

Research Article

CERTAIN FATTENING AND SLAUGHTER CHARACTERISTICS OF
BROWN SWISS YOUNG BULLS IN INTENSIVE CONDITIONS

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Esmer Irk Danaların Entansif Koşullardaki Bazı Besi ve
Kesim Özellikleri Üzerinde Araştırmalar

Özet: Bu araştırma, Güneydoğu Anadolu Bölgesi'nde entansif koşullarda üretim yapan özel bir işletmedeki Esmer ırkı danaların bazı besi ve kesim özelliklerini incelemek amacıyla yürütülmüştür. Araştırma kapsamında danalar besi başlangıç ağırlıklarına göre 176-225 kg, 226-275 kg, 276-325 kg ve 326-400 kg arası olmak üzere 4 gruba ayrılmıştır. Araştırmada çevre faktörü olarak besi başlangıç ağırlığı grubu ve mevsimin etkileri incelenmiştir. Besi özellikleri üzerine çevresel faktörlerin etkisini belirlemek amacıyla general linear model (GLM) prosedürü uygulanmıştır. Besi başında 275.0 kg minimum kareler ortalamasına (LSM) sahip olan tüm danalar 180 günlük besi sonunda 515.6 kg LSM'e ulaşmışlardır. Çalışmada, besi süresince günlük canlı ağırlık artışı 1336 g olarak elde edilmiştir. Besi başlangıç mevsiminin, beside toplam canlı ağırlık kazancı üzerine etkisi önemli bulunmuştur. Esmer ırk danaların karkas randımanı %58.6 olarak elde edilmiş ve kesim ağırlığının karkas randımanı üzerine etkisi önemsiz bulunmuştur.

Anahtar Kelimeler: Esmer, besi ve kesim özellikleri, besi başlangıç ağırlığı, mevsim

Summary: This study was carried out to investigate some fattening and slaughter characteristics in intensive conditions of Brown Swiss young bulls in a private farm in Southeastern Anatolia Region. The young bulls in the study were grouped in four groups according to their initial fattening weights (176-225 kg, 226-275 kg, 276-325 kg and 326-400 kg). In terms of the environmental factors, the effects of initial fattening weight group and season were investigated. To determine the effects of environmental factors on fattening traits, general linear model (GLM) procedure was used. The young bulls had a least square mean (LSM) of 275.0 kg initial fattening weight and they reached to a LSM of 515.6 kg final weight at the end of the fattening for 180 days. The daily live weight gain during fattening was 1336 g. The effect of beginning to fattening season on total live weight gain in fattening was found to be significant. The dressing percentage of Brown Swiss young bulls were 58.6% and the effects of slaughter weight on dressing percentage were not found significant.

Keywords: Brown Swiss, fattening and slaughter characteristics, initial fattening weight, season

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Introduction

The rapid human population growth and rising standards of living in Turkey are increasing the demand for proteins of animal origin. One of the most important sources of animal protein is red meat. 67% of the total red meat production in Turkey is obtained from cattle breeding. Although Turkey is among the leading countries in terms of cattle population (10.8 million), the meat production per animal is seemingly low. The main reason for this is most of the cattle population in Turkey being composed of indigenous breeds and improved breed x indigenous breed crossbreds (4, 5).

Another significant problem of animal breeding in Turkey is the majority of the animal farms being small sized family units. These small farms still continue animal production with traditional methods without using sufficient scientific knowledge and finance (15). The small sized family managements can not meet the increasing demand for red meat. Because of these reasons, there is a need for more of modern intensive fattening farms in Turkey.

After the Southeastern Anatolia Project (GAP), the region has reached to a potential of being an agriculture and animal breeding centre. When appropriate management conditions for animal breeding are provided and improved breeds with higher production levels are used, the Southeastern Anatolia Region can be the animal production depot of Turkey (10).

Growth rates in animals are in various levels in different periods of life. Arpacık et al. (6, 8) determined that beginning to fattening with lower initial weights was more successful for Holstein and Brown Swiss young bulls. However, İlgü and Güneş (11) reported for Holstein young bulls fattened for five months that, fattening young bulls with higher initial weights could be more profitable.

