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Some Slaughter and Carcass Traits of Simmental Cattle Slaughtered in Kırıkkale Province

Cansu ATEŞ[1,a], Aykut Asım AKBAŞ[2,b,✉]

[1]Kars Directorate of Provincial Agriculture and Forestry, Burdur, TÜRKİYE
[2]Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Animal Science, TÜRKİYE

[a]ORCID: 0000-0002-1993-7229; [b]ORCID: 0000-0003-2235-9439

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Abstract

This study was conducted to determine some slaughter and carcass characteristics of Simmental bulls in a private slaughterhouse in Kırıkkale province. The pre-slaughter age and pre-slaughter weights of Simmental bulls were detected as 16.91 months of age and 628.92 kg. Hot and cold dressing percentages were determined as 58.81% and 57.66%, respectively in the study. While the area of M. Longissimus dorsi (MLD) was detected as 98.19 cm^2; the back fat thickness value was 0.64 cm. In the study, it was seen that carcass length, chest depth, leg length and leg width values were 205.77 cm, 73.55 cm, 63.42 cm and 65.48, respectively. This study was important in terms of Simmental cattle production in Kırıkkale province. Thereby, it can be predicted that the results of the present study will provide a data archive for further studies.

Key Words: Kırıkkale, Simmental, slaughtering and carcass traits.

Kırıkkale İlinde Kesilen Simental Irkı Sığırların Bazı Kesim ve Karkas Özellikleri

Öz

Bu çalışma Kırıkkale ilinde sığır kesimlerinin yapıldığı özel bir et kombinasında kesilen Simental ırkı tosunların bazı kesim ve karkas özelliklerinin ortaya konulması amacıyla yapılmıştır. Çalışmada Simental ırkı tosunların ortalama 16.91 aylık yaşta kesime sevk edildikleri ve kesim öncesi canlı ağırlık ortalamalarının ise 628.92 kg olduğu belirlenmiştir. Simental ırkı tosunlar için sıcak ve soğuk karkas randımanı değerleri sırasıyla %58.81 ve %57.66 olarak belirlenmiştir. M. Longissimus dorsi (MLD) kesit alanı ise 98.19 cm^2 olurken; kabuk yağı kalınlığı ise 0.64 cm olarak tespit edilmiştir. Çalışmada karkas uzunluğu, göğüs derinliği, but uzunluğu ve but genişliği değerlerinin sırasıyla 205.77 cm, 73.55 cm, 63.42 cm ve 65.48 cm olduğu görülmüştür. Çalışmanın, Kırıkkale ilinde Simental ırkının verim performansının değerlendirebilmesi açısından önemli olacağı ve dolayısıyla sonraki araştırmalar için de önemli bir veri niteliğinde olacağı öngörülmektedir.

Anahtar Kelimeler: Kesim ve karkas özellikleri, Kırıkkale, Simental.

INTRODUCTION

A major percentage of daily consumed protein is obtained from animal origin foods in the developed countries, and more than half of the total agricultural incomes are supplied from animals and animal origin products in these countries (1). As well as production of animal origin products, consumption amount also draws attention as a critical criterion in comparison of the developmental levels of the countries (2). At this point, cattle are one of the most important sources of meat consumption in Türkiye.

Carcass and carcass quality in cattle are the most substantial factors that determine the meat yield and also important for the breeders and consumers. In this respect, the factors that affect carcass and meat quality also are the primary issues in terms of acquiring the expected quality level. Of those factors, also sex and breed of the slaughtered animals are the privileged factors to take into consideration (3). Bulls are commonly preferred by the breeder facilities for their superiority regarding edible meat percentage in carcasses as well as carcass tissue (4).

In Türkiye, slaughtering for cattle are performed in four different systems such as meat and milk board, municipal slaughterhouses, meat combines of private sector and uncontrolled slaughtering. Of those, slaughterhouse of public and private sectors are the institutes that apply the technological innovations and utilize from almost whole of the animals. The slaughters are performed more simply in the municipal slaughterhouses and less yield is obtained from the by-products of the animals (5).

A significant increase has been observed in the amount of the crossbred animals in the recent years in Kırıkkale province that has 0.43% of the total number of cattle in Türkiye (6). Also with the effect of increased cattle breeding in the province Simmental and Simmental crossbred cattle constitute a great portion of the overall existence of cattle (7).

The aim of the present study is to determine some slaughter and carcass characteristics of the bullocks from

pure Simmental breed slaughtered between 16-18 months of age as an indicator of the cattle slaughters in Kırıkkale Province.

MATERIAL AND METHODS

Animals and Data Collection

The present study was carried out in a slaughterhouse managed by a private sector company that shows activity with regular workflow and reliable records in Kırıkkale province. In the study, some slaughter and carcass characteristics of 50 male cattle from Simmental breed slaughtered between 16-18 months of age on the certain control days were identified as well as monitoring of records related with routine slaughters.

In the study, some zoometric body measurements (8) such as chest circumference, chest depth, body length and cannon-bone circumference were taken using a measuring tape before the slaughter of 50 Simmental bullocks between 16-18 months of age.

