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Soppela, Päivi; van den Berg, Mathilde ; Kynkäänniemi, Sanna; Wallen, Henri

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CHAPTER 3

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# Castration as Part of Reindeer Herd Management

*Päivi Soppela, Mathilde van den Berg,  
Sanna-Mari Kynkäänniemi, and Henri Wallén*

**Abstract** It has been suggested that reindeer castration is a practice that started very early in the process of reindeer domestication. Castrated males have long been favoured as working animals, and have been used for the transport of people and goods. Castration makes reindeer easier

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P. Soppela (✉) · S.-M. Kynkäänniemi · H. Wallén  
Arctic Centre, University of Lapland, Rovaniemi, Finland  
e-mail: [paivi.soppela@ulapland.fi](mailto:paivi.soppela@ulapland.fi)

S.-M. Kynkäänniemi  
e-mail: [sanna-mari.kynkaanniemi@oulu.fi](mailto:sanna-mari.kynkaanniemi@oulu.fi)

H. Wallén  
e-mail: [henri.wallén@ulapland.fi](mailto:henri.wallén@ulapland.fi)

P. Soppela · M. van den Berg · S.-M. Kynkäänniemi · H. Wallén  
Research Unit for History, Culture, and Communications, University of Oulu,  
Oulu, Finland  
e-mail: [mathilde.vandenberg@oulu.fi](mailto:mathilde.vandenberg@oulu.fi)

to handle and may have played a key role in associating humans with wild reindeer in the past. Although the importance of castration is recognised, there are few methods to define castrated reindeer from archaeological materials. This chapter explores past and present reindeer castration in Fennoscandian reindeer herding through historical and ethnographic evidence, presenting promising methods that can be used for the identification of castration from reindeer bone collections. We address the role of castration in reindeer that serve different purposes such as working and for meat, and consider how they have changed in relation to past and present reindeer herding, and herd management strategies. Various aspects of castration such as age, timing, and its physical and behavioural effects on reindeer are dealt with and discussed based on our fieldwork among present-day reindeer herders. The castration of draught reindeer working in tourism and racing is discussed based on reindeer herders' traditional knowledge, practical expertise, and experiences.

**Abstrákta** Gáskin lea árvaluvvon leamaš juo áramus boazodoalu oassi. Gáskojuvvon bohccot dehege hearggit leat adnojuvvon guhká vuojániin fievrrideame olbmuid ja sin gálvvuid. Hearggit lea álkit giedahallojuvot ja gáskin leanai sáhttán leat guovddášlaš domestikašuvdnaproseassa álgomuttuin, go eallit leat seatnaduvvon olbmuid lagasvuhtii. Vaikko dutkit dihtet gáskima leat boazodoalu ja bohcco domestikašuvvna mávssolaš oassi, de dan dan arkeologalaš dovdámii leat leame dušše unnán metodat. Dán lohkosis giedahallojuvvojit historjjálaš ja etnográfalaš gáldut gáskimis sihke dakkár metodat, mat sáhtále adnojuvot herggiid identifiseremii arkeologalaš materiálas. Mii giedahallat maid gáskima rolla ovdamearkka dihte vuojániid ja biergoprodukšuvvna várás šaddaduvvon bohccuid boazobarggus sihke suokkardallat dan, mot dát áššit gullet boazodoalu dábiide ovdal ja dál. Gáskinahki, dan áigemeroštallan ja dan váikkuhusat bohcco fysiologiijai ja meannudeapmái suokkardallojuvvojit earenoamážit dálá boazoolbmuid gaskavuodas dahkkojuvvon jearhállamiid vuodul. Mii atnit ávkin maid boazobarggiid árbevirolaš dieđu, máhtu ja muosáhusaid turisma- ja gilvoatnui dábmojuvvon vuojániid gáskima mearkkašumiid suokkardallamis.

**Tiivistelmä** Kastraatia arvelaan käytetyn jo poronhoidon varhaisimmissa vaiheissa. Kastroitua urosporoja eli härkiä on käytetty pitkään ajokkaina kuljettamassa ihmisiä ja heidän tavaroitaan. Härkiä on helpompi käsitellä kuin kastroimattomia uroksia ja kastraatio on voinut olla avainasemassa domestikaatioprosessin alkuvaiheissa, kun eläimiä on totutettu

ihmisen läheisyyteen. Vaikka tutkijat tietävät kastraation olevan tärkeä osa poronhoitoa ja poron domestikaatiota, sen arkeologiseen tunnistamiseen on olemassa vain niukasti menetelmiä. Tässä luvussa käsitellään kastraatiosta kertovia historiallisia ja etnografisia lähteitä sekä menetelmiä, jotka voivat soveltua härkien tunnistamiseen arkeologisesta aineistosta. Käsittelemme kastraation roolia ajokkaiden ja lihantuotantoa varten kasvatettujen porojen hoidossa sekä pohdimme sitä, miten nämä asiat ovat muuttuneet ja liittyvät poronhoidon tapoihin ennen ja nyt. Kastroidintikää, kastroidinnin ajoitusta ja vaikutuksia poron fysiologiaan ja käyttäytymiseen pohditaan nykyisten poronhoitajien parissa tehtyjen haastattelujen pohjalta. Tässä hyödynnämme etenkin niiden poronhoitajien perinteistä tietoa, tietotaitoa ja kokemuksia, jotka kouluttavat ajokkaita matkailu- ja kilpakäyttöön muun poronhoidon lisäksi.

### 3.1 INTRODUCTION

Reindeer castration is an ancient practice that has been of great importance for reindeer herding cultures of the circumpolar north, both in the present and in the past. Reindeer were probably already being castrated very early in Fennoscandian reindeer herding for use as draft and meat animals, and as part of herd management.

