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Shepherds of the Mountains

Sheep Farming in a North Norwegian Alpine Landscape as a Community of Practice

ABSTRACT We investigated the interface between scientific knowledge of commercial sheep farming and local communities of practice. Through combining socio-cultural and cognitive theories of learning, we applied a concept of community of practice to analysing the importance of the local Goat and Sheep Society for family-based sheep farming in Lyngen after the Second World War. A point of departure for this investigation was the extraordinary results in national rankings and competitions by some of these Lyngen sheep farmers. This paper empirically documents the dynamic, multi-faceted interaction between "barn floor" breeding practices and national-level breeding science. We thoroughly analysed this domain of knowledge as a practice-driven process that involves a particular configuration of practitioners, including newcomers and old-timers, households, local sheep breeding societies and national scientific knowledge institutions. Based on this notion of a community of practice, the relations between masters and apprentices are given particular attention. One particular characteristic of this community of practice is the institutional enmeshment between the local Goat and Sheep Breeding Society and the local Læstadian congregations. We argue that certain focal normative notions of the family and of the order of creation (Norwegian *skaperordning*) to care for the creation and to survive (Norwegian *å berges*) provide the motivational force to these knowledge innovations.

KEYWORDS sheep farming, Norway, alpine landscape, Lyngen, entrepreneurship, breeding, inter-generational learning, Læstadianism

Introduction

The sheep farming community in Lyngen, Northern Norway, contains some of Norway's highest achieving farmers in terms of national standards of meat quality. This impressive achievement has yet to be analysed in depth from a socio-cultural and institutional standpoint. It is essential to analyse the dynamics of this system, linking the micro-processes in these Lyngen communities to sheep farming at the national level. These sheep farmers are engaged in both innovation and entrepreneurship; their innovation entails creating something new while not simply reproducing or imitating others, and their entrepreneurship converts this knowledge, social and physical capital, into new business ventures (Spilling 2006: 39).

In recent years, the actual and potential innovations in Norwegian arctic agriculture have been studied through a focus on entrepreneurship (Spilling 2006, Borch & Førde (eds.) 2010). One prime focus of this research has been on social and community entrepreneurship and the mobilization processes behind collective innovative projects headed by local enthusiasts (Norwegian *ildsjæler*). The rural community as a place (Norwegian *sted*) has been analysed as framed in globalised and regional space with the main concepts being regional and national innovation systems, value chains and clusters (Arbo 2009: 387). However, these processes have mainly been analysed only in the short term and with inadequate attention paid to the role of religion, work ethics and social capital (Arbo 2009). Therefore, a longitudinal perspective is necessary, focusing on intergenerational learning and analysis of both formal and informal institutional processes (including their social and cultural aspects) that generate innovation. In studying the situated nature of collective learning by practitioners (both newcomers and old-timers), particular attention must be paid to the interface between scientific and local knowledge, and investigating how this interface operates in an arctic fjord and mountain environment.

In this analysis, primary focus is placed on innovations in breeding techniques, while recognising that breeding is affected by several other critical areas related to the annual production cycle. As a whole, breeding knowledge is deeply embedded in a vast body of scientific knowledge and local "rules-of-thumb." Particular attention will be paid to the critical phase of grazing in the spectacular mountains of Lyngen. The local history of breeding and a set of other critical institutional factors (Lillevoll 1982) will also be taken into account, in order to explain the extraordinary success of the Lyngen farmers.

Lave and Wenger's socio-cultural model of situated learning, involving the process of engagement in "a community of practice," was initially developed in opposition to classical cognitivists' assertions of learning be-

ing "rule-based" and entirely governed by internal mental operations (Lave & Wenger 1991).[1] However, a synthesis of recent theories of cognitive processes and social interaction may prove to be more fruitful (Bleie 2003: 181, Greeno 1997: 15). The following analysis focuses on collective learning in a shared and evolving domain of knowledge (sheep keeping) encompassing the meetings of the Goat and Sheep Society, the barn floor, the kitchen table, and the mountain pastures: a domain defined by membership and competency.

Over the years, breeding and other sheep keeping practices have become a joint and passionately sustained enterprise. Institutional arrangements and social practices are highly enmeshed and expand the capacity for day-to-day systematic observation and experimentation. Through this, adjustment and revisions can be made and combined with intergenerational learning to produce highly efficient sheep farming communities. A highly functional community develops a shared repertoire of basic ideas, symbolic expressions, commitments, skills, tools, routines and memory. The emergent successful structure is characterised by sophisticated hybrid local knowledge and a high labour intensity, showing innovative adaptive skills not only in the arctic environment, but also in the national marketplace.

Institutional arrangements are pervaded by particular religious beliefs that, contrary to prevailing stereotypes of their stifling nature, promote innovative and adaptive behaviour that responds to complex shifts in the environment in both institutional and market conditions. Instances exist in which these knowledge interfaces create multifaceted, partly unforeseen effects, and are in certain respects innovators of scientific knowledge that coexists with both articulated and tacit (silent) local knowledge.

Even if the organizational initiative in our study case came from national authorities, as a community of practice it has become a local, predominantly self-organising system that is based on trust and a sense of joint identity (Wenger 1999: 4). In particular, it is the process of learning by practice that makes the relationship between elders and newcomers central in the community. Essentially, this relationship can be conceptualised as a relationship between that of a master and his apprentices (Lave & Wenger 1991, Lillevoll forthcoming). Communities may be anything from relatively equitable to highly hierarchical in terms of access, voice, and formal authority. Age, gender, kinship, social status, talent and leadership qualities are all integral to forming a successful farming community.

