

Some Fattening and Slaughter Characteristics of Holstein Young Bulls in Intensive Conditions

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Abstract: This study was carried out to investigate the effects of beginning to fattening weight and season on some fattening traits, and some slaughter characteristics of Holstein young bulls in intensive conditions. The 1661 Holstein young bulls used in the study were grouped according to their beginning to fattening weights (176-225 kg, 226-275 kg, 276-325 kg and 326-400 kg) and the season in which the fattening began. The effects of the factors investigated were determined by the use of general linear model (GLM) procedure in SPSS program package.

In the study, the groups having lower beginning to fattening weights gained higher live weights during the 210 days of fattening. As a result of the seasonal temperatures, the fattening performances of the Holstein young bulls were the lowest in summer, while being the highest in autumn. The dressing percentage of Holstein young bulls was 57.8% and the effect of slaughter weight was not significant on dressing percentage.

Key Words: Holstein, fattening, initial weight, dressing percentage, season.

Entansif Koşullardaki Siyah Alaca Danaların Bazı Besi Ve Kesim Özellikleri

Özet: Bu çalışma, entansif koşullarda Siyah Alaca danaların bazı besi özellikleri üzerine, besi başlangıç ağırlığı ve mevsimin etkilerinin incelenmesi ve bazı kesim özelliklerinin belirlenmesi amacıyla yapılmıştır. Çalışmada kullanılan 1661 Siyah Alaca dana, besi başlangıç ağırlığına (176-225 kg, 226-275 kg, 276-325 kg ve 326-400 kg) ve besiye başlanılan mevsime göre gruplandırılmıştır. İncelenen faktörlerin etkisi SPSS program paketinden GLM prosedürü kullanılarak belirlenmiştir.

Çalışmada, 210 günlük beside daha düşük canlı ağırlıkta besiye başlayan gruplar daha fazla canlı ağırlık artışı sağlamışlardır. Besi dönemi yaz aylarına rastlayan Siyah Alaca danaların besi performansları yüksek çevre ısısı nedeniyle daha düşük düzeylerde, sonbaharda besiye alınan danaların besi özellikleri ise daha yüksek düzeylerde belirlenmiştir. Siyah Alaca danaların karkas randımanı %57,8 olarak elde edilmiş ve kesim ağırlığının karkas randımanı üzerine etkisi önemsiz bulunmuştur.

Anahtar Kelimeler: Siyah Alaca, besi, besi başlangıç ağırlığı, karkas randımanı, mevsim.

Introduction

The majority of the cattle population in Turkey is composed of indigenous breeds or culture breed x indigenous breed crossbreds and 67% of the total red meat production is obtained from cattle breeding¹⁰. Although Turkey is among the leading countries by means of cattle popula-

tion, the production per animal is seemingly low because of the production levels of the indigenous breeds being lower⁴.

96% of the feedlots in Turkey are traditional family managements, which have a number of cattle less than 10 and they lack the means of technical fattening^{3,18}. Because of the insufficient financial structure, the managements are buying

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animals at low weights and thus the interval of fattening is getting longer⁶.

The most suitable climatic conditions for fattening young bulls is the comfort zone of 5-25°C and a relative humidity of 58-80%. It is reported that the effects of climate on animals is changing dependent to the humidity and temperature of the environment¹⁵. Lower and higher environmental temperature than the comfort zone is causing stress on animals. To balance the body temperature, the feed consumption of the animals is changing and this is affecting the live weight gain^{1,8,11,13,14,19}.

It is reported that the fattening performances of the Holstein young bulls were getting lower when the beginning to fattening weights were high^{5,6}. In several studies it was found that the feed needs for liveability of the young cattle with lower live weights were less than the older cattle with higher live weights and that the average daily live weight gains of the Holstein young bulls were 1024-1307 g^{7,9,11,12,17}.

In studies carried out on Holstein fattened cattle, hot dressing percentages were 52-59%^{2,5,9,17}.

Intensive animal breeding in big capacity administrations with culture breeds can decrease the animal breeding costs and also can improve the levels of production per animal. This study was carried out to investigate the effects of beginning to fattening weight and season on some fattening traits, and some slaughter characteristics of Holstein young bulls in intensive conditions.

Materials and Methods

This study was carried out in the Feedlot of Koç-Ata Farm in Şanlıurfa. In the study, 1661 Holstein young bulls, which were collected at the age of 5-15 months from both the breeding flock of the Koç-Ata Farm and other farms, were taken in fattening. The young bulls were investigated in four groups according to their beginning to fattening weights. These were; 1st group: 176-225 kg, 2nd group: 226-275 kg, 3rd group: 276-325 kg and 4th group: 326-400 kg.

The young bulls, which were collected from the breeding flock of the Koç-Ata Farm, were subjected to the periodical and standard breeding procedures of the farm before they were taken for fattening.