Several authors argue that the domestication of reindeer started with taming castrated males for transport purposes by hunter-gatherer groups (e.g. Ingold 1986; Bjørklund 2013). It is from the Late Iron Age onwards that the first archaeological evidence for small-scale reindeer herding in Fennoscandia emerges, in which castrated males may have been used for transport, intact males for breeding, and female reindeer for breeding and milking (e.g. Aronsson 1991; Hansen and Olsen 2014). During the sixteenth and seventeenth centuries, large-scale pastoralism arose among the Sámi in northern Fennoscandia (e.g. Hultblad 1968; Arell 1979; Mulk 1994; Bergman et al. 2013), with castrated males being used for multiple purposes such as transport, work, herd management, meat, and serving as lead reindeer during migrations.

Reindeer castration was probably not developed in isolation from other livelihoods. It was probably partly adopted from practices used in early animal husbandries by other groups such as cattle and sheep breeders with whom the Sámi had contacts and who castrated bulls to create more docile animals for transport and working in the fields. It has been argued that early Sámi livelihoods were more versatile than thought, and the

southern Sámi probably already practised livestock husbandry before reindeer herding between around 200 and 550 CE in central Fennoscandia (Piha 2020). This is supported by linguistic analyses of southern Sámi reindeer herding vocabulary, which has many loanwords from the livestock husbandry vocabulary of the Proto-Scandinavian language, and the archaeological findings of sheep and goat breeding in the dwelling sites of the southern Sámi from the early Iron Ages (Piha 2020).

In modern times, castrated reindeer are used for the meat, tourism, and reindeer-racing industries, and for herd management strategies. This chapter addresses the role of castration as part of reindeer herd management, links between castration and taming, and the identification of castration in the archaeological record. We highlight the role of castration in reindeer that serve different purposes such as working and for meat, and consider how they are related to past and present herding strategies. Different aspects of castration such as age, timing, and its physical and behavioural effects are dealt with and discussed based on our interviews among present-day Sámi and Finnish reindeer herders (Soppela et al. 2022, n.d.; van den Berg, n.d.), and integrated with archaeological research where available or applicable.

Two sets of fieldwork including participant observation and interviews were conducted in different parts of the reindeer herding area in northern Finland in 2019–2020. The fieldwork complemented each other in terms of districts and disciplinary approach that was both ethnobiological (Soppela et al. 2022, n.d.) and ethnoarchaeological (van den Berg, n.d.) (see Chapter 1). Soppela et al. (2022, n.d.) did their fieldwork among 13 reindeer herders (nine men and four women) in eight districts. The majority of herders had lifetime expertise in managing and training draught reindeer for tourism and racing, and of reindeer herding in general, including meat production. Nine herders trained draught reindeer for tourism enterprises of their own. Five of these herders had also trained racing reindeer. Four herders trained mainly racing reindeer. Van den Berg (n.d.) did her fieldwork among 11 reindeer herders (nine men and two women) in six reindeer herding districts. All the herders managed reindeer for meat purposes; four herders trained reindeer for tourism, and two herders trained racing reindeer. The fieldwork's methods and analyses are described in detail in the respective papers and manuscripts.

### 3.2 BENEFITS OF CASTRATION FOR REINDEER MANAGEMENT

The reindeer is a seasonal breeder with active rutting behaviour. The male calves can reach puberty at the age of 6 months but usually do not start to rut until their second autumn, at 1.5 years of age. The rutting season lasts about a month and peaks in early October. During the rut, mature females gather into harem groups under the control of a senior male (*FI: hirvas, NS: sarvvis*). A male invests a lot of time in guarding its harem, fighting other males for females, and keeping the harem together (Paine 1988; Holand and Weladji 2019). During the rut, males barely eat, and rest and tend to lose much of their weight (Ryg and Jacobsen 1982; Paine 1988; Mysterud et al. 2008).

The herders who trained reindeer for draught use reported that the purpose of castration was to keep a male away from fighting and running after females, and thus improve its ability to maintain its health and good condition over the winter (Soppela et al. 2022; van den Berg, n.d.). The herders mentioned that it was also important to castrate reindeer to prevent injuries related to fights during the rut. The castrated draught reindeer (*FI: härkä, NS: heargi*) do not participate in fighting and gathering the harems. Instead, they gather with other castrated males during the autumn.

Another reason for castration is to produce males with calmer behaviour that are easier to handle than uncastrated males. The castrated males have been preferred working animals over time and used for the transport of people and goods (Grotenfelt 1920; Itkonen 1948; Turi 1979; Paine 1994, Kortesalmi 2008). In addition, the castrated males have been highly valued meat animals. The males that are castrated for meat production are mature to older males. This is because when they get older, the castrated males get more fat and muscles than uncastrated males, and gain weight until slaughtered. This has made them a preferred meat animal in traditional Sámi reindeer herding (Itkonen 1948; Aikio 1989, Soppela 2002; van den Berg, n.d.).

The concept of “herd management” as it is generally used in livestock management highlights the meat production, efficiency, and controlled reproduction conditions. In turn, reindeer graze on natural pastures most of the year, and their mating is largely not controlled. It is only during the winter round-ups, and in some cases during winter feeding, that their reproduction process can be controlled at certain level. In round-ups, this

happens by selecting those reindeer that are left alive for breeding and those that are slaughtered or castrated. Due to its strong association with nature, the herd management in reindeer herding is the holistic care of the herd. It is a key concern of herders to take care of the herd's (*FI: tokka, NS: eallu*) welfare in such a way that reindeer can roam freely, find their food from pastures, reproduce, and be protected from predators at all times. The herders aim for a herd that is diverse in terms of animals of different ages, sizes, and types and is thereby strong to adapt to and survive varying conditions—a beautiful herd or *čappá eallu* (*NS*) as featured by Sámi herders (Tyler et al. 2007; Mazzullo 2010).

