

Methods of Maintaining Settled Agriculture in Finnish Lapland

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ABSTRACT: The farming methods used to maintain settled agriculture along the northern limits of cultivation in Finnish Lapland have been studied in the village of Peltovuoma. Farming is an integration of reindeer rearing, adapted from traditional Lapp methods, with settled agriculture, based on subsistence dairy production and arable cropping. Maintenance is only made possible by the careful management of a complex system of land uses, precisely located to maximize production from a limited area of reclaimed land of variable quality, within a restrictive climatic environment.

RÉSUMÉ. *Méthodes pour maintenir une agriculture sédentaire en Laponie finlandaise.* L'auteur étudie les méthodes de vie rurale utilisées pour maintenir une agriculture sédentaire le long des limites septentrionales de ce genre de vie, dans le village de Peltovuoma en Laponie finlandaise. Ici, la vie rurale est une intégration de l'élevage du renne basé sur les méthodes laponnes traditionnelles, et de l'agriculture sédentaire basée sur la production laitière vivrière et la culture fourragère. Le maintien de cette vie rurale n'est possible que par une gestion soignée d'un système complexe d'utilisations diverses du sol, précisément localisées de manière à maximiser le rendement d'une surface limitée de sol amendé de qualité variable, dans un milieu climatique restrictif.

РЕЗЮМЕ. *Методы ведения осёдлого сельского хозяйства в финской Лапландии.* В селении Пельтовуома изучались методы ведения осёдлого сельского хозяйства, используемые по северной границе культурного хозяйствования в финской Лапландии. Основу метода составляет объединение в одно целое разведения северного оленя и осёдлого хозяйствования, базирующегося на молочном производстве и пахотном возделывании почвы. В условиях сурового климата содержание хозяйства и получение максимального количества продукции с ограниченной площади возделываемой земли непостоянного качества возможно только при умелом планировании всего хозяйства в целом.

INTRODUCTION

Within the arctic regions of the world, physical conditions give rise to an environment which, even at its best, imposes strict limits on the development of any agricultural community. A number of authors, however, have noted the fact that, of these regions, arctic Finland is perhaps unique in its development (Platt 1955, p. ix). Smeds (1960a p. 149), for example, noted that while "no other state in the world has such a markedly northern position" yet "no other region in the world situated so far polewards has been so densely populated and so fully developed by man as Finland". It can also be noted that much of this development has been attributed (Smeds 1960a p. 149 and pp. 159-162; Smeds 1960b) to a national pioneering spirit of the Finnish people, which continues up to the

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present day, and is evidenced by the continuing northward shift of the boundaries of cultivation of a number of crops and by the continued reclamation of land for agricultural use. As Mead (1953 p. 43) has stated: "such reclamation gives to its farming a pioneer character. The continuous conversion of non-agricultural land to agricultural land is taking place in all parts of the country, from the gates of the capital to the Arctic frontiers of cultivation".

For agriculture to survive and develop on this "Arctic frontier of cultivation" however demands more of the farming community than a mere ability to reclaim the waste-land. Each agricultural enterprise must of necessity be developed in response to detailed local environmental conditions, but in addition separate enterprises must be organized so as to interrelate and integrate closely so that the maximum possible use can be made of the land, within the severe limits set by physical conditions.

The village of Peltovuoma is one such farming community; it is situated at latitude 68°23'N. in the parish of Enontekio, and forms one of a number of small settlements that run in an east-west line some 200 kms. north of the Arctic Circle, in the northwestern part of Finland (Fig. 1). The agricultural economy of the village is largely a product of its latitude, factors of climate and soil being of major importance in dictating the type of farming that has evolved. The severity



FIG. 1. Location of Peltovuoma.

of the climate prevents the ripening of staple grain crops and this, together with the remoteness of the village and the tradition of reindeer herding in that part of northern Finland, has given rise to the development of a farm economy based on subsistence cropping and animal husbandry. Each of these aspects of farming creates its own special demands on a limited area of farm land, demands that have to be related to the agricultural possibilities offered by physical conditions within the area.

