



RESEARCH ARTICLE

Effect of fattening length, sex and feather colour on growth and fattening performance in native Turkish geese

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Özet

Saatçı M, Arslan C, Ünal Y, Tilki M, Aksoy AR. Yerli Türk kazlarında besi performansı ve büyüme üzerine tüy rengi, cinsiyet ve besi süresinin etkisi. *Eurasian J Vet Sci*, 2011, 27, 3, 183-189

Amaç: Çalışma entansif şartlarda yetiştirilen yerli Türk kazlarında besi performansı üzerine; besi süresi, cinsiyet ve tüy renginin etkisini belirlemek amacıyla yapılmıştır.

Gereç ve Yöntem: Çalışmada toplam 145 adet kaz civcivi kullanılmıştır. Kazlar her bir besi süresi içinde (10 ve 12 hafta) tüy rengine göre 4 gruba bölündü. Kazlar, kanat numarası takılarak haftalık olarak tartıldı.

Bulgular: Çalışma sonunda besi grupları arasında (10 ve 12 hafta) canlı ağırlık bakımından herhangi bir istatistik fark bulunmamıştır ($p>0.05$). Hem tüy rengi hem de cinsiyet ise 5. haftadan itibaren çalışma bitimine kadar canlı ağırlık üzerinde etkili olmuştur ($p<0.05$). En yüksek canlı ağırlık kazancı sarı tüy rengine sahip kazlarda, en düşük canlı ağırlık kazancı ise alaca kazlarda belirlenmiştir. Hocam buraya, Çalışma ile entansif şartlarda yetiştirilen yerli kazlar için ilave bilgiler sağlanmış olup, sarı tüy rengine sahip kazların diğer kazlardan daha fazla canlı ağırlık kazandığı tespit edilmiştir.

Öneri: Elde edilen sonuçlar entansif şartlarda yetiştirilen yerli kazların besisinin, canlı ağırlık artışındaki düşme ve yem tüketimindeki artıştan dolayı 9-10 haftalık yaştan sonra uygun olmayacağı sonucuna varılmıştır.

Abstract

Saatçı M, Arslan C, Unal Y, Tilki M, Aksoy AR. Effect of fattening length, sex and feather colour on growth and fattening performance in native Turkish geese. *Eurasian J Vet Sci*, 2011, 27, 3, 183-189

Aim: Study was undertaken to determine the intensive fattening performance of native Turkish geese and to underline the effects of fattening length, sex and feather colour on fattening performance.

Materials and Methods: Total 145 daily goslings were used in the experiment. Birds divided into four groups according to their feather colour in each fattening (10 and 12 weeks) period. Birds with wing tags were individually weighed and all the birds were weighted weekly according to their groups.

Results: There was not any statistical significance between the fattening groups (10 and 12 weeks) in term of weekly liveweight ($p>0.05$). Effects of both feather colour and sex on liveweight have started at the fifth week and continued until at the end of the fattening periods ($p<0.05$). The highest liveweight gain was observed in yellow geese while the lowest liveweight gain was in piebalds. Obtained results provided additional information on the growth pattern of native Turkish geese reared under the intensive condition. Yellow feather coloured geese reached to greater liveweights than the others.

Conclusion: Observed lower liveweight gain and increasing food consumption do not allow the breeders to fatten the native Turkish geese under the intensive condition after 9-10 weeks of age.

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► Introduction

Goose rearing is a restricted livestock sector in Turkey, but some local breeders in the country, like in Kars province, are very keen to breed geese and to consume the geese products. Although there are not any identified goose breeds in the region, some differences can be detected according to feather colour or origin (Saatci et al 2005, Saatci et al 2009). But these differences are not adequate for breed characterisation. Farmers in the province rear the birds under the traditional free range conditions (8 months in pasture); therefore there are no any results about the geese reared under the intensive systems.

Geese are fattened in intensive condition for 8-10 weeks for meat production and generally are called broiler geese. It is essential to have broiler goose with high feed efficiency, few pin feathers and high meat yield. Fattening performance of geese is affected by age, breed, sex, diet and fattening period (Pingel 1990, Shalev 1995, Smalec and Brodacki 1995, Cywa-Benko et al 1999, Tilki et al 2009). It is also necessary to know the overall growth patterns of different goose types and breeds to develop fattening strategies (Knizetova et al 1994). Performances of native Turkish geese were studied in several regions of Turkey but such studies did not apply to native geese reared in Kars as a most geese populated region (Aksoy and Arıka 1997, İşgüzar and Testik 1999, Tilki and İnal 2004).