Cattle are among the homoeothermic animals, which can continue their body temperatures at a constant level in spite of the changes in the climatic conditions (16). For the fattening young bulls to continue this constant body temperature, the most suitable temperatures are in the thermo-neutrality zone of 5-25⁰C. The temperatures in this zone do not affect negatively on the physiological functions. However, at temperatures lower and higher than these limits, stress effect is being observed on farm animals. Animals are forced to produce more energy at very low environmental temperatures and not to produce energy at very high environmental temperatures. These conditions cause the rise and fall in the feed intake and decrease in the live weight gain (2, 13, 14). In two different studies (2, 9), the effect of season was found to be significant on the daily live weight gains of Holstein young bulls in Ankara. However, Oğan et al. (14) for Poland Holsteins and İlgü and Güneş (11) for Holsteins reported that the effects of season in Marmara Region conditions were not significant.

This study was carried out to investigate some fattening and slaughter characteristics of Brown Swiss young bulls in intensive conditions in a private farm in Southeastern Anatolia Region. The effects of the initial fattening weight and season on

fattening characteristics were also determined. The results obtained in this study might give some information about the cattle fattening in the region, to the initiatives which think to put finance in this sector.

Materials and Methods

This study was carried out in the feedlot of Koç-Ata Fattening and Agricultural Products Corporation in Şanlıurfa. For fattening, young bulls at the age of 5-16 months were bought from other farms. Before fattening, the animals were put in quarantine paddocks for one month. During the quarantine period they were adopted to the feed ration, which would be used for fattening; identification procedures, anti-parasite medicines and vaccinations were applied and foot controls were made. All the young bulls were taken to the fattening paddocks without any changes in the groups formed at the beginning of the quarantine period. Each of the paddocks had a capacity of 50 fattening cattle.

In fattening, the feed produced in the farm containing of 12-14% crude protein and 2500-2700 kcal/kg metabolic energy were given ad-libitum to the young bulls with free access to water. During fattening the young bulls were weighted monthly by electronic scales sensitive to 100 g.

The animal material of this study was composed of Brown Swiss young bulls, which were taken in fattening between December 2000 and January 2003. Although there were a total of 3136 Brown Swiss young bulls, which were fattened in this period, the results of 1690 animals, which were taken in fattening between 175 kg and 400 kg of live weight and stayed in fattening at least 180 days were evaluated in the present study. In addition, the young bulls, which had a chronic illness or medical treatment for a long time, were also removed from the study.

The young bulls in the study were investigated in four groups according to their initial fattening weights (1st group: 176-225 kg, 2nd group: 226-275 kg, 3rd group: 276-325 kg and 4th group: 326-400 kg).

The absolute 30th, 60th, 90th, 120th, 150th and 180th day live weights of the young bulls were calculated by the linear interpolation of the values obtained from the consecutive weightings.

In Şanlıurfa, where the study was conducted, the climate is subtropical. The average monthly environmental temperature, rainfall and humidity values of the region during the dates of the study were collected from the General Directorate of Meteorological services of Turkey and were presented in Table 1.

To investigate the slaughter characteristics, the young bulls were grouped by means of slaughter weights in three groups (451-500 kg, 501-550 kg and 551-600 kg). The hot carcass weights of the slaughtered animals were recorded and the hot dressing percentages were determined.

Table 1. The average temperature, rainfall and humidity values in Şanlıurfa, Turkey.**Tablo 1.** Şanlıurfa'daki ısı, yağış ve nem değerlerine ait ortalamalar

Month	Mean temperature (°C)	Total rainfall (mm)	Mean humidity (%)
January	6.7	41.4	68.8
February	7.6	103.9	67.1
March	12.1	85.1	62.3
April	15.9	42.9	64.1
May	20.8	29.0	51.9
June	29.0	0.15	33.5
July	32.4	2.3	35.1
August	31.0	0.0	42.8
September	27.2	0.35	45.1
October	21.2	24.35	50.4
November	13.0	38.8	61.8
December	6.9	108.0	75.0

General linear model (GLM) procedure was applied to determine the effects of initial fattening weight and season on the fattening traits investigated in the current study. The significance controls between the sub-factors were made by contrast-test. The statistical comparisons between the slaughter weight groups for slaughter characteristics were made by analyses of variance (ANOVA) and the significance controls of the differences between the groups were determined by Duncan test. SPSS computer program package was used for the statistical analyses.

