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ANALYZING THE DISTRIBUTION OF SLAUGHTERED CATTLE BREED IN EDIRNE SLAUGHTERHOUSE

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ABSTRACT

It was aimed to determine the cattle breed distribution, which were slaughtered in the Edirne slaughterhouse between 2017-2021. Slaughterhouse data were used as the material for this study that accounted for a number of 49,473 slaughtered cattle. Cattle were first grouped into pure breeds and cross-breeds, and then, sub-genotypes of cross-breeds were determined.

Twenty-one pure breeds and nineteen cross-breeds were determined corresponding to the identified genotypes. Furthermore, 148 sub-genotypes in crosses according to sire breed were observed, which accounted for 169 genotypes in total. It was determined that most of the slaughtered cattle were Holstein-Black (53.8%), followed by Simmental crosses (13.9%), pure Simmental (11.2%), Brown Swiss crosses (4.6%), pure Brown Swiss (4.2%) and Holstein-Black crosses (2.8%). Among the crossbreeds, the highest rate was found for the Simmental crosses (54.8%). Brown Swiss (18.0%), Holstein-Black (10.9%), Aberdeen-Angus (6.0%) and Belgium Blue (2.4%) crosses followed the Simmental crosses.

Considering the results, beside of the cattle breeds mostly grown in the region, other breeds that were used for the meat production would contribute to identify the farmers' breed preferences. Determination of the wide variety of cattle breeds or genotypes implies that farmers may have fattened various breeds without a proper breeding programme. Improper implementation of a breeding programme may cause herds to loss its uniformity and efficiency. We suggest policy makers to determine a proper breeding and/or crossbreeding programme by considering expectation and available resources of the farmers.

Keywords: Breed, carcass, cattle, crossbreeds, frequency

INTRODUCTION

Animal husbandry practices can differ due to the farmers' preferences, which are mainly directed by the geographic and economic conditions of the provinces (Ozturk et al., 2022). Marmara Region is in the north-west of Turkey, and it is one of the significant regions for the Turkish animal husbandry. Edirne is a province in the Marmara region, and cattle husbandry is among the main economic activities for the rural people of the region. Besides being important for the regional economic circulation, cattle husbandry provides nutritional demands for the nation (Lorcu and Bolat, 2012).

According to the FAO (2023), Turkey has a significant number of cattle population. Among 193 countries in the world, Turkey ranks 22nd ;and among 40 countries in Europe, Turkey ranks 3rd in terms of the number of cattle.

Between 2017-2022, a total number of cattle population in Turkey corresponding to breed classification and their share among the total cattle population was presented in Table 1. According to this, improved breeds and crossbreed were preferred for the animal husbandry throughout Turkey (TSI, 2023a). In Table 2, number of cattle population in Edirne corresponding to breed classification, their share and Edirne's cattle population share within Turkey was presented. Farmers in Edirne preferred to use improved breeds more commonly, and the share of local breeds among the total cattle population in Edirne was below 1%. Furthermore, cattle population in Edirne contributed at around 1% to the total national cattle population (TSI, 2023b).

Table 1 Number of cattle population in Turkey

Years	Improved Breeds	%	Cross Breeds	%	Local Breeds	%	Total
2017	7 804 588	49.0	6 536 073	41.0	1 602 925	10.1	15 943 586
2018	8 419 204	49.4	7 030 297	41.3	1 593 005	9.3	17 042 506
2019	8 559 855	48.4	7 554 625	42.7	1 573 659	8.9	17 688 139
2020	8 838 498	49.2	7 594 127	42.3	1 532 857	8.5	17 965 482
2021	8 824 784	49.4	7 641 100	42.8	1 384 659	7.8	17 850 543
2022	8 295 825	49.2	7 324 866	43.5	1 231 265	7.3	16 851 956

Table 2 Number of cattle population in Edirne province and its share within Turkey

Years	Improved Breeds	%	Cross Breeds	%	Local Breeds	%	Total	%*
2017	116,720	75.7	36,348	23.6	1,042	0.7	154,110	0.97
2018	117,527	75.2	37,705	24.1	971	0.6	156,203	0.92
2019	119,993	74.6	39,941	24.8	888	0.6	160,822	0.91
2020	117,262	72.9	42,719	26.6	894	0.6	160,875	0.90
2021	118,018	73.1	42,597	26.4	855	0.5	161,470	0.90
2022	111,200	71.4	43,829	28.1	747	0.5	155,776	0.92

*Edirne's share among Turkish cattle population

Number of slaughtered cattle and meat production in Turkey between 2017-2021 were shown in Table 3 (TSI, 2023c), as well as the number of slaughtered cattle and meat production in Edirne and its share among the Turkish slaughtered cattle population and meat production were shown in Table 4 (HBS, 2023).

