Viable grassland management – experience, challenges and opportunities

LIFE Viva Grass

Viable grassland management experience, challenges and opportunities

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Foreword

From June 2014 till November 2018, 15 partners from Estonia, Latvia and Lithuania are working together in an EU LIFE-funded project called "Integrated planning tool to ensure viability of grasslands" - LIFE Viva Grass. The aim of the LIFE Viva Grass project is to find economically viable and area specific management models for multifunctional use of grasslands. The project team has collected information on existing best practice by interviewing previous projects dealing with grassland management in the Baltic States and elsewhere in Europe. It has also organised study visits to other countries to get acquainted with good examples on diversification of income from grassland management, opportunities for alternative use of grassland biomass, role of local co-operation networks, involvement of municipalities in planning of grassland management and grassland restoration practices. Furthermore, an international conference on "Enhancing Economic Viability of Grasslands by Green Farming in Europe" has been held in May 2015 in Latvia. More information about the project is available at **http://vivagrass.eu/**.

This brochure summarises the obtained information on existing good practice and provides some recommendations for the Baltic States to overcome the challenges related to the maintenance of valuable semi-natural grasslands.

Contents

1. Introduction: The current status of grasslands in Europe

With agricultural land covering two thirds of the EU's land area, Europe's biodiversity largely depends on agricultural practices. Extensive farm management created mosaic habitats hosting a diversity of plant and animal species. It is estimated that 50% of all species in Europe depend on agricultural habitats. Grassland ecosystems cover pastures and semi-natural grasslands and land dominated by forbs, mosses or lichens. Annex I of the Habitats Directive lists 45 grassland and meadow habitat types. European grasslands are among the most species-rich vegetation types (up to 80 plant species/m^2) in Europe and have great conservation value.

However, the area covered by natural and semi-natural grasslands has considerably decreased in Europe throughout the last century

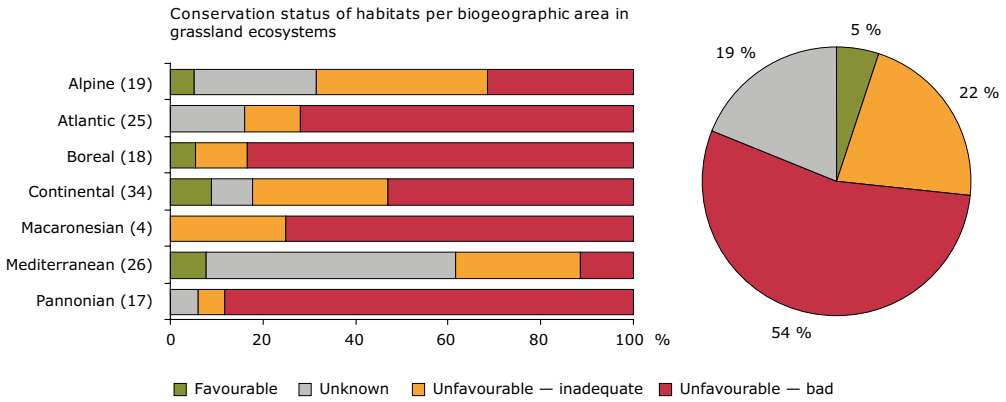

Figure 1. Conservation status of habitats per biogeographic area in grassland ecosystems (EU 2010 Biodiversity Baseline, EEA 2010 http://biodiversity.europa.eu/topics/ecosystems-and-habitats/grasslands)

as a result of urbanisation and the intensification of agriculture on more productive and accessible areas, while remoter areas underwent marginalisation and abandonment. This trend is expected to continue also in the future, since scenarios of land use change in Europe for the period up to 2030 suggest a continuous decline of agricultural land.

According to the EU 2010 Biodiversity Baseline assessment (EEA 2010), 76% of the assessments of grassland habitats of European interest were unfavourable and only 5% of the assessments were favourable (Figure 1). Europe's grassland butterflies have declined by 50% since 1990 and this reduction shows no sign of levelling off. Some 235 species which are protected by the EU Habitats Directive are linked to grassland ecosystems. Of this 28% of amphibians, 12% of reptiles and 16% of mammals are threatened with extinction at the EU level. The conclusions of the next assessment (reporting period 2007-2013) show that the Habitats Directive's habitats and species related to 'agricultural ecosystems' are doing worse than terrestrial and freshwater ecosystems, and there is no real improvement in their conservation status since the last reporting period. The threats and pressures most frequently reported as important for agricultural habitats and species include both intensification and abandonment. (EEA Technical Report 2/2015)

This is also the case in the Baltic States where a high rate of land abandonment has been experienced since the beginning of the 1990s. Since the Baltic States belong to the Boreal biogeographic region where the final stage of succession is forest, abandonment of grasslands inevitably leads to the invasion of shrubs and finally forming of forests.

With accession to the EU and availability of agricultural subsidies the share of managed agricultural land has increased. However, the Rural Development Programmes include many contradictory measures, in particular with regard to their impacts on the environment. Although the agri-environmental measures of RDP provide support for maintenance of valuable ecosystems, conditions for conventional/intensive farming practices are usually more beneficial from the economic point of view than for more sustainable measures. In our view the agri-environmental measures would have to be far more area specific since the efficiency of grassland management depends on natural and socio-economic conditions of the particular area and this is currently not taken into account by the programmes.