PHYSICAL CONDITIONS

Lying close to the northern limit of the boreal forest zone (Platt 1955), which dies out some 30 miles north of the village, Peltovuoma has a mean annual temperature of $-1^{\circ}\text{C}.$, a January average of $-14^{\circ}\text{C}.$, and a July average of $14^{\circ}\text{C}.$, whereas winter minimum temperatures may fall as low as $-40^{\circ}\text{C}.$ The main determinant of farming possibility however is the length of the growing season, here around 110 to 120 days (days with average temperatures of over $5^{\circ}\text{C}.$), with an effective temperature (day degrees above $5^{\circ}\text{C}.$) of about 600 to 700°. Spring starts in early May and mean daily temperatures rise to around $10^{\circ}\text{C}.$ by 20 to 25 June (Kolkki 1966). Summers, though short and ending in mid-August, are warm with July maxima of $30^{\circ}\text{C}.$ occasionally occurring. It is this short warm summer season, when 6 weeks of continuous daylight give more sunshine, that allows farming to be carried on in the area (Keränen and Korhonen 1952).

Precipitation is not high, about 40 cm. per annum being the average. Less than half of this, between 15 cm. and 18 cm. falls as snow which lies on the ground from late September to early May, with maximum depths of 65 cm. in mid-March. Despite its arctic location, snow is not the principal type of precipitation nor is winter the wettest season. Summer is the season of greatest rainfall, July-August being the wettest period with 17 to 18 cm.

Owing to severe winter temperatures, not only does snow lie for an extended period, but freezing also takes place in the soil below the snow cover. Soils become frozen by October and remain so until the spring thaw in May; after that they may take as much as a month in the case of lighter soils, and two months in the case of peat soils, before they thaw completely.

A final climatic hazard to agriculture in Peltovuoma is the occasional occurrence of sharp frosts between August and early September.

It is evident therefore that climate imposes strict limits on agriculture in Peltovuoma, making it impossible to farm the land for at least nine months of the year, and restricting the farmer to a short growing season (Ohlson 1960).

The nucleus of settlement is on a ridge of fluvio-glacial sands; on either side of this dry point site there are two lake basins, in which extensive, deep deposits of peat have been laid down, forming distinctive areas of wet, boggy land, surrounding the village. The soils that have developed reflect this sharp differentiation, thin iron podsols being developed on the sands, and the peat areas largely consisting of only poorly decayed vegetation (Dickenson 1963). Though neither of these soils is particularly fertile, of the two, podsols are preferred for most

types of cropping, being lighter and therefore "earlier" soils; an important factor in the context of a limited growing season. They are naturally poor in minerals, but can be improved by the application of animal or artificial fertilizers. The peats on the other hand are more difficult to reclaim and put into agricultural use. Around the village the boundary between peats and podsoles is sharp, following the break of slope which marks the shoreline of former lakes, and this soil boundary has great implications in the pattern of land use in the village.

As Peltovuoma has grown, there has been some expansion of agricultural land along the ridge away from the original nucleus, but expansion of existing farm holdings seems to have been, in the main, by reclamation of the peats. Expansion involves a choice between reclaiming and farming podsol areas at some distance from the farm, or expanding onto the peats in the close vicinity of existing fields. The farm economy is such that the advantage of the proximity of new land to the existing holding has led to the exploitation of peat areas despite the difficulty of their initial reclamation. As reclamation is therefore still a part of the farming life of the village, some discussion of the technique used is warranted.

LAND RECLAMATION

Full-scale reclamation can be divided into two parts; land clearance and land drainage. Clearance follows a pattern of felling, clearing stumps and undergrowth and ploughing. The first of these operations is carried out in winter and is today facilitated by the use of small power-saws which have replaced the slower method of hand-axe felling. Following initial felling of larger trees, the undergrowth is cleared, usually now by first cutting and collecting the material into heaps before subsequent burning, rather than using the traditional running fire which was allowed to burn across the whole area to be cleared. The removal of larger tree stumps, once a laborious task of hauling by horse and men is now aided by the use of tractors which save time and labour. The method of ploughing is largely dependent on the character of the soil, lighter podsoles presenting no problem to traditional methods of shallow ploughing by horse. Peats, however, have been more easily reclaimed since the advent of the tractor (of which there are four in the village), deep ploughing helping drainage on the peats by, in many cases, turning up underlying sands which lighten the texture of the peats.