Although there are not many research papers about native Turkish geese, studies made especially in Europe and defined many environmental effects on performance of geese. Differences among the goose breeds in terms of various performance records were reported by Davail et al (2000) and Colombo et al (2002). Very well known effect of sex on geese characteristics were also supported by many researchers (Schmutz and Ely 1999, Larzul et al 2000, Friend et al 2006) while Romanov (1999) and Sun et al (2007) did mention the variation of the goose traits according to production system and keeping (extensive/ intensive) conditions.

Corresponding study was undertaken to determine the intensive fattening performance of native Turkish geese reared in Kars province and to make a comparison among the local goose phenotypes in terms of suitable weekly ages for fattening.

► Materials and Methods

• *Animals and management*

In the region, where the experiment conducted, people keep the geese according to their feather colour and each keeper is keen to breed same coloured birds in his farm. But this characterisation can not be used for the breed categorisation. Therefore animals were accepted in the same breed (native Turkish geese)

and feather colours were accepted as a category under it. Total 145 same-day hatched Native Turkish goslings were used in the experiment. Study procedure was approved Kafkas University Ethic Committee and conducted in the Goose Unit of College Farm of Kafkas University. Allocations of goslings were presented in Table 1 according to fattening period (10-12 weeks), feather colour (yellow, black, white and piebald) and sex. Although fattening period and feather colour were determined just after the hatching, reliable sex definition was made at the end of the experiment, therefore both sexes kept together during the experiment. Birds divided into four groups according to their feather colour in each fattening period. Birds in the groups were wing tagged after hatching and they spend their first fortnight in brooder batteries (35 cm x 115 cm x 50 cm / 12-13 geese) and transferred to specially designed fattening platforms (metal cage). Birds were kept in these platforms until at the end of the study. Platforms were constructed with 2 cm mesh wire floor to avoid the faeces accumulation. The diameter of floor wires was 4 mm to avoid any foot injuries. Dimension of a metal cage platform was 100 cm x 200 cm x 85 cm / 5-7geese and it was furnished with feeder and water pots. The platform was erected 70 cm higher from floor on four legs. This position gave an ease for cleaning.

Table 1. Allocations of the geese.

10 week fattening	Male	Female	Total
Black	10	8	18
White	9	10	19
Piebald	11	9	20
Yellow	8	9	17
Total	38	36	74
12 week fattening			
Black	8	9	17
White	10	7	17
Piebald	8	11	19
Yellow	11	7	18
Total	37	34	71
General Total	75	70	145

Wing tags were allowed the birds for individually weighing and all the birds were weighted weekly until at the end of 10th and 12th weeks according to their groups.

Drinking water containing 3% sugar was offered to newly hatched goslings just after they were transferred to brooder batteries as a routine application in the region. During the study, animals were fed and watered ad-libitum either in brooder batteries or fattening platforms. First 6 weeks birds were fed with a starter diet and following weeks, until at the end of the 10 or 12 weeks, finisher diet were formulated to meet the dietary requirement of starter and finisher geese (NRC 1994). Group feeding was performed during the experiment. Ingredients of the diets and their nutrient composition were presented in Table 2.

Table 2. Composition of starter and finisher diets.

Ingredients	Starter Diet	Finisher Diet
Corn	59.55	64.80
Soy bean meal	30.00	16.40
Fish meal	5.00
Barley	2.95	10.40
Wheat bran	6.00
Limestone	1.25	1.20
DCP	0.65	0.60
Salt	0.25	0.25
Vit. Min.	0.35	0.35
Analysed Nutrients		
ME, kcal/kg*	2900.31	2900.56
Dry matter	90.95	90.08
Crude protein	22.03	15.07
Ether extract	3.80	3.49
Crude fibre	3.71	4.42
Ash	7.70	6.10

*: Metabolisable energy, provided by calculation.

• Statistical analyses

A General Linear Model was used to evaluate the liveweights for each week. Fattening groups, feather colour of the geese and sex were included the model as fixed effects. Differences between the groups were defined with Tukey test. Minitab statistical package was used for the analyses (Minitab 12.1).