Table 3 Number of slaughtered cattle and cattle meat production in Turkey

Years	Slaughtered cattle (number)	Cattle meat production (tonnes)
2017	4,334,034	1,093,841
2018	4,844,711	1,281,234
2019	4,856,517	1,330,169
2020	4,812,902	1,341,446
2021	5,134,441	1,460,719
2022	*	*

* Data for 2022 is not available.

Table 4 Number of slaughtered cattle and meat production in Edirne province and their share in Turkey

Years	Slaughtered cattle		Cattle meat production	
	Number	%	Tonnes	%
2017	24,652	0.57	6,190	0.57
2018	18,725	0.39	5,955	0.46
2019	29,452	0.61	8,002	0.60
2020	23,360	0.49	6,336	0.47
2021	23,819	0.46	6,472	0.44
2022	22,149	*	5,968	*

* 2022 data for total is not yet available, it could not be calculated.

As it is known, in addition to total amount of meat production, individual meat production per animal is essential. Beside the environmental factors, genotype is a determining factor for individual meat production (Ariturk and Yalcin, 1966). In general, local breeds are less productive as compared to the improved breeds (Arpacik, 1997; Evrim and Gunes, 2000).

Even though the number of cattle corresponds to approximately 1% of Turkey's cattle population in Edirne province, Edirne's share in the slaughtered cattle and cattle meat production is half of this. These values indicate that cattle raised in Edirne province have also been slaughtered in another cities.

In Turkey, each year a number of cattle and their milk production is presented per improved breeds, cross-breeds, and local breeds by the Turkish Statistical Institute and it is publicly available. However, there is no information regarding the slaughtered cattle, whether they are improved, cross-breed and local breed. Also, a detailed breed information is not available, which corresponds to the numbers for animals, milk and meat production.

Due to the short duration of animal breeding, especially in meat production, many commercial cross-breeds can be formed together with purely-raised breed. Considering the economic conditions, cross-breeds can be more beneficial for meat or milk production (Evrim and Gunes, 2000). However, random crossbreeding is regulated by laws (Resmi Gazete, 2001).

In this study, it was aimed to identify the breed distribution of slaughtered cattle in the Edirne slaughterhouse. Considering the results, beside the mostly used pure breeds in the region, other breeds that were preferred for the meat production would contribute to identify the farmers' breed

preferences. Furthermore, by taking the outcomes of this study into consideration, future studies on the determinants of the farmers' breed preferences, and observed and expected production yields can be compared.

MATERIAL AND METHODS

Data consisting of information on slaughtered cattle breeds in the Edirne slaughterhouse between 2017 and 2021 were used as the study material. During this period, a total of 49,473 cattle were slaughtered. Number of slaughtered cattle between 2017-2021 was given in Table 5.

Table 5 Number of slaughtered cattle in Edirne slaughterhouse between 2017-2021

Years	Number of slaughtered cattle
2017	9,417
2018	9,659
2019	12,106
2020	8,914
2021	9,377
Total	49,473

Number of slaughtered cattle in the Edirne slaughterhouse constituted approximately half of the total slaughtered cattle in Edirne. Therefore, determination of the slaughtered cattle breeds is sufficient for sampling and represents the Edirne province.

In the study, the breeds of the slaughtered cattle were determined from the records according to their ear tags. In addition to 21 pure breeds and 19 crossbreeds in general, sub-genotype groups were formed from the cow and bull records of the crosses. The creation of cross-breed groups was based on bull breeds and 148 sub-genotype groups emerged from 19 cross-breed groups. Thus, a total of 169 genotype groups were determined together with pure breed groups. The ratios of these groups were calculated according to the total number of slaughtered animals in the slaughterhouse, as well as pure breed and mixed breed groups. Due to the numerical differences of the distributions, no statistical analysis was performed between the groups.

RESULTS

In the study, 40 genotype groups (21 pure breeds and 19 cross-breeds) were identified. In Table 6, number, and frequency of the slaughter cattle breed in total, in pure breed and in cross-breed were shown. The distribution of the identified genotypes was arranged from the highest to lowest cattle breed.

