

Effects of Beak Trimming, Stocking Density and Sex on Fattening Performance of Large White Turkeys

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ABSTRACT: This study was conducted to determine the effects of beak trimming and stocking density on the growth performance of both male and female Large White turkeys. We determined live weight, feed consumption, feed conversion, and livability of turkeys. Male and female turkeys were divided into two groups: trimmed and untrimmed and it was allowed 0.25 and 0.50 m² per bird of each corresponding group.

At the end of 18-week fattening periods, sex had a significant effect on live weight ($P < 0.01$). Density*sex interaction in relation to live weight for 18th week was found to be statistically significant ($P < 0.05$). Stocking density and sex also affected the feed consumption significantly during 0-18 week-period ($P < 0.05$). Males and females housed in 0.50 m² per bird consumed feed more than females in comparison to those housed in 0.25 m² per bird ($P < 0.05$). Beak trimming had a positive effect on the feed conversion during the study period and trimmed turkeys converted feed better than untrimmed turkeys. Birds housed in 0.50 m² per bird had a higher livability than those housed in 0.25 m² per bird.

Key Words: Large White turkeys; beak trimming; stocking density; sex; fattening performance

Ağır Beyaz Hindilerin Besi Performansı Üzerine Gaga Kesimi, Yerleşim Sıklığı ve Cinsiyetin Etkisi

ÖZET: Bu çalışma, erkek ve dişi ağır beyaz hindilerin besi performansı üzerine gaga kesimi ve yerleşim sıklığının etkisini saptamak amacıyla yürütülmüştür. Hindilere ait canlı ağırlık, yem tüketimi, yemden yararlanma oranı ve yaşama gücü gibi özellikler üzerinde durulmuştur. Hindiler cinsiyetlerine göre iki gruba ayrılmış ve her iki grubun yarısının gagası kesilmiştir. Hindi başına 0.25 ve 0.50 m² olmak üzere iki farklı yerleşim sıklığı uygulanmıştır.

Onsekiz haftalık besi dönemi sonunda canlı ağırlık üzerine cinsiyetin etkisi önemli olmuştur ($P < 0.01$). 18. hafta canlı ağırlığı bakımından sıklık*cinsiyet etkileşimi önemli bulunmuştur ($P < 0.05$). Yerleşim sıklığı ve cinsiyet hindilerin 0-18 haftalık dönemdeki yem tüketimlerini önemli düzeyde etkilemiştir ($P < 0.05$). Hindi başına 0.50 m² alanda barındırılan erkek ve dişi hindiler, 0.25 m² alanda barındırılanlara göre daha fazla yem tüketmişlerdir ($P < 0.05$). Gaga kesimi, yemden yararlanma üzerine olumlu etki yapmış ve gagası kesilen hindiler kesilmeyenlere oranla yemden daha iyi yararlanmışlardır. Hindi başına 0.50 m² alanda barındırılan hindiler, 0.25 m² alanda barındırılanlara göre daha yüksek yaşama gücüne sahip olmuşlardır.

Anahtar Kelimeler: Ağır Beyaz hindi, gaga kesimi, yerleşim sıklığı, cinsiyet, besi performansı

INTRODUCTION

Beak trimming and stocking density should be taken into consideration with other production techniques. The advantages of beak trimming are to: 1) stop finger and tail pecking in chicks, 2) prevent vent and comb pecking in adults, 3) reduce fightings among males, 4) stop eating eggs in female, and 5) reduce the stress in flock. These will control cannibalism, prevent wasting of feed, improve feed conversion, increase livability, and to provide a higher uniformity in flock (16).

Debeaking is done as a routine procedure in turkeys industry (2). It has been reported that if turkeys are housed in a confined area, their beaks should be trimmed. It is advised that beak trimming should be done during the first three weeks in poults (5).