It was still more common to have a larger number of both castrated and intact males in the herd in the mid-1900s than it is today (Sect. 3.5). From the perspective of herd behaviour, castrated males offer several benefits to the herd and herder. Since the castrates stray less from the herd than bulls and have calmer behaviour than intact males, they help keep the herd gathered, and quiet, and promote herd centricity (Beach 1993; Paine 1994). These roles were particularly important in a pastoral herd or nomadic Sámi reindeer herding, because behaviour of the castrates kept the herd calm and helped the herders keep the herd together (Paine 1988; Tyler et al. 2007). The intact males and castrates also guarded the herd from predators and helped other reindeer dig lichen under hard snow cover in the winter (Tyler et al. 2007).

There are also other reasons for castration in terms of herd management, such as control of the herd gene pool and structure (Paine 1994; Holand et al. 2003; Mysterud et al. 2003). The actions include the removal of certain animals from breeding, selecting animals for later slaughter, and generally controlling herd structure and behaviour. The first two rationales overlap. Males that are seen as unfit for breeding are castrated, so the herder can steer the rut in a certain direction with desirable traits being allowed to stay in the gene pool, while less desirable ones are removed. The castrated males are allowed to gain weight the next summer after castration or even longer before slaughter. The males are slaughtered at an older age so they can gather strength during the rut instead of fighting and succumbing to fatal exhaustion during the winter.

The present-day herders carefully considered the castration of animals and herd management (Soppela et al., n.d.; van den Berg, n.d.). Among the herders it was a general practice to castrate or slaughter the males that were seen as undesirable for breeding and continuing their line. Removal from breeding usually pertains to males that are smaller and weaker

than the others. These reindeer are sold for meat or used for domestic purposes, alongside the females that have not produced offspring for several years. The stronger and bigger males are kept for breeding but castrated at a later age, so that other younger reindeer can contribute to the gene pool.

Some present-day herders (van den Berg, n.d.) also mentioned that it was not favourable to have too many intact males in the herd during gathering times, because many males would divide the herd into smaller congregations, and having more castrated males made it easier if one needed to gather the herd. One of the herders explained that castrated meat reindeer could be easy to round-up because they were calm, and they also encouraged the other reindeer to move in the right direction. Similarly, the older herders in our fieldwork mentioned that before the advent of the snowmobile, it was common to search for the herd and guide it from the woods to round-up sites using a small group of castrated males as helpers, while the herders themselves followed them on skis or with a draught reindeer (Soppela et al., n.d.). However, the herders noted that the castration was no guarantee that the reindeer would not become “wild” again when they were released back into the forest, especially if they remained without human contact for a long time (Soppela et al., n.d.).

### 3.3 INFLUENCES OF CASTRATION

#### 3.3.1 *Age of Castration*

Almost all the reindeer now used as draught reindeer in tourism are castrated males. Nearly all the herders in our studies (Soppela et al. 2022; van den Berg, n.d.) who trained draught reindeer for tourism in Finnish Lapland, reported that their reindeer were castrated at three to four years of age, or at the latest at the age of five when the training is completed. Castration is known to halt the growth of reindeer and the herders therefore preferred not to perform it at a young age. They mentioned that when the male reindeer were older than three years (*FI: hirvas*, *NS: sarvvis*), they had often attained their full size, depending on their growth capacity and nutrition. They highlighted that the age of castration depended on reindeer’s individual growth rate (Soppela et al. 2022; van den Berg, n.d.). The age of castration is mainly in line with information



related to contemporary working reindeer in northern Finland (Niemi and Pietilä 1999: 122; Korhonen 2008: 132–133; Vuojala-Magga 2010, 2010).

However, reindeer trained for racing are often not castrated at all today (Soppela et al. 2022; van den Berg, n.d.). It has been found that uncastrated racing reindeer can perform better due either to their physical or mental characteristics. They are left uncastrated to affect their behaviour as little as possible and preserve their useful “wild” characteristics such as keeping their speed and competitive spirit (Soppela et al. 2022). When racing reindeer are castrated, it is either done at the end of their career between the ages of six and seven, or between the ages of three and four—usually at four—when their final structural habitus can be better seen. Today, less than half of the racing reindeer in Finland are castrated, and the castration is decided case-by-case (Soppela et al. 2022).

It is less usual to castrate reindeer for meat purposes today as it was in the last century (Sect. 3.5). For breeding purposes, a fit reindeer is allowed to breed and may not be castrated until they are between the ages of five and six, or sometimes at four years of age. First, males are selected for breeding, but after they have fulfilled that duty, they can be castrated and sold for meat the next season. Weaker reindeer can be castrated younger, at two to three years of age, thus removing them from the gene pool and improving their chances of survival during the winter. They may be slaughtered the next year or in any year the herder finds suitable. Reindeer herders try to avoid castrating males too young, because they are then small, and the meat yield is low (Soppela et al., n.d.; van den Berg, n.d.).

Investigations among Sámi herders in the last century show that like today, males from any age class could be selected for castration with the prospect of slaughtering them for meat later in the year (Paine 1994), depending on local traditions. However, mature males were the preferred castrates for meat purposes (Itkonen 1948; Kortessalmi 2008). For example, older bulls might also be castrated at up to six years of age if there was a prospect of a harsh winter, which could prove fatal for the bull after the exhaustion of the rutting season (Rönnow 1949; Paine 1994). There were also instances in which reindeer could be castrated earlier for economic reasons, such as at two and a half years old, if not enough reindeer were available for slaughter (Rönnow 1949). Linnaeus also observed the Sámi reindeer herders castrating their reindeer at two

and a half years of age (Graves 1995). However, Paine (1994) observed among the Sámi in Finnmark that reindeer were never castrated at two years of age, because they had strong bodily growth and would recover quickly after the rut even when not castrated.

