Effect of Breeder Age, Genetic Strain and Season of Hatc on Broiler Performance

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Abstract

The aim of this study was to determine the effects of breeder age, genetic strain and season of rearing on broiler performance (chick weight, body weight at marketing , Body weight gain from start to finish, average feed intake, feed conversion ration (FCR), performance index (PI), production number (PN), mortality %, Culling %, condemnation % and Livability percentage). Data from 147 broiler flocks were classified according to broiler breeder age into 5 groups (<30 weeks, 31-40 weeks, 41-50 weeks, 51-60 weeks and > 60 weeks), genetic strain into 4 groups (Hubbard, Cobb, Ross and Arbor Acres) season of rearing (winter, spring, summer and autumn). Average chick hatching weight was lower (P<0.05) from younger breeders and increased with breeder age. Chicks from older broiler breeders (50 – 60 weeks and > 60 weeks of age) showed higher (P<0.05) final weight and body weight gain form 0-day to marketing than chicks from younger broiler breeders (<30 week, 31-40 weeks and 41-50 weeks of age). Also Chicks from older breeders (41-50 weeks, 50 – 60 weeks and > 60 weeks of age) showed higher (P<0.05) feed intake from start to marketing age. FCR of broilers from <30 week and 31-40 weeks breeders was significantly higher (P<0.05) than that of broilers from 41-50 weeks, 50 – 60 weeks and > 60 weeks old breeders. Mortality was higher for broilers from <30 week and 31-40 weeks old breeders than for those from 50 – 60 weeks and > 60 weeks old breeders. The lowest mortality percentage was in chicks from > 60 weeks old breeders. On the other hand culling percentage was highest in chicks from breeders between 31 and 50 weeks old. No significant differences were detected (P>0.05) for livability or condemnation percentages among different breeder age groups. Performance indexes (PI %) were found significantly different (P<0.05) among chicks from different age groups. Chicks from 41-50 weeks, 50 – 60 weeks and > 60 weeks old breeders were significantly higher (P<0.05) in PI % than those from <30 week and 31-40 weeks old

breeders. PI % did not differ significantly in chicks from breeder more than 40 weeks of age. The PN was significantly highe (P<0.05) in chicks from breeders higher than 50 weeks of age Hubbard strain was highest in average feed intake followed b Arbor Acres, Cobb and Ross, respectively; Cobb strain had th highest PI. Mortality percentage was higher (P<0.05) in chick from Hubbard and Arbor Acres than those from Ross and Cob strains. Livability % was highest ((P<0.05) in Ross followed b Cobb, Hubbard and Arbor Acres, respectively. Marketing weigh body weight gain and average feed intake were significantly highe (P<0.05) in winter season than other seasons. FCR was highes (P<0.05) during autumn and winter seasons and lowest durin summer season. Mortality % was maximum during winter followe by autumn, summer and spring seasons, respectively. There wer no significant interactions between breeder age and season c rearing, breeder age and genetic strain and season of rearing an genetic strain.

Key words: *Breeder Age, Genetic Strain, Season, Broiler, Performance*

Introduction

Broiler chicken production is determined by various important factors s personnel, feed, sanitation practices, management, climatic conditions quality of the chick. However, very little attention is paid to the particip the breeder hens despite them having direct effects on the productivity progeny, such as the weight of the egg, and consequently, the weigh chick when it hatches (Brake, 1996 and Jensen 1996 and Dalanezi 2005).

Young breeder flocks are often reported to produce eggs with low h potential, extended incubation periods, and chicks of low quality as juc subsequent mortality and growth. For example, mortality was sign higher among chicks coming from a 26 wk old flock compared with chic a 36 wk old broiler breeder flock, according to Wyatt et al. (1985). eggs produced by young broiler breeder hens have been found smaller chicks with longer residual yolk sacks than older breeders (Nob 1986 and Onbasilar et al., 2008). Small chicks from young hens have mortality after placement and reach market weight at a later age (Vern and Vanschoubroek, 1968; Washburn and Guill, 1974; Shanawany, The most obvious characteristics of eggs from young broiler breeders egg weight. Because chick body weight is proportional to egg weigh chicks are to be expected from young breeder.