Welfare and comfort supplied with optimum stocking density affect the health and performance of turkeys positively. With excess and less than optimum conditions for birds decrease their production and affect the profits negatively. Factors, such as season, housing isolation, and ventilation should be considered for stocking density (17). In general, it is suggested that the stocking density for turkeys should be 0.4 m² per bird (5).

This study was conducted to determine the effects of beak trimming and stocking density on the growth performance of both male and female Large White turkeys.

MATERIALS AND METHODS

One hundred and forty four males and 144 females, in total 288 Large White poults were used as day old chicks in this study. Poults, separated by sex were kept in brooding machines during the first two weeks period. Beaks of the half of male and female poults were trimmed when they were 8 days old using electrical beak trimmer.

The experiment was designed as 2x2x2 factorial arrangement with 3 replications in each group. Poults were placed into 24

unit pens at the end of the second week. Pens, allowing 0.25 and 0.50 m² per bird as the stocking densities, had 3.0 m² (1.5 x 2 m) and 6.0 m² (3 x 2 m). Males and females were grown separately during the experimental period. The experiment was carried out during May-October. Wood shaving was used as litter.

Feed and water requirements of birds were supplied as ad libitum. Birds were fed with diets containing 28% crude protein and 2800 Kcal/kg ME at 0-4 weeks period, 26% crude protein and 2900 Kcal/kg ME at 5-8 weeks period, 22% crude protein and 3000 Kcal/kg ME at 9-14 weeks period, and 19% crude protein and 3100 Kcal/kg ME at 15-18 weeks period.

Lighting during the first two weeks was provided daily as 23 L: 1 D and then 16 L:8 D up to the end of the experiment. Turkeys weighed every week and feed consumptions were measured for every two weeks.

Statistical analysis were carried out by using SPSS 10.0 software programme. For the comparison of the mean values, the Duncan test range was used.

RESULTS

Body Weights and Livability

Beak trimming and stocking density effects on live weights of male and female turkeys are given in Table 1. It was observed that beak trimming and stocking density did not significantly affect the live weights of birds at the end of 18 week-period. The live weight differences between trimmed and untrimmed turkeys and low and high stocking densities were not significant. As shown in Figure 1, sex considered as a separate parameter. Generally the trimmed males and females were heavier than the untrimmed males and females, respectively ($P < 0.05$). Males housed in 0.50 m² per bird were heavier than males housed in 0.25 m² per bird, whereas the opposite was observed for females. In general, females housed in 0.25 m² per bird were heavier than females housed in 0.50 m² per bird. Sex affected the live weights

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of turkeys from the third week. Males were significantly heavier than females at the end of fattening period ($P < 0.01$).

According to the live weights during 0-18 week-period, beak density, beak*sex, and beak*density*sex interactions were not significant. Although the density*sex interaction was not significant during 0-15 week-period, at 18th week it was found to be significant ($P < 0.05$).

During the 0-18 week feeding periods, beak trimming and sex effects on the livability of turkeys were not statistically significant (Table 2). On the other hand, the livability was significantly affected by stocking density ($P < 0.01$). Turkeys housed in 0.50 m² per bird showed higher livability than turkeys housed in 0.25 m² per bird. According to the livability of turkeys during 0-18 week-period, beak density, beak sex, and beak density sex interactions were not significant. However, the density sex interaction was found to be significant ($P < 0.01$).

Feed Consumption and Feed Conversion

The effects of beak trimming and stocking density on feed consumption and feed conversion of male and female of Large White Turkeys are shown in Table 2. Feed consumption of turkeys within 0-18 weeks period was significantly affected by the stocking density and sex ($P < 0.05$). Beak trimming affected the feed consumption of turkeys only within 12-14 weeks period ($P < 0.01$), but it did not affect the feed consumption in other periods. During the period of 12-14 week, trimmed turkeys consumed less feed than untrimmed turkeys ($P < 0.01$). Males (e.g., especially during 0-8 week-period) and turkeys housed in 0.50 m² per bird consumed more feed than their counterparts, females, and the birds housed in 0.25 m² per bird, respectively at 0-18 weeks. When sexes considered separately, at 0-18 week-period, trimmed males and females generally consumed less feed than untrimmed males and females ($P < 0.05$) (Figure 2). Males and females housed in 0.50 m² per bird consumed more feed than those housed in 0.25 m² per bird ($P < 0.05$). Feed consumption, beak density, beak sex, density sex, and beak density sex interactions were not significant at 0-18 week-period. However, during 12-14 week-period beak sex and beak density sex interactions were significant ($P < 0.05$, $P < 0.01$, respectively).

