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The Dimensions of Sustainability and the Neo-entrepreneurial Adaptation Strategies in Reindeer Herding in Finland

HANNU ILMARI HEIKKINEN, SAMI LAKOMÄKI AND JOHN BALDRIDGE

Abstract

Current public discourse in Finland concerning reindeer herding has focused on the overgrazing problem and conflicts between herding and competitive forms of land use. Both herders and government administrators agree on the problems of herding, but conceptualize their causes differently. Administrators insist that sustainability in herding is reachable through bioeconomic management that unites biological metrics of sustainable systems with an economic efficiency calculus. However, we found that such policy erodes socio-cultural sustainability at the community level. It also encourages economic rationalization that leads to increased revenues but slower income growth, because it coexists with rising investment costs and decreasing producer prices caused by increased supply. Ecological sustainability is left unstable, because bioeconomic metrics focus only on partial environmental processes. This study sheds light on these intertwined trajectories by analyzing reindeer herders' efforts to reach both economic and ecological sustainability through neo-entrepreneurial strategies. The study was carried out by semi-structured interviews in 17 enterprises run by both Saami and Finnish reindeer herders. Interviews covered the working of both traditional herding and neo-enterprises and the consolidation of these efforts. The results show that the neo-entrepreneurial adaptation strategies enhance both economic and ecological sustainability, but create problems for socio-cultural sustainability.

Introduction

The purpose of this article is to analyze the sustainability of neo-entrepreneurial adaptation strategies of reindeer (*Rangifer t. tarandus*) herders in Finland. The secondary objective is to examine government management policies and their connections to the local adaptation. The main ethnography analyzes the emergence of entrepreneurial adaptation strategies among the reindeer herders in Finland. The studied enterprises have state authorization, hold a registered business name, or are corporate organizations like joint-stock companies. Here, these are called neo-enterprises in order to distinguish them from traditional operations. Whereas herders have traditionally butchered reindeer during round-ups in the field and sold whole carcasses or live reindeer directly to private individuals or large butchering companies, the neo-entrepreneurs use certified butchering facilities to process meat further into various products, which they themselves sell to end users, like restaurants. Usually the neo-enterprises also function independently of the traditional reindeer herding cooperatives (Figure 2 and Table 1).

Applying St. Martin's (2001) ideas, we term the dominant ideology of reindeer management the "bioeconomics of herding." Its fundamental axioms are twofold. First, the biological component focuses on maximal sustainable yield metrics, related equilibrium assumptions and calculated optimum grazing pressures that, in theory, enable maximum renewal of reindeer pastures (Kumpula 2001; Riseth et al. 2004). Calving percentage and carcass weights are employed as complementary metrics of sustainable grazing pressure (Kumpula et al. 2004). Second, the common economic component, and a sign of exceeded ecological yield, has been the need for supplementary feeding that is considered an extra cost for herders. The paradigmatic maneuver is to select a few easily measured variables as the indicators of ecological and economic sustainability and assert that sustainability can be reached through the manipulation of these variables (cf. Mittarit porotalous 2003). However, though there have been recent attempts to broaden the bioeconomic perspective (Kumpula 2003; Kumpula et al. 2006; Kyllönen et al. 2006; Mattila 2006; Meristö

et al. 2004), the socio-cultural sustainability of herding communities continues to be left out of the calculations. There is a persistent tendency to detach selected economic and ecological variables from a broader political, economic and ecological context (Jernsletten and Klokov 2002; Mittarit porotalous 2003).

Often, these ecological and economic variables are handled separately and their results are mutually contradictory. The ecologically-based restrictions on the total number of reindeer, along with the simultaneous economically-based increasing of individual herd sizes, results in a dwindling workforce, which must be supplemented with further mechanization that increases costs. This process is fueled with subsidy systems, while the overall intensification of production increases supply, which in turn pulls down producer prices. This familiar Western rationalization schema easily creates a circle with increasing revenues, but stalled net income (Figures 1 and 3).

Our key analytical tool is the comparison between ecological, economic and socio-cultural dimensions of sustainability (Elliott 1999; Hukkinen 2006). The theory of human adaptation is derived from John Bennett (2005). Human adaptation is understood to depend primarily on strategic decision-making concerning the utilization of key natural resources. It is conceptualized as an open process, where local adaptation is seen as interplay between sub- and supra-local influences as well as politics of power and knowledge at different scales (Dove 2001; Robbins 2004; McGuire 2005).

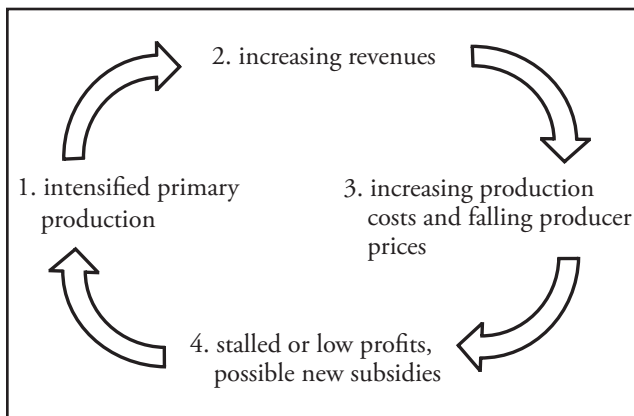


Figure 1. The Western rationalization schema.

Methodology

Data collection focused on the development of neo-entrepreneurship. For this purpose, 20 reindeer herder neo-entrepreneurs, working in 17 enterprises, were interviewed during 2004-2005. Enterprises were chosen from the official list of the Finnish Food Safety Authority (European Union approved establishments 2007). Care was taken to include both Finnish and Saami entrepreneurs from the whole reindeer herding area. According to the interviews and depending on definition, in 2004-2005 the approximate number of herders' meat processing neo-enterprises in Finland was around 25. However, the number of affiliated entrepreneurs was much higher, because many companies and cooperatives have between two and 14 associates. Interviewees estimated that about one-third of the neo-enterprises were run by Saami (Table 1).

