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Study the predictive relationship of Chinese geese breeding growth in local conditions in Iraq

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ABSTRACT

This study was conducted in the field of waterbirds in the Animal Production Department / College of Agriculture / Basra University for the period from 11/30/2020 to 2/6/2021. 50 geese breed (25 males and 25 females), white and gray geese, were reared from 1 d. Feed and water were provided ad libitum. The birds and feed consumed were weighed weekly at age (14,28,42,56, 70) in the experiment. Gompertz was used to describe the growth curve and calculate the predictive growth rates for both body weight, weight gain, time at the transformation point and highest weekly weight gain.

The results showed a significant effect for species and gender, as the white and male geese were significantly superior in body weight, the amount of weight gain, and the efficiency of food conversion on the gray and females, while there were no significant differences in the amount of feed consumed, and the average body weight at the transformation point reached (3749.56, 3519.59) g For White and Gray, respectively, with a lifespan of 112 days. While the weight gain and the feed consumed at the same point were (562.06, 543.61), (2680.10, 2689.11) gm for white and gray geese, respectively, at the age of 70 days. Gompertz applied with high accuracy in the amount of feed consumed, reaching 0.98, while it reached (0.31, 0.25), and (0.82, 0.79) for the white geese and the lead geese, respectively.

INTRODUCTION

Goose is one of the most important economic poultry around the world because of the growing demand of the human population. At the present time, goose farming is economically important both in Asia and Central Europe. Geese meat is rich with nutrition containing protein, fat, vitamin A, vitamin B, niacin (Boz *et al.*, 2019). Chinese goose breeds have been identified and domestic goose breeds have better performance due to its better adaptability to extensive management, better immunity to diseases, a higher reproduction rate, and better meat quality. Growth performance is one of the main issues in the living organism, genetics and environmental condition of living organism can influence growth (Geng *et al*., 2016), Prediction of growth pattern, using Gompertz to describe the growth curve, is an important factor that contributes to the profitability of an operation in poultry production (Lin *et al.*, 2015). Some studies have shown that the highest growth rate of waterbirds is achieved between the sixth and eighth week, and accordingly, the date of slaughter is determined (Warwro *et al.*, 2005).

There is a relationship between live body weight and age, and this relationship varies with different species of waterfowl, as the weight gain begins from the first day to the eighth day, then reaches its climax at the age of 15 to 22 days, after which it begins to gradually decrease to reach the age of 63 days. Optimum age for slaughter (Al-Asadi et al., 2013). Therefore, the present study aims to describe the growth curve of White and Gray goose through live body weight and weight gain, and to know the efficiency of food conversion and the amount of feed consumed using the Gompertz equation.
Some existing growth models can be used to determine the age-live weight relationship of animals

Material and methods

This study was conducted in the field of waterbirds in the Animal Production Department / College of Agriculture / Basrah University for the period from 11/30/2020 to 2/6/2021. 50 geese breed (25 males and 25 females) individuals from each local geese breed of China, White and Grey, were compared. The birds were reared from 1 d. Feed and water were provided ad libitum. In the experiment, two pre-made rations from the feed station of the College of Agriculture were used ,The birds were fed a starter diet (20% P, and 2900 kcal/kg) from 0 to 28 d, and a grower diet (17% P, and 2698 kcal/kg). The body weight was measured on the first day and after that every week. It was the amount of weight gain account and feed conversion efficiency for the end of the experiment, which amounted to 70 days according to the method of (Al-Zubaidi, 1986). For statistical analysis SPSS version 15 was used and The difference between the averages was tested by LSD, Gompertz was used to study the White and Grey Chinese goose growth. Yt=A*(EXP(-EXP(B-(K*t))))

Mathematical model	Gompertz
Absolute weight gain rate	dy/dt =kABe-Bexp (-kt) e-kt
The rate of relative weight gain	K (ln A-ln yt)
Weight gain and time at the transformation point	ti = (lnB) / K, yi = A/e
The highest weekly weight gain	Kyi

A- Maturity weight b- constant K- relative weight gain dy- weight difference yt- weekly weight dt- time difference yi- weight gain at transition point t- time e = 2.71 (xing et al., 1998).

Table. (1) computes the value of each of A, B and K, weight gain at the transformation point, time at the transformation point, and the highest weekly weight gain.