According to our results, most of the slaughtered cattle breeds were Holstein-Black (53.9%), followed by Simmental crosses (13.9%), pure Simmental (11.2%), Brown Swiss crosses (4.6%), pure Brown Swiss (4.2%) and Holstein-Black crosses (2.8%), and farmers dominantly preferred to use breeds which specialized in both dairy and meat production. Charolais and Limousine were two most slaughtered meat-type breeds by 0.9% and 0.8%, respectively, following the Aberdeen Angus (2.6%). Number of slaughtered cattle from Aubrac, Normande, Piedmontese cross and Salers breed were reported only one each between 2017-2021. Gray Breed was the only identified local cattle breed that was slaughtered in the mentioned period. However, the number of slaughtered Gray Breed was only 18.

Holstein-Black (72.1%), Simmental (15.0%), Brown Swiss (5.6%), Aberdeen-Angus (2.6%), Charolais (1.2%) and Limousine (1.1%) had the highest percentages among the pure breeds that were slaughtered. Furthermore, among the slaughtered cross-breeds, the highest rate was found for Simmental crosses (54.8%). This was followed by Brown Swiss (18.0%), Holstein-Black (10.9%), Aberdeen-Angus (6.0%), Belgium Blue (2.4%), as well as Charolais, Hereford, Holstein-Red and Montbeliarde crosses at lower rates (around 1%).

Table 6 Number and frequency of slaughtered cattle breed (pure and cross-breed)

Breeds		Years						Frequency (%)		
								total	in pure breed	in crossbreed
Pure	**Cross-breed**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	49473	36901	12572
Holstein-Black		6282	5513	5576	4707	4527	26605	53.78	72.10	-
	Simmental C	755	1276	1881	1447	1534	6893	13.93	-	54.83
Simmental		738	1006	1404	1082	1291	5521	11.16	14.96	-
	Brown Swiss C	273	399	506	468	611	2257	4.56	-	17.95
Brown Swiss		445	402	435	349	437	2068	4.18	5.60	-
	Holstein-Black C	184	165	253	346	428	1376	2.78	-	10.94
Aberdeen-Angus		134	38	626	135	30	963	1.95	2.61	-
	Aberdeen-Angus C	126	309	196	67	51	749	1.51	-	5.96
Charolais		39	51	271	23	45	429	0.87	1.16	-
Limousine		38	45	252	22	47	404	0.82	1.09	-
	Belgium Blue C	29	58	117	40	55	299	0.60	-	2.38
Hereford		91	5	139	7	24	266	0.54	0.72	-
Brangus		8	150	92	-	-	250	0.51	0.68	-
	Charolais C	10	20	66	51	88	235	0.48	-	1.87
	Hereford C	110	92	25	-	-	227	0.46	-	1.81
	Holstein-Red C	22	25	22	36	32	137	0.28	-	1.09
	Montbeliarde C	7	17	45	34	28	131	0.26	-	1.04
Red-Angus		78	10	25	2	5	120	0.24	0.33	-
Montbeliarde		4	8	61	14	7	94	0.19	0.25	-
	Limousine C	4	11	25	17	26	83	0.17	-	0.66
Holstein-Red		15	6	10	13	29	73	0.15	0.20	-
	Swedish Red C	17	14	17	9	13	70	0.14	-	0.56
	Norwegian Red C	-	13	21	9	7	50	0.10	-	0.40
	Normande C	-	1	10	10	15	36	0.07	-	0.29
European Red		4	6	7	5	12	34	0.07	0.09	-
Belgium Blue		-	1	9	3	8	21	0.04	0.06	-
Gray Breed		3	6	5	3	1	18	0.04	0.05	-
Swedish Red		1	2	4	5	6	18	0.04	0.05	-
	European Red C	-	-	-	2	7	9	0.02	-	0.07
	Red-Angus C	-	1	3	2	-	6	0.01	-	0.05

Breeds		Years						Frequency (%)		
								total	in pure breed	in crossbreed
Pure	**Cross-breed**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	49473	36901	12572
	Shorthorn C	-	1	1	1	3	6	0.01	-	0.05
Blonde d'Aquitaine		-	5	-	-	-	5	0.01	0.01	-
Norwegian Red		-	-	-	1	4	5	0.01	0.01	-
	Parthenaise C	-	1	-	3	1	5	0.01	-	0.04
Angler		-	-	-	1	3	4	0.01	0.01	-
	Angler C	-	-	1	-	1	2	0.00	-	0.02
Aubrac		-	-	1	-	-	1	0.00	0.00	-
Normande		-	1	-	-		1	0.00	0.00	-
	Piedmontese C	-	-	-	-	1	1	0.00	-	0.01
Salers		-	1	-	-	-	1	0.00	0.00	-
Total		9417	9659	12106	8914	9377	49473	100.00	100.00	100.00

C: Crossbreed

Even though a regular trend was not observed for the slaughtered cattle breed, numbers of slaughtered cattle were similar between 2017-2021, except for 2019. Between 2017-2019, the number of slaughtered cattle was observed to increase, but between 2019-2020, the number of slaughtered cattle was decreased by 26.3%, most probably due to the COVID-19 pandemic.