The semi-structured interviews mapped the working of traditional local reindeer herding communities, the functioning of neo-enterprises, and efforts to consolidate these activities. Specific research questions focused on the organization of industries, interactions among and between neo-enterprises and herders, and the division of labor.

Entrepreneurs were interviewed both at their homes and at facilities usually situated close by. Interviews took from 60 to 90 minutes and included touring and photographing the relevant facilities. For ethical reasons, monetary questions and herd sizes were handled as rough estimations (e.g., as shares of total family income or verbal estimation of the profitability of certain improvements). Data was organized and analyzed with QSR Nvivo Qualitative Data Analysis program. The results (e.g., how informants considered the sustainability effects of certain strategic actions) were discussed and reformulated with key informants. This data was complemented with Heikkinen's (2002) study that explored the adaptation of reindeer herding in the western part of the Finnish reindeer herding area. The main method in that study was participatory observation coupled with 33 semi-structured interviews.

Reindeer Herding in Finland

The origins of reindeer herding are uncertain, but, by the Middle Ages, several forms of husbandry were developing throughout Circumpolar Eurasia. Today, these range from large-scale tundra-herding,

in which reindeer constitute the staple of life (e.g., Nenets in Russia), to small scale taiga-herding, in which reindeer are used for transportation in hunting, fishing and trading (e.g., Khants in Russia) (Jernsletten and Klokov 2002; Anderson and Nuttall 2004).

Table 1. Studied neo-enterprises, with selected special features.

	Number of enterprises	Ethnic composition	Number of entrepreneurs	Home herding cooperatives	Processed carcasses	Seasonal workers
Extended herders' cooperation	3	Two Finnish, one mixed	6-14	7 Ivalo 18 Oraniemi 22 Kemin-Sompio	60 - 1500	0
Family enterprises	5	One Saami, four Finnish	1-2	8 Hammastunturi 18 Oraniemi 24 Salla 54 Kollaja	90 - 1500	1 – 7 (mostly kinsmen/herders)
Cooperatives	3	Three Finnish	14	19 Syväjärvi 22 Kemin-Sompio 28 Poikajärvi 30 Palojärvi 50 Oijärvi	90 - 1500	1-3 (mostly partners/kinsmen)
Joint stock companies	5	Four Finnish, one Saami	1-8	3 Näätämö 5 Vätsäri 13 Muonio 14 Kyrö 15 Kuivasalmi 16 Alakylä 23 Pohjois-Salla 30 Palojärvi 32 Kolari	700 - 1000	1 – 6 (kinsmen, herders and outsiders)
Consortium	1	Includes five Saami and one Finnish reindeer herding cooperatives	NA	2 Kaldoaivi 3 Näätämö 4 Muddusjärvi 5 Vätsäri 10 Muotkatunturi 36 Timisjärvi	7500	(processing sub-contracted)
Total	17 Enterprises	11 Finnish 2 Saami 2 mixed	81 associates (plus Consortium)	22 Reindeer Herding co-operatives	18335-19015 carcasses	25-31 (1-8 weeks)

Herding everywhere involves close interactions between humans, animals and local biophysical environments, but also connects with broader political and economic forces which complicate human-animal relationships. For example, in Soviet Russia, the small scale taiga-herding of the Evenkis was developed towards a multiethnic state-regulated reindeer pastoralism to serve the strategic interest of the state. In the early 1990s, however, decollectivization led to a sharp drop in domesticated reindeer numbers, ethnic tension and proliferation

of the feral caribou economy (Anderson 2002). On the other hand, in Scandinavia, Saami herding has been affected by national border changes, cross-border bans and war evacuations, but also by failed state-led rationalization. In Norway, for example, reindeer management reforms in the late 1970s failed to reduce both the total number of reindeer and the differences in private herd size as planned, because state management ignored the value placed on reindeer possession and kinship continuity by herders (Paine 1994).

