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STUDY OF SOME PRODUCTION EFFICIENCY FOR THREE DUCK STRAINS

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Abstract

This study was conducted in the ducks field, Animal Production Department, College of Agriculture, Al-Muthanna University from 29/12/2017 to 6/4/2018, to study the effect of strain and sex on some production, blood traits and markers of three ducks breeds, 30 ducks 1 day were used, 10 chicks (5 males and 5 females) per breed, were Muscovy , local and Pekin duck, which were prepared from local markets. The chicks were reared in a closed hall of 10 x 45 meters, the hall was divided into three parts using a plastic barrier to isolate each strain separately, the birds were numbered by plastic figures placed in birds' legs. The experiment lasted for 12 weeks. The studied traits were the productive traits (body weight, body gain, feed intake, feed conversion coefficient). The results that a significant increased (Pd"0.05) in the body weight and the weight gain of the Pekin ducks compared with the Muscovy and local ducks, all strains showed a significant superiority (Pd"0.05) for males compare with females. Pekin ducks was significantly higher (P≤0.05) than the local ducks was significantly higher (P≤0.05) compare with Muscovy duck in feed consumption and feed conversion coefficient. All strains showed significantly higher males than females, except for local ducks, which were significantly higher (P≤0.05) compare with males for feed consumption, females were significantly higher (P≤0.05) on males in all breeds except local ducks (P≤0.05).

Key words : Productive traits, ducks, local, Muscovy, Pekin.

Introduction

The production of domestic poultry contributes significantly to the supply of animal protein faster than other agricultural animals, as well as the high biological value of protein and reduced production costs (Donald, 2002). Ducks able to produce fast animal protein with at least 20% animal protein content (Douglas et al., 1988). At present, the duck production industry is similar to the chicken production projects as it is intensively cultivated in private fields for the purpose of producing meat or eggs (Byron, 2003). World production of ducks has doubled in recent decades from 1993 to 2005 and meat production rose from 1.72 to 3.45 million tons (FAO, 2017). Asia produces 83% of the production of duck meat and the most productive countries in Asia are China, producing 2924000 tons, or 67.1%. In Europe, France is the leading producer of duck meat, with an annual output of over 29,200 tons (Cherry and Morris, 2008). The main species of duck used for breeding are both Muscovy, Pekin and the mules (hybrid between Muscovy and Pekin), raised in France for the production of fatty liver, where 97% of the ducks born in that country to produce fatty liver (Adzitey and Adzitey, 2011). In view of the importance of water birds in Iraq, this study was conducted to study some of the efficiency of three duck strains were Muscovy, Pekin and the Iraqi ducks.

Materials and Methods

Experience design

This study was conducted in the duck field in Department of Animal Production, College of Agriculture, Al-Muthanna University from 29/12/2017 to 6/4/2018. Thirty ducks of one day's age were used for 10 chicks (5 males and 5 females) for Muscovy, Pekin and the Iraqi ducks, which were prepared from local markets.The chicks were reared in a closed hall of 10 × 45 meters

divided into three parts using a plastic barrier to isolate each strain separately. The birds were numbered by plastic figures placed in the birds' legs and the experiment lasted for 12 weeks.

Productive traits

Weekly body weight : The birds were weekly weighed during the trial period using an electronic balance. The following equation was applied according to Al-Zubaidi (1986):

$$\text{Body weight (g)} = \frac{\text{Total bird weights in refined}}{\text{Total number of birds in refined}}$$

Weekly weight gain : The weekly weight gain in weight was calculated according to Al-Zubaidi's Formula (1986):

Weight gain (g) = End the period body weight – Beginning period body weight.

Weekly feed consumption : The amount of feed consumed each week was determined by the weight of the remaining feed at the end of the period and subtracted from the total quantity provided during the period, according to Al-Zubaidi (1986).

Feed conversion : The weekly feed conversion coefficient as reported by Zubaidi (1986) in the following formula:

$$\text{Feed conversion} = \frac{\text{Average weekly feed consumption (g)}}{\text{Average weekly weight gain (gm)}}$$

Statistical analysis

The Completely Randomized Design (CRD) was used to study the effect of different strains in the studied traits, differences were compared with the Duncan (1955) under a significant level of 0.05 and 0.01. SPSS (2009) was used in statistical analysis.