Below explained model was used for the analyses of weekly weights.

$$Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl}$$

Y_{ijk} = i. Fattening group, j. Feather colour, k. Sex

μ = Mean,

a_i = Fattening group (i = 1-2, 10 and 12 weeks),

b_j = Feather Colour group (j = 1-4, Black, White, Piebald, Yellow),

c_k = Sexes (k = 1-2, Male, Female),

e_{ijkl} = Error.

► Results

Any mortality, feet injury or feather eating did not observe during the experiment. Welfare of animals was monitored in each stage and any odd behaviour has not been detected. Weekly liveweights of birds from hatching until at the end of the fattening period were presented in Table 3. There was not any statistical significance between the fattening groups (10 and 12 weeks) in term of weekly liveweight ($p > 0.05$). Effects of both feather colour and sex on liveweight started at the 5th week and continued until at the end of the fattening periods ($p < 0.05$). The highest liveweight was observed in yellow geese while the lowest one was in piebalds (Table 3). It also was detected that piebald geese have statistically lower liveweight than black and yellow geese in the weeks of 5th, 6th, 7th and 10th ($p < 0.05$). Additionally, yellow geese were statistical-

ly heavier than those other 3 groups in 9-12 weeks ($p < 0.05$). After the 5th week, liveweights of male geese were statistically heavier than those female geese ($p < 0.05$).

While piebald geese had lower daily liveweight gain than black and white geese in the first week, yellow geese had the higher daily liveweight gain than whites in fourth and sixth weeks ($p < 0.05$). Daily liveweight gain was defined after the individual weighing according to wing tags and it was higher in male geese than females in 5th week ($p < 0.05$). There was no any statistical significance ($p > 0.05$) between the two fattening groups (10-12 weeks) in terms of both weekly liveweights and daily liveweight gains (Tables 3 and 4).

Because of the difficulties to define the sex of goose before the slaughtering, male and female geese were fed together; therefore feed consumption and conversion ratio were not determined according to sexes. Table 5 shows the feed consumption and conversion ratio according to feather color with the mean of daily liveweight gain.

► Discussion

In general, obtained results from the corresponding study provided additional information on the growth pattern of native Turkish geese reared under the intensive condition. More specifically, study evaluated the effects of fattening length, sex and feather colour on fattening performance. Although it was not one of the main aims, study gave an extra chance to evaluate the broiler capacity in used geese.

High early growth was determined in all the geese until 5 weeks. In this period any significant effect (sex, feather colour and fattening group) can not be detected on growth traits. As expected, there was no any significant effect of fattening groups (10 or 12 weeks) on any trait from beginning to end of the 10th week. Naturally, 12 week group had the heavier final liveweight than 10 week group. But, non significant differences between the two fattening groups until 10th week can be accepted as a reflection of reliable measurements from both groups.

Although there was not a chance to compare the data from intensive and extensive goose farms, Romanov (1999) and Sun et al (2007) were reported the differences of both system in detail. According to their reports, used technique in the corresponding study can be accepted as an intensive technique and might be used in the region as an alternative way.

Hatching weights of the goslings determined in the study were in agreement with the findings (92-97 g) of Knizetova et al (1994). Four week liveweights of the geese in the study were higher than those reported (1437-1348 g) by Tilki and İnal (2004) and Tilki et al (2005) for native Turkish geese, but lower than

Table 3. Effects of fattening periods, feather colour and sex on liveweights (g) of native Turkish geese.