### 3.3.2 *Timing of Castration*

The timing of castration during the reindeer herding year depends on many variables. The choice of time depends on the region's traditional practices, the beliefs of the herders, the timing of the autumn reindeer round-ups, and prospects of slaughter. Herders who train draught reindeer for tourism in Finnish Lapland reported that they usually castrated their reindeer during the spring around March after the training season (Soppela et al. 2022), when they were still close by and soon to be released to pasture for the next six to seven months. The timing of castration depended on the reindeer's growth rate. Some herders reported that they followed the growth of their draught reindeer trainees throughout the summer and castrated most of them during the autumn, when they were in prime condition before the rutting season. In the case of racing reindeer (Soppela et al., n.d.), herders monitored their physical structure and growth rate throughout their training before deciding the timing of the castration, and carefully pondered the potential effects of the castration on their fattening, training, and speed properties.

Paine (1994), who spent time with Sámi reindeer herders in Finnmark during the last century, observed that the meat reindeer were usually castrated in the summer at the same time as the earmarking of calves. It was believed that the longer one waited in the summer to castrate a reindeer, the higher the chances of an animal becoming an incompletely castrated reindeer (Paine 1994: 26; referred as *rakkiberigi* in North Sámi). This is an individual which can still participate in the rut, and although these reindeer are often infertile, they are thought to be more aggressive and unpredictable than intact males, and are generally unwanted. However, Paine observed that castration was undertaken from the late spring to the rut itself, whenever there was an opportunity, and the herder took the decision. Collinder (1949) spent time with the Sámi in Kiruna in Sweden, and observed that the castration took place in the early autumn, just before the rutting began. Beach (1981) noted that the Sámi reindeer herders in northern Sweden castrated their reindeer either during calf earmarking or later in the autumn. In the past, meat reindeer here were

sold for slaughter just after the rut, and so it was important to castrate them during the summer so they would avoid the effects of the rutting season.

Likewise, the reindeer herders who breed reindeer for meat today have differing practices for the timing of castration. Castration may take place, in addition to the spring winter, in any suitable occasions where reindeer are available during the annual activities. For meat purposes, the practice of castration decreased during the last century due to the increase of calf slaughter and winter feeding. In most regions, reindeer are fed during the winter and thus stay in good shape over the winter, so there is often no need for them to be castrated to improve their weight and chances of survival in the winter, with the prospect of slaughter the following autumn. Some herders slaughter intact males in the early spring when they have recovered from the rut for the purpose of making dried meat that is commonly prepared in spring winter (van den Berg, n.d.). The spring slaughter is also implemented among male race reindeer that will not continue their career in the following winter (Soppela et al., n.d.).

Many beliefs are associated with the castration of reindeer. Some herders who trained reindeer for tourism and racing in Finnish Lapland emphasised that reindeer should be castrated under a high or growing moon, and practised this (Soppela et al., n.d.). Such herders believed that the reindeer castrated during this time would grow antlers with properly shed skin (*FI: kelosarvi, NS: čaloaivi, gáljačoarvi*) (Soppela et al., n.d.). This is in line with similar thinking among Sámi herders in the early 1900s (Itkonen 1948). Other, mostly young, herders mentioned this belief, but admitted they did not take the lunar cycle into account themselves (van den Berg, n.d.). These younger herders said that the physical effects of castration were more associated with chance, not with the lunar cycle. Most of the herders who took the lunar cycle into account (Soppela et al., n.d.) also admitted that the physical effects of castration greatly depended on luck, and that their choice of the timing of castration was much affected by practical matters.

### 3.3.3 *Physical Effects of Castration*

Ethnographic and ecological research refers to several physical reasons for castrating a reindeer, all related to the avoidance of the effects of the rutting season. Reindeer, like other cervids, have a cyclic growth pattern, growing intensely during the summer and decreasing their growth and

losing body weight in the winter. The rutting time triggers changes in the growth and food intake (Ryg and Jacobsen 1982; Mysterud et al. 2003), as well as in the antler cycle related to gonadal activity (Hirotani 1990). As previously mentioned, castrated reindeer retain their body weight better than intact males, because they avoid the general exhaustion and hormonal shifts of the rutting season (Beach 1981; Skjenneberg and Slagsvold 1979; Ryg and Jacobsen 1982). This allows them to be fit for work during the winter, while intact males lose weight (Ryg and Jacobsen 1982) and can get exhausted and thin (Paine 1994: 25–28). Instead of becoming emaciated due to the rut, castrated males can grow large and muscular during subsequent years (Aikio 1989). Interestingly, castrated males trained for racing have faster and stronger muscle fibres than ordinary males (Pösö et al. 1996). The meat of castrated reindeer is tender and fat, and thus good for the meat industry or domestic purposes (Aikio 1989; Paine 1994; Soppela 2002).

The reindeer herders we interviewed agreed that the physical effects of castration were indeed partly due to the fact that the harmful effects of the rutting season were avoided. The herders mentioned that castrated reindeer did not lose their weight and retain their energy during the rutting season. They reported that the castrated males were stronger and were thus perfect for draft purposes in the tourism industry, whereas it took intact males several weeks to recover from the rutting season. Herders highlighted that castrated draught reindeer stayed healthier, lived longer, and survived better in the woods due to their fat storages (Soppela et al., n.d.; van den Berg, n.d.). As mentioned in Sect. 3.3.1, castration is also known to halt the general physical development of the reindeer, which is believed to be related to the effect of castration on bone development (see Sect. 3.4).