2. Good practice on viable grassland management

2.1 Diversification of income from grassland management

Grasslands not only produce hay for animal feeding but have much more functions: for example they provide biomass for energy production, herbs for medical treatment, scenic landscape with its aesthetic qualities, and cultural heritage offering opportunities for recreation and nature tourism. Grassland biodiversity provides genetic resources and possibilities for education and science as well as for bee-keeping and pollination. These so-called "services" of grassland ecosystems can be used to develop new business ideas and diversify income from grassland management.

Traditionally, grasslands have been used for cattle breeding to produce milk and meat. An added value can be achieved through making different products from


Honey bee on oregano


Degustation of juniper syrup in Saaremaa, Estonia (www.saaremaakadakasiirup.ee)

milk, meat or animal skin: for example, non-traditional sheep and goat milk products e.g. cheese, ice cream or soaps with valuable ingredients from semi-natural grasslands could become the main income of a farm. The farmers from the United Kingdom have evaluated the impact of different wild flowers on the value of milk products and found an added value that can be used for better selling of their production. Therefore they are interested in long-term management of valuable grasslands.

Bee keeping provides opportunities to sell honey products and use pollination as a service. Also collecting medical and potherbs from grasslands and selling them can provide additional income.

A grassland can be used as a species rich 'donor' site for other grasslands. The land owner has a possibility to sell high-quality seedling material and provide grassland restoration as a service. In one farm in the United Kingdom, the owners are growing wildflower plug plants from seeds and using those for meadow restoration and selling to others, too.

The reed cut from coastal grasslands can be used for making roofs or different decorations and souvenirs. Such examples can be found from all three Baltic States. Also the wood received from grassland restoration actions can be used for different purposes, e.g. for making traditional wooden fences. Juniper wood is a good material for souvenirs as well as for other wooden products. As experience from Saaremaa Island shows, juniper syrup made from juniper branches can also be a successfully sold product.

Grasslands also provide good opportunities for tourism development. For example, mini zoos with domestic and wildlife animals have created a tourism perspective for a few farms in Latvia. Building of visitor infrastructure, such as bird watching towers, info stands, nature and hiking trails, recreational sites, car parking places and camping sites creates further tourism attraction possibilities.

Bird watching tower on coastal meadow in Pärnu

Goats eating haylage

Goat milk soap *production in Piper Hole farm in the United Kingdom*

The Piper Hole is a non-traditional farm producing goat milk soap next to managing meadows. The farm has been here since the 14th-15th century. It has five workers (all family members), two of them dealing with soap making. They manage around 200 ha of land of which 30 ha are meadows grazed by cattle and sheep. In total, the farm has 400 animals (goats, sheep, pigs and cattle), including 100 goats for milk production. The main income of the farm comes from selling lamb meat and goat milk soap as well as from the agri-environmental support scheme for meadow management. According to the calculations of the farmer, the profit from keeping goats is ca. three times higher than from sheep.

Piper Hole produces mainly organically, but does not hold a certificate of an organic producer. The goal of the farm today is not to get the highest amount of production outputs, but to manage the farm at lowest cost and lowest external input of fodder to get best quality products (sheep meat and goat milk). For animal feed only grass and haylage (dry silage) is used, no extra energy or protein with concentrates is given. The haylage contains 10.9 11 MJ/kg energy in dry matter. The daily milk production is 3 litres per goat in the beginning and 1-1.5 litres in the end of lactation period. With extra energy supply it would be possible to increase the milk production up to 4-4,5 l but this is not the aim of the farm. The fat content of the milk is 4.5 5%, for some special breeds up to 9%. Goats are milked twice a day. The current production is enough for making soap. They sell it at the road, in a local market and in farmers' markets. Extra milk is not sold for food production (because of special requirements for that) but used for feeding lambs and calves.

Goat milk soap

Cheese factory *in Goričko Nature Park, Slovenia*

Goričko is the most north-eastern region of Slovenia, wedged between the Austrian and Hungarian borders. Goričko Nature Park includes semi-dry, dry and wet meadows hosting different protected plant and insect species. The meadows are, however, threatened in Goričko due to cessation of management (mowing, grazing) and wet meadows also suffer from irrigation.

Goričko Nature Park Administration has been and is implementing different projects related to management of grasslands. In 2010, in the frame of the European Territorial Cooperation Programme Slovenia-Hungary project „Sustainable use of Natura 2000 habitats along the Slovenian-Hungarian border" ("Landscape in harmony") the first farm cheese factory was established in Goričko at the former fire house in Ratkovci. The factory aims at preserving and encouraging livestock farms in Nature Park Goričko to maintain the tradition of grazing and feeding the animals with hay.

The equipment of the factory is owned by the Public Institute Nature Park Goričko and conceded to the local community for substantive dairy production. The dairy factory collects cow, sheep and goat milk from surrounding villages and, in addition to selling locally, delivers its products to shopping centres in the biggest cities in the region and also the capital Ljubljana. Thus customers support landscape conservation and development by purchasing of Goričko products.

The cheese factory offers several types of dairy products, including soft cheeses made from sheep, goat and cow milk (during the winter only cow cheese can be bought), semi-hard cheeses, yogurt, sour cream, cottage cheese, albumin-curd and whey.