Study Context

The Lyngen peninsula in North Troms has historically made extensive land use of its fjord and alpine landscape. The rural settlements that lie dispersed

along the fjord contain a narrow landing for vessels, a cultivation zone, and higher elevations composed of lush valleys and tall mountains.[2] Since the Second World War,[3] these settlements have undergone major transformations. However, specific aspects of the agricultural innovations in the mid-fjord area, on the eastern side of the Lyngen peninsula, have yet to be investigated. More specifically, focus needs to be placed on the establishment and development of commercial sheep keeping and its underpinning knowledge and traditions. The fjord people of Lyngen are of mixed Sea Sami, Kven and Norwegian ancestry.[4] Due to the state's assimilation policy before the Second World War and up until the 1980s, people of this region reported their ethnicity as Norwegian. The ethnic revitalization that started in the 1970s in the Sami core areas in Finnmark only started to gain momentum in this fjord area in the 1990s.[5]

The early post-war years set in motion new adaptive combination income strategies. Until this time, the fjord people had pursued a livelihood adaptation in which subsistence agriculture was combined with fishing for both consumption and income.[6] New combination strategies have been developed that vary between outer coastal areas and inner fjord areas. In the inner fjord areas, the overall new combination strategies were due to reduced fish stocks as ocean and fjord fisheries ceased to provide viable incomes. New income earning opportunities were created by the state's massive public post-war reconstruction effort. Men shifted to these new income opportunities in the reconstruction sector, which grew quickly in the first two post-war decades. Farmers, mostly female, shifted from small-scale subsistence agriculture based on livestock keeping to milk production for profit and sheep production for both consumption and for the sale of meat and wool. This new role for women as income earners increased their centrality in community life, allowing them to emerge and become active in forming and running the new Goat and Sheep Society. In these coastal communities, the conservative pietistic denomination Lyngen Læstadianism has been an all-encompassing frame for a close-knit religious world. Until the establishment of the Goat and Sheep Society, the Læstadian congregation had been the principal public arena for communal affairs, apart from education. The 1960s became a period of growing diversification and rapid rise in living standards for these devoted villagers, creating an extraordinary local collective mobilization of innovative on- and off-farm livelihood strategies.[7] These strategies were also aided by state support, principally through infrastructural development that allowed long-distance transportation of milk to new dairies and agricultural extension services, which stimulated the adoption of modern production technology and scientific breeding practices. Moreover, the state established a comprehensive

regime of subsidies and supplementary financial incentive systems, which together with the new opportunities for rapid transportation (by coastal steamers and trucks plying new-built roads) increased the supply of agricultural products at affordable prices. Local producers were members of two national producer organizations; the Norwegian Goat and Sheep Breeding Society, and Norwegian Farmer and Smallholder Union, which both partook in the annual negotiations with the state about subsidies and other incentive mechanisms. In this early period of widespread mixed livelihood strategies, including management of small herds, the extraordinary active local goat and sheep breeding society played a crucial role (Lillevoll 1982).

This early phase of modification of strategies was followed by two decades of decline in the number of households depending on these mixed strategies, especially those involving sheep production. In the two decades following the early 1980s, milk production from cows almost disappeared. A small number of farms started to specialize in sheep keeping with very small flocks in the late 1970s. From the 1980s on, flocks increased to a grand scale with summer flocks containing more than three hundred animals, and a new generation of sheep farmers established themselves (Lillevoll 1982).[8] Heirs to farms and locals without any land could become sheep farmers, since a shift to off-farm income earning created an emerging lease market in local fallowing farmland. Some of these new farmers were even able to rapidly climb to the top rung in the annual national competitions for the best quality lamb meat. Farmers in this region have remained top-ranked nationally every year for the last 5–6 years. In the past ten years in the Norwegian consumer market, sheep and lamb meat has emerged as a relatively highly priced niche product that is valued as very healthy. The health value of these products is due to the animals' declining fat content, which stems from the free-grazing nature of these animals that feed on a variety of wild mountain grasses, creepers, mushrooms and herbs.

In recent years, increasing awareness has been given to the critical importance of low-fat diets for the reduction of modern lifestyle diseases such as heart disease. This awareness has given rise to the demand for meat from free-range animals, including both sheep and game. In the past ten years, lead farmers in the Lyngen communities have observed this emerging national and regional marked trend, and taken a lead in innovative breeding practices, ultimately producing extraordinary lean, high quality meat.

During the last four decades, the Læstadian congregations went through major organisational changes and religious tenants were put under new pressure. Unlike in Southern Norway and parts of Northern Norway, no thorough secularization of community life occurred. Therefore, congregational life remains essential for these farmers.

This study focuses on the communities that have diversified their income opportunities since the 1970s. Currently, many households are entirely dependent on off-farm incomes through local employment in the public sector or urban areas. In our study of approximately 820 persons in 206 households, 23 households are involved in animal husbandry, and all of them have sheep. Currently these 23 farm households have 3,100 winter-fed sheep. The changes over the last 50 years in the number of sheep per farm unit indicate the dramatic change that has occurred. In 1960, each unit had on average 4 winter-fed animals. In 1978 the average number had increased to 12 (Lillevoll 1982). Currently the average is 135 sheep per farm unit.

Data for this study was collected between 2008 to the present. One of the researchers is a native of Lyngen, which greatly facilitated the introduction and rapport with the local farmers. The other one has extensive research experience from Himalayan mountain communities and delta-land rice farming. Open-ended focus interviews and life-history interviews with two generations of acknowledged lead farmers were conducted. In selected farming households, daily routines of the annual production cycle were studied through participatory observation. Lillevoll's comprehensive study (1982) of occupational combinations in Lyngen's agricultural sector, which already by then had become a part-time occupation for many locals, has been an invaluable reference source for this study.