Another important physical effect of castration is the response of the antlers (Soppela et al., n.d.; van den Berg, n.d.). Reindeer are unique among cervids in that both sexes have antlers that are replaced annually. Males keep their antlers until rutting time and drop them soon thereafter (Hirotani 1990) becoming antlerless (*NS: nulpo*, *FI: nulppo*). Castrated males retain their antlers longer in the winter and do not drop them immediately after the rutting season like intact males. Precisely when the castrated male drops its antlers varies between individuals. For example, it can retain them until December or drop them even later in the early spring. The antlers of castrated males are of poorer quality than the antlers of intact males, and the burr is also wider (see Sect. 3.4).

The herders who trained draught reindeer highlighted that the intensity of castration had a significant physical effect on the antlers, and if it was done too tightly, the antlers kept their skin cover longer in the winter (Soppela et al., n.d.; van den Berg, n.d.), which is undesirable. Since blood is circulating in these thin skins, snow can easily melt and accumulate on them. The herders reported that if castrated males had velvet antlers (*FI: nahkasarvi, NS: námmēčoarvi*), they might remain until the spring, but if they had bare antlers (*FI: kelosarvi, NS: čaloaivi, gáljačoarvi*), they stayed just during the winter (Soppela et al., n.d.). Paine (1994) also states that the dropping of the antlers depends on the tightness of the castration.

It sometimes happens that newly growing skin antler protrudes from the base of the old antler and forms bumpy projections (*FI: peruukkisarvi*). However, these are relatively rare, and the herders reported that they developed when the castration was too tight (Soppela et al., n.d., van den Berg, n.d.). They are unwanted outcomes of the castration, because castrated reindeer that have them may more easily suffer inflammation and disease (Soppela et al., n.d.). The bony rim around the bottom of the antlers, the burr, differs markedly in these castrated males (Fig. 3.1.) from castrates with normally developing antlers (Figs. 3.2, 3.3, and 3.4). As a castrate with these projections ages, he starts to develop several branches of antlers growing outside of the base, and the burr thus becomes enlarged. Uncastrated males and females only develop one major branch.

Today, castration is performed with specific pliers, but reindeer were castrated in the past by biting them with the teeth. Herders still use the term “biting” in everyday language to describe castration. In our interviews, the herders explained that it was possible to adjust how “tightly” a reindeer was bitten. This influenced the “strength” of castration and the quality of the antlers. Most of the herders preferred a castrate which cleaned the leather from its antlers early. The older herders mentioned that it was possible to intentionally produce a particularly strong draught reindeer when its hormonal function partly remained and rut behaviour remained, although it was infertile (Soppela et al., n.d.). This agrees with a similar notion about castrated reindeer like this among Sámi in the early 1900s, referred as *peälle piehttit* (*NS*) (*FI: puolipiettiin*) mentioned as strong draught reindeer (Itkonen 1948: 109). One of the interviewed older herders belonged to a family of biters and had been able to produce this kind of strong draught reindeer (Soppela et al., n.d.). Such biters



**Fig. 3.1** The burr of this 16-year-old castrated male has become considerably enlarged over the years. Several branches have developed at the base of the antler, and they all grow simultaneously. (Photo: M. van den Berg)



**Fig. 3.2** The normally developing velvet antlers in a four-year-old male just before its castration in April 2019. The antler growth of the same reindeer one and two years later is shown subsequently in Figs. 3.3 and 3.4. (Photo: S-M. Kynkäänniemi)

and biters in general are appreciated for their skills. Herders reported that there are still herders who had a particular skill in castration, and they also castrated other herders' reindeer, though with modern methods (Soppela et al., n.d.). Every herder had their own techniques regarding their touch and the effective time of the castration.



**Fig. 3.3** The developing velvet antlers of a castrated male in April 2020 with whitish spots in the middle showing where the old antlers had dropped a couple months earlier. The male is the same as in Figs. 3.2 and 3.4 and was castrated in April 2019. Reindeer rub their antlers with an oily secretion from their leg interdigital gland, which gradually makes white spots (remains of old antlers and their release products) disappear while new antlers continue to grow. (Oral communication and photo: S-M. Kynkäänniemi)

### *3.3.4 Behavioural Effects of Castration*

In general, castration has the benefit of making the handling of animals easier. Castrated reindeer are easier to train and have generally calmer behaviour than intact males with rutting behaviour. This is beneficial when handling castrates as part of a herd or group of reindeer, where they have a reassuring effect on the group, and when cooperating with the castrates as working reindeer (Skjenneberg and Slagsvold 1979; Soppela et al., n.d.; van den Berg, n.d.).

Castration calms the behaviour of reindeer during the rutting season. Castrated reindeer do not fight with other males to assemble a harem,





**Fig. 3.4** Hurjimius, a six-year-old castrated male with handsome bone antlers (*kelosarvet*) in January 2021 on its second winter after castration. (Photo: S-M. Kynkäänniemi)

but focus instead on eating. Castrated reindeer were viewed as lazier than intact males by some herders (van den Berg, n.d.). However, some castrated reindeer were perceived as hard working and not lazy, despite castration, and this effect was thought to be related to whether this reindeer developed “hard” or “soft” antlers (i.e. a dense versus porous structure, see Sect. 3.4). Reindeer with “hard antlers” that scratched the velvet off their antlers during the rut were seen as fitter and less lazy. In contrast, lazier reindeer did not rub the velvet—or “leather” as many reindeer herders called it—off their antlers, and it thus stayed on the antler throughout the winter until the antlers were dropped (van den Berg, n.d.).

