THE ROE DEER (*CAPREOLUS CAPREOLUS*) - FROM BREEDING TO HIGHLY VALUABLE FOOD

Konjević[1], D.

SUMMARY

Natural breeding of deer provides a significant amount of highly valuable food every year. Considering the specific characteristics of natural growth, the deer meat quality is influenced by a large number of endogenous and exogenous factors that are difficult to control. Consequently, the emphasis is on the shot game handling in order to improve and maximally preserve their meat and secure better hygienic quality of meat. The paper presents a series of factors that require special attention, starting with freshly shot game on the hunting ground to transportation to authorised facilities for cutting and cooling, including also other potential factors reducing the meat quality.

Key words: *Roe deer, natural growth, meat quality, shot game procedure*

INTRODUCTION

The roe deer (*Capreolus capreolus* L.) is an autochthonous Croatian species from the Cervidae family (Figure 1). In distinction to other members of this family inhabiting the territory of Croatia (red deer, fallow deer and axis deer), it is the only species included in the group *Telemetacarpalia* (Janicki et al., 2008). This subdivision of the deer family is actually based on certain anatomical differences, such as the appearance of nasal-pharyngeal openings (choanae), presence of 2nd and 5th metacarpal bone, etc.

The roe deer, as the name of species, includes male animals or bucks, female animals or does and their offspring or fawns. There are also other local names for male yearlings (srnjačić) and two-year-old does (dvizica). Deer populations can be found in almost all regions of Croatia, but mostly in the continental part of the country, and by that is along with wild boar, the most prevalent big game species (Janicki et al., 2008). According to body characteristics, it is our smallest cervid weighing between 17 and 25 kg, with shoulder height of maximum 75 cm and head and body length to 140 cm. Only males have antlers, although individual females can on rare occasions develop antlers-like formations, usually as a consequence of sterility, certain pathological changes of the ovaries, age or other hormonal disorders. They are casted every year in regular cycles, and re-grow again from November onwards (within about 90 days). In fact, the

Figure 1. Roe doe (Photo D. Konjević)

[1] **Dean Konjević, DVM, scientific novice – assistant, Veterinary Faculty, University of Zagreb, Department for Game Biology, Pathology and Breeding, Heinzelova 55, 10 000 Zagreb, e-mail: dean.konjevic@vef.hr**

period of re-growth of antlers marks the start of growth and is the cause of a unique characteristic associated with the young roebucks, the growth of the first or juvenile antlers. While other members of "our" deer species develop their first antlers in the spring of the second year of life, the growth of antlers in young roebucks starts already in the autumn of the first year of life. This is not the growth of real antlers with all the component parts, but an outgrowth on the pedicles immediately beneath the skin of vertex or, very often, visible protrusions through the skin in the form of several centimetres long white branches. When completely developed, the antlers are considered as a beautiful and valuable trophy, which in its standard stage of development acquire the form of symmetrical hexameter (a term denoting antlers with a total of 6 tines, 3 on each side). Position of tines classifies them in posterior, anterior and superior.

The breeding season or rut in roe deer takes place each summer between July and August. Males become especially territorial at this time and try to ward other males away from the females in their territories, where they compete for access to females. When females become receptive to mating they are chased by males who want to breed with them. When a couple finally meets, they start their nuptial ritual with the male circling around the female. Such movements cause circles in the grass and ground, popularly called witch circles since ancient times. The gestation period is between 285 and 290 days. Such long gestation period of this relatively small animal is due to ability of delayed implantation where the newly formed embryo enters a state of suspended animation (first 130 to 140 days of pregnancy). This allows the pregnancy to be extended allowing the young to be born at the optimum time, late in spring from May to June. Typically a single young is born, but twins are not rare.

BREEDING MODELS

Unlike other species of the Cervidae family (Konjević, 2007), the roe deer (and moose) is much more difficult to rear on farms. Thus, the natural breeding in open or fenced hunting grounds is preferred, and significantly less in smaller fenced areas. The idea of controlled rearing, on mini farms, is still in its development phase. In addition, husbandry type of deer rearing is not rare. Individual breeders usually have a few does, or not rarely only bucks, in a smaller fenced area. In my opinion, such mode of breeding is by large the result of ignorance of the deer biology. During their walks in countryside, people often find "abandoned" fawns and then take them home to try to save them. Such action is wrong and people should be aware of the fact that the mother leaves the young alone and seemingly unprotected in long grass (mother is always in the vicinity) during its first week of life. This is the best method of protection of the young, as its scent glands are not yet active and it is invisible to potential predators, providing it stays motionless. The fawns taken

Figure 2. Mini-farm for roe deer breeding (Photo D. Konjević)