- More information on the dairy factory can be found on the website of Goričko Nature Park: **www.park-goricko.org**/en/informacije.asp?id_informacija=3989&id_jezik=3&id_tip1=8&id_tip2=1&id_tip3=0

Dairy products from Goričko Nature Park


Siberian iris (*Iris sibirica*)

LIFE Viva Grass project partners visiting dairy factory

2.2 Opportunities for alternative use of grassland biomass

In addition to hay and silage for feeding livestock, grass biomass can also be used for energy production. Compacted hay in the form of bales, briquettes or pellets can be burnt in special boilers to produce heat and hot water. As an example from Austria demonstrates, the grass pellets can be also a valuable raw fibre source for pigs. Another possibility is production of biogas, described in example from Germany. Another innovative idea is producing pet hay or pellets from diverse flora growing in valuable grasslands.

Energy production from grassland biomass *in Matsalu National Park, Estonia*

Lihula is a parish located in West-Estonia. The area of the parish is 384 km² and the number of inhabitants ca. 2500 (incl. 1400 in Lihula town). 47% of the territory of the parish is protected, including Matsalu National Park that is partly located in Lihula parish. There are ca 6000 ha of semi-natural grasslands (mainly floodplain and coastal meadows) in Lihula parish that need to be maintained.

Since 2009/2010 the grass biomass is used for district heating in Lihula. It enables to use the large unused biomass resources in the area, to reduce greenhouse gas emissions of the Lihula urban district heating system, which was previously using expensive and polluting oil shale (currently oil shale is used only as backup fuel), to solve the problem of using meadow hay and the remains of thatching reed as well as to reduce the heat price and township fiscal costs in Lihula parish. The average distance of mowing areas to the boiler house is 10-15 km. Approximately 1/3 of the meadow hay of Matsalu NP is used by the Lihula boiler house.

Heat production in the heating company "Lihula Soojus" is ~3800 MWh/y (maximum capacity 1.8MW). The boiler house is owned by the municipality and has contracts with farmers for fuel supply. If there are difficulties to harvest hay on meadows e.g. due to flooding then alternative fuels such as wood chips, straw or hay from fields can be used. Hay and wood chips cannot be used simultaneously because they require different feeding equipment and burning regimes. The maximum heating capacity with hay fuel is 1.5-1.6 MW and maximum efficiency 85%. Pre-cut (length of stem pieces 10-15 cm) and baled (round and square bales) hay, straw or reed can be used in the boiler house. The boiler has a moving grate and needs to burn dry fuel. The moisture content of herbaceous biomass has to be less than 18% (in order to prevent the mould) and the moisture content of wood chips less than 35%. 1350-1400 tons of meadow hay is used in a heating season (approx. 3000 square bales). The price of meadow hay is 43-45€/t (11-12€/MWh); heat price for the consumers ~58€/MWh. In district heating networks using oil shale the average heat price for the consumers is 70-80€/MWh (without VAT). The boiler is working well, only if the load of the boiler is high (more than 1.4 MW) can signs of melting ash and the formation of slag be noticed.

Floodplain meadows in Matsalu National Park

New boiler house in Lihula

Producing hay pellets for pig food and heating *in Austria*

Decline in cattle farming caused permanent reduction in the area of meadows in Halbenrain region in south-eastern corner of Styria, Austria. Now Halbenrain is mostly a pig farming and corn growing region where meadow management is mainly needed for nature conservation purposes. Therefore a project on "Thermal utilization of nature conservation hay" was carried out in 2008-2011 that investigated the possibilities to produce heating pellets from hay. Later the association of 7 farmers "Heu & Pellets" was established to continue the work of the pelleting factory established in the project. The pelleting machine had to be invented and built from different parts because there was no ready-made solution available on the market. The initial aim was to produce hay pellets for heating. As a result of practical testing it turned out that with pellets made 100% from hay it was difficult to reach the acceptable limits for exhaust emissions. Therefore mixed pellets from hay and corn cobs were tested. Hay is difficult to burn and crush but easy to make into pellets. Corn cobs burn well and are easy to crush but difficult to make into pellets. An ideal mix for heating pellets turned out to be 80-90% corn cobs and 10-20% hay.

During the project it was discovered that grass pellets were a good raw fibre material to put into the feed for pigs who really like it. Locally produced hay pellets are also cheaper than imported raw fibre pellets.

Currently the pelleting factory produces 50-70 t of heating pellets and 700 t of pellets for pig fodder per year. Also hay pellets with apple residues for game feed are produced. Farmers can sell the biomass to the factory or bring the biomass and pay for making pellets. Ca 700 kg of pellets can be produced in an hour and the production costs are 190-200 €/t, which is much cheaper than raw fibre pellets on the market (minimum 320€/t) and also cheaper than wood pellets for heating (260 €/t). Now the association is building a new pelleting machine which will be able to produce 5 t of pellets per hour.


Landscape in Halbenrain


Pelleting factory in Austria

- Contact:
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  andreas.breuss@stmk.gv.at


Military orchid (*Orchis militaris*).


Heath fritillary (*Melitaea athalia*).


Milkwort (*Polygala sp.*).

Production of hay pellets for pets *in Latvia*

In Latvia, the company Baltic Unique Solutions is producing grass pellets for pet fodder. The company was founded in 2009 and started production of pellets in 2010. The pellets, mainly meant for rodents' fodder, are sold to pet shops in Latvia and exported abroad (e.g. to Russia, Italy). Since 2013, the company is a certified producer of organic fodder. With the help of EU Structural Funds, a new pelleting plant is under construction. Production of organic hay pellets requires hay from organic meadows, hay preparation equipment (hay cutter, hammer mill), drying (natural or forced), pellet manufacturing equipment, suitable facilities for production and storage of ready products.