From a herd management perspective, castrated reindeer stray less from the herd than bulls (Beach 1993) and promote herd centrality (Paine 1994). Both effects were important in the management of nomadic

pastoral herds in the past, but also today when handling reindeer. Some of these effects were also perceived by the present-day reindeer herders. They mentioned that castrated males congregated and formed their own groups, especially during the rutting season (Soppela et al., n.d.; van den Berg, n.d.). One herder who owned meat reindeer said: “*But mostly, if you compare non-castrated with castrated males, non-castrated males are less social. They’re like, moving. Well, the males... in the summer, the males are moving together, but when the mating season comes the non-castrated males, they like separate from each other and start to fight and not to like each other. But the castrated males, which we call pailakka... Yeah, so they move together all the time, the castrated males, so they’re like friends all the time*” (RH8, van den Berg, n.d.).

Because castrated males retain their antlers throughout the winter months, they have better access to food during this time, alongside the females, which also retain their antlers (Paine 1988; Soppela et al., n.d.; van den Berg, n.d.). However, some herders observed that the females were still dominant over the castrated males. The herders mentioned that castrated males did not fight with other reindeer in the autumn and were thus more protected. They did not take part in rut time fighting and because of this were less prone to injure themselves (Soppela et al. 2022, n.d.; van den Berg, n.d.). However, herders mentioned that castrated draught reindeer could still protect their hierarchical position by showing off to or even fighting other males when there were changes in the herd’s feeding groups or when their antlers were sawn (Soppela et al., n.d.).

When trainers evaluated the behaviour of the draught reindeer, many opined that castration did not change the character of the reindeer as such; the change was more related to the control of the behaviour—if the reindeer had a lively character, this would remain: “*It isn’t a reason to castrate it to make it’s character quiet. It is done to stop rutting time fighting*” (H13, Soppela et al., n.d.). Most of the herders mentioned that after successful castration, a draught reindeer was calmer, and it did not go through the rut. When the castration happened too loosely it had the opposite effect, and the result might be *piettiö* (FI) with aggressive rutting behaviour (Soppela et al., n.d., van den Berg, n.d.).

### 3.4 METHODS FOR IDENTIFICATION OF CASTRATES IN THE ARCHAEOLOGICAL RECORD

Detecting castrated reindeer in the archaeological record may help elucidate the development and nature of different herding strategies over time, as well as uncover early human–reindeer relationships. As mentioned in the introduction, the castration and taming of males has been suggested as the first step towards reindeer domestication among ancient hunter-gatherer groups (e.g. Ingold 1986; Bjørklund 2013). The possibilities of identifying castrated reindeer in the archaeological record are related to the effects of castration on the antlers and skeleton of the reindeer.

Several studies have been conducted on the effect of castration on the bones of different mammal species, with results pertaining to the differing proportions and sizes of castrated versus non-castrated animal bones. Regarding large ungulates, these differences have been reported for sheep, goat, and cattle (e.g. Hatting 1983; Brannang 1971; Noddle 1974; Shahin et al. 1992; Moran and O'Connor 1994; Davis 2000; Popkin et al. 2012). The proposition of these methods is that skeletal growth is affected if castration happens before the animal has reached skeletal maturity, which is around four and a half years of age in the case of reindeer (Hufthammer 1995; Takken Beijersbergen and Hufthammer 2012). This also offers opportunities for the identification of castrated reindeer in the archaeological record.

Van den Berg et al. (2022) developed a method for the identification of castrated reindeer bones from reindeer bone assemblages, related to the differences in bone growth between the sexes. The authors employ osteometric and statistical methods, both to identify the characteristics of castrated reindeer bones and to develop a method that can be applied on archaeological reindeer bone finds. The analysis shows that the two male types, castrated and uncastrated, can be metrically separated. The osteometric differences were most pronounced in the radioulna, humerus, and femur in terms of osteometric depth and width.

Herders were specifically asked about the structure and attachment of the castrate antlers. We learned that castrated reindeer antlers differed from intact male reindeer antlers in three different ways. First, most reindeer herders agreed that antler density properties differed between males, castrated males, and females. Second, the attachment site of the antler base to the pedicle on the skull differed in shape between the sexes. Finally, the burr of the antler differed in size between castrated and intact

males. All herders reported that intact males had very dense, solid, heavy, and strong antlers. Castrated males had antlers that were less dense, and softer and porous, or are thought to have more “air” in the antler structure. Female antlers were smaller and thinner, but of a good dense quality (van den Berg, n.d.).

The herders reported that the attachment site of the antler base, or “*kiire*” in Finnish, can also indicate whether a reindeer is castrated (van den Berg, n.d.). The herders informed us that the antlers of male reindeer were strongly attached to the skull and more protruding. The castrated male antler’s base was more loosely connected to the skull, and the antlers could drop more easily in the winter when the reindeer was defending itself or digging for food. The attachment site of castrated males was concavely shaped. The attachment of the females was flatter (Fig. 3.5.). This difference in the shape of the antler base was also noted by Bosi (1960: 114).

The methodological possibilities outlined here have yet to be applied to archaeological material. However, the insights from our interviews on reindeer antlers and the new research on osteometric differences between male and castrated male reindeer bones (van den Berg et al. in press) offer new opportunities to define the presence of castrated reindeer in archaeological assemblages in future research. The approaches contribute to the evaluation and analysis of the development and prevalence of different reindeer management strategies over time. When investigating the presence of castrated reindeer from the archaeological record, the bone findings may represent working reindeer, as well as reindeer castrated for other purposes. Therefore, combining different methods to identify working reindeer are then essential.

