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EIP-AGRI Focus Group Grazing for Carbon

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1. Executive summary

The potential of grasslands as a carbon (C) sink in Europe is large. However, it is unclear to what extent different grazing systems can contribute to C sequestration. The EIP-AGRI Focus Group 'Grazing for Carbon', a temporary group of 20 selected European experts from research and practice, shared knowledge and experience from different disciplines on the relationship between grazing and soil C. The overall aim was to identify how to increase the soil C content in grazing systems.

A quick literature review showed that there is net C sequestration within grassland systems in general, but in a mixed grazing and cutting system there is less C sequestration than under a pure grazing system. Carbon sequestration is affected by the equilibrium state of C of a certain soil, i.e. the state in which input and output of C are balanced and that will be reached after a certain period of constant management; high equilibrium state leads to more possibilities of C storage than low equilibrium state. It is also affected by the current C stock, i.e. being far from the equilibrium means more potential for additional C sequestration than close to the equilibrium. Carbon equilibrium and C stock are affected by abiotic factors and by management in direct and indirect ways. The key challenge for sustainable grazing livestock systems is to find the optimum management to combine animal production with the delivery of other ecosystem services like C sequestration.

To address the knowledge gaps relating to the optimal management of grazing systems for C across different environments in Europe and the mechanisms behind the practices and the solutions, a number of research needs from practice were identified. To further support additional C sequestration and to maintain current C stocks, the Focus Group also identified ideas for Operational Groups.

The Focus Group recommended that emphasis is put on the success and fail factors for increasing the soil C content in grazing systems:

- ▶ Improve the understanding of strategies promoting better soil C management in grazed grasslands
 - Develop good grazing management strategies for different conditions (soils, weather, etc.)
 - Link C sequestration to other ecosystem services to manage trade-offs and synergies
 - Incorporate a holistic view of the grasslands and grazing systems, considering livestock, crops and soil related issues, to align perceptions between farmers, scientists and policy makers
- ▶ Provide guidelines for good grazing management/education/knowledge dissemination
 - Include practices that promote soil C sequestration in grazing guidelines
 - Work with farmers to mutually benefit from multiple sources of knowledge and awareness of the benefits of C sequestration and of the effects of grassland management on C sequestration
- ▶ Develop incentives to promote the adoption of good and appropriate grazing systems
 - Identify correct incentives for promoting soil C sequestration in the context of viable farms
 - Provide a range of incentives that reflect the varied mind-set and motivation of farmers because they are the decision-makers on the farm
- ▶ Establish monitoring schemes for C storage
 - Measure soil C as an essential step towards assessing the contribution of specific practices
 - Select the right monitoring combination of i) sampling through direct measurements and ii) registration of farm activities or indirect indicators of farm activities that have potential to increase C storage



2. Introduction

It is commonly understood that the potential of grasslands as a carbon (C) sink is large (e.g. Lorenz & Lal, 2018). Carbon promotes soil quality improvement by maintaining or enhancing soil organic matter content and thus improving soil physical properties and soil fertility. However, there are several conflicting views with respect to the effects of grazing systems on C sequestration in Europe (e.g. Conant *et al.*, 2017; Thornley & Cannell, 1997). It is currently unclear to what extent different grazing systems can contribute to C sequestration and related greenhouse gas emission mitigation.

The extent to which grazing livestock contribute to global greenhouse gas emissions or to their reduction remains a question that is still debated (e.g. Garnett *et al.*, 2017; Koncz *et al.*, 2017). However, it is clear that grazed grasslands contribute significantly to the rural economies of many European countries, are part of their cultural heritage and provide a range of valuable ecosystem services. For example, provision of feed for herbivores, combatting soil erosion, regulation of water regimes, supporting biodiversity (Gaujour *et al.*, 2012). Grasslands can potentially contribute either positively or negatively, depending mostly on the intensity of management activities, to all groups of ecosystem services. Grazed grasslands will most likely remain a major element in the European landscapes in the future. This means that it is relevant to consider how they can be managed so that they maintain or increase the sequestration of C in their soils.

One way to establish and assess innovative grazing strategies that are promising for C sequestration, is through multi-stakeholder approaches that unite experts from practice and from science. The EIP-AGRI Focus Group 'Grazing for Carbon' was therefore established to assess how to increase the soil C content in grazing systems. Focus groups are temporary groups of 20 selected experts from research and practice throughout Europe. The aim of the Focus Group 'Grazing for Carbon' was to identify how to increase the soil C content in grazing systems.