Beyond classifying slaughtered cattle as pure and cross-breds, it is also important from which breeds the crosses are obtained. For example, the Simmental breed, which has the highest number of crossbred cattle (6893 animals), has crosses from 19 different genotypes. Among these cross-breeds, there are also backcross cross-breeds formed by combining even with hybrids of their own breed. In Table 7, genotypes of crossbred slaughtered cattle in the Edirne slaughterhouse, and their numbers and percentages were given. The breeds were listed starting from the most used crossbred breed.

Table 7 Number of slaughtered cross-breed cattle in Edirne province and their percentages (%) according to the sub-genotype

Genotype of crossbreed's gender		Years						Frequency (%)	
Male ("n" of total group)	**Female**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	**in total (12572)**	**in group "n" of male**
Simmental	Holstein-Black	493	955	1248	765	790	4251	33.81	61.67
(6893)	*Simmental C	262	318	398	476	505	1959	15.58	28.42
(54.83%)	Brown Swiss	-	2	106	77	95	280	2.23	4.06
	Brown Swiss C	-	-	46	44	74	164	1.30	2.38
	Holstein-Black C	-	-	51	55	34	140	1.11	2.03
	Holstein-Red C	-	-	7	11	10	28	0.22	0.41
	European Red	-	-	9	2	1	12	0.10	0.17
	Montbeliarde C	-	-	5	3	1	9	0.07	0.13

Genotype of crossbreed's gender		Years						Frequency (%)	
Male ("n" of total group)	**Female**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	**in total (12572)**	**in group "n" of male**
	Charolais C	-	-	3	1	4	8	0.06	0.12
	Gray Bred	-	-	2	4	2	8	0.06	0.12
	Holstein-Red	-	1	1	1	5	8	0.06	0.12
	Charolais	-	-	-	4	2	6	0.05	0.09
	Swedish Red	-	-	3	1	1	5	0.04	0.07
	Belgium Blue C	-	-	1	-	3	4	0.03	0.06
	Limousine C	-	-	-	1	3	4	0.03	0.06
	Aberdeen-Angus C	-	-	1	1	1	3	0.02	0.04
	Swedish Red C	-	-	-	-	2	2	0.02	0.03
	Limousine	-	-	-	-	1	1	0.01	0.01
	Red-Angus C	-	-	-	1	-	1	0.01	0.01
Brown Swiss	*Brown Swiss C	257	133	166	209	291	1056	8.40	46.79
(2257)	Holstein-Black	13	227	292	199	225	956	7.60	42.36
(17.95%)	Simmental C	-	10	16	20	45	91	0.72	4.03
	Holstein-Black C	-	10	12	17	9	48	0.38	2.13
	Gray Bred	3	3	10	3	11	30	0.24	1.33
	Simmental	-	3	4	10	11	28	0.22	1.24
	Charolais	-	1	1	4	6	12	0.10	0.53
	Holstein-Red C	-	5	2	4	-	11	0.09	0.49
	Charolais C	-	3	-	-	6	9	0.07	0.40
	Swedish Red C	-	2	1	-	3	6	0.05	0.27
	European Red	-	1	1	1	1	4	0.03	0.18
	Aberdeen-Angus C	-	-	1	1	1	3	0.02	0.13
	Belgium Blue C	-	-	-	-	1	1	0.01	0.04
	Limousine C	-	1	-	-	-	1	0.01	0.04
	Montbeliarde C	-	-	-	-	1	1	0.01	0.04
Holstein-Black	*Holstein-Black C	184	114	186	262	300	1046	8.32	76.02
(1376)	Simmental C	-	15	11	32	55	113	0.90	8.21
(10.94%)	Brown Swiss	-	10	21	13	21	65	0.52	4.72
	Brown Swiss C	-	9	10	20	17	56	0.45	4.07
	Simmental	-	6	13	8	15	42	0.33	3.05
	Holstein-Red C	-	4	6	2	6	18	0.14	1.31
	Aberdeen-Angus C	-	-	-	2	5	7	0.06	0.51
	European-Red	-	-	1	1	4	6	0.05	0.44
	Gray Bred	-	2	2	1	-	5	0.04	0.36
	Montbeliarde C	-	-	-	2	3	5	0.04	0.36
	Belgium Blue C	-	1	-	1	1	3	0.02	0.22
	Charolais	-	1	-	2	-	3	0.02	0.22
	Holstein-Red	-	2	1	-	-	3	0.02	0.22
	Charolais C	-	-	2	-	-	2	0.02	0.15
	Limousine	-	1	-	-	-	1	0.01	0.07
	Limousine C	-	-	-	-	1	1	0.01	0.07