Land drainage, the second phase of reclamation, is a function of such factors as slope and soil. To utilize the wetter peat lands, field drains must be dug, in some cases at as little as 15-metre intervals. In Peltovuoma, all drainage consists of open ditches, some of which are as deep as 1.5 metre. On the podsol area, much less drainage is necessary, both on account of the free draining nature of these soils and also by virtue of their elevation above the peats which brings about a natural downslope movement of excess water away from the podsoles. The effect of these factors on the landscape of the village is clearly shown in Fig. 2. The podsol area of the ridge is characterised by large fields, with fewer drainage ditches, whereas the peats, both to the southwest of the settlement and along the shores of Peltojoki and Angelinjarvi, are subdivided into much smaller plots by a close-knit and complicated pattern of drains.

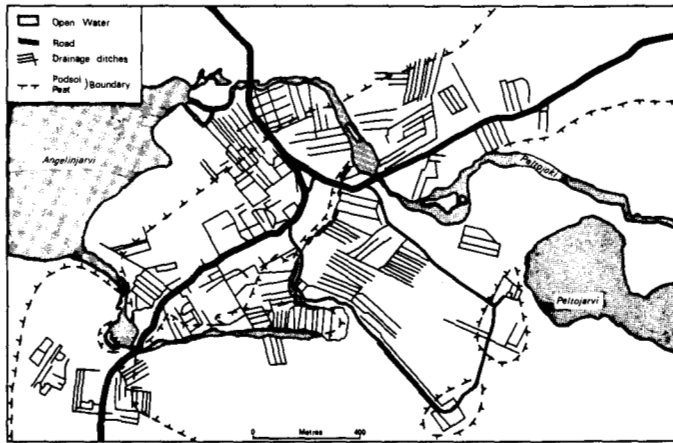


FIG. 2. Land drainage.

ANIMAL HUSBANDRY

Reindeer herding is still one of the most important parts of the agricultural economy, but its practice has been greatly modified from that of the original Lapps of the area. This modification is largely due to the fact that in Finland, not just the Lapps but all Finnish citizens can own reindeer herds, as according to law the Lapps have the same status as other citizens (Nickul 1969). The Lapp *sida* (a small group of nomadic families herding collectively) has been replaced by the *paliskunta* system evolved by the Finns. This system is an adaptation of the *sida* (Jomppanen 1960) in that the reindeer herds of the whole village community are herded by a small proportion of the villagers, leaving the majority of the population free to carry on settled agriculture. The management of the Peltovuoma herd may be considered typical of this *paliskunta* system. The herd is moved in spring, by a number of village herdsman, from the winter grazing areas around the village to the mountain grazings around Ounastunturi to the southwest. Young animals are marked during the summer grazing period, and registered with their individual owners on the return of the herd in the autumn, at which time the animals for sale or slaughter are culled from the herd, and the remainder wintered on the lichenous forest grazings close to the village. Numbers are by no means evenly distributed among the farms, nor is reindeer-keeping the sole occupation of any farmer, individual herds being kept, first to supply meat and second and most important to provide cash from the sale of skins and meat. After registration or slaughter in the autumn, the remainder of the herd is wintered on lichenous forest grazings close to the village.

Reference might also be made at this stage to the diet of the reindeer. During the spring and summer the animals' diet consists mainly of forest grasses, these foods being preferred to the lichens, normally a winter feed, which consist of almost pure carbohydrates and, if fed over long periods, may cause deficiency diseases or sterility owing to lack of protein (Hagen 1960).

