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EFFECT OF SEX, FEED FASTING and SLAUGHTER TIME ON GROWTH PERFORMANCE AND CARCASS TRAITS OF TWO BROILER OF CHICKES.

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ABSTRACT

Eight hundred sexed chicks were taken from two strains (Hubbard, H and Ross , R), 400 chicks from each strain, 200 males and 200 females). All chicks (n=800) were divided into twp groups, the 1st group were fed without fasting (fed *ad. libitum*, n= 400, 200 chicks from each strain, 100 males and 100 females) and the 2nd were fasted from feeds for 4 h/day (the same numbers) during the rearing period from hatch up to 7 wk of age. The diets were formulated to cover the requirements of chicks (NRC, 1994). Live body weight (LBW), total weight gain (TWG), feed consumption (FC), relative growth rate (RGR), feed conversion and viability percentage (VP) was recorded at 4, 6 and 7 wk of age. Carcass traits were performed at either 6 or 7 wk of age. Results show that LBW at 0 and 7 wk of age were affected by strain, being heavier (P<0.01) in H (42.2, 1822.6 and 2135.2 g) than in R (41.5, 1679.0 and 1943.6 g). However, LBW at 4 wk did not differ significantly between both strains. LBW was heavier (P<0.01) in males than in females by 6.54, 3.37, 8.02 and 12.17% at 0, 4, 6 and 7 wk, respectively. LBW at all ages was not affected significantly by fasting. Hubbard males fasted for 4 h/d showed the heaviest LBW at 6 or 7 wk. Average TWG and RGR at age intervals (0-6 and 0-7 wk) were higher (P<0.01) for H than R strain. Average TWG at all age intervals and RGR at 0-4 and 0-7 wk, were higher (P<0.01) for males than females. Only RGR at 0-6 wk was not affected by sex. The effect of fasting on TWG and RGR at all age intervals was not significant. At 0-6 or 0-7 wk, Hubbard males fasted for 4 h/d showed the highest TWG and RGR. Average total FC and feed conversion of chicks during rearing period up to 6 wk was not affected significantly by strain. However up to 7 wk, total FC was higher (P<0.01) and feed conversion was better (P<0.01) for H than R strain. Feed conversion was better (P<0.01) in males than females. Total FC at all age intervals was not affected significantly by fasting. Hubbard males fasted for 4 h/d showed the best feed conversion. Total VP at all age intervals higher (P<0.01) for H than R strain. Also, males showed higher (P<0.01) VP than females at all age intervals. However, VP only at 0-7 wk was lower (P<0.05) for fasted than without fasting chicks. Weights of carcass as eviscerated weight (EW) and edible giblets (EG) as well as total dressing weight (TDW) were heavier (P<0.01) for H than R strain. However, weight of inedible components (IEC) was not affected significantly by strain. Weight of EW, EG and TDW heavier (P<0.01) in males than females. While, weight of IEW was not affected significantly by sex. All carcass traits studied were not affected significantly by fasting. Weights of EW, EG, TDW and IEC were heavier (P<0.01) in chicks slaughtered at 7 than at 6 wk of age. It was found that H strain, males, feed fasting and slaughtering at 6 wk of age recorded the higher economic feed efficiency than R strain, females, without fasting and slaughter at 7 wk of age, respectively.

In conclusion, fasting chicks for 4 h/d during rearing period did not impaired growth performance of male or female chicks from Hubbard or Ross 43 strains up to 6 or 7 wk of age. However, the best results were obtained for Hubbard males fasted from feeds for 4 h/day and slaughtered at 6 wk of age.

Keywords: Hubbard, Ross , feed fasting, sex, growth, economic efficiency

INTRODUCTION

It has been reported that early malnutrition leads to metabolic abnormalities later, such as obesity glucose intolerance and insulin resistance in humans and rats (Martorell et al., 2001; Gonzalez Barranco and Rios-Torres, 2004 and Raatz *et al.*, 2005). However, early malnutrition-induced metabolic programming in broilers is rarely reported.

Feed fasting in the early stage is beneficial for improving the feed efficiency and decreasing the breeding cost of chicks (Zubair and Lesson, 1994). Although early feed fasting reduces growth performance, compensatory growth in the refeeding period will be attained to accelerate organism growth to reach the weight of animals (Hornick *et al.*, 2000 and Pinheiro *et al.*, 2004). Improving meat quality attracts more attention from consumers, and excessive fat deposition is one of the important factors of poor meat quality of broilers. Some studies have shown that feed fasted could decrease fat content and increase protein deposition in carcasses, thus resulting in the improved carcass composition (Jones and Farrell, 1992; Nielsen *et al.*, 2003). However, a lot of research has failed to reduce fat with feed fasting (Zubair and lesson, 1996). Such trend may be independing on strain and sex of chicks.