The young bulls, which were bought from other breeding farms, were quarantined for one month. While the young bulls were being taken in the quarantine paddocks, they were grouped according to their live weights and the original area, which they were brought from. These animals were taken to the fattening paddocks without any changes in the groups formed at the beginning of the quarantine period. During the quarantine period they were adopted to the feed ration, which would be used for fattening; anti-parasite medicines and vaccinations for epidemic illnesses were applied and foot controls were made.

The farm is in Şanlıurfa where the climate is subtropical. To determine the climatic characteristics of the region, the average environmental temperature, rainfall and humidity values were collected from the General Directorate of Meteorological Services of Turkey and were presented in Table I.

Table I. The average temperature, rainfall and humidity values by season in Şanlıurfa

Season	Mean temperature (°C)	Total rainfall (mm)	Mean humidity (%)
Spring	15.7	164.8	59.4
Summer	30.8	2.5	37.1
Autumn	20.5	63.5	52.4
Winter	7.0	206.4	67.0

The fattening unit, where the study was conducted, was composed of 140 paddocks each having a capacity of 50 fattening cattle.

The young bulls were fattened ad-libitum with a feed ration, which was produced in the farm, having 12-14% protein and 2500-2700 Kcal/kg energy and they were exposed to free access to water.

During fattening the young bulls were weighted monthly with electronic scales sensitive to 100 g, until the 210th day of fattening. The absolute 30th, 60th, 90th, 120th, 150th, 180th and 210th day live weights of the young bulls were calculated by the linear interpolation of the values obtained from the consecutive weightings.

In the study, the production data of 3750 Holstein young bulls, which were taken in fattening in April 2001-March 2003, were investigated. The results of 2089 young bulls, which were taken in fattening under 175 kg and over 400 kg of live weight, stayed in fattening for less than

210 days and had a chronic illness or medical treatment for a long time, were removed from the study.

To investigate the carcass characteristics, the young bulls were grouped by means of the live weights before slaughter in four groups; 451-500 kg, 501-550 kg, 551-600 kg and 601-650 kg. The hot carcass weights of the slaughtered animals were recorded and the hot dressing percentages were determined.

General linear model (GLM) procedure was applied to determine the effects of beginning to fattening weight and season on the fattening traits investigated in this study. The significance control between the sub-factors was made by contrast-test.

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 beginning to fattening weight (the groups of 176-225 kg, 226-275 kg, 276-325 kg and 326-400 kg),

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

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

e_{ijk} : Random error.

The statistical comparisons between the live weight before slaughter 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 analyses¹⁶.

Results

The LSM of some fattening traits of Holstein young bulls were presented in Table II. In the groups 1, 2, 3 and 4, the initial live weights were 203.3 kg, 248.9 kg, 297.4 kg and 355.9 kg and final weights were 492.6 kg, 529.8 kg, 563.0 kg and 617.9 kg, respectively. The differences between the groups for initial weight and final weight were found to be statistically significant ($P < 0.001$).

Table II. The least squares means (LSM) and standard errors (SE) of the initial weight, 210th day weight, total weight gain (TWG) and average daily live weight gain (ADG) of Holstein Young Bulls in fattening (kg).

Factors investigated	n	Initial fattening weight (kg)		210 th day weight (kg)		TWG (kg)		ADG (g)	
		LSM	SE	LSM	SE	LSM	SE	LSM	SE
Expected mean	1661	276.4	0.61	550.8	1.92	274.5	1.85	1306.9	8.83
Fattening group		***		***		***		***	
1 st group	628	203.3 ^d	0.88	492.6 ^d	2.79	289.3 ^a	2.70	1377.6 ^a	12.85
2 nd group	673	248.9 ^c	0.90	529.8 ^c	2.86	280.9 ^b	2.76	1337.8 ^b	13.14
3 rd group	269	297.4 ^b	1.03	563.0 ^b	3.27	265.6 ^c	3.16	1264.6 ^c	15.05
4 th group	91	355.9 ^a	1.80	617.9 ^a	5.68	262.0 ^c	5.49	1247.6 ^c	26.13
Season		***		***		***		***	
Spring	740	274.8 ^b	0.74	544.4 ^b	2.35	269.5 ^b	2.27	1283.5 ^b	10.80
Summer	578	272.7 ^b	1.34	539.1 ^b	4.23	266.4 ^b	4.09	1268.5 ^b	19.46
Autumn	100	279.4 ^a	1.53	575.6 ^a	4.84	296.2 ^a	4.67	1410.7 ^a	22.26
Winter	243	278.6 ^a	1.10	544.3 ^b	3.48	265.7 ^b	3.36	1265.1 ^b	16.01
Fattening group x Season		***		**		***		***	

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

In the season groups of spring, summer, autumn and winter, which were formed by the beginning to fattening season of young bulls, initial weights were 274.8 kg, 272.7 kg, 279.4 kg and 278.6 kg, respectively. The differences between spring with summer and autumn with winter were not statistically significant when the differences between the other groups were significant ($P < 0.001$). With regard to the spring, summer, autumn and winter season groups, the live weights at the end of fattening were 544.4 kg, 539.1 kg, 575.6 kg and 544.3 kg, respectively. The differences between spring, summer and winter groups were not significant and the differences between autumn and the other groups were significant ($P < 0.01$).