The second important element of animal husbandry in the village is cattle. Introduced into the economy of the area by Finnish settlers, cattle are kept for dairy production and are rarely used for meat. Two breeds of cattle were noted:

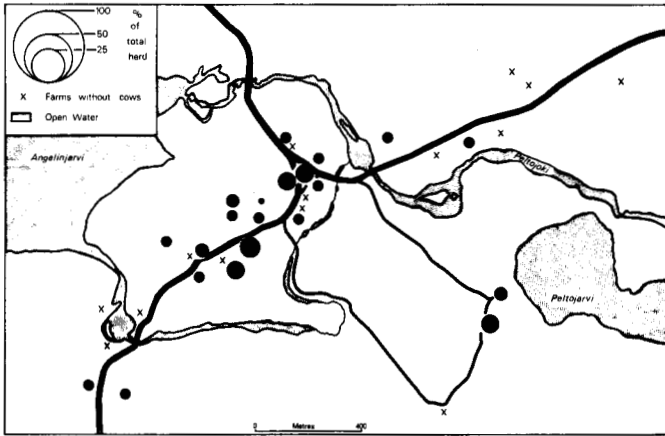


FIG. 3. Distribution of dairy cattle.

the Ayrshire (introduced into Finland in the mid-nineteenth century) and the native Finnish breed, a small, light-boned animal, dun-coloured, and bearing some resemblance to the Jersey and having a somewhat lower milk yield than the Ayrshire. However, it was also noted that the great proportion of cattle was of mixed Finnish-Ayrshire stock. A total of 63 cows were kept in 1962 on 21 of the holdings questioned (Fig. 3). Mead (1953 p. 114) quotes figures for Finland as a whole of 5 to 6 cows per holding, and over 50 per cent of cattle on holdings of between 5 and 25 hectares. The figures obtained from Peltovuoma give a rather different picture, 3 cows per holding being average, and 71 per cent of the cattle being found on holdings of between 2 and 5 hectares. The concentration of cattle on smaller holdings is, however, indicative of the subsistence nature of dairying; a large number of farms each keeping a few cows to provide for their own family needs of milk, butter and cheese.

Climatic factors limit the grazing season to, at the most, 4 months. The season starts between about 1 and 10 June and ends at the latest by 30 September. In exceptional years, an early onset of winter or a late spring can reduce this season to as little as 3 months. During the grazing period, cattle are grazed on certain areas of improved pasture, rough forest grazings near the village and, after hay harvest, on aftermath grazings in the meadows. Even in this period the majority of animals are housed at night.

The need to produce enough fodder to provide for cattle during an eight or nine month stall-feeding period occupies much of the farmer's time and is strongly reflected in the utilization of improved farm land. As Mead states (1953 p. 122) "the eight months period of stall feeding continues to tax the ingenuity of the Finnish farmer. Feeding may be difficult because of the variable yield of the fodder growing lands; to a less extent because of the variable length of the period of stall feeding", and to these factors he also adds, "the physical labour of feeding and watering stalled animals".

The physical labour required to feed stalled animals for 8 or 9 months is self evident; the labour of watering stock is vividly illustrated on certain farms, where the byre (*navetta*) is often nearer to the well than is the farm house. This is because to carry domestic water over large distances, though arduous, is less of a

labour than stock watering. Building the byre near the well also allows the well and byre to be connected by a wooden trough for bringing water to the stock.

Of other types of stock kept in the village, the most important is the horse which still provides one of the main sources of motive power on the farms. The type of horse kept, typical of most of Finland, is a small animal that is well adapted to the needs of the environment. Its light weight gives it an advantage on wet peat fields in that it is less liable to bog down than a heavier animal and also, as it does not have to maintain a high weight, is more economical on valuable winter fodder.

In addition, sheep, pigs and poultry are kept and, while their numbers are so few that they play little part in the overall economy of the village, they represent an important alternative food supply to individual farmers.

LAND UTILIZATION AND CROPPING PRACTICE

FODDER CROPS

The utilization of by far the greatest proportion of improved land is geared to animal husbandry. In addition to grazing fields, large amounts of land must be set aside for the production of hay and for such crops as timothy, cereals, turnips and potatoes which are also grown for fodder.