Several investigations have been studied and proved significant breed and strain differences in hatch weight (Proudfoot *et al.*, 1982 and Cahaner *et al.*, 1986), body weight at different ages (Proudfoot and Hulan, 1987 and Merkley and Lowe, 1988), average weight gain (Alsobayel *et al.*, 1989), feed consumption (Marks, 1980) and feed conversion (Malone and Chaloupka, 1979) of chicks. On the contrary, other investigators showed that strain had on significant effect on body weight (Alsobayel *et al.*, 1989; Suarez *et al.,* 1997 and Suarez *et al.,* 1997) and feed consumption (Alsobayel *et al.*, 1989).

Malone and Chaloupka (1979) found a significant effect of sex of birds in feed conversion ratio. In this respect, Reece *et al.* (1984) found that sex significantly influences feed conversion ratio in broiler. Males had higher feed conversion ratio than females at any age, which contrasted the results of Proudfoot *et al.* (1982) and Alsobayel *et al.* (1989).

It was found that age had significant effect on carcass weight (Chen *et al.*, 1987 and Alsobayel *et al.*, 1989), gizzard percentage and percentage of eviscerated weight (Ehinger, 1982) and giblets and viscera weights (Ehinger, 1982 and Keshri *et al.*, 1985), and this age may be associate with marked effect on growth performance and feed conversion of birds (Ulaganathan *et al.*, 1982 and Alsobayel *et al.*, 1985 and 1989).

Therefore, the current study was conducted to determine the effect of daily feed fasting for 4 hours on growth performance of males and females of two broiler strains (Hubbard and Avian strains) slaughtered at 6 or 7 weeks of age. Also, viability rate and economic efficiency were evaluated.

MATERIALS AND METHODS

The current study was carried out at the Poultry Production Farm, under supervision, Department of Poultry Production, El-Gimmizah Research Station, Gharbia governorate, belonging to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture during the period from December 2005 to April 2006.

Populations:

Chicks used in this study were obtained from two strains of broiler parent stocks raised in Egypt, Ross from AL Wadi Farm and Hubbard from Cairo Company. Eight hundred sexed chicks were taken from both strains (400 chicks from each strain, 200 males and 200 females). All chicks (n=800) were divided into two groups, chicks in the first group was fed without fasting (fed *ad. libitum*, n= 400, 200 chicks from each strain, 100 males and 100 females) while chicks of the 2nd group were fasted from feeds for 4 h/day from 12:00 to 16:00 h (n= 400, 200 chicks from each strain, 100 males and 100 females) during are rearing period from hatch up to 7 weeks of age. The chicks were provided the same commercial starter (1 to 28 d) and finisher diet (29 to 49 d) according to NRC (1994) recommendations (Table 1).

Chicks brooding, rearing and management:

The chicks sexed were secured from December 2005 and February 2006. After hatch, the obtained chicks sexed were wing banded. All chicks were reared on the flood under similar managerial conditions. Brooding houses were fumigated and temperature was adjusted at 34 to 35 °C during the first two days, then it was decreased 3°C weekly, reaching 25 °C at 23 days of age. Chicks were vaccinated against Newcastle and Gumboro diseases for 7, 17 and 27 days intervals up to the 2, 3 and 7 weeks, respectively.

Feeding system and rations:

The diets were formulated to cover the requirements of chicks (NRC, 1994). Ingredients and chemical composition of starter and finisher rations used in feeding are shown in Tables (1). Feeding period of chicks lasted for 7 weeks, 4 weeks on starter diet and 3 weeks on finisher diets.

Parameters estimated and data collection:

Growth performance:

Live body weight of chicks was individually recorded at hatch and then at 4, 6 and 7 weeks of age. Average weight gain was calculated at the same previous intervals. However, relative growth rate was computed according the following formula:

$$\textit{Relative growth rate (\%)} = \{w2-w1/(w2 + w1)/2\} \times 100.$$

Where:

W1 = body weight at certain age.

W2 = body weight after certain period.

Feed consumed by all chicks was weekly recorded, and then it was averaged and expressed at all age intervals. Feed conversion was calculated according to the following formula:

Feed conversion = Feed consumption (g)/weight gain (g).

Table (1): Ingredients and chemical analysis (calculated) of starter and finisher rations used in feeding chicks.

Ingredient (%)	Starter diet (0 – 4 wk)	Finisher diet (4 – 7 wk)
Yellow corn	58	62
Soybean meal (44 %)	29	24
Protein concentrates (52 %)	10	10
Vegetable oil	3	4
Total	**100**	**100**
Chemical analysis.		
Crude protein, %	23.06	21.22
Crude fat, %	3.00	4.00
Crude fiber, %	3.00	3.00
Calcium, %	0.99	0.97
Phosphorus, %	0.50	0.49
Salt, %	0.35	0.35
Sodium%	0.22	0.22
Lysine%	1.28	1.15
Methionine + Cystine%	0.80	0.74
ME, k cal / kg	3077	3200

*** Broiler concentrate contain: ME (Kcal/Kg) 2200, crude protein 52%, crude fiber0.77%: crude fat 5.82%: calcium 8.90%: phosphorus available 3.60%: lysine 2.93% and methionine&cystine 2.05%. ** Colculated on dry mater basis and according to NRC (1994).**

