

## EFFECT OF DIETARY BAKER'S YEAST ON MEAT QUALITY OF BROILER CHICKS

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### Broyler rasyonlarına katılan ekmek mayasının et kalitesi üzerine etkisi

**Özet:** Bu çalışma, % 2.5-20 düzeyinde ekmek mayası kapsayan rasyonların broyler et kalitesi üzerine olan etkilerini belirlemek amacıyla yapıldı.

Toplam 200 adet Ross PM3 broyler civciv kullanıldı. Her biri 40 civcivden oluşan 1 kontrol ve 4 deneme grubu düzenlendi. Kırkbeş günlük deneme süresince yem ve su ad libitum olarak verildi.

Deneme sonunda, her bir gruptan 6 broyler (üç erkek ve üç dişi) kesildi. Broyler eti kimyasal ve organoleptik özellikler yönünden incelendi.

Broyler rasyonlarına % 20 ye kadar maya ilavesinin etin kalitesini olumsuz yönde etkilemediği sonucuna varıldı.

**Summary:** This study was conducted to evaluate the effects of rations containing 2.5-20 % of baker's yeast on the quality of broiler meat.

Totally 200 daily Ross PM3 broiler chicks were used. They were divided into one control group and four treatment groups, each containing 40 broiler chicks. Feed and water was provided ad libitum throughout the 45-day experimental period.

At the end of the experiment, six broilers (three male and three female) were slaughtered from each group. Broiler meat was analyzed for chemical and organoleptic traits.

It is concluded that yeast supplementation to the broiler chicks rations up to 20 % had no adverse effects on meat quality.

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## Introduction

In recent years broiler meat has been gaining in popularity with the consumer. Quality is an important attribute affecting consumer reaction to broiler meat.

It has been demonstrated that a number of factors such as the strain, age and sex of the bird, ration formulation, nutrient intake, management and processing techniques affect the carcass composition and organoleptic quality of broiler (1, 4, 5, 8, 10).

Yeast is generally accepted as an alternative by-product feed for livestock because of its high nutritive value (6, 11, 14). Limitations on the use of yeast, when supplemented in the diet of poultry, have been its high nucleic acid content, unpalatability and bulkiness (6, 11, 14).

The effects of yeast on meat quality are not well documented. For this reason, this study was carried out to evaluate the effects of yeast on the quality of broiler meat.

## Materials and Methods

**Experimental birds and diets:** For this study, 200 daily Ross PM3 broiler chicks were used. They were randomly divided into one control group and four treatment groups, each containing 40 broiler chicks.

The levels of baker's yeast (*Scacharomyces cerevisiae*) used in the diets of control, 1, 2, 3 and 4. groups were 0, 2.5, 5, 10 and 20 %, respectively. The chemical composition of baker's yeast is shown in Table 1. The diets were kept isocaloric and isonitrogenous by adjusting the levels of vegetable fat and soyabean meal as the level of baker's yeast was increased. The composition of the diets is given in Table 2.

Feed and water was provided *ad libitum*. The birds were weighed at 0, 14, 21, 28, 35, 42 and 45 days of age. Feed intake of birds was also recorded.

**Preparation of meat sample:** At the end of 45 days, six broilers (three male and three female) were selected from each group. They were individually slaughtered, scalded, plucked and allowed to drain. Eviscerated carcasses were chilled in a cold room (2°C) for 24 h. Breast meat and thigh meat were removed from the carcasses, and then they were wrapped individually in polythene bags and immediately placed in a freezer (-20 °C). Frozen meats were thawed for 24 h in a

Table 1. Chemical composition of baker's yeast

Tablo 1. Ekmek mayasının kimyasal bileşimi

Dry matter (%)	Crude protein (%)	Ether extract (%)	Crude fibre (%)	Crude ash (%)	Nitrogen free extract (%)	Calcium (%)	Phosphorus (%)	Metabolizable energy (kcal/kg)
91.24	46.18	0.77	0.37	4.64	39.28	0.23	1.02	2600

Table 2. Composition of diets (%)

Tablo 2. Rasyonların bileşimi (%)

Ingredient	Control group	Treatment groups			
		1	2	3	4
Corn	50	50	50	50	50
Wheat	8	8	8	8	8
Soyabean meal	33	30.5	28.2	23.4	13.8
Meat and bone meal	4	4	4	4	4
Vegetable fat	3	3	2.8	2.6	2.2
Baker's yeast	—	2.5	5	10	20
Dicalcium phosphate	0.40	0.40	0.40	0.40	0.40
Limestone	0.75	0.75	0.75	0.75	0.75
Salt	0.35	0.35	0.35	0.35	0.35
Vitamin premix*	0.25	0.25	0.25	0.25	0.25
Mineral premix**	0.10	0.10	0.10	0.10	0.10
DL-Methionine	0.15	0.15	0.15	0.15	0.15
Analysis-determined					
Metabolizable energy, kcal / kg	3063	3098	3100	3047	3095
Crude protein	24.60	24.72	24.48	24.63	24.43
Ether extract	6.03	6.44	6.44	5.86	5.56
Crude ash	5.97	6.02	5.80	5.72	5.34