Beak trimming had a significant effect on feed conversion ($P < 0.05$) during 0-18 week- period (Figure 3). Although sex was not an effective factor on feed conversion during 0-18 week-period, however, it showed an effect on feed conversion in the first two weeks-period ($P < 0.01$). Although the stocking density affected the feed conversion during 12-14 and 15-18 weeks period ($P < 0.01$, $P < 0.05$, respectively), it did not affect the feed conversion in other periods. At the periods mentioned above (e.g., 12-14 and 15-18 weeks period), turkeys housed in 0.25 m² per bird converted feed better than those housed in 0.50 m² per bird. When sexes are considered, no significant differences were found between trimmed and untrimmed males and females with respect to the feed conversion. Interactions for 0-18 week-period, beak density, beak sex, density sex, and beak density sex were statistically insignificant. However, beak density sex interaction of 12-14 week-period was statistically significant ($P < 0.01$).

DISCUSSION

Beak trimming had no significant effect on live weights at the end of feeding period. Starting from the first week up to the end of the feeding period it was observed that the effect of beak trimming did not reach a significant level. Cunningham et al. (2) found that beak trimming did not significantly affect body weight in turkeys. Similar to the above, Noble et al. (13)

reported that there were no significant differences between the trimmed and untrimmed turkeys with respect to the live weights. Denbow et al. (4) stated that the beak trimming did not significantly affect body weight. However, Noble et al. (12) in two commercial lines have noticed that the trimmed turkeys were heavier at 8th, 12th and 16th week. Leighton et al. (9), on the other hand reported that beak trimming in turkeys reduced live weights significantly.

The beak trimming at 0-18 week-period did not significantly affect feed consumption. But, at 12-14 week-period, the trimmed turkeys consumed less feed than the untrimmed turkeys ($P < 0.01$). Results from our studies were similar. Noble and Nestor (14) reported that beak trimming did not significantly affect feed consumption and there was no significant interaction between sex and beak trimming. Cunningham et al. (2) reported that there was no significant effect of beak trimming on feed consumption. Leighton et al. (9) stated that the beak trimming resulted in a reduction in feed consumption.

The beak trimming at 0-18 week-period affected significantly the feed conversion ($P < 0.05$). Although there were significant differences at 12-14 week-period in response to the feed conversion between groups (e.g., trimmed versus untrimmed), these differences were not observed in other periods. Cunningham et al. (2) cited that the trimmed males were better than untrimmed males in response to the feed conversion however there were no significant differences between trimmed and untrimmed females. Noble et al. (12) in their study stated that the trimmed turkeys converted feed better than their counterparts, untrimmed turkeys, at 4-8, 12-16 and 0-16 weeks period. Denbow et al. (4) said that the beak trimming did not significantly affect feed conversion. Noble and Nestor (14) reported that beak trimming also did not significantly affect feed conversion and the sex*beak interaction was not significant.

The beak trimming did not significantly affect livability of turkeys at 0-18 week- period. Results obtained from the study conducted for this purpose were similar. Noble et al. (13) stated that the mortality was not significantly affected by beak trimming. Cunningham et al. (2) and Leighton et al. (9) cited that beak trimming (0-18 week- period) did not significantly affect livability of turkeys. Grigor et al. (7) said that the mortality and cannibalism in trimmed flocks were decreased. The same authors determined that mortality in control and trimmed groups was 8.7% and 1.6%, respectively, meanwhile the cannibalism in control and trimmed groups was then 68% and 9.8%, respectively. The cannibalism in control and trimmed groups were 68% and 9.8% respectively.