Carcass traits:

At either 6 or 7 weeks of ages, total number of 40 chicks were randomly chosen from each strain (10 females & 10 males from each of fasted or without fasting group " control") to evaluate carcass traits. Chicks were deprived from food, but not from water, for about 24 hours before slaughter, weighted before slaughter to obtain pre-slaughter weight. Slaughter was performed by cutting the gullet and jugular veins between the first and second cervical vertebra without separating the head from the body. Each bird was reweighed after the complete bleeding to detect blood weight. Feathers were removed using a mechanical picking after scalding the birds and reweighed to calculate feather weight. Edible giblets of each bird including heart, liver and gizzard were weighed together to obtain edible offals weight. Eviscerated weight of each bird was recorded and then edible offals weight was added to eviscerated weight to obtain dressing percentage.

Economic efficiency (E E %):

Economic efficiency (EE %) was calculated as the following:

EFE (%) = {Net return (L.E.)/Total cost (L.E.)} x 100

Statistical analysis:

Data were analysis using least square and maximum likelihood program of (SPSS, 1997) in factorial design to evaluate the effect of strain, sex, feed fasting and their interactions. The significant differences among treatment groups were tested using Duncan's Multiple Range Test (Duncan, 1955). All significant differences were set at $P<0.05$.

RESULTS AND DISCUSSION

Live body weight:

Effect of strain:

Data concerning average body weight at hatch, 4, 6 and 7 weeks of age presented in table (2) show that at live body weight at hatch, 6 and 7 weeks of age were significantly affected (P<0.01) by strain, being heavier in Hubbard (42.2, 1822.6 and 2135.2 g) than in Ross (41.5, 1679.0 and 1943.6 g). However, body weight at 4 weeks of age did not differ significantly between both strains. It is of interest to note that increasing hatch body weight was associated with increasing body weight at 6 and 7 weeks of age in Hubbard (H) compared with Ross (R) strain. Suares *et al.* (1997) reported a high positive correlation coefficient (r = 0.969) between egg weight and chick weight at hatch. Live body weight of chicks at 7 wk of age was significantly (P<0.01) heavier by 10.17% in H than in R strain. These results agreed with those obtained by Rizkalla (1996) who showed that the differences between strains at hatch were significant.

Table (2): Body weight (g) of chicks at different age intervals of rearing period as affected by strain, sex, fasting and their interaction.

Item			Body weight (g) at different ages			
			Hatch	4 wk	6 wk	7 wk
Effect of strain:						
H			42.2^{A}	1198.9	1822.6^{A}	2135.2^{A}
R			41.5^{B}	1186.0	1679.0^{B}	1943.6^{B}
±SEM			0.62	12.1	19.3	29.1
Effect of sex						
M			43.4^{A}	1212.9^{A}	1823.9^{A}	2171.5^{A}
F			40.6^{B}	1172.0^{B}	1677.7^{B}	1907.3^{B}
±SEM			0.44	8.56	13.8	20.5
Effect of fasting time						
Control (C)			41.8	1198.4	1746.9	2024.0
Fasted time (F4h)			41.6	1186.4	1754.7	2054.8
±SEM			0.62	8.56	0.31	0.31
Effect of interaction						
Hubbard	Male	C	43.0	1225.4	1904.1	2284.3
		F4	43.0	1218.6	1918.1	2390.3
	Female	C	41.3	1184.1	1713.9	1920.0
		F4	41.3	1167.3	1754.2	1946.3
Ross	Male	C	43.0	1208.1	1743.0	1999.7
		F4	43.0	1199.4	1730.2	2011.8
	Female	C	39.9	1176.0	1626.6	1892.1
		F4	39.9	1160.4	1616.2	1870.8
±SEM			0.62	12.1	19.3	29.1

a and b: Means with different superscripts within the same column for each classification are significantly different at P<0.05.

Several investigators have been studied and proved the significant effect of live body weight breed or strain on hatch weight (Stino *et al.*, 1981; Proudfoot *et al.*, 1982 and Cahaner *et al.*, 1986), body weight at 4 , 6, and 7 weeks of age (Proudfoot and Hulan, 1987 and Merkley and Lowe, 1988). On contrary, some authors showed that strain had on significant effect on 7

weeks of age (Becker *et al.*, 1981; Alsobayel *et al.*, 1989 and Suarez *et al.*, 1997) and at hatch weight (Cahaner *et al.*, 1986 and Suarez *et al.*, 1997).

Effect of sex:

The effect of sex on body weight at different ages was significant (Table 2). Body weight of chicks was significantly heavier in males than in females by 6.54, 3.37, 8.02 and 12.17% at hatch, 4, 6 and 7 weeks of age, respectively. These results are in agreement with those obtained by several investigators (Proudfoot and Hulan, 1981; Proudfoot *et al.*, 1982; Sonaiya and Benyi, 1983; Reece *et al.*, 1984 and Chen *et al.*, 1987).

