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Araştırma Makalesi

Comparison of Basic Fattening Performance of Cattle Breeds Used in Meat Production in Antalya, Türkiye

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ABSTRACT

In Türkiye, 98.5% of cattle in registered farms consist of dual purpose breeds. This also indicates that the rate of use of beef cattle breeds in meat production is low. Feed efficiency, daily live weight gain and meat quality of beef cattle breeds are high and this is important in terms of farm economy and market quality. In this study, cattle breeds used for meat production in Antalya, Türkiye and their performances were compared. According to the results, it was observed that the mean slaughter age of the breeds varied between 545.6±3.10 days and 619.1±3.03 days. Galloways came to the fore among all other breeds in terms of carcass weight and gain in carcass weight per day (P<0.01). In addition, while there was no difference in terms of carcass weight among dual purpose breeds, it was found that Simmentals were advantageous compared to Brown Swiss in terms of slaughter age and daily carcass weight gain (P<0.01).

Anahtar kelimeler: Cattle, Fattening, Meat production, Breed

Türkiye Antalya İli Et Üretiminde Kullanılan Sığır Irklarının Temel Besi Performanslarının Karşılaştırılması

ÖZ

Türkiye'de kayıtlı çiftliklerdeki sığırların %98,5'i kombine verimli ırklardan oluşmaktadır. Bu da besi sığırı ırklarının et üretiminde kullanım oranının ne kadar düşük olduğunu göstermektedir. Besi sığırı ırklarında yemden yararlanma, günlük canlı ağırlık artışı ve et kalitesi yüksek olup bu durum çiftlik ekonomisi ve Pazar kalitesi açısından önemlidir. Bu çalışmada Antalya ili et üretiminde kullanılan sığır ırkları ve performansları karşılaştırılmıştır. Elde edilen sonuçlara gore ırkların ortalama kesim yaşlarının 545,6±3,10 gün ile 619,1±3,03 gün arasında değiştiği görülmüştür. Karkas ağırlığı ve günlük karkas ağırlığı artışı açısından diğer tüm ırklar arasında Galloway ön plana çıkmıştır (P<0.01). Ayrıca combine verimli ırklar arasında karkas ağırlığı açısından fark bulunmazken, kesim yaşı ve günlük karkas ağırlığı kazancı açısından Simentallerin Brown Swiss'e gore avantajlı olduğu tespit edilmiştir. (P<0.01).

Key words: Sığır, Besi, Et üretimi, Irk

INTRODUCTION

Beef, which is one of the main animal protein sources, has a rich composition in terms of minerals such as iron and zinc and various vitamins (Williams, 2007). In this respect, the importance of beef in terms of nutrition is accepted by everyone. The source of 20% of the world's total meat production is cattle (FAO, 2022). In Türkiye, the largest share in red meat production belongs to cattle with 74.8%, and it is observed that beef production in Türkiye has increased three times in the last 20 years and the average carcass weight has

doubled in this period (TUİK, 2022). However, the average carcass weight per animal is still lower than the developed countries (FAO, 2022).

Although the breeds and systems used in meat production differ from each other, the basis of the process is to use breeds with high growth capacity and/or growth rate and to raise animals with as low cost as possible. Compared to typical dairy cattle breeds, animals that have been developed for meat yield will be superior in terms of fattening performance and the product will be of higher quality. However, cattle fattening in Turkey is generally done by male animals obtained in dairy farms with breeds such as Holstein, Simmental or Brown Swiss (Sahin et al., 2022). The sector generally consists of small farms with high cost and low efficiency, far behind the European scale, and the way of working in all regions is almost similar (Yucelyigit et al., 1993; Hacibebekoglu et al., 2013). Although it is possible to fatten the beef breeds imported from abroad in some beef cattle farms, because o that the necessary records are not kept during the period in most of the farms makes it difficult to reach a healthy result in comparisons to be made.

In this study, the performances of different breeds of cattle raised in the region were tried to be compared based on the information about the animals that were sent to slaughter in the province of Antalya within a period of approximately 20 months, and the results of the study were aimed to guide the selection of the most suitable breed for fattening in the country.