Studied characteristics	species	A	B	K	Weight gain at the transformation point	Time at the transformation point	The highest weekly weight gain
Live body weight	White	3749.56	1.63	0.047	1383.60	10.21	65.02
	Grey	3519.59	1.63	0.048	1298.74	10	62.33

Results and Discussion

Table (2) indicates the effect of species and gender on the average live body weight of White and Gray geese with different ages.
It was evident from the table that there was a significant effect (P <0.05) for the species on the live body weight rates of Chinese geese, as white geese significantly outperformed gray geese with average live body weight and at all ages, which amounted to (3131.31, 2968.98) grams at the age of 70 days. For white and gray, respectively. The reason for the superiority of White Goose may be the variation in genotypes of both native and commercial species (Sarica et al., 2015; Al-kurdi et al., 2019). These results are consistent with that obtained by Saatci (2008), in

which white geese outperformed black geese in live body weight at ages (10 and 12) weeks. It was evident from the table that there was a significant effect of gender (P <0.05) on the mean live body weight, as males significantly outperformed females and at all ages in the mean live body weight, which reached (3146.23, 2954.06) gm, respectively. These results were consistent with what Al-Asadi obtained (2010) from the superiority of males of geese over females of all ages.

Table (2): The effect of species and gender on live body weight (g). Chinese geese of different ages bred under local conditions in Iraq (arithmetic mean ± standard error).

Age in days	Gender / Species	Males	Females	Species impact rate
14	Grey	280.00±10.00	270.12±10.00	275.00±10.48 b
	White	304.42±5.77	275.51±5.00	289.96±6.05 a
	Gender Effect Rate	292.21±7.52 a	272.81±7.07 b	282.48
28	Grey	916.61±11.47	854.33±15.41	885.47±16.84 b
	White	960.85±11.47	865.51±15.00	913.18±21.74 a
	Gender Effect Rate	938.73±13.68 a	859.92±80.10 b	899.32
42	Grey	1912.16±23.45	1834.61±16.70	1873.38±30.35 b
	White	1983.85±20.30	1859.81±55.75	1921.83±17.88 a
	Gender Effect Rate	1948.00±40.17 a	1846.89±55.70 b	1897.60
56	Grey	2475.89±63.21	2374.86±62.42	2425.37±68.75 b
	White	2655.96±25.65	2482.55±25.65	2569.25±11.92 a
	Gender Effect Rate	2565.92±11.46 a	2428.70±47.97 b	2497.31
70	Grey	3043.34±58.89	2894.63±3.05	2968.98±61.96 b
	White	3249.13±28.72	3013.50±24.19	3131.31±13.51 a
	Gender Effect Rate	3146.23±19.57 a	2954.06±73.39 b	3050.14

The different letters indicate statistically significant differences at the probability level (P<0.05)

Table (3) indicates the effect of species and gender on the rate of weekly weight gain of white and gray Chinese geese of different ages. It is evident from the data that the white geese significantly (P <0.05) outperformed the gray ones in the average weekly weight gain at all ages, as it reached (562.06, 543.61). G) at the age of 70 days for white and gray geese, respectively. The table also shows a significant effect of gender, as males showed a significant superiority (P <0.05) over females in the rate of weekly weight gain and at all ages, and the reason for this may be due to the presence of a positive relationship between body weight and the rate of weight gain (Al-Asadi et al., 2013). These results were consistent with the findings of Tilki et al., (2009), as males of Turkish geese outperformed females at all ages.

Table (3) the effect of species and gender on the rate of weekly weight gain of Chinese geese of different ages. bred under local conditions in Iraq (arithmetic mean ± standard error).

Age in days	Gender / Species	Males	Females	Species impact rate
0-14	Grey	189.00±9.53	180.12±9.53	184.56±9.85 b
	White	213.42±6.65	185.51±4.35	199.47±7.80 a
	Gender Effect Rate	201.21±7.58 a	182.81±39.38 b	192.01
14-28	Grey	636.61±16.92	584.21±14.23	610.41±15.95 b
	White	656.43±18.46	590.00±45.00	623.21±10.48 a
	Gender Effect Rate	646.52±11.52 a	587.10±13.06 b	616.81
28-42	Grey	995.55±10.74	980.28±18.88	987.91±13.51 b
	White	1023.00±95.28	993.67±99.28	1008.33±13.22 a
	Gender Effect Rate	1009.27±91.45 a	986.97±17.96 b	998.12
42-56	Grey	563.73±31.04	540.25±78.41	551.49±53.42 b
	White	672.11±7.00	622.74±77.62	647.42±52.31 a
	Gender Effect Rate	617.92±77.69 a	581.49±88.59 b	599.45
56-70	Grey	567.45±10.21	519.77±59.36	543.61±39.35 b
	White	593.17±54.28	530.95±34.64	562.06±40.76 a
	Gender Effect Rate	580.31±54.20 a	525.36±65.99 b	552.83

The different letters indicate statistically significant differences in the likelihood level (P<0.05)

Table (4) shows the effect of species and gender on the average weekly feed consumption of White and Gray Chinese geese with different ages. It is evident from the table that there were no significant differences between the two species in the amount of feed consumption. Also, there were no significant differences for gender in the amount of fodder consumed at different ages.

