PRIMARY PROCESSING OF CERVID CARCASSES FOR TRADITIONAL SPECIALITIES

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Abstract

A thorough understanding of the inherent qualities of venison and the specialized techniques and methods for processing it, especially considering the difficulty of its preparation, is a prerequisite for the growth of the game meat processing industry as well as the manufacture of game meat products. The biological material used in this study is composed of hind carcasses that were collected from the 24 Frasin hunting area in Suceava. The carcasses were processed through the technological operations of cutting and deboning, followed by the selection of anatomical regions suitable for the production of traditional venison specialities. Following the practical implementation of the proposed processing operations, each anatomical region, as well as the auxiliary anatomical parts of the carcass, were evaluated proportionally; their weight was determined in relation to the total weight of the carcass. For the whole carcass, yields of 32.74% muscle tissue of specialities, 25.75% quality I and II meat, 13.3% bone and 10.59% connective tissue were found. The weight of the animal's gunshot wound represented 17.59% of the total carcass weight.

Key words: *cervids, cutting, deboning, selection, venison*

INTRODUCTION

The continuing urbanization of the population and its influence on consumption have in recent years highlighted the need to study consumer attitudes towards the use of natural food resources. Among these, identifying ways to increase and distribute the consumption of game meat is optimal for maintaining or supporting hunting as an activity, as well as for improving wildlife management (Hadjikakou et al. 2019). While a few years ago, the consumption of game meat and game products was concentrated around the hunting community, nowadays, a good part of the common consumers have started to turn their attention to this category of products. The motivation for the consumption of game meat by the general population is based on the desire to consume products that are more natural, but also on several exclusivist aspects, as game meat is considered a delicacy, and on the attractiveness of new experiences (Hoffman, Wiklund, 2006).

As a result of various motivations, including the perception that game is healthier and the attraction of new experiences, the consumption of game meat has increased dramatically in recent years. The common feature characterizing wild meat is its many attributes that have a positive impact on the health and proper functioning of the human body as a result of its high nutritional composition compared to meat from domestic animals (Kudrnacova et al. 2018; Okuskhanova et al. 2017).

Moreover, interest in game meat has shifted to meat and meat products derived primarily from the *Cervidae* family, with deer and roe deer meat having unique nutritional properties (Costa et al. 2016).

In terms of actual consumption, venison can be a valuable component of various food preparations or be consumed in a processed state as a meat product (Heinz, Hautzinger, 2007). Regarding game meat processing, the national venison processing network is not particularly extended. The insufficient

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development of this sector is largely a consequence of the fact that the specific operations for processing game meat into products are quite complex and are not supported by a thorough knowledge of the specialized concepts. Furthermore, the quality characteristics of game meat are sensitive to the influence of various exogenous factors, which makes the processing of game meat more difficult than for other types of meat (Meltzer et al. 2013).

In the literature review, a small number of studies were found on both the different techniques of processing and assessing game meat and the consumption of game meat by consumers in our country. Moreover, no data was found on the efficiency of using game meat in the preparation of products in terms of meat yields obtained or on the methods of selecting different categories of game meat for processing (Bodnar et al. 2014).

Based on these considerations and motivated by the insufficient exploration of the subject and the need for further studies, the research aimed to study the peculiarities of the meat processing of cervids to obtain traditional speciality products. Based on the proposed aim, the study followed techniques of technological preparation of venison meat—cutting, deboning, and techniques of harvesting game associated with maintaining the characteristics of the meat, as well as a survey of different factors by which an optimal appreciation of the venison meat to be processed can be achieved.

MATERIAL AND METHOD

The biological material of the present study was three hind (*Cervus elaphus*) carcasses harvested from the 24 Frasin, Suceava hunting grounds during the 2021 and 2022 hunting seasons by trained hunters. Obtaining the biological material necessary for the present study involved organizing a hunting session and harvesting the specimens by shooting a single shot, followed by bleeding operations. Following the bleeding operation, the carcasses were transported to the primary processing area and weighed. Primary processing involved the removal of viscera and the overall inspection of carcasses after evisceration.