Results and Discussion

Body weight

Table 1 shows that males of local ducks were significantly higher (P<.05) than their one-day females, the males of the Pekin ducks surpassed their females from the second week until the twelfth week of age, the males of the Muscovy ducks (P<0.05) significantly exceeded their females during the sixth week until the twelfth week of age, the males and females of the local ducks (P <0.05) significantly exceeded the rest of the breeds at one day of age, male and female Pekin ducks significantly exceeded P <0.05) on Muscovy and local ducks from the second week to the twelfth week of birds age, the males of the Muscovy ducks surpassed the local ducks males and the local ducks were superior to the female ducks in the 12th week of age. The interaction between strain and sex was insignificant for all ages.

The results indicate that the superiority of the Pekin ducks on local and Muscovy ducks is at the mean of body weight. This may be due to different genetic susceptibility of bird species (Huang *et al*., 2006). The reason for the superiority of the Pekin ducks in body weight is also due to differences in the growth hormone secretion systems in duck ducks, which leads to high weights (Kosba *et al*., 1997). Is due to the process of election and improvement to achieve the best market economy, where the value of the heritability of the weight of the body in ducks 0.33 (Seo *et al*., 2016). These results are consistent with Bochno *et al.* (2005), where they showed that the rate of growth in waterfowl varies by species, which in turn leads to a difference in body weight rates.The reason for the superiority of body weight may be due to the large difference in weight when hatching, since there is a positive correlation between weight in hatching and final body weight (Yakubu *et al*., 2015).

Weight gain

Table 1 shows the superiority (P<0.05) of male Pekin ducks on females during the 12-week rearing period, the superiority of local duck females during the second week of the birds' age and then decreases in males and females during the sixth and eighth seasons of the birds. As can be seen from the table, males were significantly higher (P<0.05) than females in week 12 of education, Muscovy ducks There were no significant differences in the beginning of breeding and during the second and fourth weeks of the age of birds.As for age, the difference was clear between males and females, where males were significantly higher (P <0.05) than females in the sixth, tenth and twelfth weeks of birds age, in the second, fourth and sixth weeks of the birds, the ducks in males and females outnumbered the ducks and the local ducks, it is observed from the same table in the second, fourth and sixth weeks of the age of the birds decreased significantly (P <0.05) compared to the local population in terms of the increase in weight. As observed in the eighth week, the muscovy ducks significantly outperform (P<0.05) compared to the domestic and local populations, was significantly lower (P<0.05) in males than males in the 12 weeks of age.

It is clear from the results for the increase in weight over the males of the Pekin ducks on the females during the period of breeding and 12 weeks. These results are consistent with Cheng *et al*. (1995). This is due to the effect of genes specific to sex, which is related to male

hormones, which are found in larger quantities in males, where it is noted that the superiority of males starts from the first week of rearing, unlike the Muscovy ducks. Sixth, tenth and twelfth week of education.This superiority is due to the increase in weight to body growth, the development of the organs and the secretion of hormones that may be the cause of male superiority over females, in contrast to the Pekin ducks, this difference is at an early age of education (Burn and Larzul, 2003), This is due to the growth of the body's various organs and hormone production, including the growth hormone, which is available in a larger quantity in males, where growth is related to several reasons, including nutrition, temperature and light and the number of light hours that directly affect the sexual maturity of birds (Kamesh Pandian *et al*., 2018). Onk *et al*. (2018) found that the male superiority of females in the rate of live body weight may be due to increased growth hormone secretion in males as well as male susceptibility to fat deposition and in higher amounts of females.

Feed consumption

Table 3 shows that the average feed consumption of male Pekin ducks is significantly higher (P<0.05) than females during the 12-week rearing period, in the Muscovy ducks, the males were significantly higher (P<0.05) than females in all weeks except for the second week of the birds age, which significantly exceeded (P<0.05) males, Local duck males significantly increased (P<.05) their females during the period of breeding except for the fourth and tenth weeks of the age of the birds, where the females were significantly superior (P<0.05) to males. The effect of the strain was pekin ducks significantly higher (P<0.05) on the local ducks throughout the experiment, The tenth week showed a significant superiority (P<0.05) for the Muscovy strain of ducks compared to other breeds in feed consumption, the table also showed a significant superiority (P<0.05) for the local ducks on the Muscovy ducks during the second, fourth and sixth weeks of bird age, in the eighth week, the Muscovy duck strain was significantly improved (P<0.05) on the local ducks, at the tenth and twelfth weeks of the birds, the results showed a significant superiority (P<0.05) for the local ducks compared to the Pekin ducks, the total feed consumption of the three breeds was 9935.40, 8425.60 and 5656.20 g for Pekin, local and Muscovy ducks, respectively.