Genotype of crossbreed's gender		Years						Frequency (%)	
Male ("n" of total group)	**Female**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	**in total (12572)**	**in group "n" of male**
Aberdeen-Angus	Aberdeenshire	109	250	84	-	-	443	3.52	59.15
(749)	Holstein-Black	9	44	92	41	28	214	1.70	28.57
(5.96%)	*Aberdeen-Angus C	3	1	5	7	7	23	0.18	3.07
	Brown Swiss C	-	4	-	8	9	21	0.17	2.80
	Brown Swiss	4	1	6	4	4	19	0.15	2.54
	Simmental	1	2	1	2	2	8	0.06	1.07
	Belgium Blue C	-	1	3	-	-	4	0.03	0.53
	Holstein-Red C	-	4	-	-	-	4	0.03	0.53
	Limousine	-	-	2	1	1	4	0.03	0.53
	Holstein-Black C	-	-	3	-	-	3	0.02	0.40
	Simmental C	-	1	-	2	-	3	0.02	0.40
	Charolais C	-	-	-	1	-	1	0.01	0.13
	Limousine C	-	1	-	-	-	1	0.01	0.13
	Red-Angus C	-	-	-	1	-	1	0.01	0.13
Belgium Blue	Holstein-Black	29	48	99	32	41	249	1.98	83.28
(299)	Brown Swiss	-	6	12	5	3	26	0.21	8.70
(2.38%)	*Belgium Blue C	-	-	4	1	2	7	0.06	2.34
	Holstein-Black C	-	3	-	-	4	7	0.06	2.34
	Simmental	-	1	2	-	2	5	0.04	1.67
	Brown Swiss C	-	-	-	2	1	3	0.02	1.00
	Aberdeen-Angus C	-	-	-	-	1	1	0.01	0.33
	Simmental C	-	-	-	-	1	1	0.01	0.33
Charolais	Holstein-Black	10	12	36	19	20	97	0.77	41.28
(235)	*Charolais C	-	-	6	9	27	42	0.33	17.87
(1.87%)	Brown Swiss C	-	-	8	12	18	38	0.30	16.17
	Brown Swiss	-	7	8	7	13	35	0.28	14.89
	Simmental C	-	-	6	-	3	9	0.07	3.83
	Holstein-Black C	-	-	-	3	5	8	0.06	3.40
	Simmental	-	1	1	1	2	5	0.04	2.13
	European Red	-	-	1	-	-	1	0.01	0.43
Hereford	*Hereford C	106	92	25	-	-	223	1.77	98.24
(227) (1.81%)	Aberdeen Angus	4	-	-	-	-	4	0.03	1.76
Holstein-Red	Holstein-Black	-	18	13	25	12	68	0.54	49.64
(137)	*Holstein-Red C	22	5	6	7	8	48	0.38	35.04
(1.09%)	Simmental	-	2	2	2	1	7	0.06	5.11
	Simmental C	-	-	-	-	7	7	0.06	5.11
	Brown Swiss	-	-	1	-	1	2	0.02	1.46
	Belgium Blue C	-	-	-	-	1	1	0.01	0.73
	European Red	-	-	-	1	-	1	0.01	0.73
	Montbeliarde C	-	-	-	-	1	1	0.01	0.73
	Norwegian Red C	-	-	-	-	1	1	0.01	0.73