At the end of evisceration, the carcasses were transferred to the primary storage area. The game carcasses were stored in the field storage areas without skinning or removal of the head or extremities for periods of between two and six days and then transported to the meat processing facility. Transport of the carcasses was carried out in plastic-wrapped form, each time using a refrigerated vehicle, under appropriate hygienic conditions.

After the reception in the meat processing workshop of USV Iasi, each hind carcass was weighed in the form in which it was received and also after skinning and removal of the head and extremities, before storage for processing. The actual processing of the carcass involved cutting, deboning and sorting the meat. The technique of cutting the hind carcasses was based on separating the carcass into anatomical regions according to the delimitations established for each quality category.

At each stage of processing, data on the masses of the anatomical cuts was centralized in documents called hunting journals. According to these results, based on percentage calculations, the weight of each anatomical region and each type of tissue was evaluated, reporting the results obtained both at the level of the anatomical region and at the level of the carcass as a whole. The results were then interpreted in the direction of the weight of the higher-quality anatomical regions in the carcasses of the specimens, used to make traditional specialities from venison.

RESULTS AND DISCUSSIONS

Out of the three hinds, two (C1, C2) were harvested on the same day at different times of the day and the other (C3) was harvested in the morning time. The environmental temperature during the hunting period ranged from -6°C, the lowest temperature recorded at the time of the C3 hind hunt (February 2020), to temperatures of 6–8°C during the hunting periods held in the summer and autumn months.

All subjects constituting the biological material of the present study were shot using

a smoothbore with non-lead ammunition. In terms of the anatomical region, two of the specimens were shot in the thoracic area (C2, C3) and one in the spear area towards the abdomen (C1). In terms of general physical condition, the condition of all specimens harvested was found to be adequate; the body of the animals was harmonious, with no additional injuries to the gunshot wound identified. Each harvested animal was assigned an identification number by applying ear tags with the national symbols stipulated in the hunting legislation.

In the primary processing stage of the game, the mean weight of the three hinds was about 54 kg (ranging from 43 kg to 61 kg). The time from shooting to recovery was 30 minutes; bleeding was carried out within a maximum of 10 minutes from the time of actual harvest; and evisceration within a maximum of 60 to 90 minutes.

In the primary storage stage, according to the game centralizer, the storage temperature of the carcasses was between 4-6°C, as required by specific legislative limits, with an average storage time of 2-3 days. In terms of transport conditions to the processing facility, the transport time of the hind carcasses was approximately 2.5–3 h, and during transport, the refrigeration temperature was ensured at a maximum of 4°C, which meets the criteria, both from a safety and legislative point of view.

Following the cutting, deboning and sorting operations, the quantitative results obtained for the main anatomical regions of the hind carcasses, the values for the three specimens, as well as the average, minimum and maximum values are structured in Table 1.

Table 1 Results of the cutting, deboning, and selection of hind deer meat in terms of quantity

Species: Hind deer			***kg***					
			C_1	**C_2**	**C_3**	**$\bar{x}$**	**Min.**	**Max.**
Carcass weight at reception			49.64	37.06	54.7	47.13	37.06	54.7
Primary processing at reception	Carcass weight after skinning		47.15	33.96	52.4	44.5	33.96	52.4
	Skin weight		2.49	3.1	2.3	2.63	2.3	3.1
	Carcass weight after removal of the head		42.4	29.65	48.2	40.08	29.65	48.2
	Head weight		4.75	4.31	4.2	4.42	4.2	4.75
	Carcass weight after removal of extremities		40.8	28.35	46.95	38.7	28.35	46.95
	Weight of extremities		1.6	1.3	1.25	1.38	1.25	1.6
Gunshot wound removal	Weight after gunshot wound removal		33.9	21.65	41.2	32.25	21.65	41.2
	Shot wound weight		6.9	6.7	5.75	6.45	5.75	6.9
Cutting - Deboning	Weight of anatomical regions before selection	***S***	***14.6***	***11.03***	***16.93***	***14.18***	***11.03***	***16.93***
		C_I, C_{II}	13.2	7.47	17.77	12.81	7.47	17.77
	Bone weight		6.1	3.15	6.5	5.25	3.15	6.5
Selection	Weight of selected anatomical regions	**S**	**12.15**	**10.2**	**15.25**	**12.53**	**10.2**	**15.25**
		C_I, C_{II}	10.55	6	14.2	10.25	6	14.2
	Offcuts weight		5.1	2.3	5.25	4.21	2.3	5.25