From a layman's perspective, breeding might be perceived as only a hectic mating season, otherwise detached from the rest of the annual cycle of stall-feeding, outdoor grazing and slaughtering. However, results from this study prove that this entire cycle is intimately connected to breeding as a diverse, sophisticated knowledge domain.

The Production Cycle. The Critical Mountain Summer Grazing

The management and production cycle includes shifts between stall-feeding during the long, chilly winter months from October through April and transhumance during the short, moderately warm arctic summer from June to September. In the warmer months, animals are left free grazing in higher elevations from approximately 500–1,000 metres above sea level, in spectacular alpine meadows, with emerald green nutritious pastures. In this arctic climate, late August heralds the first signs of autumn with spells of yellow and red colours, and powder snow on the highest tops. These signs of nature launch a hectic collection season.

Relatively few households opted for large expansion of their sheep, keeping 200–300 winter-fed animals. Given the current fertility rate, the

flock size rises to 600–900 animals after the lambing season. This is a magnificent rise in flock size compared to the numbers in the 1950s and 1960s, when the size was 5–10 winter-fed sheep and a similar number of cattle. Later, in the 1970s and 1980s, the number had risen from 15–20 to about 100 winter-fed sheep or 60–300 summer-fed ones.[9] The rise in the number of animals from summer until the autumn slaughter, for these specialised sheep farmers, has not only necessitated negotiation for access to the vast mountain plateaus and steep mountain sides up from their own farms. Access is also needed to more distant mountain pastures in both their own and in neighbouring counties, in the inner parts of the Lyngenfjord. The most attractive pastures in the Lyngen peninsula are privately owned. The spatial distribution is composed of narrow plots, which range from the fjord up to the highest magnificent peaks. The lowest lying areas within this vertical plot mosaic are privately owned. The low hills have a mix of private (the forests) and common ownership (the pastures) patterns and the high mountains are common land (Norwegian *felles allmenning*), disposed by the nearlying farmers. In order to obtain access to valuable pastures in the inner fjord region, agreements for user rights are made with the owners. Such access is negotiated through social networks, based on kinship and friendship. Often families pool efforts together in order to share a certain pasture area. There has not been such an extensive use of mountain meadows, mountain plateaus and high mountains as grazing grounds for domesticated animals since the seventeenth century, when the erstwhile indigenous nomadic and semi-nomadic Sami used the Lyngen (*Ittonjárga*) mountains for their large flocks of domesticated reindeer.

Sheep farmers are very aware of how breeding is influenced by a range of environmental conditions, including the impact on lamb weight both during and at the end of the extensive free-ranging seasons.[10] Changes in weight are often evident by the increase in mortality rates during summers with more predators. Farmers in this study use composite breeds of Norwegian White Sheep (NWS) of Dala, Rygja and Steigar, a genetic mix of old Norwegian breeds and British breeds (Burditt *et al*. 2008).[11] In order to reduce the mortality rates during the risky outdoor season, farmers will identify high-risk lambs in the spring and keep them on the farm longer, or even for the duration of the summer if necessary. They are also keenly aware that litter size, sex and age of the ewe (dam) affect lamb mortality during the 5-month pre-weaning period both on the home pastures and during the free grazing season.

Monitoring of the well-being of the flocks during the summer and sheep gathering in early autumn are done by effective, coordinated use of our perceptive apparatus, knowledge of instincts of flocks of sheep and shepherd

dogs, and use of modern communication technology. This effective combination is best understood by combining ethological knowledge of flock behaviour and cognitive perspectives of humans' perceptive apparatus.

Current methods of sheep gathering combine an intricate triangular relation among humans, sheep dogs (border collies) and sheep. Modern technology, in the form of binoculars, and mobile phones, is regularly used. Some farmers even make use of a global positioning system (GPS) to help track their sheep. Until the 1970s, the sheep-gathering season from the early transition of the arctic summer to early autumn took place based on local collectors' intimate knowledge of their sheep's preferred grazing grounds in the mountains. The human visual sense and long-term memory were mobilised. The interplay between spatial memory (both place memory and three-dimensional orientation) and hearing faculties (i.e. the direction of tickling bells and animal cries) enabled collections, but collections remained arduous.

Until the 1980s, collecting sheep in the foothills was eased by the intensive grazing of cattle, which checked the growth of dense forestation in this elevation zone. In this period local sheep collectors started to use walkie-talkies as an aid for communicating the whereabouts of the herd. The walkie-talkie was considered a more social technology than the subsequently introduced VHF radio and the most recent mobile network, since the wavelength used was open and could be heard by anyone in the region. Most fjord-side and upper-elevation villagers had their own walkie-talkies, and listened eagerly to the steady, but crackling, stream of communication between the bands of collectors in the mountains. Even though since the mid-1970s the use of walkie-talkies had eased communication and coordination, the consolidation of the dispersed small bands of sheep and their lambs was still a laborious physical task, involving highly coordinated calls and orders from collectors who ran across areas of streams, hillocks and vast berry-clad moors.