Genotype of crossbreed's gender		Years						Frequency (%)	
Male ("n" of total group)	**Female**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	**in total (12572)**	**in group "n" of male**
	Red-Angus C	-	-	-	1	-	1	0.01	0.73
Montbeliarde	Holstein-Black	7	14	36	23	17	97	0.77	74.05
(131)	*Montbeliarde C	-	2	3	4	3	12	0.10	9.16
(1.04%)	Simmental C	-	-	2	1	4	7	0.06	5.34
	Simmental	-	1	-	4	1	6	0.05	4.58
	Brown Swiss	-	-	1	2	2	5	0.04	3.82
	European Red	-	-	1	-	1	2	0.02	1.53
	Holstein-Red	-	-	2	-	-	2	0.02	1.53
Limousine	Holstein-Black	-	5	11	8	2	26	0.21	31.33
(83)	Simmental	4	4	1	-	6	15	0.12	18.07
(0.66%)	Brown Swiss	-	1	4	3	3	11	0.09	13.25
	Brown Swiss C	-	-	2	3	5	10	0.08	12.05
	Simmental C	-	-	3	2	4	9	0.07	10.84
	*Limousine C	-	-	1	-	3	4	0.03	4.82
	European Red	-	-	2	1	-	3	0.02	3.61
	Holstein-Black C	-	-	-	-	3	3	0.02	3.61
	Aberdeen-Angus C	-	-	1	-	-	1	0.01	1.20
	Charolais	-	1	-	-	-	1	0.01	1.20
Swedish Red	European Red	17	7	3	3	-	30	0.24	42.86
(70)	Holstein-Black	-	1	10	5	3	19	0.15	27.14
(0.56%)	*Swedish Red C	-	5	1	-	6	12	0.10	17.14
	Brown Swiss C	-	-	-	1	1	2	0.02	2.86
	Holstein-Red C	-	-	-	-	2	2	0.02	2.86
	Simmental C	-	-	2	-	-	2	0.02	2.86
	Brown Swiss	-	1	-	-	-	1	0.01	1.43
	Holstein-Red	-	-	1	-	-	1	0.01	1.43
	Simmental	-	-	-	-	1	1	0.01	1.43
Norwegian Red	Holstein-Black	-	8	12	4	1	25	0.20	50.00
(50)	European Red	-	1	4	2	1	8	0.06	16.00
(0.40%)	Swedish Red C	-	3	2	1	-	6	0.05	12.00
	Simmental	-	-	1	2	-	3	0.02	6.00
	Brown Swiss	-	-	2	-	-	2	0.02	4.00
	Holstein-Red C	-	-	-	-	2	2	0.02	4.00
	*Norwegian Red C	-	-	-	-	2	2	0.02	4.00
	Brown Swiss C	-	-	-	-	1	1	0.01	2.00
	Holstein-Red	-	1	-	-	-	1	0.01	2.00
Normande	Holstein-Black	-	1	8	7	9	25	0.20	69.44
(36)	Brown Swiss	-	-	2	-	2	4	0.03	11.11
(0.29%)	Simmental C	-	-	-	1	3	4	0.03	11.11
	European Red	-	-	-	1	-	1	0.01	2.78
	*Normande C	-	-	-	-	1	1	0.01	2.78
	Simmental	-	-	-	1	-	1	0.01	2.78

Genotype of crossbreed's gender		Years						Frequency (%)	
Male ("n" of total group)	**Female**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	**in total (12572)**	**in group "n" of male**
European-Red	Holstein-Black	-	-	-	1	3	4	0.03	44.44
(9)	*European Red C	-	-	-	-	2	2	0.02	22.22
(0.07%)	Swedish Red C	-	-	-	1	1	2	0.02	22.22
	Limousine C	-	-	-	-	1	1	0.01	11.11
Shorthorn	Holstein-Black	-	-	1	1	1	3	0.02	50.00
(6)	Simmental	-	1	-	-	1	2	0.02	33.33
(0.05%)	Brown Swiss	-	-	-	-	1	1	0.01	16.67
Red-Angus	Brown Swiss	-	-	3	-	-	3	0.02	50.00
(6)	Brown Swiss C	-	-	-	2	-	2	0.02	33.33
(0.05%)	Holstein-Black	-	1	-	-	-	1	0.01	16.67
Parthenaise	Holstein-Black	-	1	-	2	1	4	0.03	80.00
(5 – (0.04%)	Brown Swiss	-	-	-	1	-	1	0.01	20.00
Angler	Holstein-Black	-	-	-	-	1	1	0.01	50.00
(2 - 0.02%)	Limousine	-	-	1	-	-	1	0.01	50.00
Piedmentosa (1-0.01%)	Brown Swiss	-	-	-	-	1	1	0.01	100.00
Total		1537	2403	3189	2542	2901	12572		

C: Crossbreed, * Backcross group of male genotype

When Table 7 was examined, it was observed that most cross-breeds were obtained by using the Simmental (6893) bulls. Simmental crosses were a breed in which females from other breeds were mainly used (19 breeds), beside of its numerical majority. Among the cross-breeds of the Simmental breed, Holstein-Black (33.81%) and their crosses took the first place, while followed by the Simmental own cross-breeds (*i.e.*, backcrossed to the Simmental breed) and the Brown Swiss and their crosses (2.41%). Crosses from the other 14 genotypes were not in significant numbers among the total Simmental crosses.