Effect of fasting:

Data in table (2) show that average body weight at all ages (4, 6 and 7 weeks) was not affected significantly by fasting. The obtained results agree with those obtained by Hornick *et al.* (2000) and Pinheiro *et al.* (2004), who reported that early feed fasted reduces growth performance, compensatory growth in the refeeding period will be attained to accelerate organism growth to reach the weight of control animals.

Effect of interaction:

As affected by the insignificant interaction of fasting, sex and strain, Hubbard males fasted for 4 hours showed the heaviest body weight at 6 or 7 weeks of age. However, the lowest values were observed for Ross females fasted for 4 hours/day (Table 2).

Body weight gain and relative growth rate:

Effect of strain:

Data in Tables (3&4) show that average total weight gain and relative growth rate of chicks during rearing intervals 0 - 6 and 0-7 wk of age were significantly ($P<0.05$) higher for H than R strain. The significant differences in relative growth rate at 0-6 and 0-7 wk of age indicated maintenance of chicks in H strain to express their superiority in term of high growth rate during the later intervals of rearing period. However, average total gain and relative growth rate of chicks during the 1st age interval from hatch to 4 wk of age was not affected significantly by strain.

Results concerning total gain agreed with those obtained by Mahmoud (2003). Moreover, strain effect was significant on average weight gain as reported by Ulaganathan *et al.* (1982) and Alsobayel *et al.* (1989), who also found that daily weight gain increased at a greater rate when birds get older. Moreover, results regard to relative growth rate agreed with those obtained by many authors, who found that the strain differences in the relative growth rate were significant (Leclercq *et al.*, 1980; Marks, 1980; Proudfoot *et al.*, 1982 and Rizkalla, 1996).

Generally, strain differences in total weight gain and growth rate may be attributed to genetic and physiological background of both strains.

Effect of sex:

Data in Tables (3&4) show that average total weight gain during all intervals of rearing period and relative growth rate of chicks during 0-4 and 0-7 wk of age, were significantly ($P<0.05$) higher for males than females. However, only relative growth rate of chicks during interval from 0 to 6 wk of age was not affected by sex. The percentages of differences between the two

sexes were 3.3, 8.1 and 12.3% for total gain at intervals, 0-4, 0-6 and 0-7 of age, respectively.

Results concerning total gain agreed with those obtained by Hargis and Creger (1980) and Sonaiya and Benyi (1983), who showed that total gain of female to male ratio ranged between 0.75 and 0.9.

Effect of fasting:

Data in Tables (3&4) show that the effect of fasting on average total weight gain and relative growth rate of chicks during all intervals of rearing period was not significant.

The obtained insignificant effect of fasting on total gain and relative growth rate of chicks at different intervals of rearing period indicated that the early feed fasting did not induce metabolic of productive disorders in broiler chicks. According to the present results, early feed fasting reduces growth performance, but compensatory growth in the refeeding period may accelerate organism growth to reach the weight loss (Hornick *et al.*, 2000 and Pinheiro *et al.*, 2004).

Table (3): Effect of strain, sex and feed fasting on total gain of chicks during different age intervals of rearing period.

Item			Total weight gain (g) at different age intervals		
			0-4 wk	0-6 wk	0-7 wk
Effect of strain:					
H			1156.7	1780.4 A	2093.0 A
R			1144.5	1637.5 B	1902.2 B
±SEM			51.8	78.8	145.1
Effect of sex:					
M			1169.9 A	1780.9 A	2128.6 A
F			1131.4 B	1637.2 B	1866.7 B
±SEM			45.6	77.5	142.5
Effect of fasting:					
Control (C)			1156.7	1705.2	1982.3
Fasted time (F4h)			1144.7	1712.9	2013.0
±SEM			51.7	88.0	144.6
Effect of interaction :					
Hubbard	Male	C	1182.4	1861.1	2241.3
		F4	1175.6	1875.1	2347.3
	Female	C	1142.8	1672.6	1878.7
		F4	1126.0	1712.9	1905.0
Ross	Male	C	1165.1	1700.0	1956.7
		F4	1156.4	1687.2	1968.8
	Female	C	1136.1	1586.7	1852.2
		F4	1120.5	1576.3	1830.9
±SEM			51.8	78.8	145.1

a and b: Means with different superscripts within the same column for each classification are significantly different at P<0.05.

Effect of interaction:

It is of interest to observe that the highest total gain and relative growth rate showed different trends during the first interval (0-4 wk of age) of rearing period. During the interval from hatch to 4 wk of age, Hubbard males without feed fasting showed the highest total gain, while Ross females without feed fasting showed the highest relative growth rate. However during the intervals

(0-6 or 0-7 wk) of age, Hubbard males fasted for 4 hours showed the highest total gain and relative growth rate (Tables 3&4). This may suggest an adapted period to feed fasting during the first interval (0-4 wk) of rearing period, in which growth performance and feed utilization reduced for fasted compared with normal chicks, thereafter feed utilization increase and organism growth accelerated for fasted chicks during the later intervals up to 6 or 7 wk of age (Pinheiro *et al.*, 2004).

