dried tomato pomace level in both starter and finisher broiler chicken diets resulted lower live weight ($P < 0.01$). However there is no significant difference between control and 5 % dried tomato pomace supplemented diet groups.

Table 3. Ingredients and calculated nutrient content of the starter diet (0-3 wks of age), %

Ingredients	Dried tomato pomace level			
	0 % (control)	5 %	10 %	15 %
Dried tomato pomace	-	5.00	10.00	15.00
Corn	49.84	44.66	39.50	34.30
Wheat	10.00	10.00	10.00	10.00
Soybean meal	29.78	28.60	27.57	26.56
Fish meal	6.00	6.00	6.00	6.00
Vegetable oil	1.72	2.99	4.25	5.52
Dicalcium phosphate	0.88	0.88	0.82	0.77
CaCO ₃	1.04	1.04	1.02	1.01
Vit.+Min premixes*	0.25	0.25	0.25	0.25
Salt	0.35	0.35	0.35	0.35
DL-Methionine	0.14	0.14	0.15	0.15
TOTAL	100.00	100.00	100.00	100.00
		Calculated Nutrient Content		
ME (Kcal/kg)	3011.32	3011.32	3011.19	3011.20
Crude protein	22.06	22.06	22.06	22.06
Calcium	1.09	1.09	1.09	1.09
Available phosphor	0.75	0.75	0.75	0.75
DL-Methionine	0.55	0.55	0.55	0.55
Lysine	1.17	1.17	1.17	1.18

Table 4. Ingredients and calculated nutrient content of the finisher diet (4-6 wks of age), %

Ingredients	Dried tomato pomace level			
	0 % (control)	5 %	10 %	15 %
Dried tomato pomace	-	5.00	10.00	15.00
Corn	52.25	46.90	41.48	36.00
Wheat	10.00	10.00	10.00	10.00
Soybean meal	29.64	28.66	27.67	26.71
Fish meal	2.00	2.00	2.00	2.00
Vegetable oil	3.20	4.61	6.05	7.50
Dicalcium phosphate	0.86	0.83	0.80	0.80
CaCO ₃	1.26	1.21	1.21	1.20
Vit.+Min premixes*	0.25	0.25	0.25	0.25
Salt	0.35	0.35	0.35	0.35
DL-Methionine	0.10	0.10	0.10	0.10
TOTAL	100.00	100.00	100.00	100.00
		Calculated Nutrient Content		
ME (Kcal/kg)	3125.00	3125.00	3125.00	3125.00
Crude protein	19.70	19.70	19.70	19.70
Calcium	0.90	0.89	0.90	0.91
Available phosphor	0.60	0.60	0.60	0.60
DL-Methionine	0.45	0.45	0.45	0.45
Lysine	1.01	0.99	0.97	0.95

* 2.5 kg vitamin and mineral premix contains 10,000,000 IU vitamin A, 3,500,000 IU vitamin D₃, 30,000 mg vitamin E, 3,000 mg vitamin K₃, 1,500 mg vitamin B₁, 7,000 mg vitamin B₂, 3,000 mg vitamin B₆, 20 mg vitamin B₁₂, 500 mg folic acid, 10,000,000 calcium dipentethenate, 50,000,000 mg vitamin C, 500,000 mg choline chloride, 35,000 mg nicotinamid, 100 D-Biotin, 80,000 mg Mn, 50,000 mg Fe, 60,000 mg Zn, 10,000 mg Cu, 1,100 mg I, 200 mg Co and 150 mg Se.

These results were contrary with report of Squires *et al.* (1992) who found that dried tomato pomace can be used in broiler chicken diets up to 20 %. However, in general it seems dried tomato pomace can be used in poultry diets as a feed ingredient any level. This case was agreed with reports of researchers. It is also observed there is no mortality in any group during trial. It is

suggested that new researches on this subject must be carried out in different conditions and it must be decided for level of tomato pomace in poultry diets after an economical analysis. Besides it must be investigated effects of the tomato pomace supplemented diets on meat quality and shelf life.

Table 5. Live weights in groups ($\bar{X} \pm S_{\bar{X}}$)

Groups (Level of dried tomato pomace in diet)	Live weight (g)	
	3 rd week	6 th week
1 (0 %)	562.70±11.60 ^a	1723.00±35.1 ^a
2 (5 %)	547.30±6.26 ^{ab}	1662.50±21.5 ^{ab}
3 (10 %)	519.50±5.49 ^b	1601.60±8.2 ^b
4 (15 %)	519.17±9.20 ^b	1582.50±24.5 ^b

^{a, b}. Different letters in the same column denote significant differences between means (P<0.01)

Table 6. Cumulative feed consumptions ($\bar{X} \pm S_{\bar{X}}$)

Groups (Level of dried tomato pomace in diet)	Cumulative feed consumption (g/bird)	
	0-3 wks	4-6 wks
1 (0 %)	667.50 ± 19.60	2275.00 ± 45.40
2 (5 %)	712.20 ± 10.00	2323.50 ± 29.50
3 (10 %)	682.00 ± 16.20	2245.90 ± 31.90
4 (15 %)	680.50 ± 18.70	2204.00 ± 39.60

Source of variation Significance level

Dried tomato pomace NS NS

NS: Not significant (P>0.05)

Table 7. Feed conversion ratios ($\bar{X} \pm S_{\bar{X}}$)

Groups (Level of dried tomato pomace in diet)	Feed conversion ratio	
	0-3 wks	4-6 wks
1 (0 %)	1.28 ± 0.06	2.01 ± 0.08
2 (5 %)	1.41 ± 0.04	2.11 ± 0.08
3 (10 %)	1.42 ± 0.04	2.10 ± 0.02
4 (15 %)	1.42 ± 0.03	2.06 ± 0.09

Source of variation Significance level

Dried tomato pomace NS NS

NS: Not significant (P>0.05)

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