Given the steady flock increase in the 1970s and early 1980s, a few young sheep farmers attended courses in sheepdog instruction. They started using Scottish sheepdogs on an experimental basis, utilising experiences from pioneer farmers in Southern Norway as a guide. These early experiences gradually convinced the sheep farmers that these dogs would be invaluable helpers in their increasingly arduous task. The sheepdogs' flock instinct is mobilised by its human flock members through an intricate mix of commands and by approvals and disapprovals that direct the dogs to take up a hunt. Hunts end with the gradual encircling of the escaping flock until they ultimately give in and come to a standstill. This signals the sheep's reluctant acceptance of the sheepdog as their flock leader. After this first run-escape

encounter, the sheep are herded across the majestic mountain terrain under the direction of their human flock leaders. The autumn gathering starts with the collection of the easily identifiable larger flocks, resulting in total herds ranging from 50 to 300 animals retreating from the mountains. The rows of humans and animals descend on narrow trails through the forested foothills. There the tired flocks are herded into temporary enclosures until they are moved onto large tractors that transport the animals to the farms.

The autumn collection process contains a visible social element. If the weather permits, the collectors, who are often close relatives or neighbours, take a few breaks during their long and arduous days. During these cherished breaks, both bawdy joking and serious discussions ensue. Coffee is brewed over open, crackling and aromatic fires and served with salty food and sweetmeat. The well-established practice that any collector who spots other farmers' animals nearby should track them and bring them down is on the decline. However, in certain areas communal solidarity prevails. If other collectors' animals are spotted in farther locations, they are carefully reported as soon as possible. Those collectors, who use a mobile network, will instantly notify owners about the situation. These acts of communal solidarity not only reduce the total time used for collection in each farm household, but also reduce the mortality rates of the sheep themselves. The joint sheep collection gatherings, which take place in closer pastures and often are lively social gatherings, are attended not only by the collectors themselves, but also by villagers who are no longer sheep owners.

Back on the farms, the herds are subjected to full inspection, and lambs and sheep are sorted out for slaughtering. What the locals call "the mother's line" is kept, while those in the "meat line" are sent for slaughter. Sheep that do not have the ideal slaughter weight are driven out into on-farm high quality pastures in order to grow quickly to the desired weight. Ewes that demonstrate weak mothering and have caused deaths in their litter may also be sent for slaughter. Nonetheless, autumn is a hectic season, with animals sent for slaughtering every week while many remain in cultivated pastures. After wool shearing, there is in-door collection, launching the winter-feeding season in December. This begins with treatment for parasites, sorting of sheep in the mother line, sorting lambs by age and growth, and development of a fodder plan for each animal in preparation for the mating season.

The early mating plans from the spring are now adjusted, based on careful observations made during the outdoor season. These observations are supported by physical and visual examinations, based on systematically registered data and indexes for each animal. The indexes measure fertility, meatiness (Norwegian *kjøttfylde*) and growth, and are developed by animal specialists of the national breeding organizations. All of the indexes

can be influenced by barn-level breeding practices and by combining scientific and local knowledge about environment-genotype interaction (affecting morbidity, mortality, weight, etc.). Over the decades, farmers have become very experienced breeders using these indexes. Whereas past farmers mainly relied on natural mating (Norwegian *parring*), artificial (Norwegian *semin*) methods have gradually become more important and common in the herding community. In 2007 some sheep farmers decided to leave the community's only breeding cycle (Norwegian *værring*) and begin in a new cycle. Modelled on trademark development in Lofoten (in Nordland) of "Lofotlam," two trademarks were registered in 2005. The smallest and most recent trademarked producer group (Alpe-ringen) is a kin-based circle comprised of four brothers. The largest and oldest circle of sheep keepers is called "Lyngen *værring*." The circle's carefully selected rams are then sent into a hectic mating tour (Norwegian *bedekking*). Artificial insemination often supplements this process, due to the large number of ewes to be impregnated.

Starting at the third week of pregnancy, ewes (Norwegian *søyer*) and their foetuses are monitored closely. Practical preparations for the lambing are crucial to their survival, and things such as weight are registered in a specially designed data system. Given the large number of pregnancies, the farmers virtually live in the barn around the clock for 3–4 weeks. Continuous observation and birthing assistance are critical in order to ensure that the mother sheep's maternal instinct is triggered. If the mother sheep refuse the lambs, morbidity and mortality would ultimately increase, leading to substantial economic losses. Refused lambs (Norwegian *flaskelam*) have to be bottle fed, and those with many siblings are transferred to sheep with only one or two offspring. The first days and weeks are very important for ensuring stable growth of the lambs. Healthy mothers with fresh udders have a bounty of milk. Animal health depends both on nurture (good stall care, access to nutritious on-farm and off-farm pastures, and regular health monitoring and treatment) and nature. Even after the animals have been let out on the fenced greening home pastures, the mother-child bonding remains critical for survival. If mother and lamb become separated outdoors for more than 24 hours, the lamb will risk not being accepted back by the mother.

The Interface between Barn Floor Experiments and National Breeding Science

Norwegian agriculture authorities established a comprehensive national multi-tiered institutional apparatus, financed breeding science in domestic animals (and later in fish breeding), and mobilised scientific insights for national

breeding programmes. This new apparatus is supported by comprehensive training and extension programmes that are ultimately aimed at spearheading modern sheep farming.[12] From 1947, authorities moved to establish local Goat and Sheep Societies reaching even to the fjord regions of Northern Norway. These different societies were formed under the umbrella of the Norwegian Association of Sheep and Goat Farmers (NSG). Through extension visits, booklets and district and region-level trainings, society members gained exposure to modern scientific notions of animal health, feeding, breeding and meat quality. Local leaders gained access to regional and national level forums, bringing home new knowledge and inspiration from meetings with enterprising sheep farmers from the fjord areas of Western Norway to the Eastern and Central Regions. Whether or not these movements have had a substantial "trickle-down effect" is a matter of considerable interest in this study. When we interviewed the oldest living members in this society as well as current active members in the leadership, we found evidence of a level of self-organization and innovation that cannot be suitably explained or conveyed as a simple protocol. We uncovered that local institutions have been a hub for breeding experiments, based on an extraordinary amount of careful and systematic observation of animals, including local trials that have not been outlined in something like a scientific textbook standard.

