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Introducing a special issue: What lessons to be learnt from reindeer-herding research in Russia?

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This introductory paper outlines the aim and tasks of the special issue “Reindeer herding research: Crossing disciplinary and regional borders of biology and social science”. After presenting the content of the special issue, the article illustrates the importance of overcoming political and disciplinary borders by focusing on one aspect of Soviet/Russian reindeer-herding research which is little discussed in the other contributions to the issue: zootechnics. In particular, reindeer zootechnics include functional types, herd structure, pasturing techniques, slaughter strategy, and productivity indicators. Attention is paid to tracing how this research was received, deliberated, and utilized in Fennoscandia, and to its role in developing the so-called Røros Model. It is demonstrated that Soviet reindeer-related research as perceived in Fennoscandia can best be understood as a (partial) traveling model. Similarly, it can be suggested that Fennoscandian experiments with fenced herding were perceived by Soviet specialists in a similar manner. Finally, it is shown how expert scientists gradually came to acknowledge reindeer herders’ own knowledge, thus shifting from “recommendation” mode towards more mutual knowledge exchange.

KEYWORDS

pasturing techniques, productivity indicators, reindeer herd structure, slaughter strategies, traveling models, agricultural science, reindeer husbandry, zootechnics

Introduction

What is a reindeer?

“What is a reindeer?” This seemingly simple question has received answers from multiple perspectives, some of which have been more dominant in the debate than others, as Vitebsky and Alekseyev (2015), 413 have shown. In social and cultural anthropology – this is the discipline that the authors of this introduction self-identify with – the interaction of reindeer and humans has generated a wealth of scholarship, with plenty of literature giving first-hand accounts of how reindeer hunting and reindeer herding occur in practice, and showing how such practice creates specific livelihoods and “reindeer cultures” (*ibid.*).

This stands in stark contrast to a domain of knowledge which derives from a markedly different epistemological basis. We call this domain of knowledge *reindeer-herding science* and see it as a peculiar combination of economic, biological, and veterinarian approaches. Other authors, whom we quote below, prefer the term *reindeer science*; however, we think that the term *reindeer-herding science* does more justice to the prevalent mode of “recommending” humans how to go about reindeer. Whence this peculiar cross-disciplinary combination, and whence this remarkable zeal for recommending and instructing? These are questions to be explored in this introduction and the subsequent articles on reindeer-herding science in Russia. Conspicuously, reindeer-herding science has for some periods been “out of synch” with how reindeer herders themselves see and talk about the things they do: we will show that in the past, the scientific experts in this field were mentally quite detached from their target group of practitioners; nowadays, the relation between experts and practitioners seems closer and more mutual.

Reindeer herding occurs throughout the northern part of the Eurasian continent, e.g., in Fennoscandia – the Nordic states of Finland, Sweden, and Norway. However, Russia may clearly claim a special position when it comes to the number of (semi-) domesticated reindeer as well as the number of humans involved in the multiple activities around reindeer herding.¹ Russia may thus be described as a reindeer superpower (*velikaia olenevodcheskaia derzhava*).² It is more than a simple post-structuralist cliché to ask, then, if such super-power translates into super-knowledge. One may presume that in Soviet times, there was a research agenda which would systematically study and suggest innovations to the methods of keeping and breeding reindeer, curing reindeer diseases and utilizing reindeer products. Russian reindeer-

herding scientists could draw for their research on a large diversity of reindeer-herding traditions, types and breeds—arguably more so than their colleagues in Finland, Sweden, or Norway.

To what extent does Russia, and did the Soviet Union, hold a special position in reindeer-herding science? How were Soviet experts’ recommendations received abroad, particularly in the Nordic states? These are the key questions that this issue of *Pastoralism* wants to explore. We draw on contributions from authors who are themselves experts in reindeer-herding science in Russia. It must be emphasized that little is known about this field of scholarship beyond the borders of Russia itself. From a western perspective, its institutional difficulties have been underrated, its success sometimes overrated, and its mission often misunderstood if not ignored. Few scholars in western countries have paid attention to Russian/Soviet reindeer-herding science: among the scarce publications in English are those of Vladimirova (2020) and Stammler (2024), about which more below. Let us first trace, even if briefly, the case of a “traveling model” (to use a concept discussed by Olivier de Sardan, 2025)³ – more concretely, the ramifications of what arguably was a *partial* traveling model.

Nordic engagements with soviet reindeer-herding science

Intriguingly, the image of an empirically rich and advanced Soviet research on reindeer herding did emanate to other countries. It was during the “thaw” period of the Cold War. Experts from Norway, Finland, and Sweden visited reindeer-herding enterprises and research stations⁴ from 1957 to the mid-1970s; and Soviet experts came for mutual visits (Mathiesen et al., 2024). The quotations collected by Mathiesen and colleagues suggest that there were two areas of Soviet research the Fennoscandian specialists considered particularly advanced and beneficial: first, the selective breeding of reindeer; and second, what Soviet/Russian agricultural scientists referred to as zootechnics (*zootekhniiia*) – that is, techniques of keeping and using domestic animals, in this case reindeer. In the latter area, Soviet research into optimal herd composition and slaughter

1 Of the c. 3 million (semi-)domesticated reindeer currently living in the world, c. 2 million live in Russia, while the remaining 1 million live almost exclusively in Fennoscandia (Finland, Sweden, and Norway). Even in the late 1990s, when reindeer herding in Russia was significantly damaged by the economic and institutional crisis, Russia thus featured more reindeer and more reindeer herders than all the other countries in the world taken together (Jernsletten and Klovov, 2002). Since then, reindeer herding recovered and experienced growth at least in some parts of the Russian North, most notably in the Yamal-Nenets Autonomous Okrug. Russia also has more reindeer herders than Fennoscandia. Furthermore, although the role of reindeer herding in the national economy steadily declined during the last 100 years—which, however, can be said about the role of food production in general—it still has more than just cultural significance in Russia: the livelihoods, rather than just cultural or ethnic identities, of a significant number of people depend on it.