Grazings provide the first type of land use geared to animal husbandry, but an examination of Fig. 4 shows a surprisingly small amount of land of this type. One reason for this is that the areas mapped as grazings form only one type of grazing land. Jantti (1945) defines three types of grazing: extensive, intensive and aftermath, and only the intensively grazed area is indicated on the map. This category is itself small, as the shortness of the grazing season and the availability of extensive and aftermath grazing cuts down the need for large areas of land to be set aside for intensive grazing.

All intensively grazed areas can be classed as improved pasture, as a productive grass sward can only exist in this area after considerable improvement by way of clearance, drainage and seeding.

The distribution of intensive grazings is an indirect response to soil and drainage conditions. Of all the ways of using improved land, grazings are the

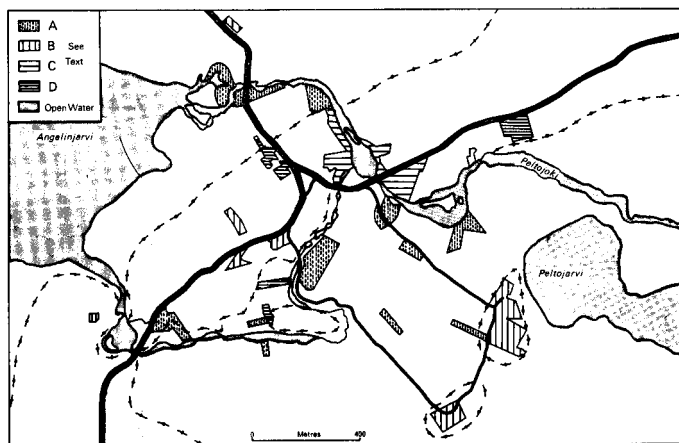


FIG. 4. Intensive grazings.

most tolerant of difficult conditions and, as a result, are often located on the poorest areas of improved peat land (Fig. 4-A). The light soil areas are rarely used for grazing except around farms as home paddocks (B) and certain wetter or steep sloping areas near the rivers (C), these light soils being needed for the production of crops with far more particular soil and moisture requirements. Even on peat (A), grazings seem to be located on the wetter parts leaving the drier peats, where transport is easier, for hay production. Areas of ley pasture (D) mainly found on the drier peats are also used for a few seasons, before being ploughed and re-seeded, when yields of grass originally sown for hay have declined.

Extensive grazings could not be mapped as they consist of the forest and swamp areas around the village and have no precise boundaries. They are used to a limited extent for cattle pasture in summer, but their main role is in the provision of lichenous pasture for reindeer during the winter.

Aftermath grazings could not be precisely mapped either as any hay field provides potential aftermath grazing. The choice of which fields are used is largely up to the individual farmer, bearing in mind such factors as the need for natural manure, etc. Nevertheless, this type of grazing is vital to the feeding of stock and cuts down the need for large areas of pasture, thus leaving land free for other uses. The availability of aftermath grazing, however, is dependent on weather conditions, a favourable summer, with hay harvests in late July or early August, and a grazing season extended to mid or late September, allowing maximum use of the aftermath. Unfavourable summer weather, delaying the hay harvest until late August, or the early onset of winter conditions in early September, can seriously limit the use of this type of grazing. The land devoted to intensive grazing must therefore be sufficient to provide for such eventualities.

Thus it can be seen that the 3 types of grazing have to be carefully interrelated to provide a maximum of feed during the grazing season. This close interrelation and the ease with which its balance can be upset by adverse climatic conditions, shows how the provision of adequate grazing can be a major problem in the type of environment experienced in Peltovuoma.

Shortness of the grazing period in Peltovuoma emphasizes the importance of fodder-growing and, of crops used as fodder, hay is the most important and is the main crop on improved land (Fig. 5). The drier, more easily drained podsols of the ridge are preferred for hay, both for greater ease of cutting and of carting the crop, and because there is a tendency for sedges to enter the sward on the peats. However, such is the competition for these podsols for housing and, less tolerant but no less important crops, that the increased need for hay consequent on the growth of the village has meant that the peats have had to be used. Hay fields, therefore, are distributed over the whole of the improved land of the village, giving preference to the podsols but not being limited to them and avoiding the deeper and wetter peats where the nutritive value of the hay crop is lower.