Observable phenotypes, the result of lucky genetic imprints, caused farmers to select particular rams on an experimental basis. Incidents of abnormal meatiness in slaughtered lambs were registered by animal specialists in Northern Norway as early as 1938, and documented officially in 1940 (Boman 2007). Our informants report that there were such cases registered by Lyngen farmers in the early post-war period. After the post-war period, decades passed before some Lyngen farmers started using the locally selected ram called *Hjalmar*, which they observed had extreme meatiness. In the 1990s Hjalmar began to be used systematically on an experimental basis in some herds, in order to test out genes and environment-genotype interaction. Local lead breeders took enthusiasm to these barn floor experiments, and the phenotypical qualities of their different breeding experiments were a matter of passionate local discussions both at meetings and on the farms themselves. These local breeding experiments started independently of breeding experts. Sound scientific knowledge of breeding, and recognised national standardized qualities of slaughter, mothering, wool quality and volume were mobilised and complemented with old "rule-of-thumb" knowledge of sheep fertility, mortality, and exteriority (muscle composition, body composition's effect on coping in the mountain, good udder, etc.).

At a Breeding Forum Meeting (Norwegian *Fagforumsmøte*) in 2003, a sheep-breeding specialist was presented with photo documentation from a

sheep farmer in Nordland, a district south of Troms. This photo documentation of abnormal meatiness leads to a scientific "discovery" that prompted the aforementioned Competence Centre of Animalia and NSG to start research on this sensational gene variance. Through comparative genetic research between cattle (Norwegian *storfe*) and sheep, it was concluded that this phenotypical characteristic was a functional mutation of the myostatin gene, which resulted in "double muscles" and a very low fat content. Emboldened by the specialists' results, the sheep farmers continued experimenting in meat quality and fat content, using their own terminology for mating strategies, mainly the "mother's line" and "meat line," wherein Hjalmar's semen was inseminated. The meat line produced extremely lean lambs for slaughtering, while the mother's line lambs were fit for becoming mothers since they had a higher fat content and ample milk production. Observations of genetic variances were discussed at length, involving the Hjalmar gene observed in either both parents or on just one side. In our assessment, this was a systematic breeding experiment that began at a "barnfloor level" that was verified scientifically. Among the scientists, however, there was a considerable controversy. Scientists were divided in their views about whether the positive effects of this gene variance (affecting slaughter class and fat group) outweighed the negative effects. Even after these discussions with the scientists, farmers continued their breeding efforts. Following a 3-year research project by the Norwegian University of Life Sciences on the myostatin gene mutation (Boman *et al*. 2010), project leaders *recommended that* the gene should not be selected for future breeding. The decision was met with considerable scepticism among local sheep farmers involved in our study.

The pioneer breeders who spearheaded these experiments included the mentors of a new generation of breeders. Among these new breeders are the top achievers in the national competition for meat quality and breeding rams, as well as experienced breeders who came to age in the 1970s and 1980s. Until the late 1970s, the breeding effort was an extremely collective one, which nurtured a "community of practice." This community provided for an enriched learning environment for master breeders, competent breeders and apprentices including the community's school going children starting at only 6 years of age.

"A Community of Practice" of Sheep Farmers

Before commencing this study, we were intent on enquiring whether the post-war breeding success story was the result of a particular collaborative effort. Following this question, we wanted to know if the relations between

old and new breeders were best understood through Lave and Wenger's concept of masters and apprentices: a concept one of our researchers (Bleie) has been using in explaining intergenerational learning in Himalayan mountain communities. Furthermore, we argued for an understanding of "communities of learning," which dismisses a polarised view of social versus cognitive theories of learning. Mental representations, neural execution of movements, and observable practices on the barn floor and at summer pastures are always completely interdependent. What goes on inside peoples' heads is both preconditioning and influenced by what transpires verbally and non-verbally between people in a community. Learning is, in this sense, also distributed among co-participants. In our study, the co-participants or community involve the most skilled master breeders, other skilled breeders and apprentices—all of them school children.

We have already defined the learning community in our studied hamlets. It consists of the Goat and Sheep Breeding Society as something more than a local chapter of a national organization. It is found to have certain self-organizing features that surpass the national rules and regulations of NSG. While membership is formally considered individual and usually only one member in each household held membership, most family members were actually active participants. In the 1960s a nearly seamless, yet multifaceted flow of information between this institutionalized public arena and the family-farming units began. Everyone knew from their own observations what was discussed in the Society's meetings. Through daily chores and observations from each barn-floor, information became quite open and shared in the Society's meetings. Since the local chapter was part of a multiscale organization, members and elected leaders had access to centrally distributed knowledge of breeding and a range of other aspects of sheep and goat keeping. Each paying member received a comprehensive Practitioners' Resource Book[13] that was very actively used, typically read thoroughly by most adult household members.