3. Brief description of the process

The Focus Group 'Grazing for Carbon' was established in the spring of 2017. Members ([Annex 1](#)) were selected by EIP-Agri from research and practice throughout Europe. A starting paper (Van den Pol-van Dasselaar, 2017) was circulated to the experts, prior to the first meeting of the Group in Clermont-Ferrand, France, in June 2017. This paper discussed the role of grasslands in the delivery of C sequestration and other ecosystem services, grazing methods, management practices that affect soil C content within grazing systems, drivers and barriers, tools and business models. The paper served as a starting point for the Focus Group discussions during the first meeting. At the end of the first meeting, the group developed a short list of specific topics and priorities to be further addressed. These topics were then elaborated in 'mini-papers', produced in between the two Focus Group meetings ([Annex 2](#)). The 'mini-papers' included a brief review of literature, ideas for operational groups (to be funded by rural development programs), research needs from practice and further developments. The second meeting of the Focus Group was held in Barcelona, Spain, in November 2017. During this meeting, the mini-papers were presented and discussed. A list of relevant topics for Operational Groups, research needs and other developments was created based on the mini-papers and the discussion. The Focus Group members voted for the most relevant topics from this list. These topics were further shaped in an interactive session ("brain writing" – a brainstorming method where participants wrote down their ideas) that resulted in a document with objectives, activities, outcomes and who to involve for each of the relevant topics on the list ([Annex 3](#)). Based on the results, a final report was drafted and reviewed by the Focus Group members.

4. State of play

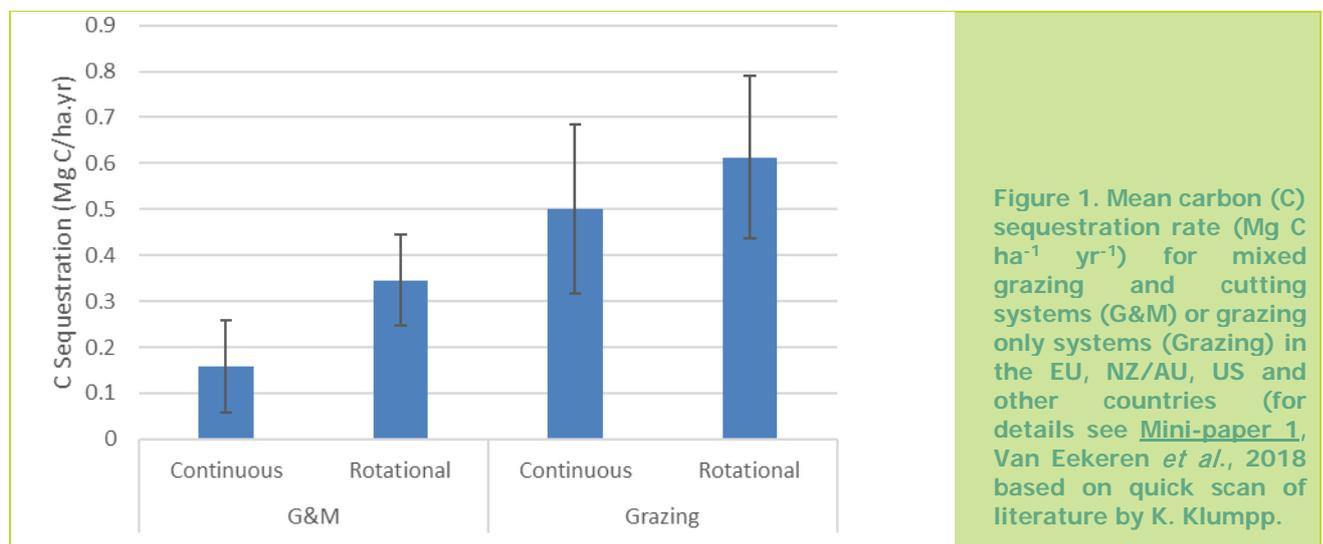
a. Framing key issues

Net C sequestration in grazing systems

Soils organic C may increase by i) adding C sources from outside the system, ii) slowing mineralisation of soil organic matter and iii) through additional photosynthesis by surface vegetation (Powlson *et al.*, 2011). Improved grassland management, including the improved management of grazing animals can contribute to organic matter build-up in grasslands in various ways (e.g. Conant *et al.*, 2017, Soussana & Lemaire, 2014). Grazed pastures may sequester more C than grasslands used for silage or hay production, due to the recycling of organic matter and nutrients (C and N) from faeces and plant residues (ungrazed leaves and roots).

Apart from C sequestration, grazing practices that favour soil C storage have multiple advantages for farmers, including increased soil quality and reduction of long-term production costs. For example, soils with high C content are generally characterized with better soil structure, greater water-holding capacity and can provide more nutrients to plants.