The results did not show any effect of strain and sex interaction for feed consumption and for all experimental periods.The results of the experiment indicate that the Pekin ducks consumed higher feed compared to the local duck, which is superior to local in turn to the Muscovy ducks, may be due to the genetic susceptibility or behavior of birds in the consumption of fodder as well as a significant difference in the behavior of consumer birds,It was observed that the correlation coefficient was high in feed consumption (Bley and Bessei, 2008). The increase in the weekly weight of the Pekin ducks may be due to the special genetic makeup of these birds (Onba *et al*., 2014).The reason for the superiority of males over females in the rate of consumption of feed may be that the size of males is greater than females, or may be due to growth hormone in males higher than females (Biesiada-Drazazga *et al*., 2012).

Feed conversion

Table 4 shows that males of the Muscovy ducks surpassed their females during the 12-week rearing period, The males of the Pekin duck were significantly higher (P<0.05) during the breeding period of 12 weeks, Except for the sixth week of age, the female Pekin ducks were significantly higher (P<0.05) than males in the feed conversion, local ducks were significantly higher (P <0.05) in the second, sixth and tenth weeks of birds than males,the males were significantly higher (P <0.05) in the fourth and twelfth weeks of the birds.For the effect of the strain in the feed conversion where the Pekin ducks and local ducks were significantly superior (P<0.05) to the Muscovy ducks and the local ducks during the second week of birds, in the fourth week, the female ducks of Muscovy and local ducks were significantly higher (P <0.05) on the Pekin ducks, the males of the Muscovy ducks and the local ducks.The strain of Muscovy ducks (P<0.05) significantly exceeded the Pekin ducks in the sixth, eighth, tenth and twelfth of bird age, while the females of the Pekin ducks were significantly superior (P<0.05) to the local ducks during the sixth week of the birds, in the eighth week, the local ducks were significantly higher (P<0.05) than the Pekin ducks, while the ducks of Pekin significantly exceeded (P<0.05) on local ducks in the tenth week of birds' age.Total feed conversion showed a significant improvement (P<0.05) in the Pekin ducks' strain on the Muscovy and local strains, with a significant superiority (P<0.05) for the local ducks strain on the Muscovy ducks. As for the interaction between the breeds and the sex, the results did not indicate any significant differences between the strain and sex for all ages.

Note from the results of table 4 to the moral superiority of male Muscovy ducks on females during the duration of the experiment, amounting to twelve weeks, significantly improvement of male ducks during

Table 1 : Effect of strain and sex in the weekly body weight (g) for three duck strains.

Age (week)							Sex	Strain
12	10	8	6	4	2	0		
2343.0Ba±97.1	1775.0Ca±77.2	1102.2Ca±95.6	602.4Ca±49.4	197.0C±37.7	52.4C±13.4	44.2B±1.2	Male	Muscovy
1511.6Cb±92.2	1339.8Cb±70.4	998.0Cb±80.5	578.0Cb±52.5	198.6C±52.4	52.6B±15.8	44.4B±1.0	Female	
1927.3C±61.38	1557.4C±51.0	1045.6C±49.5	590.2C±33.1	197.8C±26.6	52.5C±9.7	44.3B±0.87	average	
3736.8Aa±88.3	3384.2Aa±82.1	3034.6Aa±89.9	2246.4Aa±82.1	1252.4Aa±80.8	302.4Aa±14.3	44.6B±1.1	Male	Pekin
3185.4Ab±82.4	2920.6Ab±91.9	2658.8Ab±79.4	2024.6Ab±91.3	1095.2Ab±75.2	264.6Ab±16.6	44.8B±1.1	Female	
3460.1A±56.4	3152.4A±61.0	2846.7A±56.8	2135.5A±56.2	1173.8A±12.3	283.5A±9.5	44.7B±0.8	average	
2345.4Ca±69.2	2165.4Ba±77.2	1952.4Ba±81.7	1372.4Ba±92.5	661.6B±43.1	224.6B±11.9	49.4Aa±1.3	Male	Local
2152.0Bb±82.5	1951.6Bb±72.5	1761.6Bb±92.0	1319.4Bb±90.4	661.6B±51.5	249.8A±15.4	46.8Ab±1.2	Female	
2242.7B±55.3	2058.5B±43.0	1857.0B±46.2	1345.9B±55.1	661.6B±27.2	237.2B±6.2	48.1A±0.77	average	