The linear model below was used for the fattening characteristics:

$$Y_{ijk} = \mu + a_i + b_j + ab_{(ij)} + e_{ijk}$$

The symbols in this model are:

Y_{ijk} : Value of the given characteristic of any animal.

μ : Overall mean,

a_i : Effect of initial fattening weight group (the groups of 176-225 kg, 226-275 kg, 276-325 kg and 326-400 kg),

b_j : Effect of initial fattening season (spring, summer, autumn and winter),

$ab_{(ij)}$: Effect of the interaction between initial fattening weight group and season,

e_{ijk} : Random error.

Results

The LSM of some fattening characteristics of Brown Swiss young bulls were presented in Table 2.

The groups 1, 2, 3 and 4 having 200.9 kg, 249.0 kg, 299.6 kg and 350.6 kg initial fattening weights, reached to a final weight of 446.9 kg, 491.5 kg, 537.0 kg and 586.8 kg, respectively, at the end of a fattening duration of 180 days. While the effect of season was not significant on the final weight, it was found to be significant on the initial weight, TWG and ADG. TWG of 1st, 2nd, 3rd and 4th fattening groups were 245.9 kg, 242.5 kg, 237.4 kg and 236.3 kg, respectively. Among the season groups, the young bulls in the winter group gained the lowest live weight. In terms of the season groups, the highest daily live weight gain of 1359 g was in the summer group and the lowest daily live weight gain of 1303 g was in the winter group.

Table 2. The least squares means (LSM) and standard errors (SE) of the initial weight, final weight, total weight gain (TWG) and average daily live weight gain (ADG) in fattening for Brown Swiss young bulls

Tablo 2. Esmer danaların besi başlangıç ağırlığı, besi sonu ağırlığı, beside toplam canlı ağırlık kazancı (TWG) ve günlük canlı ağırlık artışlarına (ADG) ait en küçük kareler ortalamalar (LSM) ve standart hataları (SE)

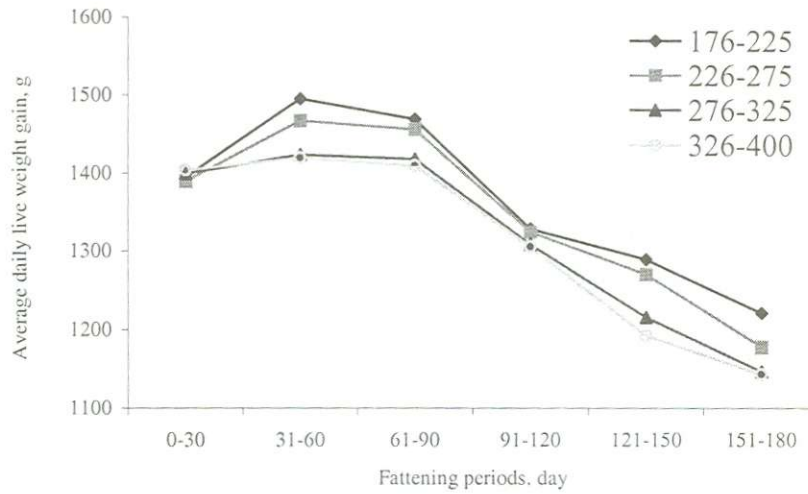
Factors	n	Initial weight (kg)		Final weight (kg)		TWG (kg)		ADG (g)	
		LSM	SE	LSM	SE	LSM	SE	LSM	SE
Expected mean	1690	275.0	0.49	515.6	1.43	240.5	1.36	1336	7.5
Fattening group		***		***		*		*	
1 st group	555	200.9 ^d	0.66	446.9 ^d	1.95	245.9 ^a	1.84	1366 ^a	10.2
2 nd group	584	249.0 ^c	0.65	491.5 ^c	1.92	242.5 ^{ab}	1.82	1347 ^{ab}	10.1
3 rd group	345	299.6 ^b	0.83	537.0 ^b	2.45	237.4 ^b	2.33	1319 ^b	12.9
4 th group	206	350.6 ^a	1.19	586.8 ^a	4.40	236.3 ^b	4.17	1313 ^b	23.2
Season		***		NS		*		*	
Spring	307	272.0 ^b	1.37	512.6	4.05	240.6 ^{ab}	3.84	1337 ^{ab}	21.3
Summer	569	273.9 ^b	0.86	518.4	2.54	244.5 ^a	2.41	1359 ^a	13.4
Autumn	463	276.7 ^a	0.72	519.0	2.10	242.3 ^a	1.99	1346 ^a	11.0
Winter	351	277.5 ^a	0.80	512.2	2.37	234.6 ^b	2.25	1303 ^b	12.5
Fattening group x Season		***		**		NS		NS	