Stocking density had no a significant effect on live weight of turkeys. The effect of stocking density during the experiment did not reach a significant level. But in general, with increasing stocking density, was reported higher mortality, less feathering, and low feed conversion with a decrease in live weight. Gill and Leighton (6) stated that there were significant differences among turkeys which were housed in low and high population densities in response to live weight gain at 4-24 week-period. However, Singh and Singh (19) cited that stocking density did not significantly affect the live weight. Maurice et al. (11) stated that an increase in stocking density with a decrease in live weight was not significant but high population density resulted in an increase in leg abnormalities. They also applied two different stocking densities to turkeys (3.2 and 4.3 m²/bird) and observed that as the increased stocking density was decreased the live weight, but carcass weight was not affected by stocking density.

Halvorson et al. (8), on the other hand, cited that stocking density significantly affected carcass weight. Noll et al. (15) reported that for turkeys housed in 0.21 m² per bird had 5.5% less live weight than turkeys housed in 0.46 m² per bird. Perkins et al. (18) reported that different stocking densities (5.5 and 2.8 bird/m²) in Heavy Toms did not significantly affect live weight gain. Martrenchar et al. (10) reported that high population density caused problems in leg and hip parts of males and females turkeys. Şengül et al. (20) cited in their study that stocking density did not affect live weight at the end of 16th week.

The stocking density affected significantly feed consumption of turkeys at 0-18 week-period ($P < 0.05$). Turkeys housed in 0.25 m² per bird consumed less feed at 6-8, 12-14, and 15-18 weeks period ($P < 0.01$, $P < 0.05$). Singh and Singh (19) reported that stocking density did not significantly affect feed consumption. Şengül et al. (20), on the other hand, cited that the feed consumption of turkeys was significantly affected by stocking density at the end 16 week period.

Even though the stocking density did not affect the feed conversion at the end of 18 week- period, it significantly affected 12-14 and 15-18 weeks period ($P < 0.01$, $P < 0.05$, respectively). For the same periods, turkeys housed in 0.25 m² per bird had a better feed conversion than turkeys housed in 0.50 m² per bird. Gill and Leighton (6) reported that there were significant differences between turkeys housed in low and high densities with respect to the feed conversion at 4-24 week-period. Perkins et al. (18) cited that different population densities did not affect feed conversion in Heavy Toms. Davidson and Leighton (3) reported that a decreasing in feed conversion occurred with increasing stocking density. Şengül et al. (20) reported that feed conversion was significantly affected by stocking density.

The stocking density affected the livability of turkeys at the end of 18 week-period ($P < 0.01$). The livability was found to be higher in the low population density (0.50 m²/bird) than in the high population density (0.25 m²/bird). Gill and Leighton (6) reported that the birds housed in the high population density

caused a 5-6% reduction in livability of turkeys after 14 week old.

Sex affected significantly the live weights of turkeys ($P < 0.01$). The effects of sex at the end of 3rd week reached a significant level and continued up to the end of the experiment. The live weight was affected by sex and genotype. Results of the studies conducted in this manner, it was reported that male turkeys had significantly heavier body weights than their counterparts, the female turkeys (1, 2, 6, 11, 18, 20).

Sex significantly affected feed consumption of turkeys ($P < 0.01$). Males consumed more feed than females at 0-18 week-period ($P < 0.05$). Although, the feed consumption among sexes at 12-14 and 15-18 weeks period was not significant, but the differences were significant at other periods. Cunningham et al (2) reported that the sex had to be a significant factor on feed consumption and males consumed more feed than females. The results of studies conducted for the same experiment were similar and it was also reported that more feed was consumed by males than females (2, 6, 18, 19).