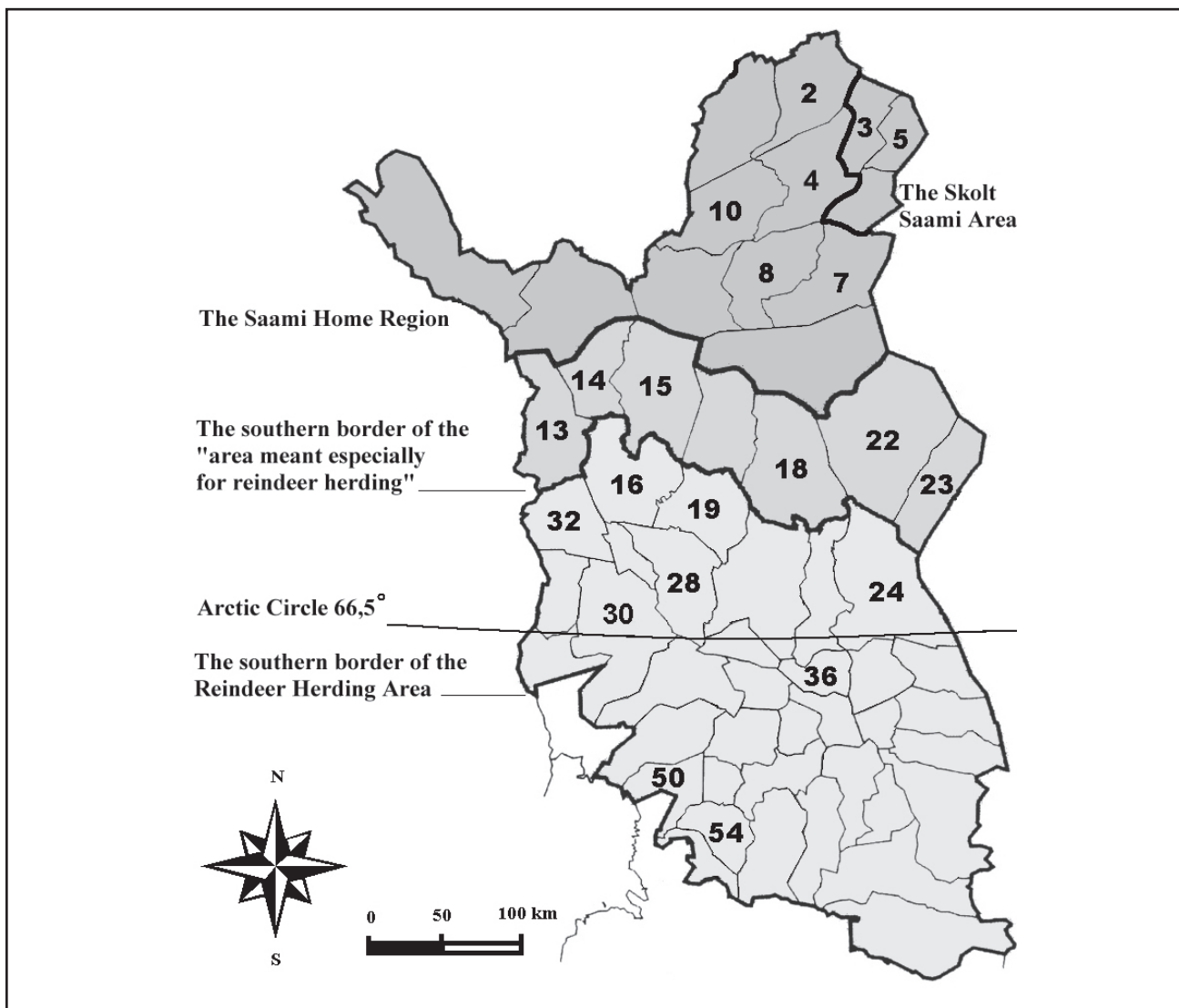


Figure 2. The Reindeer Herding area and reindeer herding cooperatives of Finland. The studied neo-enterprises operated in the reindeer herding cooperatives marked with their official number (Table 1).

In Finland, reindeer herding is important for the survival of Saami cultures, identities and languages, but also an essential part of the lifestyle, identity and annual rhythms of Finnish herders. Approximately two-thirds of the herders are Finns, and they own two-thirds of the reindeer in Finland. Current reindeer husbandry in Finland is an amalgamation of Saami (tundra-type) and Finnish (settled taiga-type) herding practices. Both have varied histories from the seventeenth century onwards and share common origins in the older husbandry of the Forest Saami, who utilized reindeer mainly for transportation and hunting (Penanen and Näkkäläjärvö 2002; Heikkinen 2002).

This twofold ethnic history partially explains why the development of herding in Finland has diverged from its Scandinavian neighbors where Saami are the solid majority in the reindeer industry. Whereas in Finland herding is officially regarded as part of the market economy, in Sweden and Norway it is defined as an important part of minority culture, with attendant higher subsidies. Thus, herders in Finland have to rely more on basic meat production and its rationalization – i.e. intensification of meat production and reduction of labor time per unit produced (Työryhmämuistio 1999a; Jernsletten and Klokov 2002).

There is considerable diversity in local reindeer and pasture management and tending practices, which result from the ecological diversity of the reindeer herding area. For example, both Saami and Finnish systems vary from relatively free-range grazing inside large fence systems to intensive herding by kin or village communities that control the circulation of pastures. The latter kind of arrangement is typical in sparsely forested areas. Particularly in the south, private winter pens are common and associated with full-scale feeding from January to April. There, the herders usually grow hay for their reindeer. In May, similar pens are also utilized in the northern area to earmark calves. Recently, such pens have become common for protecting calves from increased predator populations and freeing work time from herding to pursue various sidelines. Especially in the north, helicopters and snowmobiles are utilized to gather reindeer for autumn round-ups and all-terrain vehicles during calf markings in

midsummer. Kin-based herding communities are prevalent among Saamis and village-based units among Finns. Collective works are usually compensated by daily and subsistence allowances. The reindeer herding cooperative's (**paliskunta**) ability to pay these benefits depends on the shareholders' payments to the cooperative per breeder animal, which are registered living reindeer after slaughtering (Heikkinen 2002).

There are 56 reindeer herding cooperatives that are the legal representatives of local herder communities in Finland. Each reindeer owner is a member of the cooperative in the territory where their reindeer live. Cooperatives are responsible for matters concerning reindeer herding in their territory, but individual members do not have personal responsibility for the liabilities of their cooperative. The members' voting power is tied to the number of reindeer owned. Each cooperative has its own administration, including an elected leader and board. The division of labor for autumn round-ups is decided in the members' fall meeting, while a spring meeting organizes the calf earmarking and accepts official records. Reindeer herding cooperatives belong to the Reindeer Herders' Association, which functions as their joint body. The association is funded by the Ministry of Agriculture and Forestry. This has been criticized as undermining the credibility of an otherwise good traditional organization because there are doubts as to whether the association can work as a joint interest group, if necessary, against ministerial interests (Reindeer Husbandry Act 848/1990 and Reindeer Husbandry Decree 883/1990; Hukkinen et al. 2003).

The reindeer herding area of Finland covers around one-third of the entire country. In theory, in this area herding is allowed irrespective of land ownership for all European residents, but in practice, each local reindeer herding cooperative controls the admission of new members. However, the state defines and enforces the maximum number of reindeer allowed in the region. The number of breeding stock is about 200,000. One-third of the reindeer graze in the Saami home region (Figure 2) and the relative economic importance of reindeer is higher there than in the southern parts, where herding is, for a great majority of owners, an auxiliary occupation.