\* Supplied (per 2 kg of mixture): A vit, 15 000 000 IU; D3 vit, 3 000 000 IU; E vit, 15 000 IU; K3 vit, 2.5 g; B1 vit, 1 g; B2 vit, 10 g; niacin, 70 g; calcium D-pantothenate, 20 g; B6 vit, 4 g; B12 vit, 20 mg; folic acid, 2 g; biotin, 100 mg; BHT, 125 g.

\*\* Supplied (g per 2 kg of mixture): Mn, 80; Fe, 25; Zn, 50; Cu, 7; I, 0.3; Se, 0.15; choline chloride, 350.

refrigerator (4 °C) prior to analysis. One halves of breast and thigh meat were used for chemical analysis. The other half of thigh meat was used for organoleptic evaluation.

Organoleptic evaluation: Thigh meat was wrapped individually in aluminium foil and roasted 175 °C for 90 min. They were served warm to the panellists. A taste panel of 12-15 semi-trained panellists rated the samples on a scale in the range from 1-8 (8 being rated the most desirable). Organoleptic evaluation was carried out on the basis of colour, tenderness, juiciness and flavour (3, 7, 9).

Chemical analysis: The breast meat and thigh meat were separated from bone and skin. Then the samples of breast meat and thigh me-

at were analyzed for moisture, fat, protein and ash content according to AOAC (2) methods.

Statistical analysis: Data were statistically analyzed by one way ANOVA. The significance of mean differences was tested by Duncan (12).

### Results

The effects of feeding different levels of yeast on body weight, feed intake and feed/gain ratio are shown in Table 3.

Table 3. Effect of feeding different levels of yeast on body weight, feed intake and feed/gain ratio of broilers

Tablo 3. Farklı düzeylerde maya ile beslemenin broylerde canlı ağırlık, yem tüketimi ve yem / ağırlık artışı oranı üzerine etkisi

	Control group	Treatment groups			
		1	2	3	4
Final body weight, g	1950.65	1938.40	1985.95	1992.25	1884.25
Feed intake, g/ bird (0-45 d)	3966.13	4257.63	4190.40	4339.65	4381.75
Feed/gain ratio, g feed/g gain (0-45 d)	2.08	2.25	2.16	2.23	2.38

The composition of breast meat and thigh meat is given in Table 4. Organoleptic properties of meat of broilers fed different levels of yeast are presented in Table 5.

### Discussion

The supplements of yeast had no significant effects on final body weight of birds. However body weight of 2. and 3. group was found to be 5-5.5 % higher than that of 4 .group fed the rations containing 20 % yeast. Birds receiving ration containing 2.5, 5, 10 and 20 % yeast consumed 8.17, 3.85, 7.21 and 14.42 % higher than that of control group for one kg of weight gain, respectively. These results were similar to the findings of some researchers (11, 13).

No significant differences among treatments were observed for dry matter, protein, fat and ash content of breast and thigh meat of

Table 4. The chemical composition of breast meat and thigh meat (% on a dry matter basis)  
 Tablo 4. Göğüs eti ve but etinin kimyasal bileşimi (% kuru madde temelinde)

	Control group		Treatment groups								F
			1		2		3		4		
	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	
<b>Breast meat</b>											
Dry matter	24.07	0.99	25.43	1.10	23.96	0.21	24.13	0.57	24.10	0.46	0.89
Fat	2.42	0.26	3.05	0.20	3.20	0.14	2.87	0.17	2.83	0.33	1.70
Protein	93.21	0.25	92.51	0.24	92.40	0.17	92.69	0.30	92.76	0.38	1.35
Ash	4.37	0.06	4.44	0.07	4.40	0.08	4.62	0.02	4.41	0.06	2.62
<b>Thigh meat</b>											
Dry matter	21.64	0.30	22.44	0.38	21.85	0.31	22.52	0.94	23.17	1.53	0.46
Fat	6.96	0.22	7.73	0.45	7.83	0.31	6.92	0.21	8.01	0.45	2.21
Protein	88.43	0.14	87.64	0.44	87.49	0.30	88.33	0.22	87.32	0.40	2.51
Ash	4.61	0.09	4.64	0.09	4.68	0.07	4.75	0.04	4.68	0.08	0.49

Means within a row are not significantly different ( $P > 0.05$ ).