All hay lands have to be regularly re-seeded and the most popular method seems to be to sow a seed mixture containing a high proportion of timothy (*Phleum pratense*). This grows relatively quickly and provides a hay crop in the second or third year after sowing. Other grasses, including smooth-stalked

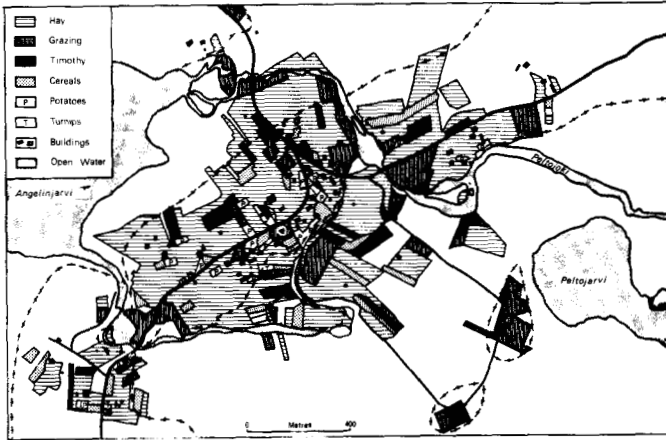


FIG. 5. Land use.

meadow grass (*Poa pratensis*), meadow fescue (*Festuca pratensis*) and common bent grass (*Agrostis tenuis*), sown in the mixture but developing more slowly in this environment, gradually replace the timothy in the sward. Though yields fall off as the timothy grows out, these other grasses, though not as productive, make for a better sward than would timothy alone, and also prolong the use of the land for hay.

Yields (from official statistics, Sheriff's Office, Enontekiö) range from about 4,500 kg./hectare in early years when timothy dominates, to about 1,700 kg./hectare at the end of the productive life of the hay field. When yields fall below this latter level, the land is either re-seeded or used as grazing for a limited period.

The hay is harvested in Peltovuoma from July to the latter part of September. Much depends on favourable climatic conditions, a late spring thaw or an extension of the normally dry spring period, retarding growth, while prolonged rain at harvest time can also cause delay and loss of yield. Any such delays are liable to upset the whole of the farm economy, as they disrupt the complex system of cattle feeding, not only by loss of winter fodder, but by preventing the full use of aftermath grazings.

Though there is some mechanization, much of the hay crop is still cut by scythe and it is remarkable how little is wasted, grass being skilfully cut off very close to the ground. Small light-weight mowing machines are owned by several farms, but costs bar their general use. Not only is the expense of buying the machine itself to be considered, but it must be pulled by either a tractor or horse involving the owner in additional expense either in cash or fodder. Such machines as are available, however, are lent out whenever possible.

After cutting, hay is not left to dry on the ground, but is spread on racks and poles. This method not only prevents loss of nutrients in drying but is ideally suited to local conditions. Ground drying, necessitating frequent turning, is better suited to areas where farming is more mechanized and the labour force is less. In Peltovuoma, as indeed in most of Finland, where lack of capital makes mechanization difficult, and where the inaccessibility of hay fields on wet peats makes it impracticable, the system of rack or pole drying is more suitable. The types of rack and pole used in the village are shown in Fig. 6. The pole

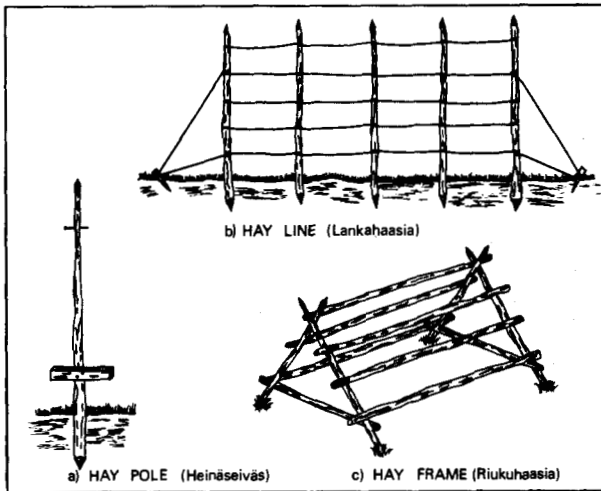


FIG. 6. Types of hay rack used in Peltovuoma.