This varying importance is partially reflected by herder-animal ratios across these regions. The average owner (total 5134) in 2004–2005 had 48 breeder reindeer in the Saami area, 43 across the rest of the north and 23 in the southern reindeer herding area of Finland. While official Finnish statistics don't track income types at the family level, the Reindeer Herders' Association estimates that some 700 families earn most of their income from herding, while it provides supplementary income for another 900 families. Only about 500 families own 100 reindeer or more, and 77.6 percent of all owners had less than 49 reindeer in 2000. In Norway, by contrast, reindeer herds are bigger than even in Finnish Saami area, but there can be only two registered owners per family, which complicates statistical comparisons. The Swedish system, however, is similar to

the Finnish one, and, in Sweden, 80 percent owned less than 49 reindeer, 6.7 percent owned between 50–99 reindeer, 6.2 percent between 100–199 and 2.3 percent owned more than 400 reindeer in 1998 (Reindeer Herders' Association 2007; Jernsletten and Klovov 2002).

In this study, most of the herder neo-entrepreneurs interviewed can be considered professional herders, which means that they own more than 79 breeder reindeer. The neo-enterprises studied handled approximately 16 percent of the reindeer slaughtered in Finland in 2004–2005, but the value of this production is not available. Generally, some two million kilograms of reindeer meat is distributed to the markets annually, and the value of unrefined meat is 10–12 million euros (Figure 3) (Reindeer Herders' Association 2007).

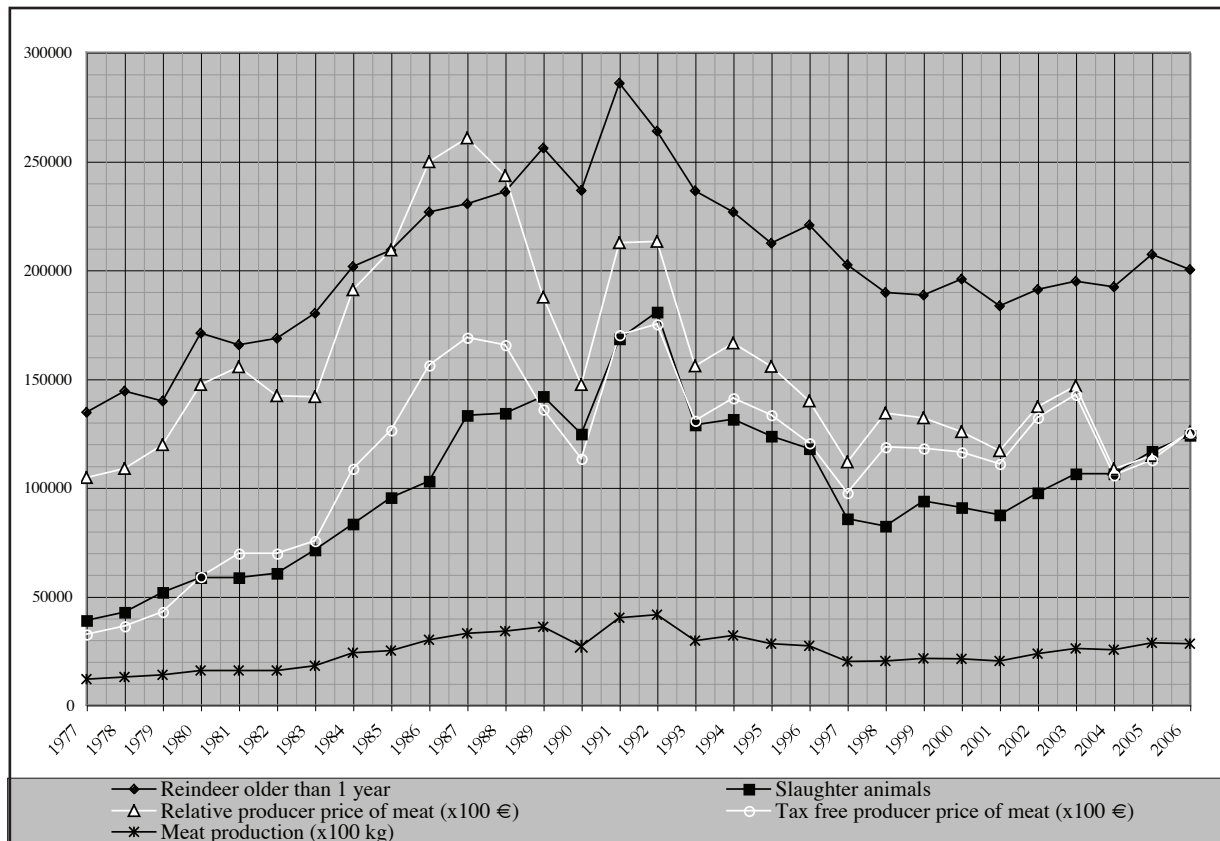


Figure 3. Quantitative development of reindeer herding in Finland. Numbers refer to the high season of the reindeer economy in Finland in 1983–1997. This high season is blamed for severe overgrazing effects. It is also important that the relative value of production was almost the same in 2004 and 1977, although the amount of produced meat in 2004 was double that in 1977 (Reindeer Herders' Association 2007).

Generally, the Finnish government considers the economic state of reindeer herding to be poor. One suggested reason for this is the fall of relative producer prices from the highest rates of 9.50 euros/kg in the 1980s to the current 4 euros/kg. At the same time, production costs have increased (Porotalouden kannattavuus edelleen heikko 2006; Mittarit porotalous 2003). Another suggested reason is the great number of small owners. The proposed solution has been to centralize the ownership of reindeer under full-time herders by eliminating subsidies for herds of less than 80 animals. Investment and beginner subsidies have also been withdrawn from small owners. Herd sizes have grown, but increasing the number of full-time professionals has necessitated decreasing the total number of herders and increasing mechanization (Työryhmämuistio 1999a; Hukkinen et al. 2006).