Sex did not have a significant effect on feed conversion for 0-18 week-period. During the experiment males had a better feed conversion than females only at 0-2 week- period ($P < 0.01$). Cunningham et al (2) stated that the feed conversion was significantly affected by the sex and the males were better regarding feed conversion.

Sex did not have a significant effect on livability of turkeys for 0-18 week-period. Cunningham et al (2) reported that the sex had a significant effect on livability ($P < 0.05$) and at the same time females showed higher livability than males.

Treatment of beak trimming in turkeys and to allow the housing of 0.25 m² per bird in general have a positive effect on fattening performance. However, a significant increase in the mortality in response to an increase in the population density should be considered. Growing males and females separately gives a better result as well.

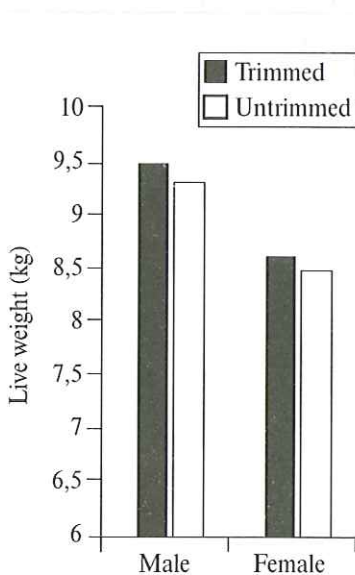


Figure 1. The Live Weights of Trimmed and Untrimmed Males and Females at 18th Week.

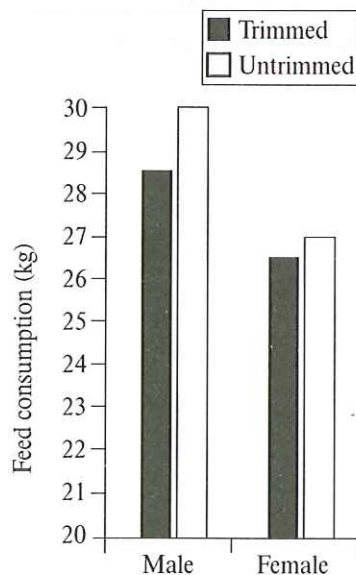


Figure 2. The Feed Consumptions of Trimmed and Untrimmed Males and Females at 0-18 Weeks Period.

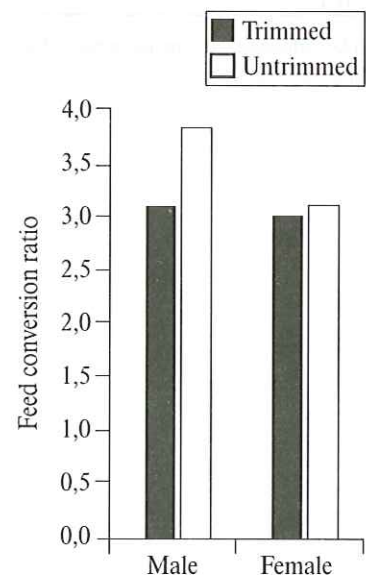


Figure 3. The Feed Conversion Ratios of Trimmed and Untrimmed Males and Females at 0-18 Weeks period.

Table 1. Effects of Beak Trimming, Stocking Density and Sex on Live Weights In Large White Turkeys.