Interestingly, backcrosses of Brown Swiss (in total 2257 crosses) and Holstein-Black (in total 1376 crosses) had the highest rate (46.79% and 76.02%, respectively). It has been determined that the Holstein-Black breed, which is grown in the region and in the Edirne province, was not really preferred in the production of crossed-use animals.

It has been observed that the crosses of Aberdeen-Angus cattle, which is a well-known and popular beef cattle breed, consist of crosses with the Abendenshire breed at a large rate by 59.15%. In addition, it was determined that Holstein-Black crosses, one of the main breeder breeds, took the second place by 28.57%. Females of the Holstein-Black breed were combined with the bulls from meat breeds such as Belgium Blue, Charolais and Montbeliarde, and hybrids were bred. Here, some meat breeds such as Limousine, Swedish Red, Norwegian Red and Normande were also used, albeit in small numbers, in crosses with females, mainly Holstein-Black. In addition, it was determined that crosses of some meat breeds (Aberdeen-Angus, Belgium Blue, Charolais, Hereford, Montbeliarde, Limousine, etc.) were combined with the same breed to form backcrosses and be used in meat production.

DISCUSSION AND CONCLUSION

In this study, the distribution of slaughtered cattle in the Edirne slaughterhouse according to their breed was investigated. Edirne slaughterhouse is the largest slaughterhouse among the five

slaughterhouses in the province. Holstein-Black was identified as the most prevalent of slaughtered cattle breeds, followed by the Simmental and Brown Swiss breeds and crosses of these breeds. Identified cattle breeds predominantly slaughtered emphasize that farmers prefer to use breeds of both milk and meat types. However, when farmers do not need breeding animals or when the meat prices are higher comparing to milk prices, meat-type sires are preferred in order to increase farm profit in the short term. This fact may be the reason of various genotypes that were identified in this study.

It was expected that the Holstein-Black breed is used as female material for breeding because it is the most abundant breed in the region. However, Simmental breed was the most used breed as a sire line in the five-year period studied. Simmental is specialized in beef-dairy and has improved dairy traits in the last years. The data show that the Simmental breed is preferred not only for the cattle raised in Edirne, but also for the cross-breeds brought for slaughter by import. In this study, genotypes were classified according to the sire line in the analysis of breed distribution. If the same data had been classified according to the breed of the cow line, it could be more clearly seen which cow breed crossed with which sire breed.

In this study, beside of the well-known meat and dairy specialised breeds, we have identified twelve genotypes (*i.e*. European Red crosses, Red-Angus crosses, Shorthorn crosses, Blonde d'Aquitaine, Norwegian Red, Parthenaise crosses, Angler, Angler crosses, Aubrac, Normande, Piedmontese crosses, and Salers) which were reportedly slaughtered in numbers below ten .In fact, during the study period, only one animal from some genotypes (*i.e.* Aubrac, Normande, Piedmontese cross and Salers) was reported to be slaughtered. Smallholders in developing countries have often failed to follow recommendations from veterinarians and breeding associations, when motivated by other extrinsic factors such as physical appearance of the cow (large mature size dairy cows), temperament, advise from the neighbour, and/or marketing opportunities (Bebe et al., 2003; Desta et al., 2010; Traore et al., 2017). In this study, observation of some genotypes only once during the five-year period could also be explained by the geographical condition of Edirne, which is a border city, therefore the import could be preferred by some farmers. It should be noted that upon importing live animals, the following processes should be carefully carried out. For instance, for some time, the replacement of the earrings of imported animals with local earrings made it difficult to follow up the breed, causing an irrational existence of various breeds in the national database. For this reason, abandoned was to change the earrings afterwards, which is a correct practice.

When the currently existing cattle breeds in Edirne are examined, it is seen that almost all the breeds brought to be slaughtered by import had been used by farmers for breeding or fattening. On the other hand, twelve breeds which were not observed in our data, *i.e.* Ayrshire cross, Gray Breed cross, Domestic Black, Chianina crosses, etc. (total 192 cattle) were found. However, they have no numerical significance (HBS, 2023).

Another interesting issue is the presence of backcrosses in some breeds, including breeds that are in minority. This may be due to the female material remaining in the farm after a cross is not sent to slaughter but is used for breeding and obtaining crossbreeds of the same breed. In this case, it is necessary to question why the intermediate breed is used. In fact, the official registration of crossbreeding with different breeds is important for the protection of breed characteristics, and this issue is under control by law. Regardless of the chosen breeding programme, farmers should plan for several generations, not just a few years ahead and should be aware of the negative circumstances of productivity and profitability if the breeding programmes are not fully contemplated before implementation (Garcia et al. 2019).