Older hens lay larger eggs that hatch into larger chicks (Washburn ar 1974; Weatherup and Foster, 1980; Wilson, 1991), and egg wei hatching weight of chicks are correlated with market age weight (G 1961; Morris et al., 1968). A 1-g increase in hatching weight has bee

to result in increased weight at market age (Morris et al., 1968; Shanaw 1987, Peebles et al., 1999a). As the broiler breeder ages, it produces l follicles, which results in larger eggs with larger yolks (Zakaria et al., Therefore, eggs from older broiler breeders are heavier than those younger broiler breeders. This means, that chicks from older broiler bre have higher weights at hatching. Body weight gain between 0-21, 21-42 a 42 d of broiler age was lower for broilers from younger breeders (Peeb al. 1999a and Onbasilar et al., 2008). They reported that broilers from h 21, 32 and 35 wk of age were lowest BW gain than in those at 48, 51 a wk of age.

Several studies have been done to investigate the effect of genetic str performance of broiler. It was found that differences in broiler performanc to genetic strain may result from differences in body weight, feed consur and feed conversion ratio (Hornaikova, 1985, Zullitch et al., 1989, Azad Sarker et al., 2001, and Awobajo et al., 2007).

On the other hand, season of rearing was found to be affecting performance. El Shahat, 1983, Soliman, 1985, Baghel and Pradhan, reported that body weight gains and feed intake of broilers were maxim cold followed by those of hot-humid and hot seasons. Meanwhile, (1990) reported higher incidence of mortality during spring than in su winter and fall seasons.

The aim of this study was to determine the effects of breeder age, g strain and season of rearing on broiler performance (chick weight, body at marketing , Body weight gain from start to finish, average feed intak conversion ration (FCR), performance index (PI), production numbe mortality %, Culling %, condemnation % and Livability percentage).

Material and methods:

Data

This study was carried out on data collected from Egypt Company for Production during the period 2004-2006. Data from 147 broiler flock classified according to:

a. Broiler breeder age into 5 groups (<30 weeks, 31-40 weeks weeks, 51-60 weeks and > 60 weeks)
b. Genetic strain into 4 groups (Hubbard, Cobb, Ross and Arbor A
c. Season of rearing (winter, spring, summer and autumn)

Studied traits

1. Average chick hatch weight (g)
2. Average body weight at marketing (Kg)
3. Body weight gain (Kg) = Average body weight at marketing - A chick hatch weight
4. Average feed intake per bird = Total feed consumed / Total nur birds
5. Feed conversion ratio (FCR) = Average feed intake (Kg) / body gain (Kg) (Sarker et al., 2001)

6. Performance Index (PI %) = (Final Body weight / Average feed inta
100 (Sarker et al., 2001)

$$7.\ \text{Production Number (PN)} = \frac{\text{A.l.w. X \% Liv.}}{\text{Days X FCR}} \div 10$$

Where:

A.l.w. = Average final weight
% Liv. = Livability
Days = Duration of fattening in days
FCR = Feed conversion ratio (Sarker et al., 2001)

8. Mortality percentage
9. Culling Percentage
10. Condemnation percentage
11. Livability percentage = 100 – (Mortality % + culling % + Condemnatio

Statistical Analysis:

Data were analyzed statistically using Statistical Analysis System cor package (SAS, 1996). Data were subjected to Analysis of variance usi general linear model (GLM). Least significant difference (LSD) test wa after analysis of variance the significant differences.

Results and Discussion

I. Effect of breeder age on broiler performance:

a. Body weight, weight gain and average feed intake:

Average chick hatching weight was lower ($P<0.05$) from younger br (Table 1) and increased with breeder age. Similarly, Noble et al., (198 Onbasilar et al., (2008) reported that smaller eggs produced by very yo and 32 weeks of age) broiler breeder hens have been found to yield chicks with longer residual yolk sacks than breeders at 41 wk.