2 Several years ago, while lecturing on reindeer herding for students in St. Petersburg, Kirill Istomin coined the term “reindeer-herding superpower” (*velikaia olenevodcheskaia derzhava*) to characterize the position of Russia among other states where reindeer herding is practiced. The term rapidly spread among students and professors and acquired ironic and critical political meaning. Politics aside, however, the characterization does contain obvious truth and, in contrast to other branches of the Russian economy, it always did.

3 Olivier de Sardan (2025), 13) describes “traveling models” as “standardized social intervention programs. [...] They are deliberate, planned, formalized interventions [...]” Olivier de Sardan also adds a shorthand definition provided by his earlier co-author: “organizational models developed somewhere else as solutions to problems found elsewhere” (Bierschenk, 2014, 82, quoted by Olivier de Sardan, 2025, 14).

4 Notably, visitors from Norway, Sweden, and Finland were invited to Leningrad, to Kola Peninsula (Lovozero, we may presume), and to Indiga and other places in the Nenets National Okrug (Mathiesen et al., 2024).

strategies seemed to be of particular interest for specialists across the border.

Among the earliest visitors from Norway to the Soviet Union was Anders Fjellheim (Mathiesen et al., 2024). In subsequent years, he became known as one of the inventors of the Røros Project or Røros Model (Kalstad et al., 2023, 196–197), which entailed state-imposed guidelines about herd composition and slaughter-strategy recommendations in Norwegian reindeer herding. A debate concerning these guidelines was recently held in *Pastoralism* (Marin et al., 2020; Stien et al., 2021; Marin et al., 2023). According to Holand (2007), 24, the participants in this debate occasionally refer to the Soviet recommendations that provided inspiration for the so-called Røros Model. Interestingly, both the defenders of the Røros Model and its critics refer to Soviet recommendations, even though they draw divergent conclusions from it. It seems to us, however, that both sides in this debate may not be sufficiently aware of how and why Russian/Soviet zootechnicians came to advise particular types of reindeer herd composition (there were several such types) and slaughter strategies, what considerations stood behind their proposals, and what kind of research actually informed them. In other words: what Nordic experts perceived as the “Russian way” of reindeer herding was in fact the “meat-skin type” in Soviet terminology – one of several functional types, as laid out below. It is on these grounds that we describe the “traveling model” as a *partial* model. The over-simplified equation misses an important point of Soviet reindeer-herding science: functional and regional variability.

Such deficit of information is not restricted to the recent debate on Røros guidelines: it can be felt frequently when Soviet/Russian tradition of reindeer herding research is referred to. In our opinion, the mismatch is explained by decades of non-communication, and the mutual visits mentioned above could not fully compensate this void. In addition to the Iron Curtain that separated, among other things, Soviet and Fennoscandian reindeer-herding scientists during most of the 20th century, there is a profound language gap that, regrettably, continues to separate them even today. Indeed, very few Russian reindeer-herding scientists speak English and very few academic papers have been published by them outside the Russian linguistic sphere. For several decades it could be hoped that this problem was to be solved by the younger generation of scientists on both sides of the gap, who would bring Russian and western traditions together, using their improved linguistic skills and good will. Unfortunately, the current war of Russia against Ukraine suggests that this hope has to be postponed for an indefinite period.

Aims and scope of this special issue

The aim of this introductory article as well as the whole special issue, therefore, is to try and start building the basis for

better mutual understanding by engaging critically with the history, epistemology, key problems, and key achievements of Soviet and Russian *reindeer-herding science*. We intend to make non-Russian readers acquainted with this line of research and its political context, hoping that future publications will continue to examine how scientific research on reindeer in Norway, Sweden, and Finland came to circulate transnationally.

Of course, no single article can deal with all aspects of the Russia-based research tradition that has by now been in existence for about one hundred years. Hence, this special issue consists, at the time of writing this introduction, of five contributions covering different aspects of this tradition, with more articles possibly following: (1) The article by Istomin and Habeck (2025) describes the complex history of Soviet/Russian reindeer-herding science with a particular focus on its institutional framework, the key personalities, and their ideas about the role and aim of their work. (2) The contribution by Yuzhakov (2025) delves into the science and practice of selective breeding, the results of which have in fact been rather modest; hence, the author proposes that scientific selection may gain from coproduction of knowledge with practitioners of folk selection. (3) The article by Yuzhakov and Laishev (2025) reviews Soviet/Russian research on reindeer diseases and methods to prevent and cure them. (4) The contribution by Elsakov (2025) describes the current state of Russian research on reindeer pasturelands and their use. (5) The article by Windle et al. (2025) describes how reindeer herders in present-day Russia count on insects as means to control their animals. While this article does not deal directly with reindeer-herding science, it provides readers with an exemplary case in which such research is performed.