When the imported cattle breeds are examined, it will be observed they are also obtained through different crossbreeding. Generally, variability between the breeds is higher than between

individuals in a breed. All breeds have strengths in terms of some economically important traits, but there is no breed showing excellence for all traits (Weber, 2008). A crossbreeding programme is helpful to capitalize on the traits that each of the parent brings to crosses. It is essential to consult veterinarians when performing crossbreeding to maximize hybrid vigor (Garcia et al. 2019).

The existence of a large number of animals of different breeds shows that the breeders are trying to produce different solutions in order to increase their income from meat. It should be kept in mind that the effect of genotype on yields is smaller than the effect of environmental conditions. Improving environmental conditions or providing optimum conditions will ensure high yields from breeds with high genetic potential (Ariturk and Yalcin, 1966; Evrim and Gunes, 2000).

When the distribution of slaughtered cattle in the Edirne slaughterhouse according to breeds was examined, it was observed that Holstein-Black, Simmental and Brown Swiss breeds and their crosses were used as majority. In addition, it was observed that some of the imported cattle breeds for slaughter were continued to be bred. It is known that these crosses are made to benefit from the slaughter characteristics by using hybrid vigor. Here, it should be separately evalauted which animals are slaughtered and what proportions are available for slaughter (either by fattening or directly), and the level of productivity of the hybrid females groups. To increase the income of the farms, it should be determined what benefit will be gained by using many breeds as the female material. It is important to compare the performances of cattle imported for slaughter and those slaughtered after being imported and fattened.

As a result, in a five-year period, the high number of breeds or genotypes shows that the farmers may have fattened various breeds without a proper breeding programme to improve their profitability. However, improper implementation of a breeding programme may cause herds to lose their uniformity and efficiency and the extinction of local breeds. Before applying a breeding programme, farmers should consider their available sources (i.e. labour, feed, pasture, financial) and optimum herd size. We suggest policy makers to determine and motivate farmers to apply for a proper breeding and/or crossbreeding programme by considering the expectations and available resources of the farmers to prevent uncontrolled breeding.

CONFLICT OF INTEREST

The authors declared that there is no conflict of interest.

CONTRIBUTIONS

Concept – H.G.; Design – H.G.; Supervision – H.G.; Resources –S.A.; Materials – S.A.; Data Collection and/or Processing – S.A.; H.G.; Analysis and/or Interpretation – H.G., N.O.; Literature Search – S.A., N.O.; Writing Manuscript – S.A.; Critical Review – H.G., N.O.

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ANALIZA DISTRIBUCIJE STOČNIH VRSTA U KLAONICI U EDIRNE

SAŽETAK

Cilj istraživanja je odrediti distribuciju stočnih vrsta u klaonici u Edirneu u periodu od 2017. do 2021. godine. Kao materijal za istraživanje su korišteni podaci iz klaonice koji su obuhvatili ukupno 49.473 zaklanih grla. Grla su prvenstveno podijeljena na čistokrvna i križana, nakon čega su određeni podgenotipovi križanih grla.

Uključeno je 21 čistokrvno i 19 križanih grla prema identificiranim genotipovima. Nadalje, određeno je 148 podgenotipova križanaca prema pasmini bikova i ukupno 169 genotipova. Ustanovljeno je da je većina zaklanih grla pripadala pasmini Holstein-Black (53.8%), potom križancima pasmine Simmental (13.9%), punokrvnoj Simmental pasmini (11.2%), križancima smeđeg švicarskog goveda (4.6%), čistokrvnom smeđem švicarskom govedu (4.2%) i križancima Holstein-Black pasmine (2.8%). Među križanim pasminama, najbrojniji su bili križanci pasmine Simmental (54.8%). Slijedili su ih križanci smeđeg švicarskog goveda (18.0%) te pasmina Holstein-Black (10.9%), Aberdeen-Angus (6.0%) i belgijskog plavog goveda (2.4%).

Iz rezultata je vidljivo da, osim stoke koja se uglavnom uzgaja u regiji i ostale pasmine koje se koriste za proizvodnju mesa doprinose identifikaciji pasmina koje uzgajivači najviše vole. Određivanje velikog broja uzgajanih vrsta ili genotipova znači da su uzgajivači mogli udebljati različite vrste bez odgovarajućeg uzgojnog programa. Nepravilna provedba uzgojnog programa može uzrokovati gubitak uniformnosti i efikasnosti stada. Naš prijedlog kreatorima politika jeste odabir odgovarajućeg uzgojnog programa.

Ključne riječi: Goveda, križanci, pasmine, trupovi, učestalost