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Effect of Different Diets on the Behaviour of Slow-growing Broiler Genotype

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Abstract

Ipek, A., Karabulut, A., Sahan, U., Canbolat, O. and Yilmaz-Dikmen, B. 2009. Effect of different diets on the behaviour of slow-growing broiler genotype. J. Appl. Anim. Res., 35: 87-90.

*A total of 420 male day-old-chicks of a slow-growing genetic line (Hubbard ISA Red JA) were used as the trial material. The treatment groups were: Dilute-AL (energy and protein diluted diet fed **ad libitum**), Dilute-R (restricted energy and protein diluted diet), High-AL (high energy and protein diet fed **ad libitum**) and High-R (restricted high energy and protein diet). Restricted birds showed a greater percentage of time spot pecking, preening and in feather maintenance and less time resting than birds fed **ad libitum** but the differences were relatively small.*

Key words: Free-range, diet, performance, behaviour.

Introduction

Many factors impact growth and performance of birds, including genotype, age, sex, diet, flock density, environment, exercise and pasture intake (Gordon and Charles, 2002). A better understanding of these factors and their interactions might help to improve performance in free-range production systems. Genetics have been shown to have a major impact on the growth rate of broiler chicks and

a relationship has been reported between feed protein level, energy and genotype (Morris, 2004).

Under alternative management systems chickens may show different behavioural characteristics. The behaviour, leg problems, mortality rate and live weight of fast growing broilers up to 84 days of age have been investigated in a limited number of studies in commercial production (Butterworth *et al.*, 2002; Bokkers and Koene, 2003). There is a lack of detailed studies on the behaviour of broilers raised on free range.

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The aim of this study was to determine the effects of diets with two levels of protein and energy on the behaviour characteristics of slow-growing broilers.

Materials and Methods

A total of 420 male day-old-chicks of a slow-growing genetic line (Hubbard ISA Red JA) were randomly allocated into 12 pens of experimental groups (three replicates of 35 chicks per pen, for each of the four treatment groups) with a floor area of 2.5 x 2.0 m². Pasture available amounted to 2 m² per bird. The free range area was covered with 30% Alfalfa (*Medicago sativa*), 10% White clover (*Trifolium repens*) and 60% Perennial ryegrass (*Lolium perenne*). The composition and feeding value of the diets were ascertained by using the Weende analysis (AOAC,1990).

All groups were fed *ad libitum* hatch to 14 d of age. From d 15 all birds had access to an area of pasture during the day. The treatment groups from d 15 of age were: Dilute-AL (Group 1, *ad libitum*): The group starter diet (190.0 g/kg CP and ME 11.9 MJ/kg) was fed between d 15-28 and grower diet (170.0 g/kg CP and ME 12.3 MJ/kg) between d 29-84. High-AL (Group 3, *ad libitum*): The group starter diet (220.0 g/kg CP and ME 12.8 MJ/kg) was fed between d 15-28 and grower diet (200.0 g/kg CP and ME 13.2 MJ/kg) between d 29-84. Dilute R (Group 2) and High-R (Group 4) were fed on 80% of the feed consumed by the 1st and 3rd group, respectively. Records of daily feed consumption and weekly weight change were maintained.

One area (pen and pasture) was randomly selected from each treatment group to determine the behaviour of the birds. Three randomly selected birds in each group were marked and a total of 12 birds were used for the analysis of behaviour. Two digital video cameras were used to record the behaviours of the marked birds in the pen and pasture. The video surveillance was recorded between 4 to 12 weeks of age (from Monday to Thursday; a different treatment group was monitored for

each day). All records were taped continuously for pen and pasture at the same time between 09:00-10:30, 13:00-14.30 and 17:00-18:30 h. Nine videotapes were used for each treatment group and each videotape record was accepted as one replicate for behaviour analysis of the groups. The video record was monitored using the instantaneous sampling procedure (Lehner, 1996). The number of birds in each pen or pasture area that were eating, preening, drinking, spot pecking, walking-standing, feather maintenance, resting-lying and other behavior were recorded.

The data of live weight, cumulative feed consumption and feed conversion ratio were analyzed by the general linear model program of SAS software (SAS, 1989). The percentage of time spent on each behaviour was approximately normally distributed and the data were analyzed by using split-plot design in Genstat statistical programme (Genstat, 2007).

Results and Discussion

Live weight on d 84 and daily weight gain were lowest in the Dilute-R group, whereas, the highest live weight occurred in the High-AL group (Table 1). Results of the present study generally agree with several researchers that

Table 1
Effects of different diets on performance of birds (Mean±se)

Treatment	Live weight, g	Feed consumption, g	Feed conversion ratio
	**	**	*
Dilute-AL	2780±154 ^b	8009±284 ^a	2.86±0.09 ^c
Dilute-R	2268±138 ^d	6441±154 ^b	2.84±0.09 ^c
High-AL	2987 ±178 ^a	7764±247 ^a	2.60±0.08 ^b
High-R	2575±160 ^c	6258±174 ^c	2.43±0.07 ^a

a, b,c,d; Within columns, means with different superscripts are significantly different at *P<0.05; **P<0.01; Dilute AL: Energy and protein diluted feed- *Ad libitum*, Dilute R: Energy and protein diluted feed- Restricted. High AL: Energy and protein increased feed -*Ad libitum*, High R: Energy and protein increased feed- Restricted.