(a, b, c). The different small letters vertically indicate that there were significant differences between the average sex levels within the single line below 0.05.
(A, B). The capitals of the different verticals indicate that there are significant differences between the average of the breeds within the same gender under 0.05.
The interaction between strain and sex is insignificant for all ages.

Table 2 : Effect of strain and sex in the weekly body weight gain (g) for three duck strains.

Total	Age (week)						Sex	Strain
	12	10	8	6	4	2		
2298.8Ba±86.6	235.0Ca±7.4	335.4Aa±12.5	499.8Ca±25.2	405.4Ca±10.5	144.6C±11.4	8.2C±1.6	Male	Muscovy
1467.2Cb±67.5	28.8Ab±0.2	240.8C±16.0	411.0Cb±18.2	379.4Cb±23.3	146.0C±6.2	8.2C±1.8	Female	
1883.0C±55.1	131.9A±1.4	296.8C±11.3	455.4C±31.2	392.4C±18.5	145.3C±8.6	8.2C±1.6	average	
3691.4Aa±97.4	9.0Ba±0.0	274.4Aa±14.9	788.2Aa±42.2	994.0Aa±32.3	950.0Aa±28.2	257.8Aa±10.2	Male	Pekin
3140.2Ab±90.0	23.0Cb±0.1	200.2Ab±17.5	634.2Ab±40.0	929.4Ab±32.0	830.6Ab±95.4	219.8b±26.1	Female	
3415.3A±88.5	16.0B±0.1	237.3A±9.3	711.2A±38.1	961.7A±28.0	890.3A±74.4	238.8A±21.2	average	
2295.6Ba±75.4	30.4C±1.0	277.8Ba±15.5	580.0Ba±25.3	710.8Ba±22.2	437.0Ba±36.2	175.2Bb±39.7	Male	Local
2103.2Bb±65.4	46.8B±0.3	185.4Bb±16.2	442.2Bb±35.3	657.8Bb±22.5	411.8Bb±16.0	203.0a±26.3	Female	
2199.4B±57.3	38.6C±0.2	231.6B±8.9	511.1B±25.2	684.3B±21.5	424.8B±9.6	189.1B±29.4	average	

(a, b, c). The different small letters vertically indicate that there were significant differences between the average sex levels within the single line below 0.05.
(A, B). The capitals of the different verticals indicate that there are significant differences between the average of the breeds within the same gender under 0.05.
The interaction between strain and sex is insignificant for all ages.

Table 3 : Effect of strain and sex in the weekly feed consumption (g) for three duck strains.

Total	Age (week)						Sex	Strain
	12	10	8	6	4	2		
6396.4Ca±302.7	2131.0Ba±209.6	1711.6Ca±206.0	1460.8Ca±115.4	802.4Ca±13.0	245.4Ca±57.8	45.2Cb±1.9	Male	Muscovy
4896.0Cb±302.7	1089.2Cb±209.6	1425.8Bb±206.0	1394.2Cb±115.4	724.8Cb±13.0	218.4Cb±57.8	43.6Ca±1.9	Female	
5646.2C±214.0	1610.1C±148.2	1568.7C±145.6	1427.5C±81.6	763.6C±9.2	231.9C±40.9	44.4C±1.3	average	
10345.2Aa±302.7	2121.0Aa±209.6	2234.8Aa±206.0	2155.6Aa±115.4	2021.2Aa±13.0	1566.8Aa±57.8	245.8Aa±1.9	Male	Pekin
9525.6Ab±302.7	2090.7Ab±209.6	1938.6Ab±206.0	1895.2Ab±115.4	1908.8Bb±13.0	1467.2Ab±57.8	225.4Ab±2.0	Female	
9935.4A±214.0	2105.7A±148.2	2086.7A±145.6	2025.4A±81.6	1965.0A±9.2	1517.0A±40.9	235.6A±1.4	average	
8370.2Bb±302.7	1778.4Ca±209.6	1927.8Bb±206.0	2013.0Ba±115.4	1756.2Ba±13.0	683.8Bb±57.8	211.0Ba±2.0	Male	Local
8481.0Ba±302.7	2335.6Bb±209.6	1974.2Aa±206.0	1616.4Bb±115.4	1631.2Bb±13.0	743.2Ba±57.8	180.4Bb±2.0	Female	
8425.6B±214.0	2057.1B±148.2	1951.0B±145.6	1814.7B±81.6	1693.7B±9.2	713.5B±40.9	195.7B±1.4	average	