Materials and methods

“Crossing disciplinary and regional borders of biology and social science” is the subtitle of this special issue. In line with the mission of this special issue, the materials presented here illustrate the breadth of scientific research on reindeer breeding and veterinary studies; simultaneously, the gaps in knowledge and communication come to the fore. It is thus the careful perusal of existing scholarship along with our historic contextualization that serves as key method to elicit how certain ideas, recommendations, and models of “proper” reindeer herding have permeated from one region to another, along with the limitations of such discursive exchange. Presented here are contributions which translate and explicate the Russian part of the discursive field. This should not remain a one-way road: we hope for more contributions in the near future, particularly from colleagues in Fennoscandia. Regarding the disciplinary borders, it is our task to recollect, as social scientists, how a peculiar combination of scientific disciplines

came into being and how it slotted reindeer-herding practice into the normative framework of high modernity and rational resource use.⁵

Selective breeding is one of the two domains of Soviet/Russian reindeer-herding science which Fennoscandian specialists of the 1950s and 1960s found so impressive. As to the other domain – zootechnics – admittedly, none of our contributors looks into this in detail. This fact partly reflects the state of reindeer-herding science in Russia today: the number of scientists involved in reindeer-herding science has never been large and, after the crisis of the 1990s, has decreased to just few persons. None of them now works on zootechnics as his/her primary area of study (Yuzhakov, personal comm.); thus, we could not find a specialist who would agree to write a review on it. This domain is nonetheless important because it continues to determine many aspects of how reindeer are kept in Russia.⁶

Therefore, we are now going to present an overview and analysis of the Soviet/Russian research and resulting recommendations in zootechnics on the basis of publications. We will mainly focus on the studies on functional types, pasturing techniques, the calf-output indicator, slaughter strategies, and herd composition. It is the latter which has been of particular interest for western colleagues.

Results

Basic works of Soviet reindeer-herding science in the sphere of zootechnics

Probably the best point from where to start discussing Soviet research on reindeer zootechnics is the fact that Soviet reindeer-herding scientists never attempted to work out a single set of recommendations of pasture work that would be applicable across all the regions of reindeer herding in Russia. Even if, in

a certain period, scientific experts did not have a particularly high opinion about traditional reindeer-herding systems and their diversity,⁷ they nonetheless recognized that reindeer herding existed in different ecological zones, environmental settings, with various purposes and roles in local economies. Therefore, any attempt to produce universal recommendations would have been futile. Specialists worked out their recommendations for particular zones; later (since c. 1950) they started formulating recommendations for particular administrative regions. This facts needs to be taken into account when referring to the “Russian way” of doing reindeer herding, including the recommendations on herd composition and slaughter strategy (e.g., Holand, 2007; Marin et al., 2020): it is important to clarify for which type of reindeer herding, and/or for which region this recommendation was made.

Since there is evidence that contacts between Soviet and Fennoscandian scholars were most intensive in the 1960s and early 1970s (see above), it makes sense to turn to the publication that was in those years the most influential in Soviet reindeer-herding science – namely, the book *Reindeer Husbandry* (Zhigunov and Terent'ev, 1948) and the larger manuscript that lay at its basis: “Rational Techniques of Practicing Reindeer Herding Economy” (*Ratsional'nye priëmy vedeniia olenevodcheskogo khoziaistva*) of 1947. How this manuscript and the ensuing book came into being is a topic of the article by Istomin and Habeck (this issue). Suffice it to say here that by the 1960s and 1970s, the “Rational Techniques” had become a standard reference. Its significance also derived from the fact that, by the mid-1950s, reindeer herding in the Soviet Union was, from the viewpoint of officials, completely collectivized: reindeer herds had been confiscated from their former private owners and transferred to collective (*kolkhozes*) and state-owned (*sovkhoses*) enterprises, for which the reindeer herders worked as employees.⁸ Reindeer herding in these enterprises was supposed to be organized in a fully rational and scientific way – that is, the way described by the 1947 guidelines and the 1948 publication.⁹ Its recommendations on

5 Readers in search of up-to-date literature on the legal aspects of reindeer herding in Russia are advised to consult Kryazhkov (2025). Sikora (2022) provides a case study on the implementation of legislation with regard to Izhma Komi reindeer herders. We are aware that our introductory article deals with a rather technicist, biological way of seeing reindeer. This is on purpose, to explain how the epistemological rift between reindeer herders' knowledge and reindeer-herding science has influenced reindeer-herding practice over decades. As to the epistemological rift itself, see references in Footnote 18.

6 Notwithstanding the dearth of scientific experts in zootechnics, many reindeer-herding enterprises in present-day Russia employ zootechnicians; that is, specialists trained in applying recommendations on keeping and using reindeer formulated by reindeer-herding science. While their role varies from enterprise to enterprise, their impact on reindeer herding continues to be quite significant.

7 For details, see the contribution by Istomin and Habeck on the history of Soviet/Russian reindeer-herding science in this special issue.

8 In fact, some very small groups of reindeer herders nomadizing in remote areas managed to escape collectivization and continued their traditional (private) herding economy throughout the Soviet period (see Vallikivi, 2024 for a historical and ethnographic description of one of such groups). Besides that, although private property in the means of production (including reindeer) was officially prohibited in the Soviet Union, reindeer herders working for the enterprises could possess a small number of so-called “personal” reindeer pastured together with the enterprise's herd (see Konstantinov, 2023 for a good discussion). Nonetheless, the absolute majority of reindeer were owned by collective farms or state enterprises; likewise, the absolute majority of reindeer herders depended on these enterprises for instructions on what and how to do with the animals.