There was a significant effect for breeder age ($P<0.05$) on marketin weight, body weight gain and average feed intake from start to ma ((Table 1). Chicks from older broiler breeders (50 – 60 weeks and > 6C of age) showed higher ($P<0.05$) final weight (2.07 and 2.08 kg) an weight gain (2.02 and 2.03 kg) form 0-day to marketing than chic younger broiler breeders (<30 week, 31-40 weeks and 41-50 weeks Also Chicks from older breeders (41-50 weeks, 50 – 60 weeks and > 6C of age) showed higher ($P<0.05$) feed intake from start to marketing ag eggs from young broiler breeders produced smaller offspring at 48 d compared to those from larger eggs (Proudfoot and Hulan, 198 relationship of egg size and chick size at hatching was repo Shanawany (1987) and according Wilson (1991) for each additional egg weight, the chick has an increment in two to 13 grams in body w hatching, which remains until the six weeks of life of the broiler. Lee

Summers (2000) also reported that one-gram plus in egg weight could re ten to 15 grams at forty days of age. Overall growth rate between 1 an has been reported by Sinclair et al. (1990), Peebles et al., (1999a), Maic al., (2004), Dalanezi et al., (2005) Onbasilar et al., (2008) to be gre chicks from old flocks compared to those from young flocks.

b. Feed conversion ratio (FCR)

There were significant (P<0.05) breeder age main effects for broile between 0 d and marketing day of broiler growout. Differences between coming form breeders with different ages are shown in Table 1. F broilers from <30 week and 31-40 weeks breeders was significantly (P<0.05) than that of broilers from 41-50 weeks, 50 – 60 weeks an weeks old breeders, which, in turn, did not differ significantly (P>0.05 each other. These results are in agreement with the findings of McNaug al. (1978), Peebles et al., (1999a and b), Arce et al., 2003.

c. Mortality, culling, condemnation and livability percentages

There were significant main effects due to breeder age for perc mortality and culling percentage between 0 and marketing age (P< Percentage mortality data for each breeder age are provided in Ta Mortality was higher for broilers from <30 week and 31-40 weeks old br than for those from 50 – 60 weeks and > 60 weeks old breeders. The mortality percentage was in chicks from > 60 weeks old breeders. On th hand culling percentage was highest in chicks from breeders between 3 50 weeks old. These results are in accordance with the findi McNaughton et al. (1978), Peebles et al., (1999a and b) and Arce (2003). They reported a higher mortality in chicks from 29-wk-old breed eggs compared to eggs from 58-wk-old breeders. There are various re that back-up the benefits of progeny from adult breeder hens, such as g efficiency in transferring essential nutrients for embryonic developmen allowing the chicks to start off with less metabolic deterioration (Suarez, It is important to point out that the yolk sack has other properties apa providing nutrients during the last phases of embryonic developme during hatching, it also has the capacity to transfer cells that migrate t bone marrow, the cloacal bursa and thymus, thus conveying the ab produce antibodies or cellular immunity (Fletcher at al., 1986) resultir better survival response during early growth phases (Noy and Sklan, However, no significant differences were detected (P>0.05) for livab condemnation percentages among different breeder age groups.

d. Performance index (PI %)

The over all performance of broilers from breeders with different age calculated with formulae and tabulated in Table 1. Performance indexes were found significantly different (P<0.05) among chicks from differe groups. Chicks from 41-50 weeks, 50 – 60 weeks and > 60 wee breeders were significantly higher (P<0.05) in PI % than those from <3

and 31-40 weeks old breeders. PI % did not differ significantly in chicks
breeders more than 40 weeks of age. These results was compatible with th
of Peebles et al., (1999a and b), Arce et al., (2003) and Maiorka et al., (2
who observed higher body weight, higher body weight gain, higher feed in
and better feed conversion in chicks from older breeder hens .