The main benefit of biological pellet production, especially for small farms, is additional use of biological meadows. The pellets are high value feed containing natural vitamins and they are easy to transport and store. Individual recipes are developed for different pets at different ages. The hay that is not suitable for feed production can be pelleted for fuel. The ash can be used for fertilisation of arable land. Lignin is not a probleem but even a „must" for forage pellets as it makes pellets compact.

- More information:
  http://www.nicety.lv/?lang=en


Small pellet mill

Bio-organic certified animal feed.

A one-man biogas plant *in Bavaria, Germany*

The "Chiemgauer Biogasanlagen" in Seeon, Bavaria, Germany was established in 2004 after several years of testing dry fermentation technology for producing biogas from biomass. Run by one person, it is now producing about 550 kW*h/day of green electricity that is bought by a local electricity supplier. The facility uses grass and crop remains assembled from surrounding agricultural land. It is an advanced business favourable to regional grassland management. The owner of the Chiemgauer Biogasanlagen, Mr. Hans Wolfertstetter, is also offering services related to biogas plants, including advice, planning and construction of a functional system with commissioning and support.

The technology used for the Chiemgau Model: the fermenters are in principle rectangular driveable reservoirs. A front loader or similar vehicle feeds in the substrate and removes it. In order to achieve an optimal fermentation process, the substrate has to be kept wet permanently, with the help of the so-called percolate at a constant temperature of 38°C. Covering the substrate with an insulation film prevents cooling down at the surface. A gas membrane, which can be fixed and removed with a roll-up unit (tightened with a patented Seeger® seal, encompassing the fermenter), stores the biogas right above the biomass. Therefore no separate gas storage is needed. Suction pipes supply end-users (combined heat and power plants (CHPs), gas heating systems) directly from the fermenter. Typically further processing of the gas is not required. In order to avoid the installation of costly technology for feeding and removal of the substrate, the fermenters are operated by way of a batch process. The batch duration is about 4 weeks. After 4 weeks about 15% of the well-fermented biomass (stored for months separately in the fermenter) is removed and replaced with fresh substrate. To ensure an uninterrupted supply to the end-users during changing of the batches, at least two fermenters need to be in place and operational. When operating a CHP, part of the heat will be needed to heat the fermenter. The rest can be used for heating the living rooms, for drying, etc.

Mr. Hans Wolfertstetter and his biogas fermenters

Cogeneration plant converting biogas into electricity and heat

Place where locals can bring grass biomass

- More information and photo series about refilling fermenters and building a biogas plant can be found on the website of the company: **www.chiemgauer-biogasanlagen.de/.**

2.3 The role of local co-operation networks in the maintenance of grasslands

What is difficult for one farmer can be manageable for a co-operation network. Examples from Germany, Sweden and Lithuania prove that local co-operation networks can be economically beneficial for the farmers as well as contribute to landscape management and biodiversity conservation.

Co-operation network for landscape management *in Neumarkt district, Germany*

Since its establishment in 1995, the Landscape Management Association Neumarkt (Landschaftspflegeverband Neumarkt, www.lpv-neumarkt.de) has been taking care of preserving the characteristic cultural landscape in the Neumarkt district (Bavaria, Germany). The goal of the Association is to preserve the diversity and uniqueness of landscapes of the Neumarkt district as well as to provide agriculture a reliable additional income from nature conservation and assist farmers in the marketing of regional products.

The Association has built up a network of partners and stakeholders consisting of active local citizens, horticultural societies, nature conservation associations, farmers and shepherds, landowners, mayors and municipal councils, authorities, tourism representatives, restaurants, agricultural associations, schools and kindergartens. The members of the Association include the Neumarkt district, all 19 municipalities of the district, 34 organisations and more than 70 individuals. There is also a strong support from the business community. The work of the Association is financed by membership fees, sponsors and through different projects.

The range of activities of the LPV-Neumarkt has expanded greatly since its founding. In addition to traditional landscape management the current projects deal with protection of species and habitats, river basin management (renaturation of straightened rivers, maintenance of riparian holdings), development and marketing of landscape-related products, such as the "Juradistl Lamm" (brand for regional lamb meat), "Juradistl Weiderind" (Juradistl pasture beef) or „Juradistl-Streuobst" (Juradistl orchard, products from fruits grown in the region), establishment of thematic hiking trails in the landscape and offering guided nature tours. With the establishment of the Environmental Education Centre "Haus am Habsberg" in 2007, environmental education became an important activity of the association. The annual programme of the Haus am Habsberg includes events for local people as well as for tourists, for example traditional cuisine workshops, gardening seminars, lectures, educational events for children etc.

Environmental Education Centre "Haus am Habsberg"

Regional brand "Juradistl"

Landscape in Neumarkt

Maintaining traditional agricultural landscape *in southern Sweden*

Bråbygden is a 5400 ha area in Småland, southern Sweden where traditional agricultural landscape with wooden and stone fences, barns, genuine farm environments, small fields, wooded meadows and pruned trees is maintained in co-operation between the local development association and the local community. Visitors will find, for example, ca. 60 km of traditional Swedish wooden fences and about 5000 so-called 'Harry Potter trees' cut in a traditional way. The area also has unique flora and fauna with an incredible diversity of species.

Since the early Middle Ages, people in the Bråbygden area have been dealing with farming and livestock breeding but also with burning tar and charcoal as well as selling timber.