The total live weight gains during fattening in 1, 2, 3 and 4th groups were 289.3 kg, 280.9 kg, 265.6 kg and 262.0 kg, respectively. The differences between the groups were statistically sig-

nificant ($P<0.001$), other than the difference between the 3rd and 4th groups. In terms of the total live weight gain during fattening of season groups, the differences between the spring, summer and winter groups with gains of 269.5 kg, 266.4 kg and 265.7 kg were not significant, when the differences between the autumn group with the highest gain of 296.2 kg and the other groups were significant ($P<0.001$).

In the study, to control the possibility if the young bulls with different live weights were exposed to different levels of the effects of the season, the interaction between the beginning to fattening live weight groups and season was investigated. The effects of this interaction were found to be significant in terms of the initial weight, final weight, total live weight gain and average daily live weight gain.

Table III. The slaughter weight, hot carcass weight and hot dressing percentage means and standard errors (SE) of Holstein young bulls in different slaughter weight groups

Group	n	Slaughter weight (kg)		Hot carcass weight (kg)		Hot dressing percentage (%)	
		Mean	SE	Mean	SE	Mean	SE
		***		***		NS	
451-500 kg	74	484.23 ^d	1.35	279.35 ^d	1.37	57.69	0.23
501-550 kg	269	528.96 ^c	0.84	307.86 ^c	0.79	58.21	0.13
551-600 kg	378	573.78 ^b	0.74	332.75 ^b	0.61	58.00	0.08
601-650 kg	216	619.54 ^a	0.92	358.64 ^a	0.96	57.89	0.12
Total	937	564.39	1.38	327.36	0.86	58.01	0.06

The differences between the means of groups carrying various letters in the same column are significant (*** $P<0.001$; NS: $P>0.05$)

The daily live weight gains in different periods of fattening for Holstein young bulls were presented in Figure 1. When the live weight gains in different periods of fattening were investigated, it could be seen that the higher rises in the 4th group in 0-30 days of fattening were then shifted to the groups with lower beginning to fattening weights until 181-210th days.

The slaughter weight, hot carcass weights and hot dressing percentages in the different live weight before slaughter groups were presented in Table III. The hot dressing percentage was 58.01% and the differences between the live weight before slaughter groups were not significant.

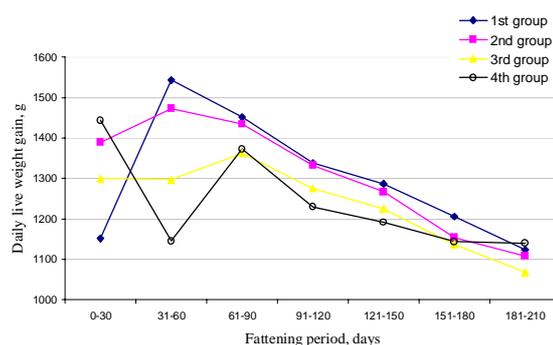


Figure 1.
The average daily live weight gain of Holstein young bulls in fattening periods

Discussion

In the study, when the live weights in different fattening periods were investigated, it was seen that the differences between the groups were significant in all periods, probably because of the effects of the beginning to fattening weights.

In terms of the daily live weight gain in different periods of fattening, the results of Holstein young bulls in the current study were similar to the results reported by Arpacik et al.⁵ and were higher than the results of Holstein young bulls in other studies^{8,9,11,12,17}.

The average daily live weight gain during fattening was 1306.9 g. This was similar to the result of Tüzemen et al.¹⁷ for Holstein young bulls and was higher than the results of other studies^{1,5,9,11,14}. The reason for these results of average daily live weight gain being higher than the results of different studies might be the higher standards of management and feeding conditions of the farm in which the current study was carried out.

The daily live weight gains of the groups, which were taken in fattening during summer months, were affected negatively by the higher average environmental temperatures, which were above the comfort zone. The young bulls that were taken in fattening in autumn gained higher live weight at the end of fattening than the other groups ($P<0.001$), as they did not have a fattening period in the summer months. In different studies^{1,8,13,19}, the effects of season were found to be a significant factor, supporting the results of the present study. In their study Oğan et al.¹⁴ reported that the effect of season on fattening was not significant as their study was in Marmara Region

where the average temperatures were usually in comfort zone.

The hot dressing percentage results determined in the current study were higher than the results reported in different studies^{5,9,17}. In the current study the effect of slaughter weight on hot dressing percentage was not found to be significant, being different than reported by Akcan et al.².

As a result, it was seen that when appropriate management and feeding condition were applied in big capacity feedlots, high results of production could be maintained in intensive conditions. In fattening, the interaction between beginning to fattening weight with season and the effects of season on young bulls should be taken into consideration. When the fattening duration of the Holstein young bulls is being decided by the beginning to fattening weights, particularly the young bulls with lower live weights at the beginning of fattening should be fattened for a longer time period.

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