Reindeer Pastures and Bioeconomic Management

Reindeer summer pastures renew quickly, but are used for only a short period during the year. The growing season varies between 110 and 145 days in northern Finland and the 0°C mean annual temperature limit runs a bit to the south of the Arctic Circle (Finland's Climate 2007). The most important forage plants include birches (e.g. *Betula nana*) and underbrush (e.g. *Salix*, *Carex* and *Vaccinium* species). Continuous light grazing is estimated to enhance the biodiversity of summer pastures by clearing space for annual small plants. However, continuous heavy grazing with its accompanied trampling disfavours perennial plants and alters species composition. The debates concerning summer-time grazing have focused on Saami area,



Figure 4. Traditional cooperation during reindeer roundups in Muonio in 1998 (Photo by Heikkinen)

on the problems of birch renewal (*Betula pubescens* subsp. *czerepanovii*) and grazing effects on nature conservation areas (Kumpula et al. 2004; Olofsson and Oksanen 2005; Jokinen 2005).

Winter pastures (notably those comprised of ground lichens, e.g., *Cladonia* sp., and tree lichens, e.g., *Bryodina* and *Usnea* sp.) renew slowly, with a maximum growth of a few millimetres per year. Reindeer utilize lichens from September to May. Average snow cover between November and May varies between 0.5-1.2 meters and, at high altitudes, from zero to several meters. When snow surpasses some 80 cm, and especially from March to May, when its upper layer freezes, reindeer rely on tree lichens and underbrush that peek above the snow. Lately, wavy hair-grass (*Deschampsia flexuosa*) has become an abundant winter food within logging areas (Helle and Saastamoinen 1979; Kumpula et al. 1997).

The primary production of reindeer husbandry is based on the summer growth of reindeer population and, thus, on the summer pastures. However, winter grazing is vital for the survival of breeder animals and reindeers' winter condition affects calving outcomes. The well-being of reindeer, then, depends on their controlled access to a varying range of alternative pastures. Understanding this is the key to successful pasture management. It also enhances the ecological well-being of pastures. For example, easily demarcated summer grazing grounds help to protect winter pastures from trampling and scattered grazing pressure and, thus, help winter pastures to regenerate (Riseth et al. 2004; Forbes et al. 2006)

Not surprisingly, the need for good pasture management has led to programs of reindeer pasture monitoring and research. Government-led monitoring has developed from aerial photography with small field samples to satellite-based remote sensing with enhanced field sampling, biomass modeling, and utilization of GIS techniques (Kumpula et al. 1997; Kumpula et al. 2006). In pasture research, ecologically and economically sustainable reindeer herding is considered to depend on grazing pressure (reindeer/km²). Between 1991-2001, the average overall reindeer density was 2.4/km² in the north and 1.6/km² in the south, but the variation between reindeer herding cooperatives was high, ranging from

0.7 to 3.2 reindeer/km². This variation corresponds to the local availability of lichen pastures, which are considered to be the ecologically limiting factor. Consequently, overall reindeer densities have traditionally been low in the south. However, southern ground lichen pastures are so small that reindeer densities are actually relatively high if calculated only for these pastures. In contrast, if one focuses only on summer pastures, reindeer densities are higher in northern cooperatives and can reach even 6.4/km² (Mittarit porotalous 2003; Kumpula et al. 2004). The point here is that grazing pressure can be calculated in various ways and actual applications are socially negotiated combinations, because any single variable may obscure ecological details which are critical to understanding local sustainability.

In the 1980s and early 1990s, the highest overall reindeer densities were above four reindeer per km². Since then, the overgrazing debate has continued in Finland, even after reindeer numbers collapsed following several hard winters in the early 1990s. Degradation of ground lichen has also been explained solely as a result of too many reindeer and to conclude that herding has generally reached an ecologically unsustainable level (Heikkinen 2002; Helle and Kojola 2006). At the same time, the increasingly common winter-feeding has been interpreted as yet another sign of both ecological and economic untenability of herding. Both claims soon gained popularity among governmental officials as ways of explaining the problems of reindeer husbandry. Thus, in 2000, the Ministry of Agriculture and Forestry decreased the maximum allowed number of breeder reindeer from 220,900 to 203,700 (Työryhmämuistio 1999a and 1999b; Mittarit porotalous 2003).

The bioeconomic management axiom focusing on ground lichen and supplementary feeding has been advocated by the Ministry of Agriculture and Forestry and several scientists. However, herders and some researchers have criticized the assumptions upon which ecological sustainability is being based. For example, the government's concept still fails to adequately acknowledge that competing land uses decrease pasture availability and push herding to ever smaller and less exploitable areas and thus increase grazing pressure on remaining pastures, such as nature conservation

areas. This oversight results partly from the fact that, although in pasture research reindeer are conceptualized as semi-domesticated animals, research methods and ecological models are derived mainly from caribou studies. This is problematic, because caribou studies assume as their setting a natural state of nature instead of the kind of complex ecological, economic and political environment where contemporary herding exists (Kumpula 2001; Riseth et al. 2004; Olofsson and Oksanen 2005).

Logging is one example. Clear cutting reduces tree lichens, which forces reindeer to rely on ground lichens and wavy hair-grass. Clear cuts and tilling also disturb ground lichens, promote other underbrush and change snow conditions, while the logging waste hinders reindeer's access to remaining food supplies (Kumpula 2003, Jaakkola et al. 2006; Greenpeace 2007).