Today, more than 250 inhabitants live in Bråbo (the centre of Bråbygden) and the average age is about 35. There are five full-time farmers and a dozen hobby farmers to ensure that the landscape is kept open. For development of the area, a local development association named Bråbygdens Intresseförening that has more than 300 members was founded in 1993. The Association is taking care of nature trails and organising different events (e.g. traditional mowing events, workshops on pruning trees or building traditional wooden fences) in the area as well as operating a small museum "Naturum" introducing the unique natural environment of the area. Local organic products can be bought in the village shop which is also managed by the Association.

The idea of Community Supported Agriculture (CSA) was brought into Bråbygden by a Belgian family that moved to Sweden. CSA members or subscribers pay at the onset of the growing season for a share of the anticipated harvest; once harvesting begins, they receive weekly shares of vegetables and fruit in a vegetable box scheme. In 2014, 54 people participated in this initiative (paying 2600 SEK (280€) in February and sharing the harvest later).

'Harry Potter trees' and traditional wooden fences in Småland, Sweden

Helsinge sheep – a local Swedish breed

Tobias De Pessemier moved from Belgium to Sweden to deal with CSA.

Co-operation of farmers *for CSA in Lithuania*

In 2006, the cheese producers Valdas Kavaliauskas and Rasa Ilinauskaite established a farm in Dargužiai village, Varėna district with the aim of developing small-scale and responsible farming that can generate economic, ecological, and social added value. They were new entrants to rural area bringing an innovative farming approach to the region. They chose to establish themselves as farmers and to adopt a peasant approach to farming, based on small-scale production, limited inputs, environmentally friendly production practices and strong links with urban consumers and local inhabitants.

On the other hand, the farmers promote urban-rural solidarity, sustainable consumption, and healthy local food approach. They have developed a wide range of activities, over several areas of work, for example, supporting small-scale breeders in the project "Promotion of Dairy Sheep and Goat Husbandry in Lithuania Combining Traditions with Innovations". Its aim is to distribute milk sheep and goats to about 15 small farmers, as well as provide them with cheese-making, animal health and marketing skills. This is a means for family farmers to diversify their activities and generate new income, and for new entrants to get established more easily.

The farmers in cooperation with Kaunas Technological University developed a training programme for new entrants who would like to start producing fermented cheese and to gain an added value to the dairy farm by producing cheese instead of selling the fresh milk. The programme became very popular in the country, providing training for more than 200 farmers annually.

The Cheese-makers' Home

In spring 2010, the farmers started a non-profit company, the Cheese-makers' Home (Sūrininkų Namai, **www.surininkunamai.lt**). It is a co-operative of 7 cheese makers who grow their sheep/goats and cows and produce cheese together. The Cheese-makers' Home sells locally produced cheeses, bakes bread, and cooks food with locally produced vegetables. Besides offering food through the restaurant and shop, the Cheese-makers' Home also organizes concerts, trainings (including cheese-makers' school and knowledge exchange trips to France), social activities and serves as a meeting place for the villagers.

An added value can also be achieved by developing a special brand of 'Grassland beef' and using it in the marketing strategy. For example the non-profit organisation of beef cattle breeders in Estonia has introduced a quality scheme for beef from grassland-grown cattle.

Quality scheme for beef from grassland-grown cattle *developed by Liivimaa Lihaveis in Estonia*

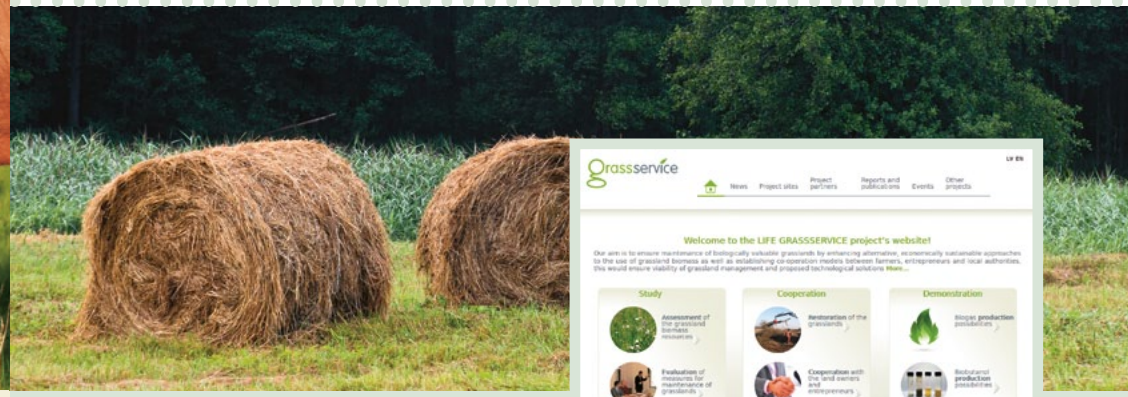
Liivimaa Lihaveis is a non-profit organisation established by Estonian producers of Angus and Hereford beef cattle for promoting and marketing beef from natural grasslands. All members of Liivimaa Lihaveis are organic farmers, most of them also produce breeding bulls and heifers for other beef cattle farmers.