Table (4) the effect of species and gender on the rate of weekly feed consumption rate of Chinese geese of different ages. bred under local conditions in Iraq (arithmetic mean ± standard error).

Age in days	Gender / Species	Males	Females	Species impact rate
14	Grey	318.21±2.88	310.35±1.52	314.28±4.84 a
	White	309.63±5.00	315.67±4.50	312.40±5.16 a

	Gender Effect Rate	313.92±4.08 a	312.76±3.03 a	313.34
28	Grey	956.27±2.88	945.15±5.00	950.83±7.36 a
	White	955.48±5.00	947.56±2.51	951.52±5.49 a
	Gender Effect Rate	955.87±3.76 a	946.35±3.76 a	951.17
42	Grey	1986.43±3.21	1980.32±5.00	1983.37±8.37 a
	White	1995.67±1.15	1987.92±2.51	1991.77±7.51 a
	Gender Effect Rate	1991.02±2.42 a	1984.12±3.76 a	1987.57
56	Grey	2486.00±5.00	2461.05±7.63	2473.50±73.25 a
	White	2495.31±0.57	2472.22±2.08	2483.76±73.40 a
	Gender Effect Rate	2490.50±3.20 a	2466.52±5.00 a	2478.63
70	Grey	2690.17±28.86	2670.00±26.45	2680.10±31.88 a
	White	2695.00±75.49	2683.23±76.73	2689.11±86.12 a
	Gender Effect Rate	2692.58±54.92 a	2676.61±73.59 a	2684.60

Table (5) indicates the effect of species and gender on the average nutritional efficiency of White and Gray Chinese geese at different ages.

The results indicate that there are significant differences (P <0.05) between white and gray geese in the rate of food conversion efficiency, as white geese significantly outperformed gray geese at all ages as they reached 70 days of age (4.79, 5.02), respectively, except for age (28 and 42). There were no significant differences between the two species, as it is noticed from the results that there were significant differences due to the effect of species, as males significantly outperformed females (P <0.05) over females in the rate of food conversion efficiency at all ages, reaching at the age of 70 days (4.64, 5.18) respectively Except for the age of 42 days, when there were no significant differences between the genderes. The reason for the superiority of the white and male species may be due to the influence of the gender-related genes and the amount of benefit from the amount of feed consumed and converting it to an increased weight (Al-Asadi and Al-Salhi, 2015). In the efficiency of nutritional conversion at different ages.

Table (5) the effect of species and gender on the rate of food conversion efficiency ratio of Chinese geese of different ages. bred under local conditions in Iraq (arithmetic mean ± standard error).

Age in days	Gender / Species	Males	Females	Species impact rate
14	Grey	1.68±0.09	1.72±0.10	1.70±0.09 a
	White	1.45±0.04	1.69±0.32	1.57±0.23 b
	Gender Effect Rate	1.56±0.06 b	1.70±0.24 a	1.63
28	Grey	1.50±0.22	1.61±0.29	1.55±0.24 a
	White	1.45±0.30	1.60±0.12	1.52±0.22 a
	Gender Effect Rate	1.47±0.24 b	1.62±0.20 a	1.53

42	Grey	1.99±0.22	2.02±0.28	2.00±0.22 a
	White	1.95±0.17	2.00±0.21	1.97±0.20 a
	Gender Effect Rate	1.97±0.18 a	2.01±0.23 a	1.98
56	Grey	4.40±0.35	4.55±0.36	4.47±0.34 a
	White	3.71±0.04	3.96±0.23	3.83±0.17 b
	Gender Effect Rate	4.05±0.27b	4.25±0.45 a	4.15
70	Grey	4.74±0.11	5.31±0.02	5.02±0.09 a
	White	4.54±0.24	5.05±0.06	4.79±0.15 b
	Gender Effect Rate	4.64±0.19 b	5.18±0.17 a	4.90

The different letters indicate statistically significant differences in the likelihood level (P0.05)