	Weeks												
	Hatching	1	2	3	4	5	6	7	8	9	10	11	12
Fattening Periods													
10 weeks	95.98±1.76	317.93±5.94	648.46±10.73	1172.05±26.71	1746.12±34.11	2424.34±31.41	3060.18±33.87						
12 weeks	93.91±1.92	309.07±6.48	633.32±11.69	1222.43±29.11	1765.91±37.18	2411.72±34.24	2967.00±36.92						
Colour													
Black	96.52±2.74	327.83±9.24	667.26±16.69	1209.73±41.54	1792.24±53.05	2473.38±48.86 ^a	3106.13±52.68 ^b						
White	91.78±2.38	321.19±8.04	633.09±14.51	1222.67±36.11	1728.01±46.12	2354.71±42.48 ^{ab}	2886.25±45.80 ^b						
Piebald	96.09±2.65	295.18±8.94	608.04±16.14	1120.16±40.18	1659.75±51.32	2314.91±47.26 ^b	2889.83±50.96 ^b						
Yellow	95.38±2.69	309.79±9.09	655.15±16.42	1236.38±40.87	1844.07±52.20	2529.11±48.07 ^a	3172.14±51.84 ^a						
Sex													
Male	95.96±1.89	310.69±6.38	638.03±11.52	1217.37±28.66	1802.01±36.61	2494.91±33.72	3104.37±36.36						
Female	93.93±1.83	316.31±6.19	643.75±11.18	1177.10±27.82	1710.02±35.53	2341.15±32.72	2922.81±35.28						
Fattening Periods													
10 Weeks	3207.00±27.78	3412.98±30.01	3627.85±32.34	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31	3786.78±28.31
12 Weeks	3128.67±30.28	3342.21±32.74	3534.16±35.25	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86	3705.99±30.86
Colour													
Black	3209.20±43.21 ^{ab}	3423.96±46.68 ^a	3604.15±50.31 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b	3771.77±44.03 ^b
White	3080.75±37.57 ^{bc}	3251.53±40.58 ^b	3450.21±43.74 ^b	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}	3599.03±38.28 ^{bc}
Piebald	3066.24±41.80 ^c	3261.07±45.15 ^b	3455.40±48.66 ^b	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c	3588.42±42.59 ^c
Yellow	3315.15±42.52 ^a	3573.82±45.93 ^a	3814.25±49.50 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a	4026.33±43.33 ^a
Sex													
Male	3235.05±29.82	3424.10±32.21	3639.68±34.72	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39	3832.04±30.39
Female	3100.61±28.64	3331.09±31.26	3522.32±33.69	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49	3660.74±29.49

^{a, b, c}: Differences between group means having different superscripts in the same column are significant ($p < 0.05$).

Table 4. Effects of fattening periods, feather colour and sex on daily liveweight (g) gain of native Turkish geese.

	Weeks					
	1	2	3	4	5	6
Fattening Periods						
10 weeks	31.31±0.92	54.42±1.65	75.00±2.65	82.00±2.92	96.90±2.14	90.83±3.03
12 weeks	29.33±1.01	51.58±1.80	72.96±2.88	76.17±3.18	93.73±2.34	79.33±3.30
Colour						
Black	32.96±1.43 ^a	54.90±2.57	71.04±4.12	83.20±4.54 ^{ab}	97.32±3.34	90.39±4.72 ^{ab}
White	32.57±1.25 ^a	51.33±2.23	77.51±3.58	71.94±3.95 ^b	89.78±2.90	75.93±4.10 ^b
Piebald	25.25±1.39 ^b	50.31±2.48	70.61±3.98	74.51±4.40 ^{ab}	96.17±2.23	82.13±4.56 ^{ab}
Yellow	30.52±1.41 ^{ab}	55.46±2.53	76.74±4.05	86.69±4.47 ^a	97.99±3.28	91.86±4.64 ^a
Sex						
Male	29.72±0.99	53.96±1.77	76.40±2.84	83.24±3.13	99.26±2.30	87.07±3.25
Female	30.92±0.96	52.04±1.72	71.56±2.76	74.93±3.04	91.37±2.23	83.09±3.16
	Weeks					
	7	8	9	10	11	12
Fattening Periods						
10 weeks	26.76±1.74	32.07±2.52	31.35±1.59	26.90±1.60	---	---
12 weeks	25.28±1.90	30.43±2.74	27.29±1.73	26.56±1.74	19.45	20.10
Colour						
Black	24.38±2.71	33.68±3.92	30.66±2.48	22.64±2.49	13.45±3.34	22.40±3.22
White	26.51±2.36	33.22±3.40	27.99±2.15	25.81±2.16	24.82±3.23	18.41±3.12
Piebald	26.13±2.62	28.15±3.79	24.79±2.40	27.99±2.41	18.04±3.10	20.60±2.99
Yellow	27.06±2.67	29.95±3.85	33.84±2.44	30.48±2.45	21.50±3.34	20.92±3.22
Sex						
Male	24.82±1.87	29.04±2.70	30.08±1.71	28.84±1.72	19.19±2.28	19.23±2.20
Female	27.22±1.82	33.46±2.62	28.56±1.66	24.63±1.66	19.72±2.33	21.94±2.25

^{a,b}: Differences between group means having different superscripts in the same column are significant ($p < 0.05$).

Table 5. Means of daily liveweight gain (DLG, g), daily feed consumption (DFC, g) and feed conversion ratio (FCR, %) according to weeks.