(a, b, c). The different small letters vertically indicate that there were significant differences between the average sex levels within the single line below 0.05.
(A, B). The capitals of the different verticals indicate that there are significant differences between the average of the breeds within the same gender under 0.05.
The interaction between strain and sex is insignificant for all ages.

Table 4 : Effect of strain and sex in the weekly feed conversion (g feed consumption/ g body weight gain) for three duck strains.

Total	Age (week)						Sex	Strain
	12	10	8	6	4	2		
2.78Aa±0.18	3.75Aa±0.73	2.54Aa±0.61	2.92Aa±0.39	1.97A±0.19	1.69Bb±0.16	5.51Bb±0.08	Male	Muscovy
3.34ABb±0.16	6.33Ab±0.73	4.17Ab±0.61	3.39Bb±0.35	1.91A±0.20	1.49Aa±0.20	5.31Ba±0.10	Female	
2.99A±0.13	5.04A±0.52	3.35A±0.43	3.15AB±0.28	1.94B±0.13	1.59A±0.11	5.41B±0.12	average	
2.80Aa±0.22	6.02Ba±0.73	6.39Ba±0.61	2.73Aa±0.39	2.03A±0.18	1.64ABa±0.16	0.95A±0.06	Male	Pekin
3.03Ab±0.26	7.88Bb±0.73	7.40Bb±0.61	2.98Ab±0.39	2.05A±0.13	1.76Bb±0.17	1.02A±0.05	Female	
2.90A±0.16	6.95B±0.52	6.89B±0.43	2.85A±0.28	2.94A±0.12	1.70B±0.10	0.98A±0.04	average	
3.64Ba±0.17	9.88Ca±0.73	9.05Ca±0.61	3.47Ba±0.39	2.47B±0.18	1.56Aa±0.19	1.20Ab±0.18	Male	Local
4.03Bb±0.19	14.59Cb±0.73	10.39Cb±0.61	3.65Bb±0.39	2.47B±0.25	1.80Bb±0.20	0.88Aa±0.20	Female	
3.83B±0.22	12.23C±0.52	9.72C±0.43	3.56B±0.28	2.47B±0.13	1.68B±0.09	1.04A±0.15	average	

(a, b, c). The different small letters vertically indicate that there were significant differences between the average sex levels within the single line below 0.05.
(A, B). The capitals of the different verticals indicate that there are significant differences between the average of the breeds within the same gender under 0.05.
The interaction between strain and sex is insignificant for all ages.

the breeding period, except for the sixth week of the birds, the females are significantly higher in the second, sixth and tenth weeks of the birds, While in the fourth and twelfth weeks males significantly outnumbered females. This finding was consistent with that found by Marie-Etancelin *et al*. (2008) who observed a significant improvement in the feed conversion of ducks compared to females. Solomon *et al*. (2006), who noted that the duck was significantly superior to the Kunshan ducks and the Muscovy ducks,as well as weight gain for males heavier than females below a significant level ($P<0.05$) at the age of slaughter, the male weights were 2426 g, 2491 g and females 2315 g and 2323 g, the male superiority of females in the conversion efficiency of food is attributed to the high rate of metabolism in males, this is the result of the in-between sex hormone (androgen) with thyroxine, which is responsible for the speed of metabolism.This superiority may be attributed to the differences in genetic traits among them and the susceptibility to rapid growth where the ability to represent is positively correlated with the speed of growth (Bochno *et al*., 1994), the results also indicate a decrease in the feed conversion of food in Pekin ducks, Muskovy ducks, local ducks and both genders in the age of the bird, This confirms the need to delay the marketing of ducks at the twelfth week of the age of birds, because education in this period become uneconomical.

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