Feed consumption and conversion:

Effect of strain:

Data in Tables (5&6) show that average total feed consumption and feed conversion of chicks during rearing period up to 4 wk was not affected significantly by strain.

Table (4): Effect of strain, sex and feed fasting on relative growth rate of chicks during different age intervals of rearing period.

Item			Relative growth rate (%) at different age interval		
			0-4 wk	0-6 wk	0-7 wk
Effect of strain:					
H			186.4	190.9 A	192.2 A
R			186.5	190.4 B	191.6 B
±SEM			0.15	0.12	0.13
Effect of sex:					
M			186.2 A	190.7	192.2 A
F			186.6 B	190.6	191.7 B
±SEM			0.11	0.08	0.09
Effect of fasting:					
Control (C)			186.5	190.7	191.9
Fasted time (F4h)			186.4	190.7	192.0
±SEM			0.11	0.08	0.09
Effect of interaction :					
Hubbard	Male	C	186.4	191.2	192.6
		F4	186.4	191.2	192.9
	Female	C	186.5	190.6	191.6
		F4	186.3	190.8	191.7
Ross	Male	C	186.3	190.4	191.6
		F4	186.2	190.3	191.6
	Female	C	186.9	190.4	191.7
		F4	186.7	190.4	191.6
±SEM			0.15	0.12	0.13

a and b: Means with different superscripts within the same column for each classification are significantly different at P<0.05.

However up to 6 and 0 – 7 wk of age, average total feed consumption was significantly (P<0.05) higher and feed conversion was significantly (P<0.05) better for H than R strain. Chambers *et al.* (1981) reported differences between strains in feed conversion. However, Alsobayel *et al.* (1989) did not find significant breed effect in feed consumption between Hubbard and Shaver broiler strains.

Effect of sex:

Feed conversion was affected significantly (P<0.05) by sex at all age intervals, being better in males than females (Table 6). This was associated with the recorded higher total gain for males than females (Table 3).

Results concerning total feed consumption and feed conversion agreed with those obtained by Reece *et al.* (1984), who found that sex significantly influenced feed conversion ratio in broiler, being higher in males than females at all ages studied.

Effect of fasting:

Total feed consumption at all age intervals of rearing period tended to be lower in fasted than those control non fasting chicks, but the differences did not reach the significance level (Table 5). This tendency in total feed consumption, particularly at interval from 0-7 wk of age, along with the significantly higher relative growth rate in fasted than control non fasting at this interval, resulted in significantly ($P<0.05$) better feed conversion in fasted than in without fasting chicks (Table 6).

Table (5): Effect of strain, sex and feed fasting on feed consumption of chicks at different age intervals of rearing period.

Item			Average feed consumption (g) at different age intervals		
			0-4 wk	0-6 wk	0-7 wk
Effect of strain:					
H			1758.2	3369.4 A	4184.0 A
R			1762.5	3430.2 B	4450.5 B
±SEM			32.2	171.9	59.5
Effect of sex:					
M			1778.2 A	3318.4 A	4405.1A
F			1753.7 B	3481.2 B	4229.5 B
±SEM			22.8	121.5	42.1
Effect of fasting:					
Control (C)			1781.3	3488.4	4430.3
Fasted time (F4h)			1751.4	3311.3	4204.3
±SEM			22.8	121.5	42.1
Effect of interaction :					
Hubbard	Male	C	1797.2	3356.4	4506.8
		F4	1739.9.	3312.8	4280.9
	Female	C	1748.5	3597.1	4191.0
		F4	1745.3	3211.4.	3757.4
Ross	Male	C	1770.9	3374.4	4429.8
		F4	1780.9	3230.0	4402.6
	Female	C	1783.7	3625.5	4593.5
		F4	1725.6	3490.7	4375.9
±SEM			32.2	171.9	59.5

a and b: Means with different superscripts within the same column for each classification are significantly different at $P<0.05$.

These results agreed with those obtained by Zubair and Lesson (1994), who showed that feed fasting in the early stage is beneficial for improving the feed efficiency and decreasing the breeding cost.

Effect of interaction:

Inspite the different trend of change in feed consumption (Table 5), Hubbard males fasted for 4 hours showed the best feed conversion (Table 6) as a result of showing the highest total body gain (Table 3) and relative growth rate (Table 4).

Table (6):Effect of strain, sex and feed fasting on feed conversion of chicks at different age intervals of rearing period.

Item			Feed conversion at different age intervals		
			0-4 wk	0-6 wk	0-7 wk
Effect of strain:					
H			1.52	1.90 A	2.0 A A
R			1.54	2.2 B	2.3 B B
±SEM			0.02	0.09	0.04
Effect of sex:					
M			1.52 A	1.9 A	2.1 A
F			1.53 B	2.1 B	2.3 B
±SEM			0.02	0.07	0.03
Effect of fasting:					
Control (C)			1.54	2.0	2.2 a
Fasted time (F4h)			1.53	1.9	2.1 b
±SEM			0.02	0.07	0.03
Effect of interaction :					
Hubbard	Male	C	1.52	1.78	2.0
		F4	1.48	1.79	1.8
	Female	C	1.53	2.00	2.2
		F4	1.55	1.90	2.0
Ross	Male	C	1.52	2.00	2.3
		F4	1.54	1.90	2.2
	Female	C	1.57	2.30	2.5
		F4	1.54	2.20	2.4
±SEM			0.02	0.09	0.04

a and b: Means with different superscripts within the same column for each classification are significantly different at P<0.05.