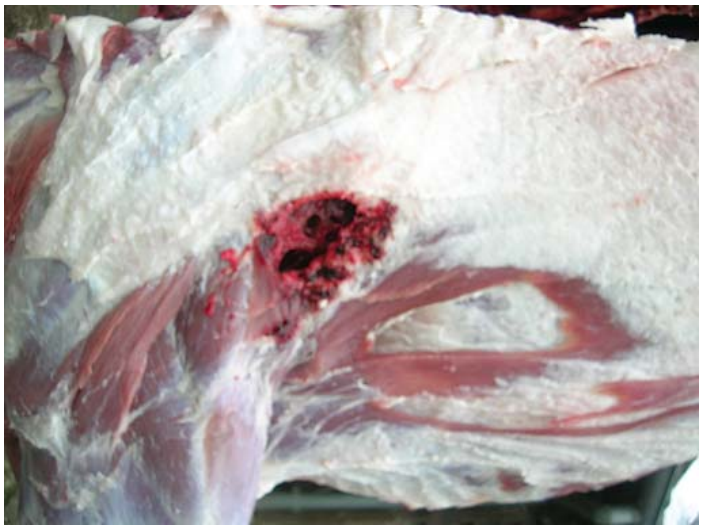
from their natural habitat will hardly adapt to it again if released, so that they often remain with their "owners" in small fenced areas.

Natural breeding of roe deer

Natural breeding of roe deer, and of other deer species (Konjević, 2007), is based on the habitat evaluation and determination of the game hunting-breeding areas. Book of rules on content, mode of preparation and decision-making procedure, i.e. granting of the hunting-husbandry base and programs of game breeding and protection (Anonimus, 2006a), serve as the basis for determination of the permissible number of roe deer for breeding per unit of hunting-productive area (1 unit =100 ha). It also includes working out of the animal sex and age structure and development of the foundation stock of this game species. It should be also pointed out that fawns and young animals are the most interesting category from the aspect of production of highly valuable food. Furthermore, the natural breeding of game is based on the implementation of hunting-husbandry rules laying down the measures of protection and feeding of game, as well as the measures for the improvement of habitat and reduction of game-induced losses. In this context, and especially nowadays, special attention should be paid to the establishment of the game-warden service and implementation of regular patrolling of hunting grounds. Unauthorised hunt was once regarded as a shameful act, mainly indispensable in order to provide food for one's family. Today, however, poaching is a source of excellent profit obtained through the sale of game. Of course, no directives of rearing are respected in the process. In case of natural breeding of game, the licensed manager of the hunting ground is responsible for securing sufficient amounts of high quality fodder for feeding of game during unfavourable environmental conditions.

Selective hunt is regulated by the Rules on the close hunting season (Anonimus, 2005a and Rules on the mode of use of the hunting fire-arms and cartridges (Anonimus, 2006c). As regards the hunting technique, the deer game is hunted either from the ground or from high seats, by stalking and allurement during the mating season. Rifle guns are used for selective hunt. The lowest permissible calibre is 5.6 x 57 with bullet weight not less than 3.24 g and kinetic energy at 100 meters not less than 1 000 J (Joule). Heavy bullets and large calibre with kinetic energy at 100 meters exceeding 3 000 J are not recommended. Maximally permitted hunting distance of 150 m is a prerequisite for regular selective hunt and optimum aiming point.

▼ **Figure 3.** Site of shot just in front of the sixth rib. Preserved muscle parts of the shoulder and rumen (Photo S. Tomić)



Controlled breeding of roe deer

Although the farm model of deer rearing was established years ago, the roe deer (and moose) was reported to be much more difficult to rear on farms. Roe deer are known as characteristic selectors (browsers) as regards feeding, requiring a larger portion of foliage in their daily diet. That directly reduces the level of intensification of rearing. On the other hand, roe deer can be successfully reared in small-size, fenced complexes, the so-called mini-farms (Figure 2). It should be remembered that according to its social structure the roe is mostly a solitary animal. They normally live alone, or in small groups made up of a female and her young of the current year and sometimes also those of the last year (family or extended family group). Such conditions should be provided for them, as well as sufficient quantities of selected feed for browsing. Care should be taken also about the observed excessive aggressiveness of bucks in captivity.

MEASURES FOR UPGRADING MEAT QUALITY

From the aforementioned, it is evident that roe deer breeding under controlled conditions is difficult. Consequently, the emphasis should be put primarily on the procedure with shot game in natural form of breeding, procedure with freshly shot game, respectively. It is well known that the annual roe hunt shows an upward trend. Number of shot deer game amounted to 4546 in 2000, 6017 in 2001, 6501 in 2002, 7432 in 2003, 7878 in 2004, and 8127 in 2005, respectively (Anonimus, 2007). Even the elective hunt, as the first step, is of utmost importance for subsequent meat quality. So, for example, "fall in fire"