$\bar{x}$ - mean values; S – specialties; CI, CII – quality I and II meat

At the reception, the hind carcasses with skin, head and limbs were weighed and the average value was 47.13 kg, the lightest being C2 with 37.06 kg, while the heaviest weight was identified in C3, approximately 54.7 kg. After primary processing of the received

carcasses, their weight decreased by approximately 8.5 kg, including on average 2.63 kg of skin, 4.42 kg of head weight and 1.38 kg of limb extremities.

The average weight of the gunshot wound was 6.45 kg, ranging from a minimum of 5.75 kg for C3 to a maximum of 6.9 kg for C1. The weight of the gunshot wound varied, depending on the actual shooting area and the damage to the animal's muscle tissue.

Cutting and deboning revealed the quantities of the muscle tissue itself and bones, so that from the average weight of 32.25 kg remaining after removal of the gunshot wound, 14.18 kg of specialities, 12.81 kg of meat quality I and II and 5.25 kg of bones were obtained.

In the case of the specialities, after the removal of an average of approximately 1.65 kg of connective tissue, average values of 12.53 kg were obtained, with a minimum of 10.2 kg (C2) and a maximum of 15.25 kg (C3). Quality I and II meat was also selected, with approximately 2.5 kg of offcuts removed for a total average of 10.25 kg (figure 1).

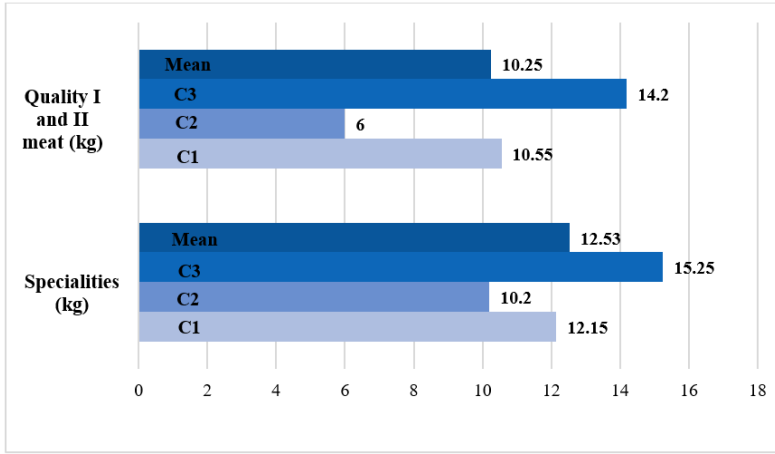

Fig. 1 Comparative weight of specialities and quality I and II hind meat after cutting, deboning and sorting

Thus, for the C1 hind carcass, 12.15 kg of specialities and 10.55 kg of quality I and II meat were obtained, while for the C3 hind, 15.25 kg of specialities and 14.2 kg of quality I and II meat were obtained, the average differences in these cases not exceeding 1 kg unit. Greater differences in the quantities of muscle tissue obtained were found in the case of cutting, deboning and sorting the meat from C2, which yielded 10.2 kg of specialities and 6 kg of quality I and II meat.

In a similar context, the individual proportional values and mean values of the three hinds on the proportions of anatomical regions by quality class were shown in Table 2. The main regions in terms of percentage out of the carcass were represented by the specialities, followed by meat of quality I and II, the shot wound, bones and other secondary components.

Regarding the initial weight of the hind deers obtained from the hunting centralizer, the specialities constitute the part with the highest share, 23.34% of the body weight, followed in second place by 18.58% of the quality I and II meat. The secondary components removed along with the shot wound, bones or after the selection contributed about 2.62 – 12.37% to the overall composition of the hind carcass.