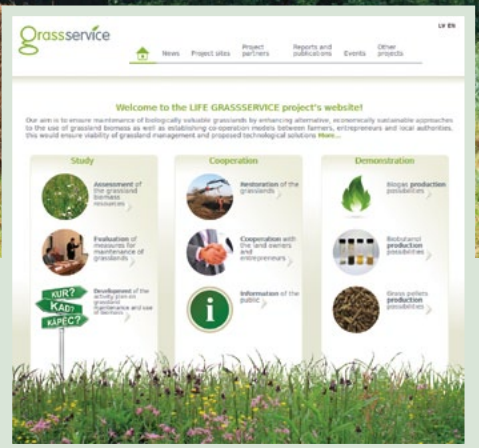
To provide a quality guarantee for the consumers and a standard for the producers, Liivimaa Lihaveis developed a quality scheme for beef from grassland-grown cattle. Farms that have joined this quality scheme have agreed to pasture their cattle mostly on grasslands and feed them only hay and silo in the winter period. 50% of pastureland used for grazing is permanent, natural or semi-natural grassland, which means that it is not ploughed or consistently cultivated. The ecological footprint of grassland farming is many times smaller than that of intensive farming and grass-fed beef is also healthier - it contains conjugated linoleic acid (CLA), vitamin E and betacarotene, and has an optimal ratio of omega-6 to omega-3 fatty acids. In addition to the domestic market, the quality scheme has also opened new export possibilities for Liivimaa Lihaveis.

- More information: **www.liivimaa-lihaveis.ee**/quality-scheme

Products from grassland-grown beef

Grassland management goes far beyond working in the field. When talking to various stakeholders related to grassland management, one more important aspect comes up lack of information. On one hand, many land owners have problems with the use of grass biomass that has to be removed from the managed grasslands. On the other hand, there are still farmers who need grass but are not informed about its availability. Often the exchange of information is limited to only neighbour-to-neighbour communication. The LIFE GRASSSERVICE project in Latvia developed a web-based information exchange platform to solve this problem.





Web-based information exchange platform *developed by GRASSSERVICE project in Latvia*

The European Commission LIFE+ funded project "Alternative use of biomass for maintenance of grassland biodiversity and ecosystem services" (LIFE GRASSSERVICE, LIFE12 BIO/LV/001130) made efforts to facilitate information exchange by developing a special web based information exchange platform in the project pilot area of Sigulda Municipality. The information platform offers possibilities for local residents to place their information related to grassland management at the platform: offer/demand of grass or hay, offer for grassland mowing or restoration services. Already in the first year, people started to use this platform actively. Often it is without commercial interest people offer grass free of charge which is already mown and sometimes even prepared as bale haylage. The information is being checked and placed on the web by an appointed person in the municipality.

- More information about the project: http://**grassservice.balticgrasslands.eu**/en/

2.4 Grassland restoration practices

The restoration of grasslands aims at increasing their biological value. This can be done through changes in management and by methods to introduce wild plants including spreading green hay, broadcasting seeds, slot seeding and using plug plants. The techniques used are dictated by the site, seed source, and machinery and livestock available. Successful restoration also needs the commitment from the landowner for long-term appropriate management of the meadow. Restoration of a meadow can often be a lengthy process with improvements being observed over a period of years.

The first step is to identify restoration objectives and conditions. This includes a soil test to ascertain fertility and pH level as well as a botanical survey to identify the occurring species, including problematic and more competitive species.

The second step includes the removal of shrubs, trees and invasive species (for example the Sosnowsky's hogweed (*Heracleum sosnowskyi)* as well as preparation of the soil for seeding by flattening or harrowing the ground.

The best methods for removal of the Sosnowsky's hogweed are root cutting, cutting the plants, covering the soil, mowing, ploughing and removing the umbels (flowerheads). However, all methods need to be repeated for multiple years until no new plants grow from the seed bank. In the frame of the LIFE Viva Grass project, Sosnowsky's hogweed will be eliminated by covering the field with a plastic membrane in a pilot area in Latvia. Tree and shrub harvesting or grazing are widely used practises for grassland restoration in different habitats, e.g., alvars (for example in the project "LIFE to alvars" in Estonia), floodplain, calcareous, wooded and coastal meadows etc.

The third step is improvement of the botanical quality of the grassland by transferring the seeds from species-rich meadows to the prepared restoration site. Seeding methods are broadly used in the United Kingdom grassland restoration projects but in the Baltic States they are not widespread. The species rich "donor" site needs to have similar environmental conditions and be geographically close. The seed spreading can be done using green hay, slot seeding or strewing the seeds by machinery or by hand. Field rolling is desirable after the seeds have been introduced. In small areas it is possible to use the plug planting method. An effective method for reduction of dominant grasses is introducing parasitic species such as yellow rattle (*Rhinanthus minor)* in the early years of restoration. That practise has been successfully carried out in Cumbria's meadows project in the United Kingdom.

The fourth step is maintaining grassland quality by grazing and mowing. Traditional grassland management with aftermath grazing and low nutrient inputs can successfully maintain the good status of grasslands after the restoration. Mowing increases the species' diversity as cutting all vegetation at the same height in the middle of the summer creates even conditions for different plant species. The impact of grazing depends on the animals used: different animals prefer different plant species. Therefore, it is recommended to use a combination of different grazing animals in grassland management. Some grassland habitat types, e.g. alvars or coastal meadows, are managed mostly only by grazing as mowing is difficult in stony and hummocky areas. Careful calculation of the exact amount of animals is needed to achieve an appropriate grazing level (usually 0.5-1 animal units per ha). Annual species monitoring enables to evaluate how successful the restoration has been and assess if future restoration is necessary.