The master breeders, who headed local improved breeding and rearing practices from the 1970s to the early 1990s, grew up in the early post-war years. This was the time when sheep-, cow- and to certain degree goat-keeping gained a proper foothold. The forefathers of the oldest of the studied master breeders had arrived in Lyngen from Tornedalen in Swedish Lapland around 1836 and had a century-long legacy as horsemen and horse breeders. This master breeder sustained his family's history, through oral tales and also a few written texts. The narrative structure of the life history interviews contains an intricately interwoven lineage of his ancestors along with the mares (female horses) that the family kept. The mares were named by the same female name in every generation. This master breeder's oral nar-

ratives represent a rich testimony of an extraordinarily close relationship between men and mares. His family's horse stories are rife with detailed and captivating narratives of their extraordinary natural ability to sense deaths and disasters in advance. The mares are poignantly described as displaying feminine beauty, a varied emotional repertoire of attachment, sadness, fear, disappointment akin to humans, and advanced cognitive abilities in path-finding and sound recognition. This emotional and respectful intimacy that this master breeder was socialized into from his childhood years came also to mark his relationship to his sheep in his mature years. His forefathers practised some level of breeding of the ancient Lyngen horse (Norwegian *Lyngshesten*) in the early decades of the twentieth century. When systematic sheep and goat breeding was adopted by the state's agricultural line agencies after the war, quite a number of Lyngen families, including this master breeder's family, had a proud local record of keeping and breeding horses and sheep.

The late 1950s and 1960s was the early period of communal engagement in improved sheep and cow keeping. The Lyngen Goat and Sheep Breeding Society was established in 1964 and a circle (Værringen) of producers a few years later. The Society mobilised all generations in its regular membership meetings, and tapped into an ore of old local horse breeding knowledge. These meetings were cherished and huge social affairs. The attendance at ordinary membership meetings was so massive that the main hall was so packed that the crowd overflowed into the outer entrance hall.

Though women tended to play a somewhat submissive role in the congregation, the level of active participation of women in the discussions of these membership meetings from the 1960s to 1980s is striking. Women were also responsible for important tasks of hospitality, typically centred on the impressive coffee tables. Men (as heads of households) and leaders in the Læstadian congregation held the formal memberships in the community. Women were often in charge of the family farm, as many men were away on seasonal migration. This division of labour opened up opportunities for women's involvement and leadership in the breeding efforts, even if they were not elected to the formal top positions in the local society at that time (Lillevoll 1982). The names of four pioneers in this period are still remembered with deep respect as the "sheep chaps" (Norwegian *sauekarer*), a gendered terminology, that hides the already mentioned fact that among the remembered pioneers in this vicinity there are a number of female farmers who were talented and active breeders as well as engaged in innovating local agriculture in other respects.

From the 1970s, a new generation of young farmers became active, while the first generation of *sauekarer* were still in business and highly regarded

as mentors (even though they were near or above the pension age). In this period, one of the master breeders (selected for an in-depth study) became chairman of the Society and held the position for 10 consecutive years. After this decade as the Society's leader, this master breeder remained very active in the society for another two decades. In the period, he tapped into his family tradition and pioneered the revitalization of breeding of ancient Lyngen horses, which were nearly extinct.[14]

Over the last two decades or so, new shifts in the gender division of labour emerged on these family farms, as a result of an intricate interplay between macro induced changes through state policies (most notably gender equity policies, increased job opportunities in local government, education and health sectors and incentives for mechanisation of the agricultural sector) and local gender relations. The first ever well-educated generation of young local women chose jobs in the formal sector. Women's entry into the job market was not uncontroversial, yet fairly acceptable, since jobs as cleaners, nurses and teachers could be seen as an extension of their traditional care giving roles. These off-farm occupations for the first time enabled them to earn independent incomes, which made them breadwinners alongside their husbands and gave the family economy a cherished security. The introduction of big machines (seen as an entirely male preserve), and the increasing sophistication of breeding as a knowledge domain, further contributed to the exit of women as fulltime sheep farmers and breeders. The accumulated result was a male-dominated farming system, if compared to the previous generation. Women and school children continued to contribute during peak seasons, when labour shortage was acute.

Life history interviews with the current generation of master breeders demonstrate fully the rich learning environment of breeding and several other aspects of sheep farming. The young apprentices were allowed to accompany their mentors who were in charge of free veterinary services. Transportation of rams and weighing were also offered free of charge by active members. Interested children, especially boys, were allowed to do much of this work. When current master breeders were interviewed, they recalled the excitement and pride instilled inside them when their elders entrusted them with the arduous task of transporting rams along dark slippery autumn and winter roads. The intense engagement through creative play and participation in the daily life of sheep keeping stands out in the life-history interviews, in great contrast to the dull instructional learning in the traditional classroom setting. Lillevoll's study (1982) also emphasised the importance of gender-differentiated socialization and situated learning for interest-orientation and occupational choice. The study contains observation data from the early 1980s of children learning through imitation and

practising a range of tasks. Among the children observed by Lillevoll in his first study are today's master breeders (Lillevoll forthcoming).

The apprentice period lasted from a full decade (from ages 6–16/17), during the 1980s. This was a time of socio-economic changes. Many young people chose to move from Lyngen in order to pursue higher education and obtain lucrative formal employment. However, none of the new generations of master breeders opted for this. New generations were "hooked" on becoming sheep farmers. Their immersion in the world of sheep keeping was not solely due to openness of the Society to newcomers, but also partly to the restrictions on modern leisure posed by religious restrictions. Since sports and other modern out-of school activities were forbidden, these children were left out (if expressed negatively), or freed (if expressed positively) to let sheep keeping become an all-consuming interest, besides daily school and homework. School-going girls were expected to help their mothers with daily household chores in these large families, in which having 4 to 6 children was still common until recently. This might seem like a draconian control (as late as the 1980s and 1990s) of teenagers' freedom. Our interviews do not indicate, however, that these restrictions led to serious conflicts between parents and children. In the retrospective interviews the current lead farmers recall fondly their accommodative masters and the unique practical insights and responsibilities they and their nearest kin entrusted them with at such a tender age.