On the other hand, supplementary winter feeding is not merely an adaptation to deteriorating pasture conditions. It enhances the overall well-being of reindeer and improves calving outcome. On open-range pastures, feeding likewise eases tending because fodder keeps reindeer stably situated without constant intervention. By contrast, keeping and feeding reindeer inside small pens often occurs in conjunction with part or full-time modern professions that limit the herders' abilities to participate in traditional free-grazing. Farming hay for the reindeer also provides extra income, thanks to the European Union's agricultural subsidies. This kind of reindeer farming reduces winter grazing pressure, but it easily decreases social interaction and can lead to herders' alienation from the herder community (Heikkinen 2002).



Figure 5. Veikko Feodoroff presenting the meat processing facilities of Sevetin Kiela, Ltd. and the company's shop for direct sales. The shareholders of the enterprise are four Skolt Saami herders from the village of Sevettijärvi (Photo by Heikkinen 2004).

Neo-entrepreneurship among Herdsmen

In this section, we present reindeer herders' entrepreneurial efforts and their effects on sustainability at different levels. The analysis includes enterprises that 1) process reindeer meat, and 2) are founded and operated by reindeer herders.

The Organization of Neo-enterprises

The simplest organizational form is that of entrepreneurs who sell and process reindeer meat without any particular form of company. Their economic pursuits differ from traditional modes of direct sales, however, because they utilize modern registered meat processing facilities and their end products are prepared to commercial standards instead of being simply whole carcasses. Their customers also include middlemen and restaurants. Usually, one partner has invested in modern meat processing facilities and others pay rent or compensation per kilo of processed meat and share expenses according to verbal or formal contracts.

Neo-enterprises with a business name (**toimini**) have a more formal organisation. They are usually still more or less family enterprises, although some of these families have rather extensive businesses and operate in diversified industries. For example, they can be engaged in small-scale meat processing, tourist programs and maintenance of rental cottages.

A more complex form of local neo-enterprise is the cooperative. Some of these have focused on both slaughtering and processing of local reindeer. Mostly they process the partners' reindeer, but subcontracting and slaughtering for other herders are also common. Cooperatives frequently buy reindeer meat processed by partners and re-sell it. Typically, one older herder specializes in organizing meat processing and marketing. Other partners participate when needed. Some have a much wider job description. The activities of the Lokka village cooperative, for example, range from processing and marketing fish and reindeer to contract maintenance services for local school and rental cottages. Table 2 makes clear

Table 2. The main differences between the various neo-entrepreneurial strategies.

	Relationship to local traditional herding	Development attitude	Company specialities	Internal relations to other neo-enterprises
Extended herders' cooperation	Combined to traditional herding	Prudence	Direct continuation from carcass sales	Rather independent
Family enterprises	Separate roles as herders and private family entrepreneurs	Continuity of family's traditional herding engagement	Processing focused on family's reindeer	Young companies are subcontractors, older enterprises independent
Cooperatives	Herders specialize in herding or processing	Village cooperation	Combined small-scale slaughtering and meat processing	Sub-contractors and independent producers
Joint stock companies	Separate roles as entrepreneurs and herders	Clear rules and limited risk (invested capital)	Entrepreneurs come from different reindeer herding cooperatives	Sub-contractors/ buyers of special services e.g. smoke curing
Consortium	Reindeer herding cooperative leaders participate	Continuity of the independence of Reindeer herding cooperatives	A marketing and processing logistics company	Buyer of processing services

some of these main features and differences among the entrepreneurial strategies.

The most numerous and strict organizational form is the joint stock company. Their sizes vary from one-man companies to large operations, which have up to eight shareholders from neighbouring reindeer herding cooperatives and a separate managing director.

The largest and “loosest” neo-enterprise is a marketing consortium, which has several partner reindeer herding cooperatives. Its management is in the hands of the leaders of the partner reindeer herding cooperatives, but a hired employee organizes practical work. The scale of their processing is rather large—7,500 carcasses in 2004. Their business plan is to organize, store, market and deliver the bulk of their reindeer through subcontracts with other enterprises. In fact, at least four of the herder neo-entrepreneurs studied do subcontract processing for this consortium.

Meat Processing and Products

The simplest form of local meat processing is traditional carcass-based direct sales. Neo-enterprises that have their own small-scale slaughterhouses, all of which are organized in cooperatives, still engage in carcass-based direct sales. The fast-spreading meat processing trend is to cut reindeer into basic body parts. All neo-entrepreneurs practice this kind of simple butchering—even contract butchering for other herders. The common opinion is that the time of carcass-based direct sales is over. Consumer culture has changed and customers do not have the cutting equipment, freezers, time or skills to handle large amounts of meat. As a result, the prevalent entrepreneurial upgrade is to produce easily stored and consumed meal-ready frozen meat products and traditional dried meat. Marketing fresh, but unfrozen meat, especially to middlemen, has become almost insignificant.

Primary products are different frozen boneless roasts, fillets and sliced meat. Almost all neo-entrepreneurs have some special products, such as shin discs or rib cuts. A common slogan is “we butcher reindeer to order.” This principle is considered especially important when dealing with restaurants and

competing with bigger industrial producers. One special local innovation in reindeer meat markets has been the development of so called reindeer meat assortment boxes. Nearly half of the neo-enterprises produce these. The idea is to cut a half or whole reindeer into meal-ready portions, to be packed in a cardboard hand-case with cooking recipes.

The most sophisticated processing level for these small-scale producers is cold, warm and “cool” smoked reindeer and special dried and ground preparations of smoked meat for restaurants. The typical arrangement is that some neo-enterprises specialize in smoke curing and provide the service to other entrepreneurs. Different cold cuts and full meat sausages are also common, but canned products are considered uncompetitive compared to industrial products, despite their great shelf life and sales period. Subcontracting—especially meat cutting for bigger companies—is a common business for entrepreneurs who have made big investments in meat processing facilities.