### 3.5 CHANGES IN CASTRATION AND REINDEER MANAGEMENT

The present-day reindeer husbandry in Fennoscandia is a modern livelihood which is still based on the extensive use of pastures and herders’ skills in knowing and working with their reindeer. However, instead of pastoral herding as in full nomadism, present-day reindeer husbandry is based on the free grazing of reindeer, in which contact with reindeer is mainly confined to certain periods of the year, such as calf earmarking and autumn round-ups, and increasingly, when supplementary feeding of



**Fig. 3.5** The attachment site (Fi: *kiire*) of the antler base to the pedicle on the skull is differently shaped for males (upper), castrated males (middle), and females (lower). The attachment protrudes in males, is concave in castrated males, and is flat in females. (Photo: M. van den Berg)

reindeer occurs during the winter months (Turunen and Vuojala-Magga 2014; Horstkotte et al. 2020). In some northernmost districts, reindeer are still herded in the winter. It is also necessary to herd reindeer to protect them from predators. However, in the summer and autumn, reindeer graze freely on pastures.

Major changes in Fennoscandian reindeer herding occurred during the last century, starting in the 1960s and 1970s. This resulted in a drastic decrease in castration practice for herd management reasons, and thus the proportion of castrated males decreased too. This change was especially dramatic in reindeer husbandry in Finland. The drivers of this fundamental change were new technologies and policies adopted for more efficient meat production, such as supplementary feeding, but above all, starting to use calves as slaughter animals (Helle and Kojola 1993; Helle and Jaakkola 2008). A castrated male was a typical slaughter animal in both Sámi and Finnish reindeer herding before the present type of meat production based on calf slaughter started in the 1970s (Itkonen 1948; Aikio and Helle 1985; Kortessalmi 2008). The new practice was based on two benefits from the perspective of meat production: the growth of reindeer is fastest and therefore most efficient during the first months of life (Timisjärvi et al. 1982); and when calves born in spring are slaughtered in the autumn, they do not burden the pastures during the following winter improving the survival of the herd. Presently, the proportion of reindeer castrated for meat purposes in Finland is only 3%, whereas nearly 30% of the meat reindeer in the 1960s were castrated males (Soppela et al., n.d.).

The number of castrated males also started to decrease because of the development of road networks and the prevalence of horses and cars, and as a result, reindeer were no longer needed as working animals for the transport of people and goods. The final blow to the use of draught reindeer, and thereby to castrated males, was the advent of snowmobiles in the 1970s (Pelto et al. 1968). The snowmobile made it possible to manage the herd from a distance, and reindeer were left to range freely. This made reindeer herding more extensive in nature, entailing changes in the behaviour of the herd, segregating females and males for most of the year. The older herders in our fieldwork mentioned that the reindeer castrated for draught reindeer or slaughter (*FI: härkätokka; NS: heargieallu*) in the last century were the first reindeer collected from the forests in the autumn, and as they were easier to handle, they were used for leading the other reindeer to round-up sites (Soppela et al., n.d.). Due to the major changes starting in the 1960s and 1970s, contact with the herd

reduced, from close herding, in which reindeer were guided from pasture to pasture. Trained castrated reindeer as guides for the others were no longer as necessary for herders.

The change not only affected the number of castrates, and herd management and behaviour, but also the proportion of males of the herd in general, which has in turn affected the structure of the herd, and its reproduction dynamics and even genetic composition (Holand et al. 2003; Mysterud et al. 2003).

### 3.6 CHANGES IN CASTRATION AS PART OF TAMING AND TRAINING OF REINDEER

It was reported by the present-day herders that in the past, or in the twentieth century, draught reindeer were usually castrated first and then trained (Soppela et al. 2022; van den Berg, n.d.). Males were castrated at the age of two or three, and training started the year after. A castrated male that was not yet tamed and trained was called a *pailakka* (FI) or *spáillit* (NS). This practice seemed common in Lapland among both Sámi herders and peasants raising draught reindeer in the 1900s (Itkonen 1948; Kortosalmi 2008). Likewise, Paine (1994) observed that Sámi reindeer herders in Finnmark in Norway started to train their draught reindeer during the winter after castration, or more commonly, after waiting a year. In the latter case, the animal could still be observed in the herd, and rejected if inappropriate for training and sold for meat (Paine 1994). In any case, it appears that reindeer in the past were trained mainly after they had been castrated. The purpose of the early castration was to halt rutting behaviour and the deterioration of body condition, but obviously, also to facilitate the handling and training of the animals. It is unknown when the castration was started in reindeer herding, but we can speculate that it was done early to facilitate the handling and training of wild reindeer (Bately 2007; Bjørklund 2013). In the account Ohthere, a Norwegian chieftain, gave to King Alfred the Great of England in 890 CE, tame deer and decoy or draught reindeer are mentioned (Bately 2007). Taming of wild male reindeer would hardly have been possible without castration. It can therefore be seen as one of the first human interventions in the reindeer's lifestyle, essential for the start of the domestication process.

The past practice of castration versus training is the opposite of what we discovered among most present-day reindeer herders, who often started to train their draught reindeer for tourism as calves on their first winter

and castrated them later, when training was largely completed (Soppela et al. 2022; van den Berg, n.d.). During the field work of Soppela et al. (2022), it was evident that the herders, who all had long experience of training, did not consider castrating their reindeer before habituating them to humans. The herders reported that they castrated their reindeer after several years of training, when the reindeer was accustomed to human proximity and cooperation, and could be regarded as ‘tame’ (Soppela et al. 2022). The castration was accomplished when reindeer had completely or almost reached to their full size. However, in contrast, two young reindeer herders participating in van den Berg’s interviews (n.d.) said they castrated their reindeer relatively young, sometimes at one or two years of age, while starting their training the following winter.