Viability percentage:

Results in Table (7) show that total viability percentage during all intervals of rearing period was significantly (P<0.01) higher in chicks of H than R strain. Also, males showed significantly (P<0.01) higher viability percentage male than females at all age intervals of rearing period. However, the effect of feed fasting was significant (P<0.05) on viability percentage only during age interval from 0 to 7 wk of age, being lower for fasted than control non fasting chicks.

The obtained results regard to the effect of sex on viability percentage disagreed with those demonstrated by Malone and Chaloupka (1979), who found that sex had no significant effect on mortality percent.

Carcass traits:

Effect of strain:

Table (8) show that weights of carcass (eviscerated weight) and edible giblets (heart, liver and gizzard) as well as total dressing weight (carcass and edible giblets) was affected significantly (P<0.05) by strain, being heavier in chicks of H than R strain. However, weight of inedible components (blood and feather) was not affected significantly by strain.

Results concerning total dressing weight agreed with those obtained by Chambers *et al.*, (1981), who reported differences between strains in dressed carcass weight. Also, several investigators reported highly significant differences between strains in eviscerated carcass weight and carcass yield (El-Attar and El-Zeiny, 1983; Mahapatra *et al.*, 1984; Pandey *et al*, 1985; and

Merkley and Lowe, 1988). However, the results of Becker *et al.* (1981) and Alsobayel *et al.* (1989) contrasted the present results.

Table (7): Effect of strain, sex and feed fasting of broiler chicken on viability percentage of chicks at different age intervals of earing period.

Item			Viability percentage at age interval		
			0-4 wk	0-6 wk	0-7 wk
Effect of strain:					
H			97.5 A	95.3 A	93.8 A
R			96.5 B	93.8 B	92.5 B
±SEM			12.1	19.3	28.9
Effect of sex:					
M			97.5 A	95.8 A	95.0 A
F			96.5 B	93.3 B	91.3 B
±SEM			8.58	13.7	20.5
Effect of fasting:					
Control (C)			97.0	94.8	93.5 A
Fasted time (F4h)			97.0	94.3	92.8 B
±SEM			0.21	0.33	0.21
Effect of interaction :					
Hubbard	Male	C	98.0	97.0	96.0
		F4	98.0	96.0	95.0
	Female	C	97.0	94.0	92.0
		F4	97.0	94.0	92.0
Ross	Male	C	97.0	95.0	95.0
		F4	97.0	95.0	94.0
	Female	C	96.0	93.0	91.0
		F4	96.0	92.0	90.0
±SEM			12.1	19.3	20.5

a and b: Means with different superscripts within the same column for each classification are significantly different at P<0.05.

Effect of sex:

Weight of carcass (eviscerated weight) and edible giblets (heart, liver and gizzard) as well as dressing weight (carcass and edible giblets) was affected significantly (P<0.01) by sex of chicks, being heavier in males than females. While, non-edible components weight (blood and feather) was not affected significantly by sex (Table 8). Results concerning total dressing weight agreed with those obtained by Mahapatra *et al.* (1984); Pandey *et al.* (1985) and Chen *et al.* (1987), who found that sex had significant effect on dressed weight and meat yield with giblets, being better in males than females.

Effect of fasting:

It is worthy noting that all carcass traits studied including eviscerated, edible giblets, total- dressing inedible components weights were not affected significantly by fasting (Table 8). The present results are in agreement with those obtained by Jones and Farrell (1992) and Nielsen *et al.* (2003). Furthermore, some studies have shown that feed fasting could decrease fat content and increase protein deposition in carcasses, thus resulting in the improved carcass composition (Jones and Farrell, 1992; Nielsen *et al.*, 2003). However, a lot of research has failed to reduce fat with feed fasting (Zubair and Lesson, 1996 .

Effect of broiler age:

As excepted, average weights of carcass, edible giblets, total dressing and inedible components were significantly (P<0.05) heavier in chicks slaughtered at 7 than at 6 wk of age (Table 8). Such trend is in accordance with the results of Heath and Owens (1982). However, the present results contrasted those obtained by Mohan *et al.* (1987) and Alsobayel *et al.* (1989).

Table (8): Effect of strain, sex feed fasting and broiler age on weight (g) percentages of addible and in-edible organs.