Weeks	Black			White			Piebald			Yellow		
	DLG	DFC	FCR	DLG	DFC	FCR	DLG	DFC	FCR	DLG	DFC	FCR
1	33.02	40.96	1.24	32.69	38.36	1.17	25.50	33.74	1.32	30.50	32.98	1.08
2	55.16	84.82	1.54	53.24	83.66	1.57	49.89	77.63	1.56	56.18	68.70	1.22
3	70.46	164.30	2.33	75.12	152.05	2.02	69.57	111.30	1.60	76.19	120.11	1.58
4	83.15	179.20	2.16	73.36	171.00	2.33	72.73	183.90	2.53	87.55	176.46	2.02
5	97.22	222.59	2.29	90.85	221.47	2.44	94.47	213.68	2.26	98.72	244.53	2.48
6	90.54	224.74	2.48	77.64	192.68	2.48	81.28	208.80	2.57	92.61	233.52	2.52
7	24.54	166.31	6.78	26.94	152.45	5.66	26.64	155.30	5.83	27.09	169.50	6.26
8	33.80	218.20	6.46	33.03	249.98	7.57	29.10	217.80	7.48	29.68	223.90	7.54
9	30.79	243.30	7.90	29.08	233.10	8.02	24.46	228.50	9.34	34.26	251.00	7.33
10	22.57	226.70	10.04	26.22	253.62	9.67	27.09	251.42	9.28	30.82	270.80	8.79
11	13.45	184.00	13.68	21.76	226.30	10.39	18.08	199.78	11.05	20.50	218.04	10.63
12	22.40	302.70	13.51	18.10	234.23	12.94	20.18	247.10	12.24	20.92	258.79	12.37

the 4 week weight of various geese breed reported around 2423 g by Shalev (1995). Generally weekly liveweights were in agreement with the literature but the results from large type of geese like Embden, Bohemian, Synthetic and Pilgrim considerably heavier than the studied geese (Fortin et al 1983, Hrouz 1988, Grunder et al 1991, Cave et al 1994, Shalev and Pasternak 1999).

Davail et al (2000) and Colombo et al (2002) stated the breed differences on goose production, but any literature can not be found about the feather colour differences in a same breed. Great influence of sex on nearly every characteristic of geese was documented by Larzul et al (2000) and Friend et al (2006). Comparably with the literature reports, significant effects of sex and feather colours on weekly liveweights were defined after fifth week in this study. Although there was no statistical differences between yellow and black geese, liveweight of yellow geese were significantly higher than those of whites and piebalds in sixth week. These effects of sex and feather colour on weekly liveweights were observed until at the end of tenth and twelfth weeks. Male geese (4112 g) were visibly heavier than females (3856 g) in all groups as reported by different researchers (Grunder et al 1991, Cave et al 1994).

Whilst maximum daily liveweight gain was detected between the week 4 and week 6 as demonstrated in the studies of Tilki and İnal (2004), Arslan and İnal (2002), feed conversion ratio formed an uneconomic condition for fattening after the 7th week (Table 5). Therefore fattening after 7th week, in the low liveweight gain period has to be supported with forage or inexpensive alternatives. It might also be said that shifting the diet from starter to the finisher after 6th week could cause this determined decreasing in daily liveweight.

There was no any specific breed or variety differences among the geese reared in Turkey, they are always called as native Turkish geese. But, noteworthy higher liveweights of yellow geese in 10 and 12 weeks attracted an attention to this study. This detected variation might be considered as a starting point of certain differences between the yellow geese and others.

A new rearing system with the fattening platforms was successfully applied in the study, also a combination of brooding batteries and fattening platform can be recommended for intensive broiler goose rearing. A copy of pictures and the measurements of the platforms are available on request.

► Conclusions

It might be concluded from the corresponding study that yellow feather coloured goose reaches a greater liveweight at a defined age than the others (black, white, piebold). It is hardly difficult to consider the native Turkish geese as broiler, but in any case inten-

sive rearing can be applied to the local geese to reduce the fattening time. Observed lower liveweight gain and increasing food consumption do not allow the breeders to fatten the native Turkish goose under the intensive condition after 9 or 10 weeks of age. Carcass parts also showed that, 9 and 10 weeks age is the best time for slaughter for intensively growth native Turkish geese (Saatci et al 2009). Additionally, feather eating, feet injury, mortality or any odd behaviour have not been observed during the experiment. These encouraging results support to suggest the applied technique to the local breeders for intensive goose fattening.

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