MATERIALS AND METHOD

Material

The study material consists of information on 44,968 heads of different breeds raised in farms in Antalya and slaughtered between January 2018 and September 2019. The distribution of these animals by breeds is given in Figure 1.

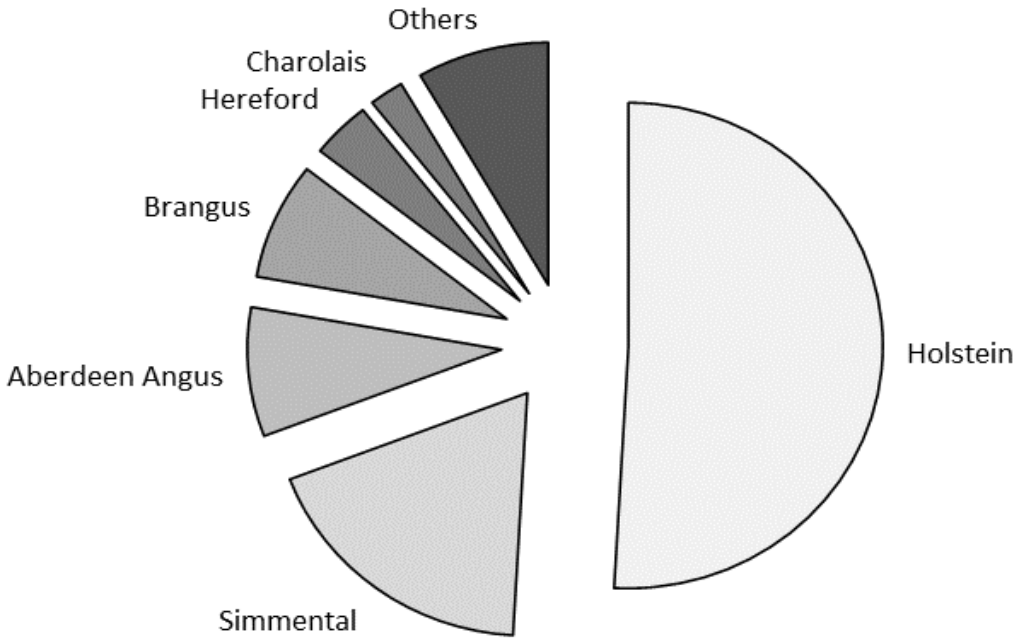

Figure 1. Distribution of animals slaughtered during the study period by breeds.

Evaluated data was obtained through TURKVET, an animal registration system where all movements of animals are recorded within the scope of the regulation on identification, registration and monitoring of cattle in Türkiye. Before a comparison between breeds, some restrictions were made to approach uniformity in the data set and to reduce the margin of error. The final data and the optimization criteria applied for these are given in Table 1. As a result, data of 33,797 male cattle from 14 breeds (10 beef and 4 dual purpose) were used.

Table 1. Optimization criteria applied for data

	Criteria
Gender	Male
Slaughter Age	400-800 days
Carcass Weight	100-550 kg
Breeds	Beef / Dual purpose
Minimum no. of animals within breed	10

Statistical Analysis

Since the birth weights of the animals and the live weights at the beginning or end of fattening were not recorded, the evaluations of the daily live weight gains in these periods could not be made, unfortunately. Instead, the rate of reaching this weight was determined by dividing the carcass weight by the slaughter age. In addition to this value, which can also be described as the carcass weight gained per day (shortly defined CWG), one-way analysis of variance was applied to determine the effect of breed on slaughter age and carcass weight, and Duncan's test was applied for multiple comparisons. Ms Access was used in data editing and SPSS (Anonymous, 2011) was used in statistical analysis.