Regarding the main trends of local meat processing, we can conclude that A) the development from traditional products and producer organizations to modern forms has been gradual, B) this transformation has resulted from changes in both local needs and the consuming culture of broader society, and C) reindeer herders have shown abilities to adapt rapidly to the prerequisites of modern society. Also noteworthy is their swiftness in building marketing and subcontracting networks with minimal formal education, and the speed with which innovative ideas, such as the meat assortment box, have spread among herdsman.

The Prerequisites and Restrictions of Neo-entrepreneurial Adaptation Strategies

The probable reason for this flexible adaptability is the communal nature of reindeer herding, including the existence of the Reindeer Herders' Association as a joint body and communication channel. This social capital makes possible the fast spread of new ideas and experiences, which, in turn, readily gives rise to social networks that can be utilized in new ways in a new situation. According to interviews, the weak point of this process is that the prices of

processed reindeer meat seem to be steadily dropping. One suggested reason is the increased supply of locally processed meat and internal market competition between neo-enterprises. Such competition reduces readiness to co-operate and, hence, prevents the full utilization of the social potential of herder communities. Reducing internal competition necessitates, for example, specializing in separate markets, like the servicing of local tourism.

The social nature of reindeer herding creates burdens for entrepreneurial development, especially in terms of common pool resource management issues. Certainly, the gains and burdens of development do not spread evenly in communities (Ostrom et al. 1994; Mckean 1996; Baden and Noonan 1998). All herder entrepreneurs mentioned severe problems with the division of labor between their enterprises and the traditional reindeer profession. Almost all neo-entrepreneurs are also fulltime herders and thus have a lot of responsibilities in the labor of the local reindeer herding cooperative. Reindeer round-ups and meat processing must be done nearly simultaneously from the end of September through December. Only few processing tasks can be transferred to the spring, when traditional herding demands less attention. If the entrepreneurs do not successfully take part in the communal work of the reindeer herding cooperative, social tensions will increase. Behaviour that their fellow herders perceive as too selfish easily corrupts the social capital that, in the first place, made neo-entrepreneurial adaptation possible. As a result, it is common for neo-entrepreneurs to process meat at night while working as traditional herders during daytime.

The diverse starting points of the entrepreneurs creates social tension. Some have used equity capital for gradual investments, while others have taken loans to build their businesses. Hence, they have different pricing needs. The underpricing of one's own work time was also mentioned as a common problem. This is often blamed on the poor education of herder neo-entrepreneurs. Only two of the studied entrepreneurs had any formal schooling in economics. However, all had taken at least some courses covering modern meat processing to meet required hygiene and product standards.

One solution in combining traditional and modern herding tasks has been to decrease the size of round-ups and organize butchering according to a more scattered schedule than the traditional slaughter from October to November. Then, the entrepreneurs can process more local reindeer and spread the positive economic effects to the local herder community. However, if round-ups are delayed, reindeer lose weight, which creates tension with other herders. Another strategy to consolidate the needs of traditional herding and neo-enterprises has been to build bigger processing facilities, especially with more freezers and coolers, and hire meat carvers for seasonal rush help. This helps with the division of labor, but creates more pressures on pricing and forces the entrepreneurs to engage in subcontract processing to earn capital for paying back these investments. A common result is that they have even less time to participate in communal works. The availability of properly educated workers is also a problem, because most of the potential rush helpers are also herders, who are likewise busy organizing round-ups.

Discussion

Key conclusions concerning the sustainability of neo-entrepreneurial adaptation strategies adopted by reindeer herders in Finland are the following:

A) Healthy neo-enterprises do not guarantee a healthy traditional reindeer economy. Local processing does reduce the pressure for increasing the herd sizes and improves the herders' income, but it creates problems with work time, because the high-labor seasons for both herding and processing occur simultaneously. Many neo-entrepreneurs are considering reducing their herds or giving up traditional herding altogether. Thus, ecological and economic sustainability are improving, but, without an adjustment of the division of labor, the impact of neo-entrepreneurial development could become socio-culturally unsustainable. However, improving income can attract young beginners and enhance socio-cultural continuity.

B) Neo-enterprises depend on the development of local tourism as a market, and specializing in separate

local markets could enhance cooperation among the entrepreneurs (e.g., subcontracting). This could help to minimize excess investments and reduce the effects of increased supply on local meat prices.

C) Socio-historical and ecological circumstances create different starting points for the adaptation strategies among Finnish and Saami herders. Finnish herders have roots in agriculture and they can, for example, utilize abandoned farm facilities in new modes of production. However, they have severe social and ecological limitations that restrict herd sizes. In contrast, Saami herders usually have more reindeer per owner, but few of them have agricultural options (e.g., to produce hay and receive agricultural subsidies).

Developing neo-enterprises is an adaptation strategy for reindeer herders who intend to make a living from reindeer in a situation where herd size is limited by ecological constraints, and because primary production cannot be extended in an ecologically, economically and socio-culturally sustainable way. Almost all neo-entrepreneurs consider themselves reindeer herders first and entrepreneurs second. All but two of them define the limits of business expansion at a level where they can still continue traditional operations. So, the development of neo-entrepreneurship in Finland is limited also by herders' desires to safeguard their traditional identity and provide for the continuation of reindeer herders-as-subjects.

In this context, a key socio-cultural question emerges: will the collective nature of the livelihood loosen or tighten up? Currently, two models are developing: 1) a model of competing individual entrepreneurs, who buy and sell services; and 2) a model of intensifying cooperation and reconciled divisions of labor. In the latter model, the crucial factor is how the benefits of the enterprises will affect the rest of the community. If, for example, the meat price rises, the readiness to cooperate might increase and vice versa. Neo-entrepreneurship and traditional herding are not separate phenomena, but depend on one another. Both are required to take care of living and slaughtered animals, and both take advantage of alternative buyers for meat, but this reciprocal relationship depends on community spirit.