It appears from figure (1,2,3,4) that the growth equations for each of body weight, weight gain, feed consumed, and food conversion efficiency were (3749.56, 3519.59) gm for white and gray at the age of 112 days, respectively. While the weight gain and the feed consumed per week were (562.06, 543.61), (2680.10, 2689.11) for white and gray, respectively, at the same point but at the age of 70 days. The conversion efficiency at the same age for white and gray geese was (4.79, 5.02), respectively. The prediction value of body weight, the amount of weight gain, the amount of feed consumed, and the efficiency of food conversion depend on R2, as it reached (0.31, 0.25), (0.82, 0.79) for both White and Gray geese in the amount of weight gain and conversion efficiency, while it reached (0.98) in the amount of feed consumed. The R value came different because of the birds were raised under local conditions, as the variation in the growth rates of global species raised in local conditions is mostly related to differences in genetic susceptibility between species, especially those that descend from wild breeds, Beiki et al., (2013). Our results were in agreement with what Ibtisham et al., (2017) found in his study of two species of Chinese goose ST and SCW White to compare their growth trends, as ST goose outperformed SCW white goose in body weight, which reached (5494.88, 3476.33) gm, respectively, at 84 days of age.

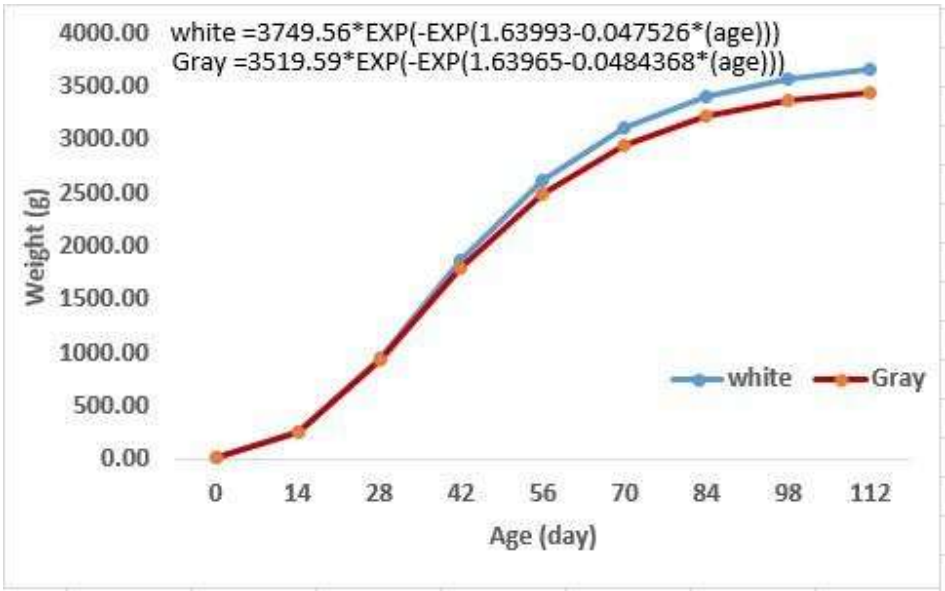

Figure (1) Bodyweight growth curve in white and gray Chinese geese

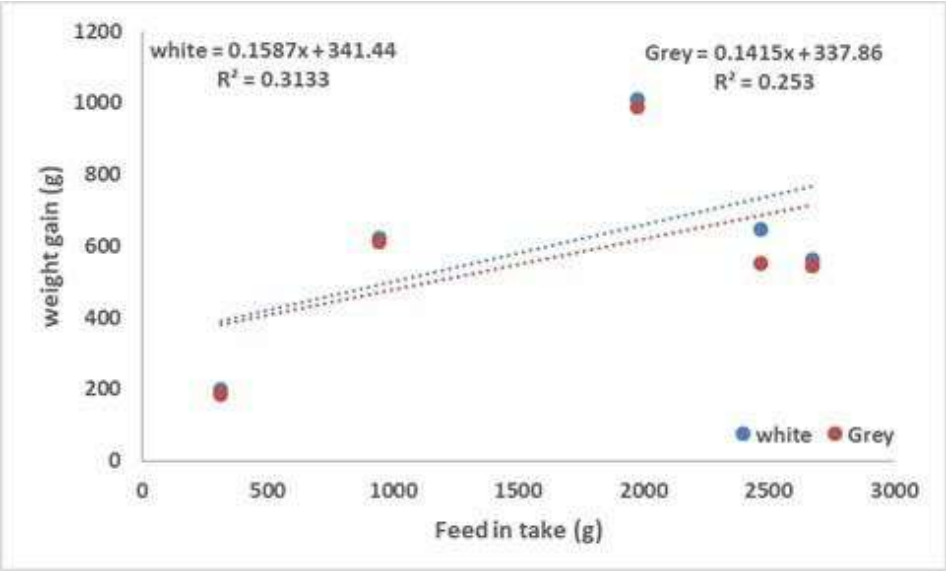

Figure (2) Weight gain curve in Chinese geese White and Gray

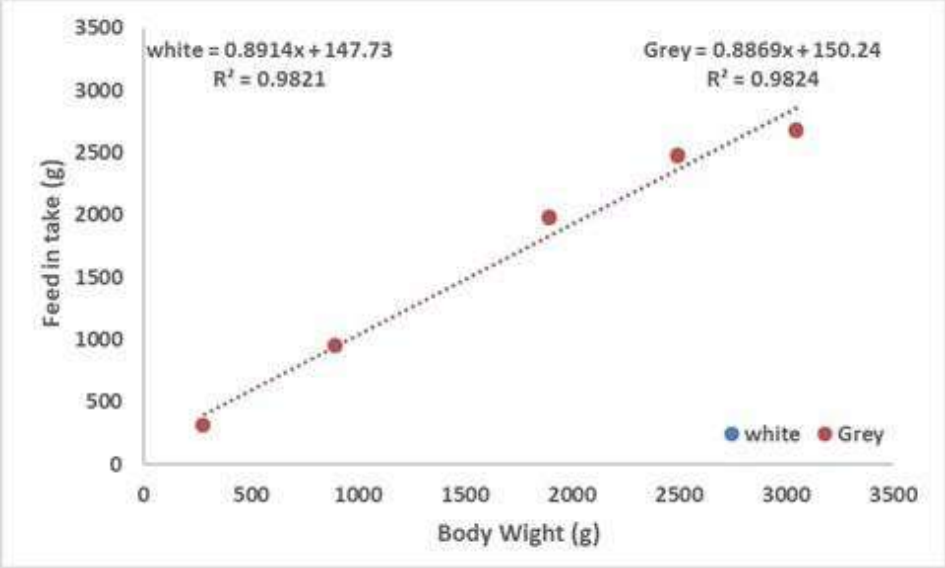

Figure (3) Feed consumed curve in Chinese geese White and Gray

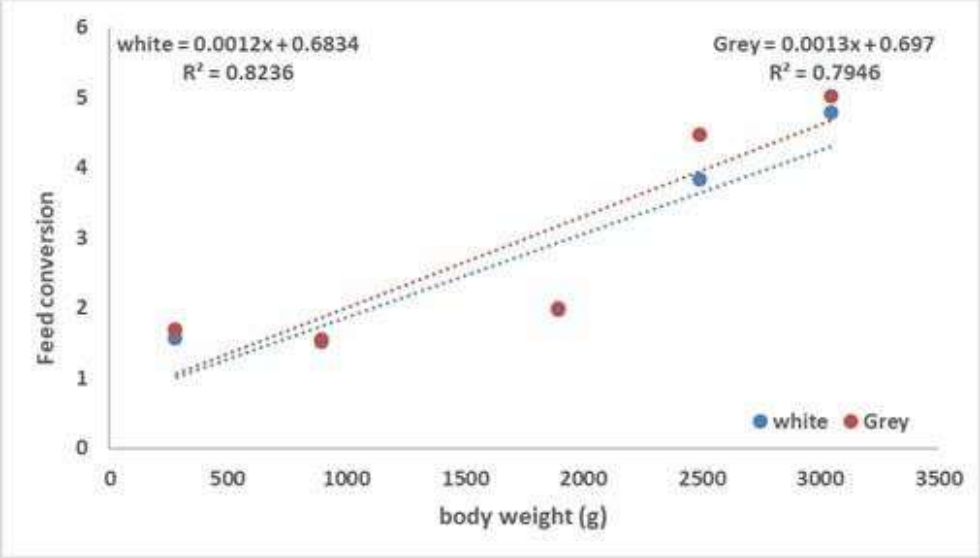

Fig. (4) The feed conversion efficiency curve in Chinese geese

Conclusions

The study showed that white geese were significantly superior in body weight, weight gain, and the efficiency of nutritional conversion over gray geese, while males showed a significant superiority over females in all studied traits and at different ages, and the highest correlation value was found in the amount of feed consumed.

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