RESULTS AND DISCUSSION

According to the analyses, the effect of breed on all three traits examined in the study was found to be significant ($P<0.01$). When the results in Table 2 were examined in terms of slaughter age, the lowest slaughter age was found for the Red Angus breed as 545.6±3.10 days, but the differences between this breed and Galloway, Montbeliarde, Limousin, Belgian Blue, Simmental and Brangus were not found significant. The highest slaughter age was found for Zebu (619.1±3.03 days), and it was determined that Charolais, Brown Swiss, Hereford and Holstein were also slaughtered at an age close to Zebu. It is seen that there is a difference of approximately 2.5 months between the breeds with the lowest and highest slaughter age. In this case, since there is no data on the starting age of fattening in the study material, it can be mentioned that the fattening age of the animals is late or the fattening period is kept long as a possibility. Whatever the reason is, the difference between the results is important for the fattening made to be profitable and efficient. For cattle fattening to be a profitable and economic activity, there are some technical and economic requirements, one of the most important of which is the optimal fattening period. (Sakarya and Gunlu, 1996).

Table 2. Slaughter age (days), carcass weight (kg) and carcass weight gained per day (CWG) (kg) for different breeds

Slaughter Age (days)**			Carcass Weight (kg)**			CWG (kg/day)**		
Breed	**N**	**Mean±SE**	**Breed**	**N**	**Mean±SE**	**Breed**	**N**	**Mean±SE**
	1,013	545.6±3.10 [a]		1,013	300.5±1.09 [a]		492	0.53±0.003 [a]
Red Angus			Red Angus			Zebu		
	19	553.5±3.73 [ab]		118	315.8±4.73 [ab]		659	0.53±0.005 [ab]
Galloway			Red Friesian			Brown Swiss		
	89	555.2±7.98 [ab]		14,907	316.3±0.48 [abc]		14,907	0.54±0.001 [abc]
Montbeliarde			Holstein			Holstein		
	147	562.1±6.69 [abc]		659	318.5±2.35 [bc]		1,608	0.54±0.002 [abcd]
Limousin			Brown Swiss			Hereford		
	135	571.8±6.04 [abcd]		3,494	320.4±0.99 [bc]		118	0.54±0.008 [abcd]
Belgian Blue			Brangus			Red Friesian		
	6,578	573.0±1.10 [abcd]		492	322.0±1.18 [bc]		3,494	0.56±0.002 [bcde]
Simmental			Zebu			Brangus		
	3,494	575.2±1.56 [abcd]		1,608	323.8±1.08 [bc]		1,013	0.57±0.003 [cde]
Brangus			Hereford			Red Angus		
	3,701	581.6±1.31 [bcde]		89	326.8±5.83 [bc]		3,701	0.57±0.002 [def]
Aberdeen Angus			Montbeliarde			Aberdeen Angus		
	118	587.2±7.27 [cdef]		3,701	328.2±0.77 [bc]		6,578	0.59±0.001 [fgh]
Red Friesian			Aberdeen Angus			Simmental		
	14,907	599.4±0.76 [defg]		6,578	329.8±0.75 [bc]		89	0.59±0.010 [fgh]
Holstein			Simmental			Montbeliarde		
	1,608	609.2±2.31 [efg]		147	335.2±4.28 [cd]		837	0.60±0.004 [fgh]
Hereford			Limousin			Charolais		
	659	614.7±4.05 [fg]		135	348.4±5.47 [de]		147	0.60±0.009 [gh]
Brown Swiss			Belgian Blue			Limousin		
	837	615.5±2.35 [fg]		837	362.2±2.14 [e]		135	0.61±0.009 [h]
Charolais			Charolais			Belgian Blue		
	492	619.1±3.03 [g]		19	398.3±7.99 [f]		19	0.72±0.014 [i]
Zebu			Galloway			Galloway		
	33,797	589.2±0.50		33,797	322.1±0.31		33,797	0.56±0.001