NS: not significant (P>0.05)

^{a, b, c, d}: The differences between the means of groups carrying various letters in the same column are significant (*: P<0.05, **: P<0.01, ***: P<0.001)

In the present study, assuming that the young bulls with different live weights might be affected by the seasonal climatic conditions in different levels, the interaction between the initial fattening weight group and season was investigated. The effect of this interaction was found to be significant on the initial and final weights, but was not significant on the TWG and ADG.

The average daily live weight gain differences of the fattening groups were presented in Graphic 1. The 4th group had the highest daily live weight gain with 1404 g in the first 30 days of fattening, while showing the lowest daily live weight gain with 1143 g in the last period of fattening. The highest ADG were in the second month of fattening for all fattening groups. In this period, the ADG of 1st, 2nd, 3rd and 4th fattening groups were 1495 g, 1467 g, 1424 g and 1420 g, respectively. In each of the following months of fattening, the ADG decreased.



Graphic 1. The daily live weight gains of Brown Swiss young bulls in different periods of fattening

Grafik 1. Esmer danaların besinin çeşitli dönemlerindeki günlük canlı ağırlık artışları

The hot carcass weights and dressing percentages of the Brown Swiss young bulls in different slaughter weight groups were presented in Table 3. In terms of the hot dressing percentages, the differences between the slaughter weight groups were not significant.

Table 3. The slaughter weight, hot carcass weight and hot dressing percentage means and standard errors (SE) of Brown Swiss young bulls in different slaughter weight groups**Table 3.** Farklı kesim ağırlığı gruplarındaki Esmer danaların kesim ağırlığı, sıcak karkas ağırlığı ve sıcak karkas randımanlarına ait ortalama ve standart hatalar (SE)

Group (kg)	n	Slaughter weight (kg)		Hot carcass weight (kg)		Hot dressing percentage (%)	
		Mean	SE	Mean	SE	Mean	SE
		**		**		NS	
451-500	237	473.7 ^c	1.25	277.7 ^c	0.95	58.6	0.12
501-550	371	526.0 ^h	0.77	308.9 ^h	0.67	58.7	0.10
551-600	289	574.2 ^a	0.84	336.1 ^a	0.72	58.5	0.09
Total	897	527.7	1.38	309.4	0.86	58.6	0.06

NS: not significant (P>0.05)

^{a, b, c}: The differences between the means of groups carrying various letters in the same column are significant (**: P<0.01)