Independent varibles			Carcass trait			
			EVW (X±SE)	EGW (X±SE)	TDW (X±SE)	ICW (X±SE)
Effect of strain						
H			1379.1±32.7A	134.9±3.7A	1514.0±37.0A	223.1±0.32
R			1209.5±34.0B	119.8±3.8B	1329.1±36.1B	215.3±0.30
Effect o sex:						
Male			1398.4±33.5A	136.8±3.7A	1535.2±35.8A	222.4±0.32
Female			1190.8±33.3B	117.9±3.8B	1308.7±37.4B	216.0±0.34
Effect of fasting						
Control (C)			1290.8±33.8	127.3±3.4	1418.1±36.2	218.4±0.32
Fasted time (F4h)			1298.4±33.0	127.4±3.8	1425.8±37.0	220.1±0.31
Effect of slaughter age broiler :						
6weeks			1171.7±41.0B	114.7±3.9B	1286.3±44.9B	203.7±0.33
7weeks			1416.9±34.9A	140.1±3.4A	1556.9±37.2A	234.8±0.35
Effect of interaction :						
Hubbard	Male	C	1494.5±32.9	145.1±4.4	1639.6±38.6	227.1±0.32
		F4	1533.8±31.5	150.1±3.9	1683.8±33.5	226.9±0.32
	Female	C	1237.6±35.6	122.0±3.1	1359.6±40.1	214.4±0.33
		F4	1250.4±30.8	122.3±3.5	1372.7±35.6	223.8±0.30
Ross	Male	C	1282.5±35.6	126.5±3.8	1409.0±30.5	218.3±0.32
		F4	1282.5±33.6	125.4±3.0	1407.9±40.2	217.2±0.31
	Female	C	1146.3±30.8	115.5±4.0	1261.8±35.2	213.6±0.28
		F4	1126.5±36.0	111.7±4.5	1238.2±38.5	212.1±0.29

EVW: Eviscerated weight. EGW: Edible giblets weight (heart, liver and gizzard).
TDW: Total dressing weight (carcass and edible giblets weight)
ICW: Inedible components weight (blood and feather).

Economic feed efficiency (EFE):

The total cost of feed consumed and the total revenue of final weight as affected by strain, sex, fasting and slaughter age are shown in table (9). It is of interest to note that the cost of feeds and in turn total cost was lower for H than R strain, females than males, fasted than without fasting and at 7 than 6 wk slaughter age. Such trends were associated with higher total feed consumption (Table 9).

On the other hand, the observed lower total cost in H than R strain and in fasted than without feed fasting was associated with increasing total weight gain, which increase total return and net return. However, the observed increase in total cost in males than females and at 7 than at 6 wk slaughter age reflected increasing total weight gain, and in turn total return and net return (Table 9).

When economic feed efficiency was calculated, it was found that H strain, males, feed fasting and slaughter at 6 wk of age recorded the higher

economic feed efficiency than R strain, females, without fasting and slaughter at 7 wk of age, respectively (Table 9).

Based on the foregoing results regarding growth performance of chicks and from the economic point of view, fasting chicks for 4 hours/day during rearing period did not impaired growth performance of chicks of males and females from Hubbard or Ross strains up to 6 or 7 wk of age. However, the best results were obtained for Hubbard males fasted from feeds for 4 h/day and slaughtered at 6 wk of age.

Table (9): Economic feed efficiency of chicks as affected by strain, sex, fasting and age of slaughter.

Item	No. of viable chicks	Total chick cost (L.E.)[1]	Feeds cost (L.E.)	Total cost (L.E.)	Final weight (kg)	Total return (L.E.)[2]	Net return (L.E.)	EFE (%)[3]
Effect of strain:								
Hubbard	400	720	2129.7	2849.7	729.4	4376.4	1526.7	53.6
Ross	400	720	2198.6	2918.6	658.4	3950.4	1031.8	35.4
Effect of sex:								
Male	400	720	2166.0	2886.0	729.3	4375.8	1489.8	51.6
Female	400	720	2162.7	2882.7	654.5	3927.0	1044.3	36.2
Effect of fasting hours:								
Control (C)	400	720	2226.9	2946.9	690.0	4140.0	1193.1	40.5
Fasted time (F4h)	400	720	2102.1	2822.1	693.8	4162.8	1340.7	47.5
Effect of slaughter age (wk):								
6 wk	800	1440	3814.2	5254.2	1277.9	7667.4	2413.2	45.9
7 wk	800	1440	4843.7	6283.7	1494.1	8964.6	2680.9	42.7

[1]: Price of each chick was 1.8 L.E.
[2]: Price of each kg gain was 6.0 L.E.
[3]: EFE: Economic feed efficiency was calculated as EFE (%) = {Net return (L.E.)/Total cost (L.E.)} x 100

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تأثير الجنس والتصويم على الأداء الإنتاجي وصفات الذبيحة عند عمر ٦ ، ٧ أسابيع لسلالتين من دجاج إنتاج اللحم .