(hunter's term for fall of game on the site of shooting) will enable prompt procedure with killed animal, but with a less good shot the animal will run away, and sometimes it will necessitate tracking with help of a bloodhound. In such circumstances, the period between shooting and finding of wounded animal will vary significantly, depending upon the place of shooting, land configuration and whether or not a bloodhound has been included in the pursuit. For example, if an animal has taken a bullet in the lung area, a big "air" surface will absorb the bullet striking energy and a wounded animal will live longer and will be able to run away further. In conformity with this, in case of a finding of foaming blood at the site of shooting, in general, a longer chase after wounded animal can be expected. It is advisable to immediately include a bloodhound in its tracking. Presence of bloodhounds in big game hunting grounds is obligatory (Anonimus, 2005b). Prolonged tracking of wounded animals increases the risk of microbiological contamination and meat spoilage. Furthermore, the very shot can be the cause of meat contamination, but also of direct loss of individual muscle parts (Figure 3). There is always a risk of meat contamination when a bullet hits the abdomen, including even a larger part of chest. As reported by Winkelmayer et al. (2005), both the heart and large blood vessels in deer are positioned more cranially in comparison to optimal shooting site in other game species. Thus, hits behind the sixth rib will in most cases cause perforation of rumen and visible contamination of the carcass with rumen content. Besides meat contamination with content of the alimentary tract, there is also a risk of direct loss of muscles due to a hit in e.g. shoulder or thigh. Fractured bone parts will be found at the site of hit, including extensive blood suffusions requiring cutting and removal of affected parts.

After the hunt and successful finding of shot game, each animal should be marked immediately with an identification tag, in compliance with the Rules on marking of big game with tags (Anonimus, 2006d), and then eviscerated. Traditional procedure with big game after kill has been described in earlier issues of the journal Meso (Konjević, 2003). New legal provisions now in force regulate obligatory examination of the game in authorised facilities, although certain specific characteristics of the very hunt are still present. Thus, for example, considering the rapidity at which the ripening and post-mortem processes in digestive organs occur, it is advisable to perform evisceration soonest possible, remove the coagulated blood and allow cooling of the carcass (Figure 4). In addition to already mentioned circumstances that can prolong the period between the kill and evisceration, the number of killed game in a hunt and configuration of hunting ground are also important. The hunting techniques for deer game permitted in the Republic of Croatia include stalking either from the ground or from high seats, allurement, lurking and hunting from vehicles (Grubešić, 2004; Janicki et al., 2004). Collective hunting with the so-called mild dogging or pushing was once practised as well (Kesterčanek, 1896; Janicki et al., 2003). Dogging technique of deer game hunting is now not allowed in Croatia, although certain forms of such collective hunting still exist in the neighbouring countries. During collective hunting in Austria and Germany, it was found that the very shot was significantly less precise, because of constant and often very quick movement of the game (and not standstill like in case of stalking). It also provided fewer possibilities for aiming, while evisceration was performed later on average in comparison with individual hunting (Brodowski and Beutling, 1998; Deutz et al., 2006). The latter was conditioned by the need of collecting and transporting all the shot game to the site of evisceration, quality of the hunt organisation and number of persons needed for eviscération. In our country, similar conditions can occur when a greater number of hunters go to individual hunt at the same time, so that the above-mentioned should be taken into account. Since open habitats are in question, there is also a possibility of the game falling dead on the territory with no access to vehicles. This necessitates dragging of the shot game to the first available road (forest or field path), and time interval to evisceration is prolonged again.

▼ **Figure 4.** Oozing out of the remaining blood immediately after evisceration; before transportation to the game cutting and cooling facility; corpses marked with identification tags (Photo S. Tomić)

Obligatory collection of samples for veterinary-sanitary examination and safe disposal of the remaining part of viscera follow evisceration. The game is then transported to a registered facility for cooling and cutting of shot game. In addition to correct handling of shot game, the mating season is an important factor that can have certain effect on meat ripening processes. Namely, some members of the roe deer family (bucks) are killed during the mating period, and that can adversely affect the pH value of meat and water binding capacity as well (Bittner, 2001). If all the indicated postulates of the shot game procedure are respected, the game meat, as regards its microbiological composition, will be food of acceptable hygienic quality, similar to food products of farm reared animals (Atanassova et al., in print). As regards subsequent storage of venison, studies have shown that an earlier deboning (12 to 24 hours after kill) is convenient for more qualitative storage of meat (Paulsen et al., 2005). According to its chemical composition, venison contains 74% of water, 21% of proteins and 4% of fat (Kulier, 1996), what makes it a highly valuable, low-caloric food.

ACKNOWLEDGEMENT

This scientific work has been prepared within the framework of the project of the Ministry of Sciences, Education and Sports, ''Applied biomedical research of deer game'', code: 053-0532400-2399.