Herders who trained sledge reindeer for tourism emphasised that it was important to gain the trusting relationship with a reindeer before they could be trained successfully (Soppela et al. 2020, 2022). This trust was based on frequent contact with reindeer that started when they were calves. The present practice of training first and castrating later is possible, because reindeer can now be kept and fed close to reindeer farms throughout the winter, and they get accustomed to humans and handling. Castration is done after several years of training, when the reindeer is seen as sufficiently strong and skilled to start driving with tourists. Reindeer are trained annually from the late autumn to the late spring, starting as calves, until they are castrated (usually in the spring) and begin to work in tourism the following autumn (Chapter 4; Soppela et al. 2020, 2022).

The reason for the earlier castration in the last century may have been that it facilitated the handling of males, because they started to work sooner. There was probably less time to habituate them to humans before castration than there is now. Itkonen (1948) mentions that draught reindeer were usually tamed and trained for one winter after castration. Taming is not a main reason for castration today. The present-day herders agreed that a reindeer was sufficiently tame when it was ready to work at three to four years of age and thereafter castrated. However, it would still continue learning after that age (Soppela et al. 2022). The prime time for a working reindeer is from about five to ten years of age, and in some cases until 12 years of age. Reindeer are castrated before the prime so that they can be used as draft animals during that period, but castration is more related to maintaining their physical condition and health than taming per se. One reindeer herder mentioned that it was important to castrate a reindeer that had become familiar with people through training.



If it was not castrated, it might attack people during the rutting season, because it had no fear of humans (van den Berg, n.d.).

### 3.7 CONCLUSIONS

Castration is an ancient practice that has probably played a key role in the taming of wild reindeer and making them available for draught use during the early stages of domestication. The earliest written documents about reindeer domestication among the Sámi in Fennoscandia from 890 CE discuss the use of draught reindeer, which likely would not have been possible without taming them by castration. While it can only be speculated when and how castration was started, it probably did not develop in isolation but adopted features from early livestock husbandries.

Castration causes a variety of physical and behavioural changes in reindeer that have been considered by herders over time when working with reindeer. These effects, due to the cessation of mating behaviour, make reindeer easier to train and cooperate with. The changes also keep reindeer in better condition, because they do not lose weight during rutting time fights. Herders carefully consider various effects when they select reindeer for different purposes, such as for working, transport, and meat. For example, mature and older castrated reindeer have been traditionally valued as meat animals, because they gain more muscle and fat than uncastrated males. The benefits of castration are also implemented by herders at the level of herd management, as in the control of herd behaviour, structure, and genetic heritage. Castrated reindeer are calmer and stray less from the herd than intact males, which helps herders keep the herd gathered and quiet, and promotes its centricity. Castrated reindeer also help herders by guarding the herd from predators and finding forage to it under the hard snow in winter pastures.

The benefits of castrated reindeer in herd management and draught use probably played an important role in the establishment of mobile pastoralism among the Sámi after the fifteenth century (Chapter 9). In a pastoral herd, contact with reindeer was close and continuous. Castrated reindeer were important for leading the herd from pasture to pasture, and in other gathering and controlling tasks. Draught reindeer were used to transport people and their goods when they were following the herd during seasonal migrations. The choice of reindeer for castration and its timing depended on requirements, conditions, and tradition. However, mature castrated males were preferred as meat animals. The proportion of

castrated males was much larger in a pastoral Sámi herd than it is today, and it was still relatively large until contact with the herd started to loosen in the mid-1900s with new herding strategies, technologies, and policies.

The large changes in Fennoscandian reindeer herding during the last century resulted in a drastic decrease in castration practice and castrated reindeer. The changes not only affected the number of castrates and herd management, but also the proportion of males in the herd in general, which in turn affected the herd's structure and its reproduction dynamics, and even genetics. Similarly, the training and use of draught reindeer declined due to the introduction of roads, vehicles, and snowmobiles. However, in recent decades, the use of draught reindeer has been revived and their number has increased. In today's reindeer herding, castration is an important part of draught reindeer training for tourism, although practices and technologies vary (Chapter 4; Soppela et al. 2020, 2022). Castrated reindeer are also still used to some extent as slaughter animals and in herd management, for example, in its guidance when needed. However, the control of the herd is looser, because reindeer graze freely most of the year.

There is an abundance of traditional knowledge about the different aspects of the castration and its effects on reindeer among present-day reindeer herders who train draught reindeer. Herders carefully consider the age and growth rate of the reindeer when planning the castration of draught reindeer, and time it accordingly. Draught reindeer working in tourism are generally castrated at the age of three or four, or five at the latest, when their training is more or less completed, whereas in the last century, reindeer were castrated at an earlier age, and training started thereafter (Soppela et al. 2022). Late castration is possible, because reindeer can be kept close to reindeer farms throughout the winter, and they become accustomed to humans and handling. Draught reindeer trained for racing are often not castrated at all to preserve some of their "wild" characteristics. Today's herders see castration as successful when the male has reached its optimal growth by the time of the castration and sheds the velvet skin from its antlers in the early winter. If not shed properly, the antlers accumulate snow and ice, and this can cause health problems. According to the herders, castrates keep velvet antlers longer in the winter if the castration is too loose (incomplete).

Today, draught reindeer exemplify particularly close contact and interaction between human and reindeer that have otherwise almost disappeared in modern reindeer herding. The training and use of draught

reindeer, in which castration is part of the process of producing a draught reindeer, maintains this special relationship and related knowledge today (Soppela et al. 2020, 2022).

The living tradition of castration shows a continuum throughout the domestication of reindeer, despite the gaps in knowledge, especially about prehistorical, but also historical, times. The newly developed osteometric methods presented in this chapter may shed light on the early stages of reindeer domestication by identifying castrated reindeer from archaeological bone finds. These methods, based on the differences in the shape and size of the long bones between castrated and uncastrated reindeer (van den Berg et al. 2022), will make it possible to identify castrated reindeer in archaeological findings in future studies.

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