Yellow rattle (*Rhinanthus minor*)

Sosnowsky's hogweed (*Heracleum sosnowskyi*)

Grassland enhancement method *with plug plants in Cumbria in the United Kingdom*

In the UK, 97% of flower-rich hay meadows have been lost between the 1930s and the mid 1980s, mostly due to agricultural intensification. However, there are still patches of species-rich meadows left in places not suitable for intensive agriculture. The main goal of the Meadow Life project (2013-2016) is restoration of hay meadows, using the preserved species-rich meadows as species donor sites for restoration areas. The aim is to restore ca 132 ha of meadows all over the Cumbria. One of the used grassland enhancement methods is plug planting into meadows. Grazing can start 4-6 weeks after plug planting, to allow rooting of the plants.

The project is working closely with farmers, smallholders, community groups and volunteers. 46 volunteers trained in the project have carried out botanical surveys and planted 28 000 wild flowers in 8 different locations. The prisoners from Haverigg prison will grow 20 000 plants for restoration actions in 2016. 39 farmers have been involved in the project and they will be supported under the agri-environmental scheme. The project proves that volunteers can be successfully involved in grassland restoration. Involvement and education of farmers and different community groups ensures also the continuation of management of the restored sites.

- More information: **www.cumbriawildlifetrust.org**.uk/what-we-do/conservation-projects/hay-meadows

Plug planting

Meadows managed by the Ball Sykes farm

Grassland restoration *with green hay method in Ball Sykes farm in the United Kingdom*

The Ball Sykes farm is located in Slaidburn in the county of Lancashire. This farm was involved in the Hay Time meadow project. The farm served as a species-rich donor site for the meadow restoration activities of the project and also restored its own meadows. These meadows are among the species richest in Lancashire, in the late 1990's designated as Sites of Special Scientific Interest. The farm has 100 sheep and 12 cows. The meadows are not grazed during late spring and early summer to allow meadow species to flower and set seeds. According to the agri-environmental scheme the meadows can be mown after 15th July. Cattle and sheep are let into the field for grazing in August after the hay is collected. The meadows are grazed throughout the winter until Easter.

The restoration was carried out using green hay. Green hay is the preferred method, as it collects the most seeds from the widest range of plants and is least affected by wet weather. Shortly after the receptor meadow has been cut, cleared and harrowed, the forage harvester is used to cut and collect the donor green hay. The green hay is transported to the receptor site in a tipping trailer and then spread out by muck spreader. The whole process (cutting, collecting, transporting, tipping and spreading) should not take more than an hour, to ensure that the green hay does not heat up, as heating can lead to the reduced viability of the seeds.

The research in the UK has shown that meadows that have been in unfavourable condition for more than a few years will not have a 'bank' of desirable seeds in the soil from which the meadow can regenerate under favourable management. Therefore the methods for re-introducing species from species-rich meadows have been developed in the UK and there is also relevant agri-environmental funding available. This experience could be used also in the Baltic States in areas that have lost their species diversity.

- More information about the Hay Time project and restoration methods can be found at **www.ydmt.org/**

Grinder used for removing small stumps

Alvar in Kurese, Estonia

Forest guillotine used for cutting pine trees and bigger junipers

Chain swipe mower used for crushing smaller junipers, bushes and stumps

Alvar restoration project *in Estonia*

The aim of the LIFE + Nature project "LIFE to alvars" - Restoration of Estonian alvar grasslands (LIFE13NAT/EE/000082, 2014-2019) is to restore 2500 hectares of alvar grasslands in Western Estonia (Saaremaa, Hiiumaa, Muhumaa, Läänemaa and Pärnumaa) and create conditions for continuous grazing of the restored sites. The main activity of alvar restoration is removing pine trees and junipers from overgrown sites. The tree and shrub coverage should not exceed 30% on favourable status alvar pasture.

As a large proportion of Estonian alvars is situated on private land, the involvement of private land owners is crucial for the persistence of alvars. The project has made contracts with farmers in 25 project areas who will maintain the restored alvars later with help of agri-environmental subsidies. By the end of the first project year, 250 ha of the restored alvars were already under grazing in the frame of agri-environmental subsidy scheme. By the end of 2015, restoration agreements were made for the half of the planned area and restoration had started on 900 ha. Most of restoration is done with different machines, only minor part manually. The used innovative technological solutions have proven to be good in terms of restoration speed and the quality of the results.

- More information: **www.keskkonnaamet.ee/**

3. Challenges and opportunities for viable grassland management in the Baltic States

3.1 Challenges

In the Baltic States, same as in many parts of Europe, rural areas are undergoing the process of marginalisation and related social and economic decline resulting in depopulation, exit from labour force and consequent abandonment of grasslands. Also the former rural life style and traditional extensive farming practices for maintaining biologically valuable grasslands are vanishing. Due to the lack of economic incentives for maintaining grasslands they are often transformed into forests or intensively used agricultural lands.

A recent study from Latvia shows that about 40% of grasslands of Community importance are located in Natura 2000 sites; however the protection status is not ensuring their favourable conservation status. On average almost half of the protected grassland habitat types are not managed. The most threatened are dry and mesic habitats (6120* and 6210 according to Annex I of the Habitats Directive), which are the least managed and mostly suffering from overgrowing with shrubs and invasive species.

In Estonia, the estimated area of different meadow habitats needing maintenance is 60 000 ha, of which only ca. 27 000 ha were managed in 2013. The most critical situation is regarding alvars and wooded meadows - in 2011 ca. 2000 ha of alvars (6280*) and only 700 ha of wooded meadows (6530*) were managed which is too small an area to ensure preservation of those habitat types.