Institutional Embeddedness and the Motivational Role of Religious Notions

It may be asked how this North Norwegian fjord area, dominated by a conservative form of Lutheran Christianity, became a vanguard of sheep and horse breeding in Norway. Until the mid-1980s, many households had phased out cow keeping, but had kept small winter-fed flocks of sheep. Peoples' engagement in sheep keeping and breeding was very considerable. Breeding practices and their outcomes in exteriority (phenotypical traits) were ever-present topics at both the Societies' well-attended meetings and in everyday informal interaction. Even at the Læstadian congregation's Sunday services that all sheep farmers attended, news and observations from the barn floor and grazing ground were shared. Everyday talk about the sheep's phenotypes in relation to pursued breeding strategies was part of a larger discourse on survival skills (locally expressed through the verb *å berges*) in times of extraordinarily rapid social and economic changes. *Å berges* is a complex morally grounded concept, with connotations to responsibility for ensuring survival through modest living, hard labour, and

foresight. The concept has connotations that may be explicated in English as surviving through adaptation, resilience and intelligence. The notion, which we like to suggest originated from the Sea Sami concept *gáddjot*, which translated into Norwegian means *berges*, *frelses*, *reddes*, *bli fri* ['be rescued, saved,' 'be liberated'], has been incorporated into the Læstadian belief system (Lillevoll forthcoming). This Protestant sect is marked by Calvinist and puritanical conceptions of ethical behaviour, which were first spread around Norway in the early and mid-nineteenth century by the Haugeian movement.[15] Læstadianism, also in its variant in Lyngen,[16] cultivated a work ethic that emphasized high work moral, prudence and ascetic living. Progress in material terms (*å berges*) is a sign of salvation, being among God's chosen ones (predestination). This notion has placed responsibility and agency on the local collective. This responsibility elevates the family as a primary moral and organizational framework at the level of households, the inclusive patrilineal kin-groups, and in local associational life. The notion of the order of creation (Norwegian *skaperordning*) in Lyngen Læstadianism states that the family is instituted by God, and everyone has to care for this divinely created nature as shepherds of the sea, and for their flocks of domestic animals. These interlinked notions of the order of creation and survival skills provide the motivational force behind the tremendous local support for establishing and participating (on family basis) in their Sheep and Goat Breeding Society. There was a seamless overlap between the Congregation(s) and the Society. These foundational religious values in this close-knit Læstadian congregation formed a solid social capital for the sheep keeping households and the Sheep and Goat Breeding Society as a community of practice. Lillevoll (1982: 256–258) underlines the importance of religious values. He argues that Læstadian values directed young people towards attendance in the congregation, participation in farm work and outdoor recreation, rather than in sports, which were seen as sinful, since they took place on the week's holy day. Analysis of our newly collected data confirms that the institutional overlap between the Læstadian milieu and the Society remained important (during the 1980s and 1990s) for situated learning and recruitment to the farming occupation.[17] We observed that among these biblically learned and believing people, there was a perfect match among their biblical notions of Christ as a shepherd, the Old Testament's vivid narratives of a pastoral society, and their own diverse life world as shepherds of the sea fisheries and domestic flocks.

During the first thirty years of the Society, the sharing of observations of breeding results, animal health, and assistance was nearly unconditional. This changed with the increasing commercialization of sheep keeping in the 1990s, resulting in the splitting-up of Lyngen Værring into the two

trademark-oriented groups named *Alpelam* and *Lyngenlam*. The considerable strain on moral values and social reciprocity of this new competitive situation was observed and articulated during interviews. One of our key informants, the most senior "master breeder," argued that over the last 15 years, a more selfish individualistic attitude had emerged, and the splitting to two *værring*s was a symptom of this regrettable tendency. The weakening of collective control and sanctions of selfish ways to enhance survival and progress is related to a slow but steady erosion of gender and age hierarchies (from the 1980s onwards) in this congregation (Olsen 2008).

From the mid-1990s, a new generation of enterprising farmers successfully developed sheep farming into commercially viable large-scale enterprises. Flock size expanded rapidly, demanding large modern barns and heavy machines. These new breeding masters not only retained their childhood Christian faith, but remained active members of the Læstadian congregation. Their interviews show a reflective attitude to their faith as a motivating force and how their notion of order of creation (*skaperordning*) reminded them that they are threading a precarious line as virtual masters of life through their sophisticated breeding practices. We would like to cite such a statement:

> In agriculture one experiences the work one is doing as blessed. It bears fruits. When we do breeding work on sheep, horses, and dogs, cultivate our land and fertilize it to our best knowledge, [...] you see results. Much is dependent on what one has done oneself. There is blessing in this endeavour, it is about faith, really. One feels satisfaction seeing living life from between ones fingers [...]. It is possible to create, without making ourselves into God. This pleasure is great.

Our late master breeder, expressed himself metaphorically: "The Læstadian faith is like cargo for a sailing ship, enabling it to sail well and keep the direction in our efforts to develop and renew our sheep keeping."

While not all our informants so directly articulated their endeavours through such poignant religious expressions, all felt very familiar with our use of language when we raised the question of whether there are connections between their Læstadian outlook and their struggle to survive (*å berges*). In this community of practice with its overlapping religious and economic domains, "*å berges*," with its connotations to the notion of predestination and ascetical activism and the ancient Sami faith, is constantly referred to in everyday practice as well as in communication as the explanation of why they innovate sheep keeping as a practice. Ultimately, being successful promises salvation. These eminent, hardworking and devout sheep farmers see their responsibility for sustainable and improved uses of

nature. Both their domestic flocks and their cultivated seashore and hilly fields are entrusted them as believers.