** Means in a column with no common superscript differ significantly (P<0.01)

Low slaughter age in livestock is a desirable feature in terms of fattening performance, but it will not be sufficient and effective on its own. In this direction, a different evaluation can be made when the breeds that make up the study material are compared by considering the slaughter age and carcass weights at the end of fattening. Because in the study, the carcass weight at the end of fattening was found to be 300.5±1.09 kg for the Red Angus breed with the lowest slaughter age. Carcass weights of Galloway and Montbeliarde breeds, which ranked second with similar values in terms of slaughter age, were found to be 398.3±7.99 kg and 326.8±5.83 kg, respectively. In other words, although the mean slaughter age of the mentioned breeds was 8-10 days higher than the Red Angus, the mean carcass weight was 98 kg and 26 kg, respectively, and these differences are statistically significant (P<0.01). Along with Red Angus, the breeds with the lowest average carcass weight were Red Friesian and Holsteins (315.8±4.73 and 316.3±0.48 kg, respectively). While Galloway was the breed with the highest average carcass weight, it was determined that there was a significant difference of 36.1 kg between it and its closest competitor, the Charolais breed (P<0.01).

When the carcass weights of the breeds that are widely grown in Türkiye for both milk and meat production are compared with each other, results were similar to previous studies in Türkiye. For example, Catikkas (2015) reported that the average of the carcass weight was 309.25±3.45 kg for Simmentals and 304.36±4.14 kg for Holsteins, and the difference was not significant. Koc (2016) reported that the average of the carcass weight was 341.89±4.34 kg for Simmental breed. Pinarbasi and Yazgan (2020) reported that the carcass weight of Brown Swiss was lower, statistically (306.21±2.783 kg). In the same study, the carcass weight of Charolais was given as 323.22±7.333 kg, which is approximately 40 kg lower than the average obtained in our study. Although it is possible that the difference is due to the slaughter age, it was not possible to make a comparison because this value was not given in the other study. When the comparison between breeds was made in terms of CWG per day, Galloway stood out from the others with an average of 0.72±0.014 kg/day. The closest breed for the said value was Belgian Blue (0.61±0.009 kg/day), and the difference was significant (P<0.01). Zebu was the slowest breed in terms of CWG, and the averages of this breed and Brown Swiss, Holstein, Hereford and Red Friesian were close to each other. Simmental, one of the dual purposed breeds, was found to be more advantageous than the others. In the study by Hollo et al. (2012) in which the fattening performances of different breeds were compared, Angus, Charolais, Holstein and Simmental animals, which were fattened at 9-10 months of age, were slaughtered at 585-641 days of age, and 328-363 kg of carcass was obtained from them. It has been reported that the difference between races is not significant. Accordingly, the daily gain in carcass weight was higher for Angus breeds (0.59 kg/day) compared to our study and lower for other breeds (0.58 kg/day, 0.52kg/day and 0.54kg/day). In the study of Duru and Sak (2017), based on the slaughter age and carcass weight values reported for Simmental, Angus, Hereford, Limousine and Charolais, values of 0.58-0.59 kg/day are obtained in the calculation for daily carcass gain. Apart from this, it can be said that the values are quite close to our study. The study with the highest values in terms of daily gain in the literature was the study conducted by Senyuz et al. (2020). In the study, which included Angus, Charolais, Limousine and Simmental animals, 355.45-385.15 kg of carcass was obtained from animals slaughtered at 14-15 months of age, which means 0.84-0.90 kg of carcass gain per day. In order to compare the values in the study, no data on the Galloway breed could be found for the fattening performance in the national literature. Among the limited number of studies in the international literature, Filipcik et al. (2015) reported the mean slaughter age as 650±66.84 days, carcass weight as 356±52.01 kg and daily gain in carcass weight as 591±82.73 g/day for Galloway animals treated with semi-intensive fattening. In the same study, the values reported for Charolais were 610±84.70 days for slaughter age, 388±61.18 kg for carcass weight and 642±97.68 g/day for daily gain in carcass weight. Accordingly, it can be seen that there is not much difference between the two studies for Charolais, while there is a quite difference for Galloway. Also, as Diler et al. (2016) reported, although the general expectation is that the carcass weight will increase as the slaughter age increases, the opposite situation was observed when the study conducted by Filipcik et al. (2015) study was compared with our study. In this case, it should be mentioned that the effect of the feeding regimen applied is that there are studies reporting that carcass weight is higher in intensive fattening systems compared to extensive or semi-intensive fattening systems (Sari et al., 2015; Onk et al., 2017). As a matter of fact, all of the bulls that make up the study material were sent to slaughterhouses from intensive fattening farms. In fattening farms, it is generally aimed to maximize the profit per unit time, not per animal. Therefore, knowing the carcass weight that can be obtained from the animal at a certain time during fattening contributes to the farmer's planning. In this direction, carcass weights at a certain slaughter age were tried to be estimated for each breed based on the slaughter age, and the equations and coefficients of determination that gave the best estimates for each breed were calculated as in Table 3. As can be seen, the coefficients of specification of the equations are generally low. This means that although the slaughter age gives an idea about the carcass weight to be obtained from the animal sent to slaughter at a certain age, it will not be determined by itself. The reason for