9 It should be said, however, that the degree to which the “rational techniques” were actually adopted in the enterprises varied significantly.

herd size and composition, slaughter etc. depend on the functional type of reindeer herding, on the one hand, and the pasturing technique, on the other. To compare productivity across this functional and habitat diversity, Soviet reindeer-herding scientists developed one common index for all. Strikingly, however, this index – DVT (*delovoi vykhod teliat* or calf/mother animal ratio) – does not turn up in Fennoscandian debates about the pros and cons of indicators of success in reindeer herding. We will return to the importance of DVT shortly.

Functional types (directions)

According to the “Rational Techniques”¹⁰ reindeer herding could be divided into three types or “orientations” (*napravleniia*), as the researchers name them, depending on its function: (i) “transport reindeer herding”, (ii) “meat-skin reindeer herding”, and (iii) “skin-meat reindeer herding”. The recommended herd composition and slaughter strategy differed by these types.

- i. Reindeer herding of the transport type served mainly to provide “organizations and individuals” with effective means of transportation: a very important function taking into account that at the time these recommendations were made most parts of Siberia and the Soviet North were almost completely roadless, civil aviation barely started to take off, and reindeer represented the only or the most reliable means of transportation. This type of reindeer herding was recommended for most part of the taiga zone, where the size of herds and, hence, the meat and skin productivity of reindeer herding was limited.
- ii. The meat-skin type of reindeer herding was believed to be most profitable, but it demanded specific conditions: either a developed transport infrastructure which would allow for export of meat before it would lose its quality, or a relatively big local market – for example, a city situated nearby – which could consume the meat produced. These conditions, however, were rare in those parts of Russia where reindeer herding is practiced. At the time the recommendations were produced, they were met in fact only in Kola Peninsula, in a few localities in southern Siberia and in the proximity of some GULAG cities, such as Vorkuta and Noril’sk.
- iii. In the rest of tundra and in those forest locations where keeping large herds of reindeer was possible but the local market and/or transport infrastructure for meat export did not exist, it was recommended to supplement the meat focus

with the focus on skin production (skin-meat reindeer herding), which did not have such high demands on the transport infrastructure.

Herd composition, measuring, and slaughtering

For each type of reindeer herding, a particular herd composition (see Table 1) and a particular strategy of slaughtering were recommended. Thus, in meat-skin reindeer herding, it was recommended to slaughter yearlings as most productive mode, although a certain percentage of calves was also slaughtered for skins. In skin-meat reindeer herding, slaughtering calves during the first year of their life was recommended. Mathiesen and colleagues report that Anders Fjellheim, an important person in the Røros Project, visited Kola Peninsula in 1960 and learned (among other things) that in the Soviet Union “more than 50% of the calves were slaughtered as calves in order to protect the pastures [sic!] and to rise the quality of meat and hides” (Mathiesen et al., 2024, 107).¹¹ Interestingly, the idea that the Soviet recommendation to slaughter calves was based mainly or significantly on ecological considerations and aimed to protect pasturelands from overgrazing was later mentioned by Holand (2007) and others (e.g., Marin et al., 2020). However, as far as we know, ecological considerations never featured highly in Russian specialized literature on reindeer-herding science.¹² Rather, the reason, at least initially, was purely practical: given the limited ability to protect reindeer skins from damage by reindeer warble flies (*Hypoderma tarandi*), slaughtering calves ensured a significant gain in skin quality, which, in the conditions of limited, expensive or absent transportation infrastructure, more than compensated for the loss of meat productivity.¹³ Finally, in transport reindeer herding, old reindeer, unable to work in sledges, were normally slaughtered.

10 The section on zootechnics in the “Rational Techniques” was written by Ivan and Serafimida Druri; their recommendations can be found in Chapter 4 of the book *Reindeer Herding* (Zhigunov and Terent’ev, 1948) and in Druri and Mitiushev (1963), on which our description mainly relies.

11 Mathiesen et al. (2024), 107 refer here to a Russian source: an article by an author named Moshnikov, published in *Poliarnaia Pravda*, the newspaper of the Murmansk Oblast.

12 This does not mean that such considerations cannot be used to justify it: the studies in Røros demonstrated that slaughtering calves rather than grown-ups indeed decreases grazing pressure for the same rate of meat production (Holand, 2007; Marin et al., 2020). However, Fennoscandian specialists are probably wrong in thinking that their Soviet and Russian colleagues had known this before them. With the exception of a few sentences in the book by Borozdin et al. (1979, 192) there is no explicit statement about ecological concerns.

13 A gain in meat quality and a decrease of unproductive losses (the losses of reindeer scheduled for slaughter as yearlings during the first winter and the second summer of their lives) were also mentioned. However, it seems that Soviet specialists were prepared to sacrifice these gains for the gain in tons of meat produced if only these tons could be transported and consumed.

TABLE 1 Recommended structures of productive herds depending on the type of herding (taken from Zhigunov and Terent'ev, 1948, 162; compare Istomin et al., 2022).