Discussion

The Brown Swiss cattle breed is a multi-purpose breed, which is improved for both meat and milk production, and is showing good adaptation to the conditions of Turkey. Several studies have been carried out on various production characteristics of Brown Swiss cattle in Turkey. Yanar et al. (17) reported in their study that Brown Swiss young bulls, which were fattened for 210 days with an initial fattening weight of 164.2 kg, showed a live weight gain of 233.9 kg and a daily live weight gain of 1114 g. In the same study, the group with an initial fattening weight of 215 kg had a live weight gain of 168.1 kg and a daily live weight gain of 1091 g during the fattening of 154 days. Arpacık et al. (7) determined that the Brown Swiss young bull groups, which were fattened for 171, 197 and 231 days with the average initial fattening weights of 197.6 kg, 212 kg and 222.7 kg, had the daily live weight gains of 1207 g, 1225 g and 1207 g, respectively. Acet et al. (1) reported 1131 g daily live weight gain in a fattening period of 206 days for Brown Swiss young bulls which were taken as the control group of the study with an initial fattening weight of 240 kg.

In the present study, which was carried out in a private farm in Şanlıurfa, the LSM of the initial fattening weight and final fattening weight of Brown Swiss young bulls were 275.0 kg and 515.6 kg, respectively. The average daily live weight gain in the fattening duration of 180 days was 1336 g. When the monthly average daily live weight gains during fattening were investigated, it was seen that the highest ADG was in 31-60th days and the ADG decreased in the following months. The fattening performance results of the present study on Brown Swiss young bulls were higher than

the results of different studies (1, 7, 17) carried out in Turkey. These results show that high levels of management and feeding practices are being applied in the farm where the present study was carried out.

As environmental factors, the effects of fattening group and season were investigated. The effects of fattening group on the initial weight, final weight, TWG and ADG were found to be significant. The groups having higher initial fattening weights also had higher final weights. The 4th group which had the highest initial fattening weight displayed the highest monthly ADG in the first month of fattening and however, this group had the lowest ADG in the other months. After the 60th day of fattening the monthly ADG rank of the groups was the 1st, 2nd, 3rd and 4th group and this order continued until the end of fattening. The results of the fattening groups in the present study showed that, the young bulls with lower initial fattening weights had higher ADG and TWG at the end of a fattening duration of 180 days. Arpacık et al. (6, 8) also suggested that the fattening of the young bulls, which had lower initial fattening weights was more profitable than the fattening of the young bulls, which had higher initial fattening weights.

In the current study, the effects of season were found to be significant on the TWG and ADG. In terms of these traits, winter group, in which fattening ended in summer months, showed the lowest performance. Although the differences between spring, summer and autumn groups were not significant, spring group, which was in fattening during the summer period, had lower performance compared with summer and autumn groups. The autumn group, which did not have a fattening period in summer months, showed relatively high performance. Although summer group was in fattening in summer months, the high performance of this group might be due to compensatory growth in autumn months. Similar to the results of the present study, Akcan et al. (2) and Başaran and Akcan (9), in their studies on Holstein young bulls in Ankara conditions, found the effects of season significant on fattening characteristics. However, in two studies (11, 14) carried out on Holstein young bulls in Marmara Region, the effects of season on different fattening characteristics were not found significant. Oğan et al. (14) explained the season's effect not being significant on fattening characteristics, by the environmental temperatures of Marmara Region being in the comfort zone.

In their studies, Arpacık et al. (7) and Akcan et al. (3), on Brown Swiss and Holstein young bulls, respectively, reported that the dressing percentage increased when the slaughter weight increased. Different than these results, the effect of slaughter weight in the present study was not significant on dressing percentage. In different studies carried out to determine the slaughter and carcass characteristics of Brown Swiss young bulls, the dressing percentages were 52.7-58.9% (7, 8, 12, 17). The dressing percentage results in the current study were similar to the results of Arpacık et al. (7, 8) and Kendir et al. (12) and were higher than the results of Yanar et al. (17).

The results of the present study showed that when appropriate management and feeding conditions could be achieved, high live weight gains could be obtained by using Brown Swiss young bulls in fattening in the subtropical climatic conditions of

Southeastern Anatolia Region. In making their production plans, the initiatives, which think to undertake fattening units in this region, should take the effects of initial fattening weight and season on the fattening characteristics into consideration.

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