this is that the cattle fattening enterprises in Türkiye follow very different paths and the slaughter age is spread over a wide range. The attitude followed here comes from necessity rather than arbitrariness. Because, the variability of both inputs such as feed and carcass prices in market conditions makes it difficult for breeders to determine the optimum slaughter age. In order to reduce the risk, the animals in hand are sent to slaughter in small groups. This situation was also demonstrated in the study conducted by Hassan (2019) in the same region. Accordingly, regional breeders stated that they started fattening with animals aged 2-18 months, although it was more common at the ages of 6-12 months, and the fattening period varied between 5-20 months. Hassan (2019) reported that when making the decision to send to slaughter, the farmers considered not only the live weight, but also the current carcass prices, condition and age of the animal.

Table 3. Equations and coefficients of determination (R^2) that can be used to estimate carcass weight at a given slaughter age (SA) for breeds

Breed	**Equation**	**R^2 (%)**
Brangus	117.481+0.353*SA	30.7
Limousin	187.704+0.262*SA	16.8
Red Friesian	166.724+0.254*SA	15.2
Belgian Blue	152.668+0.342*SA	14.3
Montbeliarde	177.221+0.269*SA	13.6
Holstein	192.993+0.206*SA	10.7
Hereford	236.9981+0.143*SA	9.3
Galloway	63.75+0.604*SA	8.0
Aberdeen Angus	239.195+0.153*SA	6.8
Simmental	242.242+0.154*SA	5.1
Brown Swiss	246.662+0.117*SA	4.1
Zebu	279.335+0.069*SA	3.1
Red Angus	275.716+0.045*SA	1.7
Charolais	335.794+0.043*SA	0.2

CONCLUSION

Based on the records collected from the region, it has been observed that the animals used in meat production are generally among dual purpose breeds, and the share of the beef breeds in the total cannot exceed 30%.Contrary to the general belief that the fattening performances of dual purpose and beef breeds are close to each other in intensive conditions, Galloway seems to have a significant advantage over other breeds in terms of carcass weight and daily gain in carcass weight among the breeds evaluated in the study. However, due to the low number of Galloway animals in the study and the fact that all of the animals evaluated in the study were from the same farm, it is possible that an uninformed factor may have caused the difference. For this reason, it is not possible to be very assertive in the interpretations of the breed, unfortunately. According to the results of the study, another remarkable breed was the Montbeliarde. Although the low number of animals evaluated in the study makes the result open to discussion, it is remarkable that the fattening performance of Montbeliarde is the same as the Simmental, which is a very popular breed in meat production in Turkiye. Considering that the values reported in terms of average lactation milk yield of Montbeliarde, which are not far from each other in terms of origin, are also higher than those of Simmental (Koc 2016a, 2016b), it is possible to say that this breed does not get the value it deserves in cattle production in

Türkiye. The importation of live animals from beef breeds has come to the fore from time to time since the last 10-15 years in Türkiye, in order to prevent increases in beef prices. At this stage, the breeder does not have a choice about the age or breed of the animals he will buy. Studies comparing breed performances were generally small, and the results obtained and the breeds suggested based on these results also differed from each other. However, extensive studies on the performance of different breeds in this geography will shed some light on the sector stakeholders for a possible preference situation, and will increase the degree of accuracy in the selection of breeds suitable for the country's livestock dynamics.

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