Categories of reindeer	Percentage in the herd depending on the type (direction) of reindeer herding		
	Skin-meat type	Meat-skin type	Transport type
Productive females (<i>vazhenka</i>)	45	37	30
Two-years-old females (<i>netel'</i>)	10	10	8
Female yearlings (<i>telka</i>)	15	13	10
Productive males (<i>byk-proizvoditel'</i>)	3	2	2
Two-years-old males (<i>byk-tretiak</i>)	5	12	11
Male yearlings (<i>bychok</i>)	7	15	13
Castrated transport males (<i>byk-kastrat</i>)	15	11	26

Moreover, in all types of reindeer herding, injured and ill reindeer, infertile female reindeer,¹⁴ male uncastrated reindeer who failed to take part in a rut, and reindeer selected for transport but considered as unfit were slaughtered. The slaughter was recommended to start in late October or November, when reindeer reached their maximum weight, but only after the mean day temperatures would fall below -15°C in order to enable the meat to freeze. In any case, the slaughter was to be finished before 1 January. Transfer of reindeer from one age category to the next was to be performed after the slaughter rather than in May, when reindeer are actually born. Therefore, reported as well as recommended herd structures (like the one shown in Table 1) reflected the so-called January herd. This means that reindeer indicated there, for example, as yearlings were in fact some 8 months old, while reindeer indicated as two-years old were c. 20 months old (see Istomin et al., 2022 for details of the nomenclature).

The general recommendations for the respective slaughtering strategy were supplemented by more specific recommendations for reindeer selection. They were based on a system of measurements, including those taken with a measurement stick (height at withers, height at cubit or fore leg length, width behind shoulders, and chest depth); those taken with a ribbon (perimeter of the shin, perimeter of the thorax, and diagonal body length); and those taken by a bow compass (width at hips, width at shoulders, length of rump, length of head, and width of head). Most of these measurements are similar to those used internationally for cattle and horses. Probably the only specific measurement is the chest depth – the distance between withers and the chest at a tangent to the shoulder blade. Besides that, it was recommended to assess the fat layer of the animal (by

palpation) and, if possible, its weight (using a special scale). Specific formulae were worked out to transform all these measurements into general indices, reflecting the quality of the individual as a transport and/or meat animal. It was recommended to use the best animals for replacing animals in the older categories (and for increasing the size of the herd if such an increase was planned) and to slaughter the rest. It should be noted, however, that the researchers recognized that measuring all animals in the herd would be both difficult and unnecessary. Therefore, the actual recommendation was to select a group of the best animals by visual assessment and then to proceed with measuring these animals only.

Pasturing techniques

While functional type, herd composition, and slaughter strategy depended on the type of reindeer herding, pasturing techniques depended on the ecological zone. The reindeer herding scientists differentiated between three basic forms of pastoral reindeer keeping: (a) free pasturing near camps (*volnolagernyi vypas*), (b) herd pasturing (*stadnyi vypas*), and (c) fenced pasturing (*vypas v izgorodiakh*).

- a. Free pasturing near camps was believed to be suitable for relatively small herds of particularly well tamed reindeer (up to few hundred animals). In this type of pasturing, reindeer are left to graze freely near the campsite most of the time and to come regularly (ideally every day) to the camp on their own in order to get special cooked food, protection from mosquitoes near smoking fires, etc. The camp changes its position two to six times per year in order to minimize grazing pressure and ensure the animals' being able to stay near the campsite. This way of reindeer keeping, described in detail in English by Ingold (1988) as pertaining to "hunters", was

¹⁴ A female reindeer older than 3 years was categorized as infertile if it failed to get pregnant in two successive years.

associated mainly with the taiga zone and the transport type of reindeer herding.

- b. “Herd pasturing” coincides with what Beach (1981) refers to as “intensive reindeer herding”: large herds (numbering thousands of animals) are kept under systematic (ideally permanent) observation of reindeer herders who actively regulate the herd’s movement and grazing to ensure their safety and coherence. This pasturing technique was associated with extensive herd migration in the tundra and the forest-tundra zones.
- c. Finally, fenced pasturing was considered an experimental method, initially used in Kola Peninsula since the early 1950s.¹⁵ Its wider application in the tundra zone was hindered by high expenses for building and maintaining fences to enclose territories large enough for pasturing large herds of reindeer during specific seasons. Indeed, in treeless territories devoid of road infrastructure all the materials for such fences had to be delivered by helicopters. In the taiga zone, however, the situation was different: experiments with fenced reindeer herding were conducted in the 1980s (see below).

Railways and roads gradually expanded into the North and East of the country and new means of transportation, including all-terrain vehicles and snowmobiles, made their appearance in the 1970s. Thus, the economic significance of transport reindeer herding significantly decreased. By the late 1970s, transport reindeer herding in its “pure” form existed only as a subsidiary branch in some hunting enterprises, providing animals for hunting expeditions. Most reindeer-herding sovkhozes of the taiga zone were reformed into skin-meat ones, but their productivity was very limited by their small herd sizes demanded by the free-pasturing-near-camps method. Despite this general trend from transport to skin-meat and meat-skin reindeer herding, the herders themselves continued to rely on transport animals, both in the tundra but also in the mountain ranges of the taiga zone. Ironically, productivity indicators did not account for transport animals (Vitebsky and Alekseyev, 2015, 416).