As in many slaughterhouses in Türkiye, live weights of the animals cannot be measured before the slaughter also in this private meat combine in which the slaughters were performed within the scope of the present study. Therefore, live weights of the bullocks were calculated using the formula, which was developed by Willeke and Dürsch (2002) for Simmental and applied with a very high coefficient of determination (0.94) between chest circumference and live weight, before the slaughter performed on the control days. Then, hot carcass values were obtained based on the pre-slaughter estimated live weight calculated by the specified formula;
Estimated live weight = 137.6 – 2.647 x chest circumference + 0.024 x (chest circumference)^2

On the day of slaughtering, after noncarcass components such as head, feet, skin were recorded, hot carcass weights were determined. After, the carcasses were stored at +4°C for 24 hours in the cold storage room. The weights were measured and hot and cold dressing percentages were determined based on the estimated pre-slaughter live weight.

In the study, some carcass measurements including the carcass length, chest depth, leg length and leg width were detected. Also, the region between the 12th and13th ribs was used to determine the *M. Longissimus dorsi* (MLD) cross-sectional area. The MLD cross-sectional area was drawn on a tracing paper, as stated by Akbaş et al., (2018), and transferred into a computer by scanning. Then, the MLD cross-sectional area was determined using AutoCAD (2019) drawing software. The backfat thickness was measured and calculated by using a digital caliper in the same crossection.

The study was approved by the Burdur Mehmet Akif Ersoy University Local Ethics Committee on Animal Experiments (18.09.2019, resolution number: 538).

Statistical Analyses

The data were statistically compared by using 19.1.1 version of Minitab (2019) statistical packaged software. An intense descriptive statistical analysis was applied on the data with the means and standart errors of means.

RESULTS

Table 1 shows the values of some zoometrical measurements such as chest circumference, chest depth, body length and cannon-bone circumference for 50 Simmental bulls aged between 16-18 months taken on certain days before the slaughter. According to the table, mean values of chest circumference, chest depth, body length and cannon-bone circumference were detected to be 206.35 cm, 77.70 cm, 133.69 cm and 22.15 cm, respectively.

Table 1. Some zoometric body measurements of simmental bulls taken before the slaughter ($\overline{x} \pm S_{\overline{x}}$)

Traits	Values	CV
Chest circumference (cm)	206.35±0.91	5.12
Chest depth (cm)	77.70±0.77	6.48
Body length (cm)	13.69±0.88	6.94
Cannon-bone circumference (cm)	22.15±0.45	7.11

CV: Coefficient of Variation (%)

Slaughter and carcass characteristics of the Simmental bulls were presented in Tables 2-4. As seen in tables, While the estimated pre-slaughter live weight was 628.92 kg, hot carcass weight was detected as 58.81%. Hot and cold dressing percentages were determined as 58.81% and 57.66%, respectively in the study. While the area of *M. Longissimus dorsi* (MLD) was detected as 98.19 cm^2, the back fat thickness value was 0.64 cm. According to findings related to carcass measurements, it was seen that carcass length, chest depth, leg length and leg width values were 205.77 cm, 73.55 cm, 63.42 cm and 65.48, respectively.

Table 2. Certain slaughter and carcass characteristics of simmental bulls ($\overline{x} \pm S_{\overline{x}}$)

Traits	Values	CV
EPLW (kg)	628.92±0.55	7.18
Hot carcass weight (kg)	370.44±4.88	9.32
Dressing percentage (%)	58.81±0.22	2.65
Cold carcass weight (kg)	363.18±4.02	10.48
Chilling loss (%)	1.95±0.12	9.67
Cold dressing percentage (%)	57.66±0.31	8.45
Head weight (kg)	28.40±0.34	8.61
4 feet weight (kg)	14.35±0.22	10.67
Skin weight (kg)	58.32±0.85	10.34
Lungs and trachea weight (kg)	14.04±0.17	8.74
Heart weight (kg)	2.27±0.03	8.80
Liver weight (kg)	7.10±0.08	7.75
Spleen weight (kg)	1.19±0.02	10.20
Kidney weight (kg)	1.43±0.02	9.55
Full stomach weight (kg)	54.88±0.69	8.95
Full intestine weight (kg)	13.80±0.16	8.23
Internal and KPH weight (kg)	21.82±0.35	10.51
Testicles weight (kg)	0.81±0.01	7.95

EPLW: Estimated pre-slaughter live weight KPH: Kidney, pelvic, and heart fat
CV: Coefficient of Variation (%)

Table 3. Percentages of some noncarcass components of simmental bulls (%) ($\bar{x} \pm S_{\bar{x}}$)

Traits	Values	CV
Head ratio	4.52±0.04	6.67
4 feet ratio	2.28±0.02	6.31
Skin ratio	9.27±0.07	7.09
Lungs and trachea ratio	2.23±0.01	3.76
Heart ratio	0.36±0.01	7.03
Liver ratio	1.13±0.01	9.35
Spleen ratio	0.19±0.01	11.07
Kidney ratio	0.22±0.01	4.36
Full stomach ratio	8.72±0.05	5.14
Full intestine ratio	2.20±0.02	5.07
Internal and KPH ratio	3.46±0.03	5.33
Testicles ratio	0.13±0.01	3.09