e. Production number (PN):

The production numbers obtained from chicks from different breede
different ages are shown in table 1. It is distinctly clear that the PN
significantly higher (P<0.05) in chicks from breeders higher than 50 wee
age. However it did not differ significantly (P>0.05) in chicks from breede
to 40 week old. These results are in line with the findings of Peebles e
(1999a and b), Arce et al., (2003) and Maiorka et al., (2004) who rep
higher performance in all productive traits in chicks from older breeder her

II. Effect of genetic strain on broiler performance:

The effect of genetic strain on broiler performance is shown in table 2. Ge
strain did not affect significantly (P>0.05) chick weight, final weight,
weight gain, FCR, and performance number (PN). On the other hand, Av
feed intake, PI, mortality % and livability % differed significantly (P<0.
chicks belonged to different genetic strains. Hubbard strain was high
average feed intake followed by Arbor Acres, Cobb and Ross, respec
Cobb strain had the highest PI. Mortality percentage was higher (P<0.
chicks from Hubbard and Arbor Acres than those from Ross and Cobb s
Livability % was highest ((P<0.05) in Ross followed by Cobb, Hubbar
Arbor Acres, respectively. These results were in agreement with th
Hornaikova, 1985, Zullitch et al., 1989, Azad, 1996 Sarker et al., 200
Awobajo et al., 2007 who found significant differences among different g
strains of broilers in different performance traits.

III. Effect of season of rearing on broiler performance:

Results in Table (3) indicated that marketing weight, body weight
average feed intake, FCR, PI, mortality % and culling % differed signif
(P<0.05) among the seasons. Marketing weight, body weight gai
average feed intake were significantly higher (P<0.05) in winter seaso
other seasons. FCR was highest (P<0.05) during autumn and winter se
and lowest during summer season Similar results were reported
Shahat (1983), Soliman (1985) and Baghel and Pradhan (1989) who in
that body weight gains and feed intake of broilers were maximum
followed by those of hot-humid and hot seasons. PI was highest
summer season. Mortality % was maximum during winter followed by a
summer and spring seasons, respectively. These results did not agree
findings of Anjum (1990) reported higher incidence of mortality during
than in summer, winter and fall seasons. On the other hand, chick

production number and livability did not affected significantly (P>0.05 season of rearing.

There were no significant interactions between breeder age and seaso rearing, breeder age and genetic strain and season of rearing and ge strain.

Conclusion: The results of this study suggest that chicks of older br breeders showed better performance regarding body weight, body weight and feed conversion, independently of the broiler strain or season of rearin

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Table 1: Means and their standard errors Effect of broiler breeder a broiler performance

	< 30 weeks	30 – 40 weeks	41 - 50 weeks	51 - 60 weeks	>
Number of flocks	15	34	51	34	
Chick weight (g)	37.78 ±0.36^{d}	41.05 ±0.42^{c}	45.01 ±0.18^{b}	45.72 ±0.18^{b}	4
Marketing weight (Kg)	1.65 ± 0.031^{c}	1.71 ± 0.016^{c}	1.99 ± 0.025^{b}	2.07 ± 0.094^{a}	2
Weight gain (kg)	1.62 ± 0.032^{c}	1.67 ± 0.017^{c}	1.94 ± 0.025^{b}	2.02 ± 0.019^{ab}	2
Average feed intake (kg)	3.17 ±0.068^{b}	3.28 ±0.039^{b}	3.48 ±0.056^{a}	3.59 ±0.049^{a}	
FCR	1.87 ±0.026^{a}	1.96 ±0.012^{a}	1.95 ±0.012^{b}	1.78 ±0.019^{b}	
PI	52.27 ±0.68^{b}	52.36 ±0.32^{b}	57.37 ±0.39^{a}	57.71 ±0.54^{a}	
PN	216.09 ±6.29^{c}	224.47 ±2.51^{c}	284.38 ±3.64^{b}	305.89 ±4.90^{a}	
Mortality %	5.84 ±0.52^{a}	5.30 ±0.20^{ab}	4.63 ±0.27^{bc}	4.63 ±0.33^{bc}	
Culling %	1.25 ±0.13^{ab}	1.30 ±0.11^{a}	1.39 ±0.14^{a}	0.81 ±0.06^{b}	
Condemnations %	0.56 ±0.10^{a}	1.07 ±0.22^{a}	0.71 ±0.12^{a}	0.84 ±0.07^{a}	
Livability %	92.35 ±0.59^{a}	92.32 ±0.36^{a}	93.25 ±0.43^{a}	93.71 ±0.38^{a}	