Table 5. Organoleptic properties of meat of broilers fed different levels of yeast  
 Tablo 5. Farklı düzeylerde maya ile beslenen broylerlerde etin organoleptik özellikleri

	Control group		Treatment groups								F
			1		2		3		4		
	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	$\bar{x}$	$S\bar{x}$	
Colour	6.56	0.13	6.85	0.14	6.76	0.11	6.65	0.10	6.52	0.13	1.22
Tenderness	6.78	0.07	6.77	0.12	6.85	0.07	6.94	0.18	6.52	0.13	1.50
Juiciness	6.73	0.10	6.77	0.16	6.68	0.09	6.83	0.21	6.27	0.11	2.12
Flavour	6.41 <sup>b</sup>	0.12	6.64 <sup>ab</sup>	0.11	6.84 <sup>a</sup>	0.08	6.67 <sup>ab</sup>	0.19	6.29 <sup>b</sup>	0.11	2.89*

Means within a row with different superscripts are significantly different ( $P < 0.05$ ), \*:  $P < 0.05$

birds on dry weight basis (Table 4). This finding was in agreement with the earlier work of Surdzhuska et al. (13).

The differences among dietary treatments in colour, tenderness and juiciness of thigh meat were not statistically significant. The flavour of meat was significantly different ( $P < 0.05$ ) among the treatments. Meat of 2. group fed ration containing 5 % yeast was the most desirable one according to the flavour. No data are available in the literature that are pertinent to the effect of yeast on organoleptic quality of broiler meat.

It is concluded that yeast supplementation to the broiler rations up to 20 % did not produce any adverse effect on chemical composition and organoleptic quality of broiler meat.

#### References

1. Ang, C.Y.W., Jung, H.C., Benoff, F.H. and Charles, O.W. (1984). *Effect of feeding three levels of riboflavin, niacin and vitamin B6 to male chickens on the nutrient composition of broiler breast meat.* J. Food Sci., 49: 590-592, 602.
2. AOAC (1984). "*Official Methods of Analysis*". 14 th ed., Association of Official Analytical Chemists. Washington, DC.
3. Cross, H.R. Moen, R. and Stanfield, M.S. (1978). *Training and testing of judges for sensory analysis of meat quality.* Food Technol., 32: 48-54.
4. Goodwin, T.L., Andrews, L.D. and Webb, J.E. (1969). *The influence of age, sex and energy level on tenderness of broilers.* Poultry Sci., 48: 548-552.
5. Gwartney, B.L., Jones, S.J. and Calkins, C.R. (1992). *Response time of broiler chickens to cimaterol: meat tenderness, muscle composition, fiber size and carcass characteristics.* J. Anim. Sci., 70:2144-2150.
6. Hewitt, D. and Labih, A.I. (1978). *The use of n-paraffin-grown yeast as the main source of protein in diets for chicks.* Br. Poult. Sci., 19:401-410.
7. Jubarah, S.K. and Elzubeir, E.A. (1992). *Effect of dietary sorghum germ meal on performance and meat quality of broiler chicks.* J. Sci. Food Agric., 58: 301-305.



8. Lyon, C.E. and Wilson, R.L. (1986). *Effects of sex, rigor condition and heating method on yield and objective texture of broiler breast meat*. Poultry Sci., 65:907-914.
9. Mead, G.C. (1987). *Working Group Report: Recommendation for a standardized method of sensory analysis for broilers*. World's Poultry Sci. J., 43:64-68.
10. Mountney, G.J. (1976). "*Poultry Products Technology*". 2 nd ed., The AVI Publishing Company, Inc. Westport, Connecticut.
11. Shannon, D.W.F. and McNab, J.M. (1972). *The effect of different dietary levels of a n-paraffin-grown yeast on the growth and food intake of broiler chicks*. Br. Poult. Sci., 13:267-272.
12. Snedecor, G.W. (1974). "*Statistical methods*". The Iowa State Univ. Press, Ames, Iowa.
13. Surdzhuska, S., Marinov, B. and Tomova, D. (1988). *Mixed feeds for broiler chickens with different amounts of fodder yeast*. Nutr. Abst. and Rev., 58:52.
14. Yalçın, S., Önel, A.G., Koçak, D. ve Özcan, İ. (1993). *Ekmek mayasının broyler rasyonlarında protein kaynağı olarak kullanılması*, Doğa Turkish J. Vet. Anim. Sci., 17:327-331.