Weeks	Live weight (kg)							
	Untrimmed				Trimmed			
	0.25 m ²		0.50 m ²		0.25 m ²		0.50 m ²	
	M	F	M	F	M	F	M	F
1 st day	0.06 ^a	0.06 ^a	0.06 ^a	0.06 ^a	0.06 ^a	0.06 ^a	0.06 ^a	0.06 ^a
2	0.25 ^a	0.24 ^a	0.24 ^a	0.24 ^a	0.26 ^a	0.23 ^a	0.25 ^a	0.23 ^a
4	0.94 ^{abc}	0.85 ^a	0.96 ^{bc}	0.86 ^{ab}	0.97 ^c	0.87 ^{ab}	0.93 ^{abc}	0.87 ^{abc}
6	1.75 ^{abc}	1.61 ^a	1.87 ^c	1.65 ^a	1.88 ^c	1.65 ^a	1.84 ^{bc}	1.71 ^{ab}
8	2.75 ^{bc}	2.44 ^a	2.92 ^c	2.53 ^{ab}	2.89 ^c	2.54 ^{ab}	2.91 ^c	2.56 ^{ab}
10	3.74 ^{abcd}	3.36 ^a	3.86 ^{bcd}	3.39 ^{ab}	3.97 ^d	3.64 ^{abcd}	3.94 ^{cd}	3.46 ^{abc}
12	4.09 ^{ab}	4.64 ^a	5.55 ^c	4.64 ^a	5.38 ^{bc}	4.88 ^{ab}	5.45 ^c	4.74 ^a
14	6.08 ^{ab}	5.43 ^a	6.59 ^b	5.53 ^a	6.53 ^b	5.77 ^{ab}	6.49 ^b	5.86 ^{ab}
16	6.83 ^{ab}	6.73 ^a	8.05 ^c	6.91 ^{ab}	7.63 ^{abc}	7.04 ^{ab}	7.75 ^{bc}	6.93 ^{ab}
18	8.54 ^{ab}	8.35 ^a	9.69 ^c	8.29 ^a	9.18 ^{abc}	8.74 ^{abc}	9.49 ^{bc}	8.48 ^{ab}
	Feed consumption, (kg)							
0-2	0.32 ^a	0.36 ^b	0.32 ^a	0.35 ^b	0.32 ^a	0.35 ^b	0.32 ^a	0.35 ^b
3-5	1.46 ^{abc}	1.34 ^a	1.54 ^c	1.35 ^a	1.52 ^{abc}	1.34 ^a	1.60 ^{bc}	1.37 ^{ab}
6-8	2.44 ^{abc}	2.12 ^a	2.91 ^d	2.34 ^{ab}	2.64 ^{bcd}	2.17 ^a	2.79 ^{cd}	2.38 ^{ab}
9-11	3.93 ^a	3.68 ^a	4.25 ^a	3.85 ^a	4.21 ^a	3.39 ^a	3.97 ^a	3.61 ^a
12-14	3.78 ^{bcd}	3.80 ^{bcd}	5.11 ^e	4.18 ^{cd}	3.33 ^{ab}	3.07 ^a	3.69 ^{bc}	4.27 ^d
15-18	8.46 ^{ab}	8.04 ^{ab}	9.99 ^b	8.47 ^{ab}	7.65 ^a	8.24 ^{ab}	9.69 ^{ab}	8.62 ^{ab}
0-18	27.27 ^{ab}	25.95 ^a	32.02 ^c	27.37 ^{ab}	26.84 ^{ab}	24.98 ^a	30.00 ^{bc}	27.84 ^{ab}
	Feed Conversion (kg:kg)							
0-2	1.68 ^{ab}	1.90 ^{bc}	1.74 ^{ab}	1.96 ^c	1.62 ^a	2.05 ^c	1.73 ^{ab}	1.99 ^c
3-5	1.89 ^a	1.88 ^a	1.77 ^a	2.04 ^a	1.83 ^a	1.82 ^a	1.91 ^a	1.82 ^a
6-8	2.48 ^a	2.58 ^a	2.77 ^a	2.80 ^a	2.63 ^a	2.45 ^a	2.62 ^a	2.80 ^a
9-11	2.89 ^a	2.88 ^a	3.06 ^a	2.99 ^a	2.71 ^a	3.16 ^a	3.01 ^a	3.42 ^a
12-14	3.23 ^{abc}	3.76 ^c	4.41 ^d	3.74 ^c	3.01 ^{ab}	2.78 ^a	3.52 ^{bc}	3.83 ^{cd}
15-18	3.94 ^{ab}	3.48 ^{ab}	4.22 ^b	3.90 ^{ab}	3.39 ^a	3.61 ^{ab}	3.95 ^{ab}	4.18 ^{ab}
0-18	3.21 ^a	3.11 ^a	4.33 ^a	3.33 ^a	2.95 ^a	2.88 ^a	3.17 ^a	3.08 ^a

^{a-d}: The differences among the mean values shown with different letters at the same row are significant (P<.05).