(*heinaseivas*) and the hayline (*lankahaasia*) are most common; the former, used mostly in the village, consists of a simple pine pole, stripped of bark, with a bar of wood about 50 cm. in length nailed to it so as to stand about 50 cm. above the ground when the pole is driven in. This bar supports the main weight of hay, the only other support being a 20 cm. nail driven through the pole near the top. Poles are placed at intervals throughout the field, their density depending on the yield of hay. Haylines consist of a series of poles which are set in a line about 1 m. apart and joined by wire or cord. The hayline is somewhat less flexible than the pole system as, once erected, its size cannot be adjusted if a larger than expected yield is obtained. It is common to see an odd pole erected near a hayline to take up the surplus yield when this has occurred.

Fig. 6, type C, the wooden hayframe, is confined to very wet areas near the river where there is a need to keep the hay from coming into contact with the ground. When dry, hay is moved either to the home barn or into an outlying hayshed (*lato*), where it is used as the main source of winter fodder. In 1962 it was estimated that about 47,000 kg. of hay would be harvested.

A further element of land utilization geared specifically to cattle keeping is the growing of timothy and cereals (Fig. 5). From a farm survey, 20 farmers indicated that they grew timothy as a fodder crop. Of these only 15 indicated the area grown, the sum of these figures totalling 30.1 hectares. The areas mapped in Fig. 5 as timothy are merely those which had been recently ploughed and supported a young growth of timothy. These areas could be either pure timothy, as a fodder crop or, more likely, a timothy-meadow grass mixture used for hay.

Peltovuoma lies to the north of the limit for ripening of cereal crops, but nevertheless some 24.5 hectares of cereal crops were grown for fodder in 1962. All cereal crops are sown following ploughing in late autumn, the dry period in early spring tending to inhibit the development of spring sown crops in an already limited growing season. Crops are harvested green in late August or early September, at a time when the maximum amount of leaf has been produced, and are dried in much the same way as is the hay crop. The fact that there is no ripe

grain produced means that all seed for the production of further cereal crops, and all flour used by the villagers has to be bought in. In 1925 official statistics recorded 10,000 kg. of fodder being produced from cereals at an estimated average yield 1,800 kg./hectare, giving a sown area of 5.5 hectares. By 1962 the sown area had increased to 24.4 hectares implying, even with no improvement of average yield, a yield of nearly 44,000 kg. of fodder. A survey of farms by questionnaire indicates that oats, barley and mixed corn are grown. Oats were grown on 11 farms and occupied 9.24 hectares. Though a greater area of mixed corn was grown (13.2 hectares), the popularity of this crop was less general and it was only grown on three holdings. Barley, more exacting of soil conditions and generally needing higher pH conditions than are found on the peats or podsoles, and less valuable as a green fodder crop, was only grown on one farm (2.0 hectares).

As for most other crops, the light soils of the ridge were preferred, largely because of their "early" nature in spring, and a large proportion of the total cereal crop was grown on this land (Fig. 5). A notable exception to this is to be found to the southeast of the settlement, where due to the very restricted amount of podsollic soils available in this sector of the village, farmers have been forced to grow cereal crops on the shallower peats.

In addition to fodder crops already discussed, small but valuable amounts of fodder, mainly in the form of poor grass, reeds and sedges are provided by small areas of unimproved meadow located along the river and lake shores at some distance from the village. These areas are cut off by bog from land communications, and it is not uncommon to see small loads being brought back along the rivers by boat, the only possible way of transporting this fodder. In addition, the forest areas provide extra fodder in the form of birch leaves, which in Peltovuoma are used as cattle fodder on 16 farms.