ZUSAMMENFASSUNG

REH GEWÖHNLICH (CAPREOLUS CAPREOLUS) VON DER ZUCHT BIS ZU HOCHWERTIGEM NAHRUNGSMITTEL

Die natürliche Zucht von Rehwild sichert jährlich eine respektable Masse hochwertiger Nahrungsmittel. Mit Bezug auf die Besonderheit der natürlichen Wildzucht, steht die Qualität des Rehfleisches unter dem Einfluss vieler endogenen und exogenen Faktoren, die schwer zu beeinflussen sind. Deshalb wird der Akzent auf das Verfahren mit dem Wild nach dem Abschuss gesetzt, dies mit dem Ziel der Verbesserung des Wildfleisches und eines möglichst guten Bewahrens desselben sowie wegen der Sicherung eines möglichst guten hygienischen Fleischstatus. In dieser Arbeit ist eine Reihe von Faktoren dargestellt, auf die vom Abschuss bis zum Transport in zuständige Objekte für Tranchieren und Kühlen des Wildfleisches sowie auf alle möglichen Faktoren, die die Fleisqualität vermindern können, große Aufmerksamkeit gelegt werden soll.

Schlüsselwörter: *Reh gewöhnlich, natürliche Zucht, Fleischqualität, Verfahren nach dem Abschuss*

REFERENCES

Anonimus (2005a): Pravilnik o lovostaji. Narodne novine br. 155/05.

Anonimus (2005b): Zakon o lovstvu. Narodne novine br. 140/05.

Anonimus (2006a): Pravilnik o sadržaju, načinu izrade i postupku donošenja, odnosno odobravanja lovnogospodarske osnove, programa uzgoja divljači i programa zaštite divljači. Narodne novine br. 40/06.

Anonimus (2006b): Pravilnik o uvjetima i načinu lova. Narodne novine br. 62/06.

Anonimus (2006c): Pravilnik o načinu uporabe lovačkog oružja i naboja. Narodne novine br. 68/06.

Anonimus (2006d): Pravilnik o obilježavanju krupne divljači evidencijskim markicama. Narodne novine br. 54/06.

Anonimus (2007): Statistički ljetopis Hrvatske 2007. Državni zavod za statistiku, Zagreb.

Atanassova, V., J. Apelt, F. Reich, G. Klein: Microbiological quality of freshly shot game in Germany. Meat Science (2007), doi: 10.1016/j.meatsci.2007.07.004

Bittner, R. (2001): Meat quality of roe deer and wild boars under the influence of mating period. Fleischwirtschaft 81, 112-115.

Brodowski, G., D. Beutling (1998): The hygienic production of meat of game under hunting conditions – a study of fallow deer, roe deer, wild boars and red deer from Saxonia – Anhalt. Fleischwirtschaft 78, 1208-1210.

Deutz, A., F. Völk, P. Pless, H. Fötschl, P. Wagner (2006): Wildfleischhygienische Aspekte zu Stöberjagden auf Rot- und Reh-wild. Archiv für Lebensmittelhygiene 57, 197-202.

Grubešić, M. (2004): Lovljenje divljači. U: Lovstvo (Mustapić, Z. ur.). Hrvatski lovački savez, Zagreb.

Janicki, Z., A. Slavica, D. Konjević (2003): Lovstvo i zaštita prirode. Katedra za biologiju, patologiju i uzgoj divljači, Veterinarski fakultet Sveučilište u Zagrebu. Zagreb.

Kesterčanek, F. Ž. (1896): Lovstvo. Nakladom Kr. Hrv.-Slav.-Dalm. zemaljske vlade, Zagreb.

Janicki, Z., A. Slavica, D. Konjević, K. Severin (2008): Zoologija divljači. Zavod za biologiju, patologiju i uzgoj divljači Veterinarskog fakulteta Sveučilišta u Zagrebu.

Konjević, D. (2003): Postupak s dlakavom divljači nakon odstrjela, a u cilju poboljšanja održivosti mesa divljači (divljačine). Meso 5 (3), 43-46.

Konjević, D. (2007): Uzgoj jelenske divljači za meso. Meso

Kulier, I. (1996): Prehrambene tablice (kemijski sastav namirnica). Hrvatski farmer d.d., Zagreb.

Paulsen, P., F. Bauer, R. Winkelmayer, F. J. M. Smulders, P. Hofbauer (2005): A note on quality traits of vacuum packaged meat from roe-deer cut and deboned 12 and 24 h post mortem. Fleischwirtschaft 85, 114-117.

Winkelmayer, R., D. Malleczek, P. Paulsen, M. Vodnansky (2005): A note on radiological examination of the thoracical cavity of roe deer to identify the optimum aiming point with respect to animal welfare and meat hygiene. Wiener Tierärztliche Monatsschrift 92, 40-45.

Prispjelo / Received: 8.1.2008.
Prihvaćeno / Accepted: 31.1.2008.