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أستخدم فى هذه الدراسة ٨٠٠ كتكوت من سلالتين الهبرد ، الروس ، ٤٠٠ من كل سلالة ، ٢٠٠ كتكوت من كل جنس ذكر وانثى . قسمت الكتاكيت إلى مجموعتين الأولى كانت تغذى إلى الشبع بدون صيام وعددهم ١٠٠ ذكر + ١٠٠ أنثى من كل سلالة بمجموع ٤٠٠ كتكوت للسلالتين بينما فى المجموعة الثانية كان يتم تصويم الكتاكيت عن الغذاء لمدة ٤ ساعة يوميا خلال فترة التجربة حتى ٦ ، ٧ أسابيع.
كان يتم تقديم علائق لتغطى احتياجات الكتاكيت طبقا لمقررات NRC وخلال فترة التغذية كان يقدر الوزن الحي والزيادة الكلية فى الوزن والغذاء المأكول ، ومعدل النمو النسبي ومعامل التحويل الغذائي بالإضافة إلى النسبة المؤية لحيوية الكتاكيت عند عمر من صفر – ٤ ، صفر – ٦ ، صفر – ٧ أسبوع من العمر . كذلك تم عمل خصائص الذبيحة عند عمر ٦ ، ٧ أسابيع ويكن تلخيص النتائج كلاتى :

١- تأثر وزن الجسم عند الفقس ، ٧ أسابيع من العمر بالسلالة وكان وزن الجسم اثقل معنويا فى الهبرد (٤٢,٢ ، ١٨٨٢,٦ ، ٢١٣٥,٢ جرام) عن الروس (٤١,٥ ، ١٦٧٩,٠ ، ١٩٤٣,٦ جرام) . بينما كان تأثير وزن الجسم عند عمر ٤ أسابيع غير معنوي .
- كان وزن الجسم اثقل معنويا فى الذكور عن الإناث بحوالي ٦,٥٤ ، ٣,٣٧ ، ٨,٢ ، ١٢,١٧ % عند الفقس ، ٤ ، ٦ ، ٧ أسابيع على التوالى.
- لم يتاثر وزن الجسم معنويا بالتصويم عند جميع الأعمار .

٢- كان متوسط الزيادة الكلية فى الوزن ومعدل النمو النسبي عند الفترات من صفر – ٦ ، صفر – ٧ أسابيع أعلى معنويا فى الهبرد عن الروس .
- كان متوسط الزيادة الكلية فى الوزن عند جميع الفترات (صفر – ٤ ، صفر – ٦ ، صفر – ٧ أسابيع وكذلك معدل النمو النسبي عند الفترة من صفر – ٤ ، صفر – ٧ أسابيع كانت أعلى معنويا للذكور عن الإناث . بينما لم يتاثر معدل النمو النسبي فى الفترة من صفر – ٦ أسابيع معنويا بتاثير الجنس . كذلك كان تأثير التصويم غير معنوي على معدل المتوسط والزيادة الكلية فى الوزن ومعدل النمو النسبي عند جميع الفترات .

٣- لم يتاثر متوسط استهلاك الغذاء الكلى وكذلك معدل التحويل الغذائي من صفر – ٦ أسابيع من العمر بالسلالة بينما كان من صفر – ٧ أسابيع كان معدل استهلاك الغذاء أعلى معنويا ومعدل التحويل الغذائي افضل فى سلالة الهبرد عن سلالة الروس . وكان معدل التحويل الغذائي فى كل الأعمار أعلى معنويا فى الذكور عن الإناث بينما لم يتاثر الغذاء المأكول معنويا بالتصويم .

٤- كانت النسبة المؤية للحيوية عند جميع الأعمار أعلى معنويا فى سلالة الهبرد عن الروس وفى الذكور عن الإناث بينما كانت اقل معنوية فى الكتاكيت المصومة عن الكنترول .

٥- كانت وزن الذبيحة الفارغة ، وزن الأجزاء المأكولة ، وزن الذبيحة الفارغة + وزن الأجزاء المأكولة وهى (القلب + القونصة – الكبد) بالإضافة إلى الأجزاء الغير مأكولة وهى (الريش + الدم) كانو أعلى معنويا فى سلالة الهبرد عن سلالة الروس وفى الذكور عن الإناث بينما لم يتاثر الأجزاء الغير مأكولة (الريش + الدم) معنويا بالسلالة أو الجنس .
- وأيضا لم يتاثر خصائص الذبيحة معنويا بالتصويم . ومن جهة أخرى كانت جميع خصائص الذبيحة أعلي معنويا عند الذبح عند عم ٧ عن ٦ أسبوع .

٦- ومن الناحية الاقتصادية كانت الكفاءة الاقتصادية أعلى فى سلالة الهبرد ، والذكور ، والتصويم ، والتربية عند عمر ٦ أسابيع مقارنة بسلالة الروس ، والإناث ، والكنترول ،والتربية إلى عمر ٧ أسابيع على التوالى.

توصى الدراسة المقدمة إلى :-
بان التصويم الكتاكيت لمدة ٤ ساعات فى اليوم طول فترة التغذية لم تؤثر بالضرر على خصائص النمو للذكور أو الإناث لكلا سلالة الهبرد أو الروس حتى عمر ٦ أو ٧ أسابيع بينما أظهرت ذكور سلالة الهبرد خلال المصومة لمدة ٤ ساعات يوميا والكتاكيت المرباة إلى عمر ٦ أسابيع كانت افضل النتائج.