KPH: Kidney, pelvic, and heart fat CV: Coefficient of Variation (%)

Table 4. Some cold carcass characteristics of Simmental male cattle ($\bar{x} \pm S_{\bar{x}}$)

Traits	Values	CV
M. Longissimus dorsi area (cm^2)	98.19±2.43	6.49
Back fat thickness (cm)	0.64±0.02	10.13
Carcass length (cm)	205.77±1.76	9.24
Chest depth (cm)	73.55±0.71	7.45
Leg length (cm)	63.42±0.60	6.87
Leg width (cm)	65.48±0.77	7.11

CV: Coefficient of Variation (%)

DISCUSSION AND CONCLUSION

In the present, slaughter age and an estimated mean pre-slaughter live weights of cattle were approximately 17 months and 628.92. The hot carcass weight was found to be 370.44 kg on average and similar values reported in the studies of Ulusan et al. (13), Dannenberger et al. (14) and Konaç et al. (15). Likewise, several researchers have obtained lower hot carcass weight compared to the present study (16-25) whereas Karaçuhalılar (26) found a higher hot carcass weight (415 kg) compared to the present study.

According to the studies conducted on Simmental in Türkiye, average values of daily live weight gain, slaughter weight and dressing percentage of Simmental were reported as to be 1253.7 grams, 556.05 kg and 60.24%, respectively (27). The average dressing percentage value as one of the most important factors that determine the carcass quality was 58.81% in the present study, while Schwark and Kunert (28), Dannenberger et al. (14) and Duru and Sak (24) have reported similar values with the present study (57-58.8%). On the other hand, lower dressing percentage values (52.4-56.7%) have been reported by various researchers (15-17,19,23) compared to the present study; whereas, there are also different studies that have reported dressing percentage values between 60.2% and 67% (13,21,22,29).

Cold carcass weight was determined to be 363.18 kg in the present study and some researchers (13,14) have reported similar values (343-350 kg). On the other hand, Altuntaş and Arpacık (21) and Çatıkkaş (23) have reported lower values such as 310 kg and 305 kg compared with the present study, respectively. In addition, chilling loss value (1.95%) was found to be higher than those reported by Akbulut and Tüzemen (17) (1.84%), and Duru and Sak (24) (1.36%).

In the study, cold dressing percentage was found to be 57.66%. Dannenberger et al. (14) have reported a similar value (57%); whereas Akbulut and Tüzemen (17) and Çatıkkaş (23) have reported relatively lower values (55.1% and 53.4%, respectively) while higher cold dressing percentage values (59%-65%) were also reported by different researchers (13,20,21). Also cross-sectional area of Musculus longissimus dorsi (MLD) as one of the important data related with cold carcass was determined to be 98.16 cm^2 in the present study; whereas, various researchers (23,28) have reported different MLD values (61 cm^2-80 cm^2).

In the study, some carcass measurements such as carcass length, chest depth, leg length and leg width were found to be 205.77 cm, 73.55 cm, 63.42 cm and 65.48 cm, respectively. Ulusan et al. (13) obtained higher values of carcass length (123 cm), chest depth (47 cm) and leg width (52 cm) and a similar value of leg length (63 cm).

It has been thought that various factors such as live weight at the end of fattening, pre-slaughter weight, slaughter age, body condition, management procedure may cause the differences between data obtained in the present and other studies.

It was concluded that the differences between the zoometric measurements such as chest circumference, chest depth, body length and cannon-bone circumference obtained before slaughter in the present study and those determined by other researchers resulted from the younger ages and low pre-slaughter live weight values of the animals used in the study.

As a result; knowing the slaughtering rate in a country, even in the limited regions of the country, is important in terms of meeting the need to meat and orientating consumption of animal origin protein of that country. In this respect, determination of number of the slaughtered cattle in the year is also important as well as the number of the recorded cattle. Therefore, regular documentation of the records in the slaughterhouses and sharing them with the required institutions should be taken into consideration.

It has been observed that breeding of culture animal and its crossbreedings has progressively increased in the recent years in Türkiye and the world. It has been seen that Simmental, one of the culture cattle breed mostly reared in Türkiye, is also evaluated intensively for meat production in Kırıkkale province where the present study was carried out. Hence, it has been concluded that the results of the present study are important specific to Kırıkkale province with respect to determination of the yield potentials of Simmental breed, breeding performances and slaughter characteristics of which have been studied by various researchers under different circumstances.

It has been concluded in this study that Simmental raised in Kırıkkale province have shown similar and furthermore superior some of meat production traits compared to world averages, therefore its breeding can be continued and integration of this breed to the red meat sector should be maintained by supplementation of breeding material.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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✉ **Corresponding Author:**
Aykut Asım AKBAŞ
Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Animal Science, Burdur, TÜRKİYE
E-mail: icould_akbas@hotmail.com