a, b Means within the same parameter within the same row with no superscript differ significantly ($P \leq 0.05$).

Table 2: Means and their standard errors Effect of genetic stra broiler performance

	Hubbard	Ross	Cobb	Arbor Acre
Number of flocks	59	17	54	17
Chick weight (g)	44.24 ± 0.32[a]	43.44± 0.73[a]	43.26± 0.53[a]	43.82 ± 0
Marketing weight (Kg)	1.87±0.03[a]	1.89± 0.05[a]	1.85± 0.02[a]	1.91± 0.
Weight gain (kg)	1.92 ± 0.03[a]	1.83 ± 0.05[a]	1.85 ± 0.02[a]	1.81 ± 0
Average feed intake (kg)	3.56±0.05[a]	3.33±0.07[b]	3.35±0.04[b]	3.43±0.0
FCR	1.85 ±0.01[a]	1.82 ± 0.03[a]	1.81±0.02[a]	1.90±0.0
PI	55.32± 0.36[ab]	56.38±1.03[a]	56.61±0.59[a]	54.04±0.
PN	271.14 ± 4.51[a]	268.22 ±12.2[a]	274.94 ± 6.52[a]	248.62 ±
Mortality %	5.34± 0.21[a]	4.36±0.23[b]	4.28±0.20[b]	5.55±0.
Culling %	1.31±0.12[a]	1.26±0.12[a]	1.02±0.08[a]	1.14±0.
Condemnations %	0.69±0.6[a]	0.46±0.07[a]	1.00±0.14[a]	1.03±0.
Livability %	92.63±0.31[ab]	93.90± 0.33[a]	93.69±0.30[ab]	92.27±0.

a, b Means within the same parameter within the same row no common superscript differ significantly ($P \leq 0.05$).

Table 3: Means and their standard errors Effect of season of rearing broiler performance

	Winter	Spring	Summer	Autumn
Number of flocks	26	60	30	31
Chick weight (g)	44.50±0.37[a]	43.55±0.54[a]	44.22±0.54[a]	43.01±0.3
Marketing weight (Kg)	2.09±0.04[a]	1.90±0.02[b]	1.84±0.03[b]	1.88±0.0
Weight gain (kg)	2.05±0.04[a]	1.85±0.02[b]	1.80±0.03[b]	1.83±0.0
Average feed intake (kg)	3.79±0.07[a]	3.40±0.03[b]	3.20±0.06[c]	3.47±0.0
FCR	1.85±0.02[ab]	1.84±0.01[bc]	1.78±0.02[c]	1.90±0.0
PI	55.30±0.47[bc]	55.88±0.47[b]	57.77±0.76[a]	54.02±0.
PN	279.60±6.84[a]	266.20±5.3[a]	280.05±8.07[a]	257.65±8
Mortality %	5.48±0.45[a]	4.46±0.18[b]	4.59±0.29[ab]	5.40±0.3
Culling %	0.79±0.05[bc]	1.59±0.12[a]	0.77±0.08[c]	1.11±0.0
Condemnations %	0.95±0.21[a]	0.54±0.05[a]	1.03±0.04[a]	1.04±0.2
Livability %	92.77±0.65[a]	93.40±0.29[a]	93.60±0.36[a]	92.44±0.

a, b Means within the same parameter within the same row with no comm superscript differ significantly ($P \leq 0.05$).