By contrast, the technique of large-scale “herd pasturing”, so common in the tundra, was only of limited applicability in dense forests. Therefore, an attempt to develop a new method of fenced herding for the taiga zone was made, most notably by Mukhachev (1981), Mukhachev (1990b) and Syrovatskii (1979). This method was based on using cheap fences, made on the spot from local wood and minimum supplies of wire mesh, and included several

variants ranging from keeping animals in a single fenced territory during the whole year to using four separate fenced territories and moving reindeer between them on a seasonal basis. Syrovatskii (1979) and his team worked out methods for selecting season-specific territories for fencing and calculated their size depending on the number of reindeer. This work may be considered the most important contribution to reindeer zootechnics made by Russian reindeer-herding science in the second half of the 20th century. The new method was tried out in the Evenki Autonomous Okrug and the Yakut Autonomous Republic with somewhat promising results; in the years of *glasnost*, however, it came to be criticized by members of the Evenki intelligentsia (Nemtushkin, 1988) and social scientists working in the region (Boiko and Kostiuk, 1992, 84–85). The end of the Soviet Union then stopped the experiments: fences broke down because the collapsing sovkhozes (and the communities of private herders that replaced them in some areas in the 1990s) did not have means to maintain them; this contributed to the massive loss of reindeer particularly in the Evenki Autonomous Okrug. Nevertheless, the method still has its advocates. Thus, experiments with it recently started again in the Yamal-Nenets Autonomous Okrug as a part of the plan, proposed by Yuzhakov, to expand Tundra Nenets reindeer herding into the taiga zone.

Still, “herd pasturing” is of greatest scale, comprising the predominant majority of reindeer in Russia; and it is this pasturing technique that always attracted particular attention among reindeer herding scientists. Sergei Kertselli and his younger colleagues (see Istomin and Habeck, this issue) established permanent observation of grazing reindeer and permanent control over them as the ideal for this pasturing technique. An ideal hard to reach, though: the reindeer herd was to be permanently observed and controlled by duty herders working in 24-h shifts. Even in periods when observing and controlling reindeer was difficult or impossible (during dark winter nights, for example), it was still advised that a herder would be present near the herd, because this would decrease the probability of predators’ attacks.

Along with the aforementioned publication by Zhigunov and Terent’ev (1948), the book by Druri and Mitushev (1963) became authoritative over the next decades. Both books contain detailed recommendations on how to organize herd observation and how to round up the herd, directing and stopping its movement. Even more elaborate recommendations existed concerning the two most critical periods of the reindeer-herding year: rut and calving. Thus, before calving, it was recommended to keep pregnant females in a separate herd and, once the calving started, to keep this herd under permanent observation of two herders. One of them was to stay in front of the herd and prevent female animals (mostly those who did not yet give birth) from moving forward. The second herder was to stay behind the herd and observe females with calves who tend to concentrate at the rear end of the herd.

¹⁵ Possibly, this was inspired by the practice of fenced reindeer keeping in Finland, but we did not find direct evidence for this. In 1898, Finland’s Senate stipulated reindeer herders to unite in regional associations; fences began to appear along nation-state borders but also reindeer-herding district borders in the course of the 20th century (Stark et al., 2023, 4).

His duty was to ensure that females with newborn calves do not stay behind, that females do not abandon their calves when following the herd, and to collect dead calves (their skins were used for making fur hats and other products) and calves abandoned by their mothers (these could be artificially fed). Detailed recommendations existed for choosing calving grounds (see the article by Elsakov, this issue) and how the herd should be led through it. Strikingly, no comparably detailed research and recommendations exist about the other two pasturing techniques in Russia.

Calf survival per productive female reindeer: DVT as key index of efficacy

Considerable effort was invested by Soviet reindeer zootechnicians into designing conceptual instruments for assessing the effectiveness and productivity of reindeer herding and comparing it across different functional types and techniques of herding. We analyzed these instruments in detail in one of our previous publications (Istomin et al., 2022). As is clear at this point, the diversity of functional types, pasturing techniques, and strategies of slaughtering, measurements based on mean carcass weight or any other form of meat productivity per unit make little sense. Thus, carcass weight, so much debated by Fennoscandian colleagues (e.g., Marin et al., 2020; Stien et al., 2021; Marin et al., 2023), is not applicable for Russia. At best, such index would allow comparisons inside a single region with a uniform functional type and uniform herding technique. Instead, the main index to determine productivity in Soviet/Russian reindeer herding was and continues to be DVT (*delovoi vykhod teliat*) – the number of calves which were born in the given year and survived until the autumn slaughter, divided by the number of productive female reindeer in January that year.

The logic behind this choice is roughly as following. Reindeer, as semi-domesticated animals, only weakly depend on human masters for their survival. Grown-up reindeer can survive on their own without significant increase of their mortality. Where human work with reindeer makes the biggest difference is in the domain of female fertility and calf survival and, furthermore, these are the two most important factors that affect productivity of any type of reindeer herding, not depending on what product is utilized (meat, skins, transport capacity). Therefore, the best way to compare success across functional types, pasturing techniques, enterprises, and reindeer herders' teams is to determine to what extent they are increasing female fertility and decreasing calf mortality. It was believed that in a normal year, independently on the functional type, pasturing technique, and geographic location, DVT should not be below 0.5, while reindeer-herding teams that demonstrated 0.7 and more were awarded special bonuses for productivity. Since DVT was considered a very important index, many enterprises

employed rather extravagant measures to increase it, including the slaughter of female reindeer on the slightest suspicion of infertility and organizing epic “struggles” for calf survival each spring.