Conclusion

This paper documents and analyses the formation and level of self-organization since the Second World War in a selected group of fjord communities in Lyngen, applying the notion of a community of practice. By applying socio-cultural and cognitive theories of learning, we have attempted to unravel quite complex processes that have not yet been fully addressed in recent research on rural transformations in Northern Norway. One key finding is a productive interface between scientific knowledge and local knowledge in successive phases of breeding innovations after the Second World War. This pool of relevant local knowledge was composed of a vast, sophisticated local knowledge of the nature-based life world, including knowledge and skills from a longstanding family-based tradition of breeding of the ancient Lyngen horse. Another important finding of ours is the extraordinary inclusion of young schoolchildren, mostly boys, into this community of practice. We have unravelled certain salient features of these sheep-keeping communities as a thriving community of practice and the social frame-conditions that have enabled the rise of the pioneer generation of master breeders and their dedication to their young apprentices. Many of them are today's nationally ranked medal-earning farmers in lamb and sheep meat quality. They are now facing the quite formidable challenge of enabling their own young children to acquire a vast domain of nature-based knowledge at a time when their children no longer attend the meetings of the Society and are allowed to take part in sports activities and a range of other secular and religious youth activities. This new set of conditions, albeit less strictly religiously determined, still leads to hierarchically regulated family relations. However, apart from the not very encouraging national agricultural policies of particular relevance for sheep farmers, it is the encroachment of a globalised materialistic youth culture that preoccupies the thoughts of the current generation of master breeders when they look ahead for ways to ensure that their generation will not be the last in this successful post-war era of innovative sheep keeping in Lyngen.

NOTES

[1] Their early influential work (Lave & Wenger 1991) was augmented by Wenger (1999) and Lave (forthcoming).

[2] The earliest archaeological evidence of human use of the peninsula dates back to the younger Stone Age and the Iron Age.

[3] The people of Lyngen were directly affected by the German occupation, even if they were not, as the people of Finnmark and North Troms, subjected to the scorched earth tactics in the war's final months. For an authoritative account of the effect of post-war national decentralization policies on Northern Norway, see Brox (2006). For a more contemporary focused study of local transformations due to globalization and changed relations between the Norwegian state and rural communities of the High-North, see Bærenholdt & Aarsæther (2001).

[4] For an account of the farming system the Kvens introduced when they settled in Finnmark and Northern-Troms, see Guttormsen (2000).

[5] The ethnic revitalization of Sea Sami identity has been stronger in the country of Kåfjord on the opposite side of the Lyngenfjord.

[6] Before the Second World War, the men were engaged in the rich fjord fisheries as well as in the more commercialized ocean fisheries in Finnmark and Nordland.

[7] One of these fjord communities converted itself into a small booming industrial community.

[8] For a comprehensive study of the structural changes in family farms in this period, see Blekesaune (1996).

[9] For an overview of regional tendencies in sheep keeping in Northern-Norway during the 1990s, see Hansen and Stornes (1999).

[10] They know that long-tailed *Dala lambs* on average gain higher weights than *Spæl lambs*, and that these breeds have different flocking and foraging behaviours. Ewes and lambs of different breeds have variable ability to climb in difficult terrain and to react to and flee from predators; Spæl sheep are more responsive than Dala sheep.

[11] The main genetic material comes from Steigar and Dala, the use of Rygja has declined lately, and the use of old Finnish races has completely stopped.

[12] The Norwegian University of Life Sciences (*Universitetet for miljø- og biovitenskap/ UMB*), has spearheaded Norway's breeding science in domestic animals (and later in fish breeding), in close collaboration with amongst others, the already mentioned national Goat and Sheep Breeding Society, which directly organises and implements the national breeding plan.

[13] Bergøy 1976. A separate chapter on sheep breeding (pp. 37–72) describes the purposes of breeding, the different races, different kinds of breeding (pure versus mixed), scientific measures, the impact of environmental factors, organization of the breeding effort (some of it was taken care of locally and some centrally/at district level), selection principles and finally monitoring of offspring. Before this invaluable book came out, members had access to smaller pamphlets and lectures on breeding.

[14] The first tractors were introduced in the 1950s and 1960s. By the 1970s most had tractors. This led to larger herd size of cows and larger milk production. As a result of this mechanization, the Lyngen horse, the locality's ancient draft animal, got threatened by extinction.

[15] Hans Nilsen Hauge (1771–1824) preached in towns and the countryside. His preaching was marked by both a capitalist and a protestant spirit. Idleness was a great sin. Hauge knitted as he walked between meetings. Both Hauge and his disciples engaged in trade. Hauge had his own big firm in Bergen. It was organised as a religious cooperative, and exported fish products from Northern Norway. His movement faded away in the 1850s, but his long-term influence on the Norwegian Church and the early Læstadian movement is considerable (Kullerud 1996).

[16] The Læstadian movement emerged in the mid-nineteenth century in *Lappmarken*, a

region inhabited by the indigenous Sami and Kvens, Norwegians, Swedes and Finns. The conservative, pietistic Læstadian lay movement is part of a larger scenario of similar revivalist movements in Northern Europe. For an early but still influential account of the history and theological tenets of the Læstadian movement, see Boreman (1953). Gjessing (1953) saw the movement as covertly continuing ancient Shamanistic practices. Recent works by for example Nergård (2006) and Drivenes & Niemi (2000) have also emphasised aspects of ethnic cultural continuity.

[17] A different outcome of these observed interdependencies is evident in another nearby community. There industrialization replaced agriculture and was accompanied by secularization. Sports and organised football in particular took over the role of the Læstadian congregation as an all-consuming focus of community pride, attention and pooling of voluntary work.

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