The production of fodder crops therefore forms a very important part of the agricultural economy in Peltovuoma. The extended period of stall feeding focuses the farmer's attention on fodder growing and this is reflected in the areal dominance of fodder crops in the land utilization of the village.

SUBSISTENCE CROPPING

Potatoes are the principal crop grown and form, in the absence of cereals, the main food staple, producing high yields per unit area. In 1962 they were grown on 28 of the 35 farms questioned and the total area allocated to the crop was 16.97 hectares yielding on an average 25,000 kg./hectare. The resulting crop is not all for human consumption as potatoes are also used as a fodder, but it is as a staple human food that the potato is most important. Much of the seed is bought in, very little surplus being available from the year's crop for use as seed. The crop is sown in May (the earliest date given as 5 May) or June (20 June at latest), the long sowing period being largely a result of the effect of aspect, some areas warming up more quickly than others in spring. Harvesting may start by mid-August, but potatoes dug at this early date are small, and used only for immediate consumption. The main harvest period is from 1 September until early October, the crop being stored indoors for consumption during the winter.

The importance of the potato as the main subsistence crop, together with its more particular environmental requirements, is such that it takes priority, even over important fodder crops, in the use of land. As can be seen from Fig. 5, potatoes are grown in relatively small areas, mostly in close proximity to the dwelling, and in every single case, located on the podsoles.

A number of reasons can be cited to explain this preference. Probably most important are the growth requirements of the crop, potatoes preferring light-textured and well-drained land, which warms up quickly in spring. On wetter peat soils the crop is subject to a number of disadvantages: the soils take longer to warm up in spring; excess water may cause rotting of the tubers; certain diseases, notably potato blight, spread more easily.

Dwellings are also sited on the ridge taking advantage of the "dry point" site; thus points of consumption and storage are near growth sites of this high weight crop and this is a considerable advantage at harvest time. The podsoles are also more favourable to tillage and transport, their light texture being of particular value in relation to the lack of mechanised traction, and the prevalence of light horse-drawn machinery.

Finally, relative relief gives the podsol areas an important advantage over the peats, their elevation rendering them less susceptible to frosts during the growing season, which form one of the chief hazards to potato production. These summer frosts, caused by intense radiation under clear skies at night, tend to form in pools near the ground in the lower peat hollows. The elevated podsoles escape many of these frosts and only become affected occasionally when frosts are more severe.

In addition to potatoes, some small areas of turnips are grown, though no actual details of total area were obtained. The main use of the crop is as a variant in the diet of both the human and animal population, though as far as could be seen, no turnips were grown specifically for fodder. Most of the houses also had a small kitchen garden, growing such vegetables as carrots, beetroots and turnips.

CONCLUSION

It is evident, therefore, from the preceding discussion of land use, that a considerable amount of care has to be employed by the farmer to regulate the use of his land. As productive land is scarce, strict priorities must be observed with regard to the type and relative amounts of land used for different purposes. Detailed variations in soil type and micro-climate profoundly affect the distribution of crops (Dickenson and Edwards 1963), those with more particular needs being given the benefit of such advantages as are available. Potatoes, requiring lighter soils, free drainage, and protection from frosts, thus have first priority on the podsoles, where those requirements are best met. Cereals also find most favourable conditions on the warm, relatively "early" podsoles, though they may also do well on the drier peat areas, whereas the more tolerant, but none the less vital hay and grazing land is relegated to the areas of remaining podsol and to the poorer peat soils, some of the most intensively grazed areas occupying the poorest wet peat land (Fig. 5).

This type of close interrelation and integration of various elements of production seems to be the key to the maintenance of agriculture in an area such as Peltovuoma, which may be regarded as typical of many such small farming communities in arctic Finland. It would seem from this example, therefore, that any development and continuance of agriculture in these high latitude areas of Finland, must continue to rely heavily on the so called "pioneering" spirit of the Finnish farmer and agriculturalist, a spirit which displays itself not only in an ability to reclaim waste areas, but which has as its very essence the skill and ingenuity of the individual farmer, which enables him to adapt and integrate various limited resources to produce and maintain a system of farming and agricultural economy, adapted to harsh environmental conditions.

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