

EFFECT OF DIETARY PROTEIN AND ENERGY ON BROILER CARCASS CHARACTERISTICS*

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(Received: July 7, 1987)

The carcass characteristics of broiler is influenced by dietary energy protein levels apart from age, sex and management techniques. Prasad (1976) and Saxena *et al.* (1976) reported a non-significant difference in ready-to-cook yield of broilers with regard to sex and dietary protein, energy levels. Donaldson *et al.* (1956) found that dietary energy influences the carcass moisture. A positive correlation between dietary energy and ready-to-cook broiler fat was reported by Hill and Dansky (1954), Godwin *et al.* (1969), Kubena *et al.* (1974) and Farrel (1974). Broilers tend to deposit more protein in their body when fed with a high dietary protein (Summers *et al.*, 1965 and Prasad, 1976). Hence a study was designed to find out the effect of dietary protein, energy levels on broiler carcass characteristics.

Materials and Methods

Three hundred and sixty day old broiler chicks were randomly distributed into 18 replicates of 20 chicks each. They were raised in flat type cages from 0-8 weeks. Two replicates for each of nine treatments were allotted. Diets with 3 protein (20, 22 or 24%) and 3 energy (2600, 2800 or 3000 Kcal ME/kg) levels for each protein level were fed for nine treatments upto 5 weeks. From 6-8 weeks 20 birds at random in each treatment were continued with the same diet and the other 20 broilers were fed with 2% less protein diets. The feed and water were provided *ad libitum*.

At the end of 8 weeks, 2 males and 2 females from each replicate were subjected to slaughter and data on New York dressed weight, ready-to-cook weight, giblets weight and separable fat score were recorded. All the ready-to-cook broilers were utilised for analysis of moisture, ether extractives and crude protein. The data were analysed statistically as per Snedecor and Cochran (1967).

* A part of M.V.Sc. thesis submitted by the first author to the Tamil Nadu Agricultural University, Coimbatore.

Results and Discussion

The slaughter parameters are presented in Table I. The New York dressed weights between different treatments were highly significant ($P < 0.01$). However, the difference could not be attributed to a particular energy or protein level since the results were found to be inconsistent. The highest percentage of 94.30 was recorded in the group fed 24% protein and 3000 Kcal ME/kg diet while the lowest 90.45 percent was noticed on 22–20% protein with 2600 energy group. Ready-to-cook dressed weight of broilers fed on different dietary treatments ranged from 74.00 to 79.35%. Chaturvedi *et al.* (1976) reported that the broilers raised with 24% protein and 2950 Kcal ME/kg yielded 72.04% ready-to-cook weight at eighth week of age. This value was lower than those obtained in the present study. 2800 energy with 24–22% protein diet showed highest value while 20% recorded the lowest percent. However, the ready-to-cook dressed weights between different treatments were not significantly different. Similar findings were observed by Prasad (1976) and Saxena *et al.* (1976). Giblets weight of broilers ranged from 5.62 to 6.90% of ready-to-cook weight. No significant difference was noticed between treatments. Fat score of carcasses ranged from 2+ to 4+ and no significant difference between different treatments was observed.

The chemical composition of ready-to-cook broilers in terms of percent moisture, ether extractives and crude protein are presented in Table II and they exhibited a highly significant difference ($P < 0.01$) between different treatments. Moisture percent varied from 63.43 to 70.40. In general the carcasses of broilers fed on 20% protein throughout eight weeks or 20–18% level had lowest moisture than other diets, which was in agreement with the findings of Marison and Woodroof (1936) who reported that feeding low protein diet resulted in decreased moisture level. Reducing the protein level by 2% in the finisher diet resulted in a significant reduction ($P < 0.05$) in carcass moisture content at all energy levels. The influence of energy concentration of diet on moisture content of the carcasses was not discernible. This was in contradiction to findings of Donaldson *et al.* (1956). Ether extractives of carcasses ranged between 30.22 and 46.76%. Increasing the energy content at a particular protein level showed a slight increase in fat in the carcasses. Reducing the protein level by 2% in the finisher diet tends to increase the ether extractives of carcasses significantly ($P < 0.05$) in some treatments. These results are in accordance with Hill and Dansky (1954) Godwin *et al.* (1969), Kubena *et al.* (1974) and Farrel (1974). Crude protein content of carcasses ranged between 42.65 and 62.02 percent. Broilers fed on 22 and 24% protein diets had comparatively higher carcass

Table I
Effect of different dietary treatments on slaughter parameters of eighth week broilers