Table 2
Time spent on behaviours on the different feeding management systems (%)

Treatment	Behaviour						
	Eating	Preening	Drinking	Spot pecking	Walking standing	Feather maintenance	Resting-lying
Dilute-AL	17.49 ^a	1.12 ^c	3.18 ^b	6.38 ^c	14.18 ^b	2.84 ^b	54.80 ^b
Dilute-R	13.20 ^b	2.68 ^a	4.58 ^a	7.65 ^a	15.41 ^a	3.38 ^a	53.10 ^c
High-AL	18.7 ^a	1.10 ^c	3.12 ^b	5.80 ^d	11.30 ^c	2.68 ^c	57.31 ^a
High-R	14.75 ^b	2.02 ^b	4.47 ^a	7.00 ^b	14.05 ^b	3.58 ^c	54.10 ^{bc}
SEM	0.363	0.067	0.034	0.125	0.225	0.041	0.799

^{a,b,c}Values within columns with no common superscript differ ($P < 0.01$).

Dilute AL: Energy and protein diluted feed- *Ad libitum*, Dilute R: Energy and protein diluted feed- Restricted. High AL: Energy and protein increased feed -*Ad libitum*, High R: Energy and protein increased feed- Restricted.

increased dietary protein and energy content result in improved growth performance (Smith and Pesti, 1998; Temim *et al.*, 2000). As expected the highest feed consumption was found in two *ad libitum* groups. In addition, when the *ad libitum* and feed restricted groups were compared, results showed that as the protein and energy level of the feed increased, the cumulative feed intake was decreased ($P < 0.01$). Gordon and Charles (2002) reported that pasture may contribute to nutrient intake particularly if it is designed for poultry and our findings also support this conclusion.

The effect of different feeding management systems on the behaviours differed among groups ($P < 0.01$). Behaviour of fast growing commercial broilers up to 6 weeks of age has been studied extensively (Hall, 2001) and has also been investigated under experimental conditions (Weeks *et al.*, 2000). Bokkers and Koene (2003) found that slow-growing broilers perched, walked and scratched more than fast growing broilers and fast growing broilers performed more sitting on the floor, eating and drinking behaviours than slow-growing broilers. Chicks from the restricted groups showed more preening, drinking and spot pecking behaviours and less time resting. Hocking *et al.* (1996) and other workers have reported similar changes, but to

a greater degree, in food-restricted broiler breeders. The limited analysis of behaviour suggests that the *ad libitum* fed groups (Dilute-AL and High-AL) showed less feather maintenance behaviour than the feed restricted groups (Dilute-R and High-R). Chicks from the High-AL group showed less walk-stand behaviour than other groups. In the present study, the High-AL group spent more time resting than the other groups (Table 2).

The present study used pasture sown with suitable plant species for poultry. In free range systems, when the broilers are fed with high energy and protein diets and reared on suitable pasture, feed restriction of daily feed consumption produced an advantage in terms of feed consumption and FCR value.

In conclusion, the free range broilers in our study showed similar behaviours as fast growing broiler breeders but FCR was enhanced when mild feed restriction was applied. The results are expected to assist free range broiler breeders, while also to contribute to the scientific literature.

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- ए. आइपेक, ए. काराबुलुत, यू. साहन, ओ. कैन्बोलात, बी. यीलमाज-दिकमेन। धीमी वृद्धि वाले ब्रायलर जीनरूपियों के स्वभाव पर विभिन्न आहारों का प्रभाव।

इस परिक्षण में धीमी वृद्धि वाले जीन लाइन (हुब्वार्ड आईएसए रेड जेए) के कुल 420 एक दिवसीय चूजों का उपयोग किया गया। उपचारों में तनु-ए एल (ऊर्जा और प्रोटीन तनुकृत आहार का स्वेच्छिक प्राशन), तनु-आर (तनु-ए एल का प्रतिबंधित प्राशन), उच्च-ए एल (अधिक ऊर्जा और प्रोटीन युक्त आहार का ऐच्छिक प्राशन) और उच्च-आर (उच्च-ए एल का प्रतिबंधित प्राशन) वर्ग थे। प्रतिबंधित पक्षियों ने चोंच मारने प्रीनिंग और पंख प्रबंध में अधिक तथा विश्राम में कम समय व्यतीत किया जबकि ऐच्छिक आहार भोक्ताओं ने अधिक विश्राम किया, परन्तु सापेक्ष अंतर बहुत कम था।