M: Male, F: Female

Table 2. Effects of Stocking Density, Sex and Beak Trimming on The Body Weight, Feed Consumption, Feed Conversion and Livability from 0 to 18 Wk of Age for Large White Turkeys

Comparisons	Age							Livability
	0 wk	3 wk	6 wk	9 wk	12 wk	15 wk	18 wk	0-18 wk
	Body weight (kg)							
Sex								
Males	0.06	0.52**	1.84***	3.32***	5.32***	6.89**	9.22**	88.03
Females	0.06	0.48	1.66	2.93	4.73	6.24	8.47	86.47
Beak treatment								
Trimmed	0.59	0.50	1.77	3.18	5.11	6.69	8.97	86.47
Untrimmed	0.59	0.51	1.72	3.06	4.94	6.44	8.72	88.03
Density								
0.25 m ²	0.58	0.50	1.72	3.10	4.95	6.43	8.70	81.79**
0.50 m ²	0.59	0.50	1.77	3.14	5.09	6.70	8.99	92.71
Interactions								
Beak * density	NS	NS	NS	NS	NS	NS	NS	NS
Beak * sex	NS	NS	NS	NS	NS	NS	NS	NS
Density * sex	NS	NS	NS	NS	NS	NS	*	**
Beak * density * sex	NS	NS	NS	NS	NS	NS	NS	NS
	Feed Consumption (kg per bird)							
	0-2 wk	3-5 wk	6-8 wk	9-11 wk	12-14wk	15-18 wk	0-18 wk	
Sex								
Males	0.35***	1.53***	2.69***	4.04*	3.98	8.95	29.03'	
Females	0.32	1.35	2.25	3.63	3.83	8.34	26.53	
Beak treatment								
Trimmed	0.34	1.46	2.50	3.79	3.59***	8.55	27.41	
Untrimmed	0.34	1.42	2.45	3.93	4.22	8.74	28.15	
Density								
0.25 m ²	0.34	1.41	2.34**	3.80	3.49***	8.09'	26.26'	
0.50 m ²	0.34	1.47	2.71	3.92	4.31	9.19	29.31	
Interactions								
Beak * density	NS	NS	NS	NS	NS	NS	NS	
Beak * sex	NS	NS	NS	NS	*	NS	NS	
Density * sex	NS	NS	NS	NS	NS	NS	NS	
Beak * density * sex	NS	NS	NS	NS	**	NS	NS	
	Feed Conversion (kg:kg)							
Sex								
Males	1.69***	2.22	2.62	2.92	3.54	3.87	3.16	
Females	1.97	1.89	2.67	3.11	3.53	3.79	3.10	
Beak treatment								
Trimmed	1.85	1.84	2.62	3.07	3.28**	3.78	3.02'	
Untrimmed	1.45	1.89	2.66	2.95	3.78	3.89	3.24	
Density								
0.25 m ²	1.81	1.85	2.53	2.91	3.19***	3.60'	3.04	
0.50 m ²	1.85	1.88	2.75	3.12	3.87	4.06	3.23	
Interactions								
Beak * density	NS	NS	NS	NS	NS	NS	NS	
Beak * sex	NS	NS	NS	NS	NS	NS	NS	
Density * sex	NS	NS	NS	NS	NS	NS	NS	
Beak * density * sex	NS	NS	NS	NS	**	NS	NS	

*P < .05, **P < .01, ***P < .001.

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