Criteria	Diet code—Protein (%)/Energy Kcal ME/kg 0-8 weeks											
	20/2600	20/2800	20/3000	22/2600	22/2800	22/3000	24/2600	24/2800	24/3000	24/2600	24/2800	24/3000
New York dressed weight (%)	93.20 ^b	91.35 ^{hij}	91.05 ^{ij}	91.90 ^{efghi}	92.95 ^{bcde}	93.25 ^{bc}	92.60 ^{bcdef}	92.45 ^{bcdefg}	94.30 ^a			
Ready-to-cook dressed weight (%)	77.65	74.00	75.35	78.30	78.55	76.65	78.55	78.15	77.85			
Giblets weight (%)	6.20	6.70	6.90	5.70	5.73	6.27	6.40	5.83	6.66			
Fat score	xx	xx	xxx	xxxx	xxxx	xx	xx	xx	xx			
New York dressed weight (%)	20-18/ 2600	20-18/ 2800	20-18/ 3000	22-20/ 2600	22-20/ 2800	22-20/ 3000	24-22/ 2600	24-22/ 2800	24-22/ 3000			
Ready-to-cook dressed weight (%)	93.15 ^{bed}	91.65 ^{fgh}	92.10 ^{defghi}	90.45 ^j	92.35 ^{cdefgh}	92.05 ^{efghi}	92.65 ^{bcdef}	91.22 ^{hij}	91.50 ^{ghij}			
Giblets weight (%)	77.35	76.15	76.90	76.20	79.35	76.05	77.30	74.60	77.25			
Fat score	xx	xx	xxx	xx	xx	xxxx	xx	xxxx	xx			

Values bearing at least one common superscript in the same criterion do not differ significantly from each other ($P < 0.05$)

Table II

Effect of different dietary treatments on percent chemical composition of ready-to-cook broiler chickens—eighth week
(on dry matter basis)

Criteria	Diet code—Protein (%) / Energy Kcal ME/kg (0-8 weeks)								
	20/2600	20/2800	20/3000	22/2600	22/2800	22/3000	24/2600	24/2800	24/3000
Moisture	68.33 ^t	67.30 ^g	65.80 ^h	70.00 ^{abc}	69.82 ^{bed}	69.28 ^{de}	70.32 ^{ab}	69.46 ^{ede}	70.40 ^a
Ether extractives	34.40 ^{tefgb}	35.25 ^{tefg}	46.76 ^a	30.22 ^h	32.57 ^{efgh}	30.59 ^h	32.78 ^{efgh}	33.37 ^{efgh}	24.77 ⁱ
Crude protein	47.24 ^{efg}	55.12 ^{bed}	46.06 ^{bed}	62.02 ^a	57.49 ^{bc}	56.38 ^{bed}	58.58 ^{ab}	51.71 ^{ede}	50.53 ^{icf}
	Diet code—Protein level (%) during 0-5 and 6-8 weeks / Energy Kcal ME/kg								
	20-18/ 2600	20-18/ 2800	20-18/ 3000	22-20/ 2600	22-20/ 2800	24-20/ 3000	24-22/ 2600	24-22/ 2800	24-22/ 3000
Moisture	65.99 ^h	65.24 ^h	63.43 ⁱ	69.03 ^e	67.24 ^g	66.26 ^h	70.17 ^{ab}	69.38 ^{ite}	68.36 ^f
Ether extractives	43.00 ^{ab}	43.96 ^{ab}	41.54 ^{bc}	30.98 ^{gh}	37.78 ^{cd}	35.36 ^{icf}	32.73 ^{efgh}	32.09 ^{efgh}	36.45 ^{te}
Crude protein	43.68 ^g	44.32 ^g	42.65 ^g	53.22 ^{bcde}	59.22 ^{ab}	53.46 ^{bed}	45.28 ^{fg}	55.84 ^{bed}	51.69 ^{ede}

Values bearing at least one superscript in the same criterion do not differ significantly from each other ($P < 0.05$)

protein than 20% fed group. Similar findings were reported by Summers *et al.* (1965) and Prasad (1976). 22 or 24% protein with 2600 energy diets fed carcasses had significantly ($P < 0.05$) higher protein than with 2800 or 3000 energy levels. This indicated that increasing the energy concentration of the diet resulted in decreased carcass protein content. Reducing the protein level by 2% in the finisher diet reduced carcass protein level at a particular energy concentration.

The results of this study indicated that dietary treatments employed in this study do not seem to influence the slaughter parameters studied except for the New York dressed weight. The carcass lipid levels were inversely related to moisture levels. This was supported by Summers *et al.* (1965), Marison and Woodroof (1966) and Prasad (1976). The carcasses of broilers fed on 20% protein would contain low moisture, low protein and more fat. These findings were in agreement with Twining *et al.* (1978).

Summary

An experiment of 8 weeks period was conducted with 360 hybrid broiler chicken. Upto 5 weeks, 9 different diets of 3 protein (20, 22 or 24%) and 3 energy (2600, 2800 or 3000 Kcal ME/kg) levels for each protein level were fed to 9 treatment groups of 40 broilers each. From 6 to 8 weeks, 20 birds from each treatment was continued with the same diet and the rest were fed with diets less of 2% at the same energy concentration.

The results showed a highly significant difference ($P < 0.01$) for New York dressed weight. Other slaughter parameters were not influenced by protein and energy levels employed. Low protein (20%) diets fed broilers ready-to-cook carcass contain low moisture, low crude protein, high ether extractives. Carcass lipid levels inversely related to moisture levels. 22 or 24% protein diets deposited high moisture, high protein, low ether extractives in their carcasses. 20% less dietary protein during the finishing period imparted less moisture in their carcasses.

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