Meat processing organized as locally as possible might be the key to economically and, as a further consequence, ecologically sustainable reindeer herding. However, the bioeconomic management paradigm of the Ministry of Agriculture and Forestry has not taken full advantage of these possibilities. Neo-entrepreneurs received only minor governmental support for their efforts, especially during the 1994–2002 adjustment period of the Finnish economy to the European Union. Neo-entrepreneurs noted that the administration was hostile towards local meat upgrades or development of multi-livelihood strategies. The target was an independent livelihood managed through specialized administration and research (Työryhmämuistio 1999a).

The central administration tends to deal with the reindeer herders as if they share a uniform culture, are engaged in independent livelihoods, and that profitability will improve with bigger herd sizes. This sectorized management is based on bioeconomic restrictions, but simultaneous support for production enlargement—with top-down coercive subsidy systems and withdrawal of support from small-scale herding—threatens the socio-cultural sustainability of herding communities. Even ecologically, the application of management where subsidies are paid per owned animal is contradictory to the goal of decreasing overgrazing.

In short, the management policies are working against their own targets, that is, solving the overgrazing problems and securing the continuity of herding. Herders keep reindeer numbers as high as possible because of animal based subsidies, but small owners, especially younger ones, are abandoning herding. This is especially problematic considering the average age of herdsman is already high: 47 years-old in 2001 (Mittarit porotalous 2003). This is potentially fatal as younger people bring the education, motivation and endurance to engage in traditional herding and local meat processing. The final outcome is that, without seasonal help, the benefits of bigger herds and local meat processing will disappear in the face of increasing investments in helicopters, artificial feeding, and facility improvements. All this is leading to a vicious circle of increasing costs and expanding production while only modestly improving net income (cf. Figure

1; Hukkinen et al. 2006). Under these pressures, neo-entrepreneurs are in danger of having to choose between either traditional herding or neo-enterprises. It is clear that the current efficiency schema and sectorized management ideology are reproducing themselves. Development of herding is moving towards a modern style of privatized economy, a well-known recipe from the global common property resources management discussion, but it lacks a key ingredient: a herders' right to control reindeer pastures, a critical natural resource. Is the end product—modern agriculture—any healthier economically or more sustainable ecologically?¹

The main results concerning the development of neo-entrepreneurship and its effects on the various dimensions of sustainability are summarized in Table 3. Particularly noteworthy are the kinds of feedback that link ecological factors and social practices, effects that permeate every level of sustainability. The bio-economic paradigm, in particular, creates conceptions of ecology and sustainability which impact reindeer herding in complex, sometimes contradictory, ways. A good example is the seemingly inevitable need for mechanization and the conflicting expectations arising in ecological imaginaries of tourism.

Table 3. Sustainability and the special features of the development of neo-entrepreneurship.

	Effect on economic sustainability	Effect on socio-cultural sustainability	Effect on ecological sustainability
Increasing income	Improves profitability, but is affected by changing supply and demand	Might increase envy and reduce co-operation, but attract young beginners	Reduces entrepreneurs' herd size needs
Increasing work time	Perceived need for further rationalization	Decreases the interaction between entrepreneurs and other herders	Increases the need for further mechanization
Gradual change	Low investments/low risks	Time for socio-cultural adaptation and changes	Slow decrease of needed herd size
Effects of the seasonal nature of reindeer husbandry	Need to hire seasonal workers or make further investments (e.g. storages)	Need to develop division of labor (monetary or socio-cultural barter)	Need to reduce the reindeer population or mechanize further
Consumer culture	Investment needs and risks bounded to changes in demand and legislation	Access to distant markets increase the need for social networking	Ecological effects of increased transportation
Dependency on tourism	Profitability is bound to the changes in (eco-) tourism (broad society)	Pressures to fill cultural expectations (e.g. Saami traditions, exotic image)	Pressures to fill changing ecological expectations

On the one hand, reindeer pastures, protected from overgrazing under the prevailing logic of bioeconomics, become subject to further degradation as a result of increased mechanization. This mechanization offsets the increased need for labor associated with animal based subsidies that encourage keeping herd sizes as high and steady as possible, irrespective of environmental capacity. These developments, in turn, conflict with the romantic

expectations of tourists, who, like the biophysical resources, offer the potential to support sustainable local arrangements (e.g., meat processing) that could eventually ease overstocking. Yet, this can't be a long term option for all because of increased competition. Moreover, such local arrangements depend on the continuity of small-scale reindeer operations, which the administration has decided not to subsidize. In short, the bioeconomic paradigm often ignores the

subtleties of the current social-economic-ecological complex in ways which undermine the goals toward which the paradigm was deployed. Also, the meat production related logic of bioeconomics is highly vulnerable to new environmental factors, like increasing predation and related compensation systems (e.g., reindeer harassed by wolf pack and rescued in Kainuu Province 2007).

Based on these findings, we recommend that 1) management criteria should be made more transparent and open for a broader discussion, and 2) administrators should recognize the inter-connectedness of ecological, economic and socio-cultural factors when formulating management policies. Clearly, such revised policies must be informed by more detailed future research, and it seems clear that such studies will have implications beyond the cases considered here.

Reindeer herding constitutes a small, even tiny, economy and way of life. For the vast majority of the world's population, the herders of Finland live far away and seem irrelevant. Yet, these small, distant communities may teach us to understand crucial principles of the working of our world economic system and their ecological relevance.

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Notes

- ¹ Compare the development of ranching in Arizona (Sayre 2005; Sheridan 2001) or the agriculture in Finland (Decline in farm profit continued last year 2006).

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