COMPARATIVE EVALUATION OF THE IMPACT OF LOW AND HIGH PROTEIN DIETS ON FINISHER BROILER PERFORMANCE

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ABSTRACT
Small-scale farmers that face challenges in birds disposal during market saturation, leading to diet change. This study compares low and high protein diets impact on finisher broiler performance. Five dietary treatments with varying protein levels (16%, 17%, 18%, 19% and 20%) were formulated. The 20% diet served as control. Ninety (90) finisher broilers aged 28 day were used and they were divided into the 5 dietary treatments, each treated had 18 birds replicated 3 times. The design used was a completely randomized design. Feed and water were supplied ad libitum. Body weight and feed intake were measured weekly and the abdominal fat was determined after sacrificing 2 randomly selected birds from each replicate. Broilers fed 16% 17% and 18% crude protein diets showed better weight gain and feed conversion ratio but higher abdominal fat than those fed 19% and 20% crude protein diet. Therefore, it is recommended that to produce broiler with reduced abdominal fat, they diet should not be lower than 19%.
Keywords: Broilers, Performance, Crude protein, Market saturation, Market weight

INTRODUCTION

Small-scale poultry farmers often struggle with disposing of their birds at harvest, especially during market saturation, leading them to limit unrestricted feeding or mix standard finisher diets with cheaper components right after the grower phase to protect their profits. Research by Namroud et al. (2006) and Flock et al. (2005) indicates that limiting *ad libitum* feeding can delay the age at which broilers reach market weight. Moreover, according to Fouad and El-Senousey (2014), diet composition significantly influences meat quality, and excessive abdominal fat can negatively affect consumer preferences. This context raises concerns about the ramifications of altering the diets of broilers during the finisher phase. Therefore, this study intends to evaluate the impact of low and high protein diets on finisher broiler performance.

MATERIAL AND METHODS

Five diets were formulated with 16%, 17%, 18%, 19% and 20% crude protein, with the 20% diet serving as the control (Table 1). Ninety broilers, 28 days old, were randomly assigned to the five diets, with each group consisting of 18 birds divided into three replicates following a completely randomized design. The birds had *ad libitum* access to feed and water for four weeks, and their weekly body weight and feed intake were recorded to calculate the feed conversion ratio using the formula

Feed conversion ratio: FCR = $\frac{Feed\ consumed\ (kg)}{Weight\ gain\ (kg)}$

At the end of the trial, 2 birds were randomly selected from each replicate. Each bird was anesthetized in a chloroform chamber for five seconds then sacrificed. Each was immersed in warm water (50-55°C) for 60 seconds to facilitate feather removal, and then the carcass was opened, abdominal fat was extracted and weighed using a digital scale with the precision of 0.000g .

Data analysis was conducted using SPSS (IBM, version 25, Chicago, USA), and significant differences among treatment means were separated using with Duncan's multiple range test.

RESULTS AND DISCUSSION

In Table 2, broilers on 16%, 17% and 18% crude protein (CP) diets had higher weight gains and better feed conversion ratio than those on the 19% and 20% diet. However, those on the 16%, 17% and 18% diets had higher abdominal fat deposition. It can be depicted that higher energy diet (Table 1) yielded more fat deposition. This supports the assertion that excess energy is stored as glycogen thereby increasing body weight whereas excess nitrogen is first converted into urea and then exerted as waste product (Hernández *et al.,* 2012; Nahm *et al*., 2003) with resultant air pollution. The reduced fat content in broilers on the control diet aligns with poultry industry goals of minimizing abdominal fat (Fouad and El-Senousey, 2014). This demonstrates that dietary formulation

and feeding strategies provide effective methods to increase weight gain and reduce body fat in older broiler chickens (Mavromichalis, 2024).

Table 1: **Ingredients and composition (%) of experimental diets used in the study**

Ingredients	20% CP	17% CP	16% CP
Maize	49.7	53.2	54.4
Wheat offal	11.5	10.6	10.8
Full fat soybean	21	17	16
Groundnut cake	9	10	9.4
Fish meal	3	3.3	3.5
Bone meal	2.9	3	3
Limestone	1	1	1
Premix	0.25	0.25	0.25
L-Lysine HCL	0.25	0.25	0.25
DL-Methionine	0.15	0.15	0.15
Common salt	0.25	0.25	0.25
Soy oil	1	1	1
Total	**100**	**100**	**100**
Crude protein	18.56	17.60	16.60
Metabolizable energy (kcal/kg)	3200.50	3208.60	3211.40

Table 2: Performance of broilers chickens fed low and high protein diets

Ingredients	20% CP	17% CP	16% CP	SEM	P-value
Initial weight (kg)	2.12	2.05	2.24	0.10	0.044
Initial feed conversion ratio	2.35	-	-	-	-
Final weight (kg)	2.41	2.57	2.69	0.14	0.055
Weight gain (kg)	0.29^{b}	0.52^{a}	0.45^{ab}	0.12	0.355
Total feed intake (kg)	1.72	1.67	1.61	0.06	0.077
Feed conversion ratio	5.93^{a}	3.21^{c}	3.58^{b}	1.48	0.628
Abdominal fat (%)	2.13^{c}	2.99^{b}	4.30^{a}	1.09	0.633

Means in the same row not sharing common superscript are significantly different ($p<0.05$).

CONCLUSION

Broilers on the 16% 17% and 18% crude protein diets showed superior weight gain and feed conversion ratios compared to those on the 19% and 20% diet, but had an increased abdominal fat content. The findings suggest that low protein diets may enhance weight gain and abdominal fat accumulation, while higher protein diets tend to reduce abdominal fat.

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