In the modernized version of recommendations published in 1979 (Borozdin et al., 1979), the distinction between the three types of reindeer herding lost part of its significance because, as it was supposed, the progress of means of transportation in the North was thought to make the transport type of reindeer herding obsolete. Simultaneously, it would improve the possibilities for meat transportation. However, the recommendations for slaughter and herd composition were copied from the former skin-meat type of herding. Moreover, it was recommended to increase further the percentage of productive females in the herd (up to 60%) mainly by means of introducing mechanized transportation and cutting down the number of transport reindeer (Borozdin et al., 1979, 191–192). The stated reason was the finding that, despite yearlings weigh in average twice as much as calves in autumn, the overall herd productivity as measured in kilograms of meat produced per head of January reindeer was higher if calves, rather than yearlings, are slaughtered. The increased productivity arises from the arithmetical fact that, if slaughtering yearlings, the calves that were kept alive count as part of the January herd and, therefore, the kilograms of meat obtained from their slaughter next autumn have to be divided by their number as well.

This added productivity, however, was conditioned on DVT being higher than 0.75 – that is, it could be obtained only if the number of calves born and survived till the autumn slaughter was more than 75% of that of female reindeer in the beginning of the cycle. Such a high DVT is certainly possible, particularly in a good year, but usually, the majority of reindeer herding collectives had a much lower one. Whenever the survival of calves was lower, the strategy of slaughtering them rather than yearlings did not give much advantage, particularly if measures for pre-slaughter fattening of yearlings were conducted (keeping the slaughter animals on protein-rich pasturelands in summer, feeding mineral salt to them). In cases of high calf mortality (DVT being less than 0.5), slaughtering yearlings was, as it seems, more productive and safer, even if no fattening measures were used. Still, reindeer-herding specialists either preferred to be overly optimistic about the ability of herders to decrease the calf mortality – perhaps they expected, wrongly as it turned out, that improved predator control and veterinary service would ensure such decrease in the future – or (which we find more probable) the experts did not want to change the strategies of slaughtering and herd composition firmly adopted by that time in most enterprises.

Another, more technical index was the survival of grown-up reindeer, which should not fall below approx. 90%. In average years, as it seems, this index was considered of secondary importance. Its fall below 90% was usually associated with some disaster – an outbreak of a disease, starvation due to

adverse snow conditions, unexpected influx of predators into the region, *etc.*, – and was used to evaluate the damage the enterprise (or its individual herds) suffered. For this purpose, it was more informative than the DVT, which in the case of a disaster, would be very low, independently of the size of the damage.

Discussion

Soviet and Russian reindeer-herding science, with its regionally and functionally different recommendations on herd composition, pasturing techniques, and DVT, has contributed strongly to shaping reindeer-herding practice. How has this transformative potential been perceived and interpreted by scientists outside Russia?

Above, we portrayed the Fennoscandian trope of Soviet recommendations being one of the motifs behind the Røros Model. Apart from that, social scientists (mainly anthropologists) have occasionally pointed to zootechnics and selective breeding as part of the Soviet modernization project vis-à-vis mobile pastoralism – that is, allegedly “backward” nomadism – but they have usually done so only in passing. Taking the side of the reindeer-herding practitioners, social scientists were hesitant to engage with the technical recommendations provided by the biologists; unintendedly, this deepened the lacuna between different realms of reindeer knowledge which we mentioned in the beginning. For that reason, we think, the number of studies that seriously and centrally engage with the actual impact of reindeer-herding science in Russia has thus far been small – they do exist, however. Before concluding this introductory piece, we briefly present two articles published elsewhere that, from our view, directly pertain to the contributions collected here. Both these articles also delve into the changing degrees of hierarchy and equity in knowledge production.

Using the example of the Evenki reindeer-breeding farm in Surinda, Vladimirova (2020) shows how the measures implemented by reindeer-herding specialists changed the organization and techniques of reindeer herding in a way that maximized the meat output at the expense of satisfying other economic, social, and cultural needs of both the local herders and the general population.¹⁶ She argues that this resulted in

propagation of certain attitudes, views, and idioms to speak about reindeer and reindeer herding, which gradually replaced traditional ones among the herders themselves: “no matter how complex and variable relations between herders and zootechnicians were, they were always hierarchical and asymmetrical in terms of power” (2020, 256). Vladimirova’s study illustrates that Soviet and post-Soviet reindeer-herding scientists saw themselves as doing applied science to maximize the “effectiveness” of reindeer herding, and that their notion of effectiveness had little to do with what reindeer herders themselves thought about the aims of their trade. Taking inspiration from post-structuralist and feminist approaches, Vladimirova’s emphasis on the “top-down” character of Soviet expert knowledge resonates with what we have heard from colleagues with long-standing working experience in reindeer-herding science. Having said that, there was a turn towards a more dialogical format between herders and scientists, which occurred from the 1970s onwards (e.g., Anderson et al., 2017, 6800).