Table 2 Proportions of anatomical regions of wild boar obtained after cutting, boning, and selection

Species: Hind deer		C_1	C_2	C_3	$\overline{x}_C$
Animal weight (kg)		57	43	61	
Carcass weight (kg)		40.80	28.35	46.95	
Specialities	*kg*	12.15	10.2	15.25	
	% of C	29.77[a]	35.97[b]	32.48	32.74
	% of T	21.31[a]	23.72	25[b]	23.34
Quality I and II	*kg*	10.55	6	14.2	-
	% of C	25.85	21.16[a]	30.24[b]	25.75
	% of T	18.5	13.95[a]	23.27[b]	18.58
Bones	*kg*	6.1	3.15	6.5	-
	% of C	14.95[b]	11.11[a]	13.84	13.30
	% of T	10.7[b]	7.32[a]	10.65	9.56
Offcuts	*kg*	5.1	2.3	5.25	-
	% of C	12.5[b]	8.11[a]	11.18	10.59
	% of T	8.94[b]	5.34[a]	8.6	7.63
Gunshot wound	*kg*	6.9	6.7	5.75	-
	% of C	16.91	23.63[b]	12.24[a]	17.59
	% of T	12.1	15.58[b]	9.42[a]	12.37
Head	*kg*	4.75	4.31	4.2	
	% of T	8.33	10.02[b]	6.88[a]	8.41
Extremities	*kg*	1.6	1.3	1.25	-
	% of T	2.8	3.02[b]	2.04[a]	2.62
Skin	*kg*	2.49	3.1	2.3	-
	% of T	4.36	7.2[b]	3.77[a]	5.11
Organs and viscera	*kg*	3.8	3.24	3.16	-
	% of T	6.66	7.53[b]	5.18[a]	6.46

R_a – anatomical region; C – carcass; T – total weight of the animal; a – minimum value; b – maximum value; $\overline{x}_C$ – mean value.

Figure 2 shows the average proportions of the main anatomical regions of the hind in relation to their initial weight at harvest. Thus, after removal of the head, limb extremities, skin and organs, the carcass constitutes 76%, which in turn consists of 23.34% specialities, 18.58% meat quality I and II, 9.56% bones, 7.63% trimmings and 12.3% shot wound (removed immediately after primary processing).

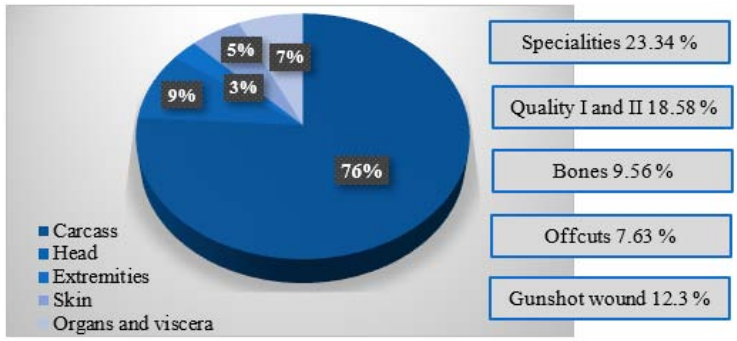

Fig. 2 Proportions of the main anatomical regions of the hind

CONCLUSIONS

According to the data, the various techniques for cutting, deboning and trimming game meat are very poorly defined and quantified in specialist practice, which, combined with the high sensitivity of game meat to the action of various exogenous factors, has meant that its processing constitutes a complex accumulation of actions.

The series of operations carried out have made it possible to assess the efficiency of using game meat to obtain meat products, in terms of the meat yields obtained, and to highlight some of the best methods for selecting the various categories of game meat for processing, concerning game harvesting techniques and maintaining the characteristics of the meat.

Comparing the values obtained in terms of the share of specialities with the share of meat of quality I and II, in the case of hind deer carcasses, specialities account for approximately 33% of the carcass, 7% more than the meat of quality I and II. A comparison with previous studies on the evaluation of wild boar carcasses showed the superiority of hind deer carcasses in terms of the share of anatomical regions in the specialities category, which indicates a higher potential for their valorisation towards traditional venison products.

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