In Lithuania, the total area of grasslands of European importance is 75 824 ha of which 51% or 38 703 ha were managed in 2014.

Nowadays grasslands are managed in an extensive, sustainable way nearly only for nature conservation purposes. Many projects have been initiated to restore biologically valuable grasslands, but the problem is how to ensure continuation of management of the restored areas after the project ends.

Agri-environmental measures within rural development programmes provide opportunities for landowners to maintain their grasslands. They could be a good tool for it. However, the general principle for subsidies within rural development programmes is to support agricultural production, but not to maintain ecosystem services and biodiversity as a public good, therefore the most beneficial measures for the farmer are those that increase his production. But grassland management cannot be sustainable if the Common Agricultural Policy supports frankly speaking "negative impacts" on the environment by setting more favourable conditions for intensive agriculture and not considering extensive farming beneficial to the environment. As long as the monetary benefit for extensive measures is not equal or even higher, they will not get preference by the farmers.

3.2 The role of nature conservation projects in management of grassland habitats

Ad hoc projects have an important role in nature conservation but it can be argued whether their potential has been sufficiently utilised. Over the years project based activities (including funded from the EU LIFE programme) have contributed to restoring, preserving and improving valuable grassland habitats in Europe. Besides the preservation and restoration of grassland habitats, the projects have helped to create favourable conditions for particular target species, and promote environmentally friendly and sustainable agriculture methods.

The measures applied during the projects have had a direct positive impact on grassland ecosystems. Although restoration activities have in most cases resulted in a quick recovery of the characteristic grassland plant species, followed by invertebrates and birds, the complete regeneration might take up to 30 years. This means that regardless of positive outcomes, it is essential that appropriate management continues also after the project ends. For example the long-term elimination of shrubs and invasive species can only be secured by repeated intervention. Due to germination from the root zone, single treatments might even cause faster and more aggressive spreading of shrubs and invasive species.

These project based activities were also aiming at raising the awareness of farmers, improving the socio-economic situation in the project areas, and developing new tourism attraction possibilities. The projects have helped to bring additional motivation and impulse for grassland management activities by providing cattle, infrastructure, machinery and investments as well as creating new working places and additional income from grassland management. Consultations and awareness raising have contributed to the use of extensive farming practices, development of new business activities, and the use of agri-environmental subsidies to improve the economic situation in local communities.

The awareness level of a local community is crucial for grassland management. The implemented projects have shown that finding interested, motivated and capable landowners and farmers willing to implement grassland management measures or willing to rent land for grazing has been the most challenging task. Therefore the projects have done a lot in terms of informing relevant stakeholders about the importance of grassland restoration and management.

In many cases local or regional authorities have been involved in the project activities which has helped to create a mediating level between different interest groups. Their involvement is especially important in areas where the land ownership structure is fragmented.

Any *ad hoc* project has a defined beginning and end. Still for being considered successful the projects need to guarantee the follow up activities as mentioned above. If a continuation is not possible the potential effect of *ad hoc* projects can decrease. Continuation of appropriate grassland management after the project ends has been highly dependent on agri-environmental subsidies. In some cases continuation has been ensured by the follow-up projects or implementation was followed up by a municipality that had been a project partner. In many cases 5-10 years contracts with farmers were made where they take the responsibility to

continue implementation of the activities started in the project if appropriate funding (e.g. agri-environmental subsidies) is available. However, despite the fact that the funding programmes financing *ad hoc* projects (e.g. LIFE) require a guarantee of continuation of the measures, those funding programmes that could provide it (e.g. agri-environmental measures) do not explicitly build on the benefits of ad hoc projects. A better interaction of both programmes would be of utmost importance.

3.3 Conclusions and recommendations

As the good examples presented in this brochure prove, the solutions lie in the multi-functional use of grasslands, diversification of income from grassland management, co-operation networks, communication and involving local community in creating and implementing the vision for development of the territory. It is important to create the pre-conditions to keep people in the countryside, including ensuring the necessary social infrastructure (schools etc.), providing tax incentives (e.g. land tax) etc.

Currently the maintenance of semi-natural habitats is mainly the interest of nature conservation authorities but the opportunities and ecosystem services/public goods provided by grasslands should be better used to make grassland management more sustainable and less dependent on subsidies. Grassland management only for nature conservation purposes does not work only economically viable landscape structures are long-lasting. The key to the viable use of grasslands lies in different grassland types and combination of different uses.

The rural development subsidies should provide equal conditions for producing crops and management of biologically valuable grasslands. Public goods provided by agriculture (nature, landscape, biodiversity etc.) should also be recognised as products.

In addition to investments into the new technologies and infrastructure, the above-mentioned solutions also require new skills, capacities and efforts from farmers. Therefore soft measures supporting innovative approaches, networking and capacity building of farmers as well as education of consumers are very much needed. Supporting and promoting innovation in agriculture and grassland management is especially important in areas that are less favourable for agriculture.

An innovative approach is integrated planning of grassland management taking into account the ecosystem services provided by grasslands as well as the socio-economic aspects. The LIFE Viva Grass project aims at contributing to this by developing an integrated planning tool for more sustainable management of grasslands.

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The aim of the LIFE Viva Grass project is to find economically viable and area specific management models for multifunctional use of grasslands.

LIFE Viva Grass