Stammler (2024) finds much more positive words for the interrelation of scientific and practitioners’ knowledge. His discussion on selective breeding and *narodnaia selektsiia* (literally: folk selection) in the Republic of Sakha (Yakutia) comprises both reindeer and cattle, which is a salutary reminder that reindeer herding does not happen in entire isolation from other forms of animal husbandry. Such a multi-species approach to locally adapted breeds has recently been exemplified by Stammler himself, in transdisciplinary cooperation with Juha Kantanen (Kantanen and Stammler, 2025).¹⁷ Stammler’s emphasis is neither on hierarchies of knowledge nor on “top-down” implementation of state policies. Rather, he underlines that the late Soviet/post-Soviet generation of reindeer-herding scientists has clearly been aware of vernacular methods of breeding: “reindeer scientists such as Zabrodin et al. (1979), Borozdin et al. (1990), Syrovatskii (1993), Syrovatskii (2000), Mukhachev (1990a), Iuzhakov et al. (2020) [...] explicitly acknowledged herding and handling practices by people as responsible for the adaptation process of the animals to their environment” (Stammler, 2024). Stammler argues that there is potential for even more dialogue, also between reindeer-herding scientists (including geneticists) and social scientists (including social and cultural anthropologists), on the basis of which the study of human-animal relations could be significantly expanded. We see Stammler’s statement in support of our plea to get Russian reindeer-herding science

¹⁶ Vladimirova’s description of reindeer zootechnics and selective breeding slightly differs from our own analysis. Her statement that maximizing meat output was the main purpose of Soviet specialists (2020, 257) does not do full justice to Soviet reindeer-herding science: the kinds of products and services reindeer herding was expected to provide, changed depending on place and time. In the case of Surinda, it was in the 1960s and 1970s that the drop of demand for reindeer transportation forced the specialists to look for ways to re-orient the local reindeer herding to meat production. Vladimirova refers to Boiko and Kostiuik (1992) who described the painful transition from the transport type to the meat-skin type, along with the experiments with fenced reindeer herding mentioned above in our article.

¹⁷ We are not sure, however, about Stammler (2024) view that folk selection was based on “negative selection techniques” (i.e., elimination of animals with “bad” traits) whereas Soviet scientific selection was based on positive techniques (i.e., targeted breeding animals with good traits). In fact, the scientific assessment criteria were stricter than the “folk” ones and every animal that did not satisfy them was scheduled for slaughter. Therefore, the “scientific” selection was based on both positive and negative techniques, and the latter were applied rather strictly.

out of its currently rather secluded position, and to enter a more nuanced discussion of how reindeer-herding science has traveled across nation-state and disciplinary borders.

Conclusion

While we have argued that Fennoscandian specialists, notably those cited by Mathiesen et al. (2024), may have overestimated the achievements of their Russian/Soviet colleagues, it is true that the latter did demonstrate considerable inventiveness and energy in attaining their goal, notwithstanding considerable institutional challenges. The Fennoscandian admiration for Soviet reindeer-herding science in the 1950s and 1960s may be explained by the ideology of rationalization on both sides of the Iron Curtain (Beach and Stammer, 2006, 15–19), with the Soviet government being able to push forward “effective” and simultaneously collectivist methods of reindeer herding (compare Mathiesen et al., 2024, 110). On these grounds, Vitebsky and Alekseyev observe: “It is debateable whether it is in Fennoscandia or the Soviet Union that managerialism and scientism have gone further in making reindeer less like humans and more like the entities studied by biologists” (2015, 419).¹⁸ What is evident, though, is the attempt of Nordic reindeer-herding managers from the mid-1950s onwards to check what can be learnt from reindeer-herding research in the Soviet Union. While not taking into account DVT and not realizing the fact that Soviet scientists were quite specific about the applicability of “their” recommendations, experts in Norway at least were prone to try them out. This is why we claim that the Røros Model was in part based on a somewhat simplified interpretation of Soviet reindeer-herding science – a partial traveling model.

It is also true that Soviet reindeer-herding scientists’ recommendations were often imposed upon reindeer herders without much consideration of the herders’ own knowledge and interests. It seems that since approximately the mid-1970s, the paradigm of modernization lost part of its steam and came to be intellectually questioned: scientific experts gradually refrained from “instructing” and started to acknowledge the herders’ practical experience. Our interviews with reindeer-herding scientists suggest that the main reason was their recognition that the “rational techniques” they had spent so much time designing actually failed to produce a palpable impact. True, veterinary research did result in animals’ better health and higher calf survival rates. But apart from that, neither did the “rational techniques” revolutionize reindeer herding as an economic branch nor did it improve the lives of reindeer herders.

It is significant, however, that many techniques and strategies invented and “recommended” by Soviet specialists have been so

pervasively adopted by reindeer herders that they have come to consider these techniques as part of their cultural tradition, projecting them back into times immemorial. DVT is a good example. A private herder from Nadym Tundra (Yamal Nenets Autonomous Okrug) once told one of us in an interview that he annually calculates the DVT of his herd in order to evaluate his own success and mastery in dealing with his animals. If the success of a scientific innovation is indeed measured by its results losing their authorship and turning into a common knowledge (as Latour and Woolgar, 1986 teach us), then Russian *zootekhnii* was undoubtedly a success. This ultimately leads us to the point made by Vitebsky and Alekseyev (2015), 418, namely, that a young reindeer herder may become acquainted with both textbooks of reindeer-herding science and the unwritten knowledge on how to travel by and with reindeer, how to sacrifice a reindeer for ritual purposes, and how to venerate an individual reindeer as the herder’s spiritual companion and *alter ego*. Reindeer-herding science has importantly shaped herders’ perceptions of reindeer and the environment wherein they live, but it has no longer the privilege of telling “what a reindeer is” and how humans should interact with reindeer.

Author contributions

JOH: concept of the special issue; concept of this introductory article; writing; literature research KVI: concept of the special issue; concept of this introductory article; writing; literature research. All authors contributed to the article and approved the submitted version.

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¹⁸ Regarding Fennoscandia, similar statements to this effect have been made by Bunikowski (2015), Heikkilä (2006), 73 and Müller-Wille et al. (2006), 365, among many others.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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