There is, however, still uncertainty with respect to C storage in soils and additional C sequestration. The Focus Group "Grazing for Carbon" therefore made a quick scan of the literature to identify the effect of grazing/stocking systems on soil C and the trade-offs within grassland production ([Mini-paper 1](#), Van Eekeren *et al.*, 2018). This quick literature review indicated that there is net C sequestration within grassland systems in general, but in a mixed grazing and cutting system there is less C-sequestration than under a pure grazing system (Figure 1). This can possibly be explained by more faecal returns and plant residues with grazing only, compared to mixed grazing and cutting systems. In this sense grazing only is more positive for C sequestration than systems which include cutting.



Regional differences

Despite the positive effects of grazing on C storage ([Figure 1](#)), there is little information on appropriate grazing management for specific regions (e.g. Abdalla *et al.*, 2018). Carbon sequestration in different grazing/stocking systems depends on many factors including:

- ▶ abiotic factors providing biomass production (e.g. climate, soil properties, exposure/slope)
- ▶ management factors (e.g. tillage, fertilization, stocking rate, irrigation, liming)

The impact of these factors is such that the optimal grazing/stocking system for C-sequestration will differ regionally. This is further illustrated in [Figure 2](#). The effect of a change in grazing management on C sequestration in a certain situation depends on:

- ▶ current C stock
- ▶ equilibrium state under the new grazing management (state where the C flow into the system equals the C flow out of the system; $C_{in} = C_{out}$)

The current C stock is relevant for determining the potential to sequester additional C, because soil C stocks can increase quite rapidly after a change in management regime: the rate of increase then progressively declines as the soil C content reaches a new higher equilibrium (Johnston *et al.*, 2009). Generally the more degraded a soil is with low soil organic matter (low initial equilibrium level), the more it can sequester before the saturation point is reached at a higher final equilibrium level (soil C content) for a given management regime – soils in good condition may not be able to sequester much, if any, more C. As soils approach a new equilibrium over time due to a change in grazing management, perhaps over 30-70 years, the net removal of CO₂ from the atmosphere dwindles to zero. During this time, the stock needs to be maintained since any change in management, which undermines the improved regime, will decrease the soil organic matter again (e.g. Smith, 2014). Introducing another type of grazing management may lead to a new equilibrium state with either loss or gain of organic matter.

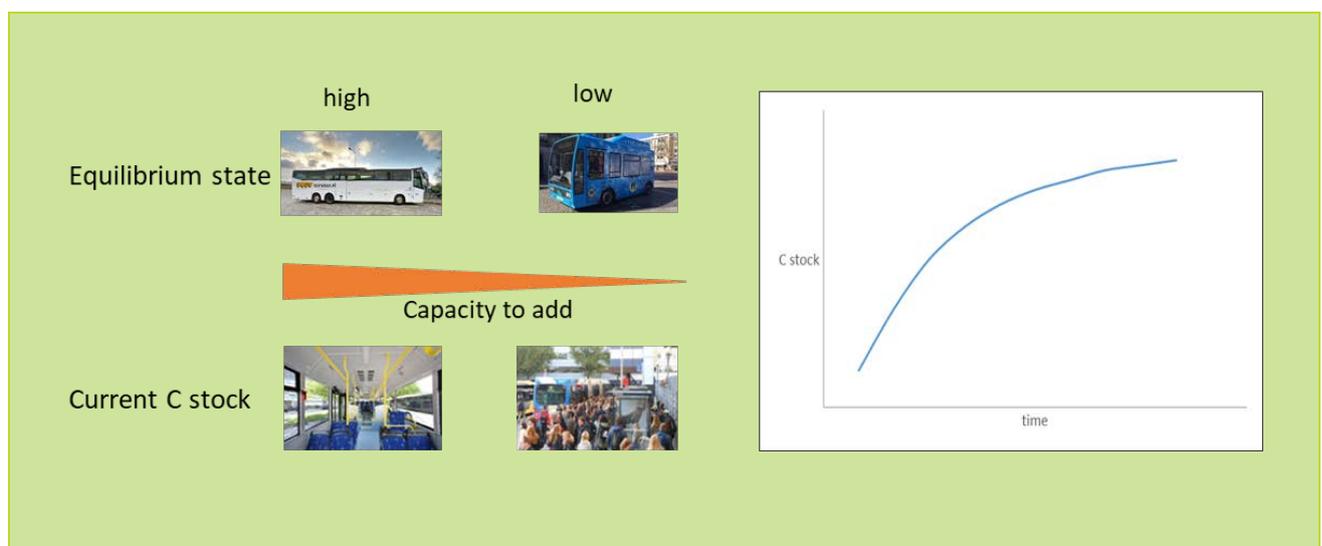
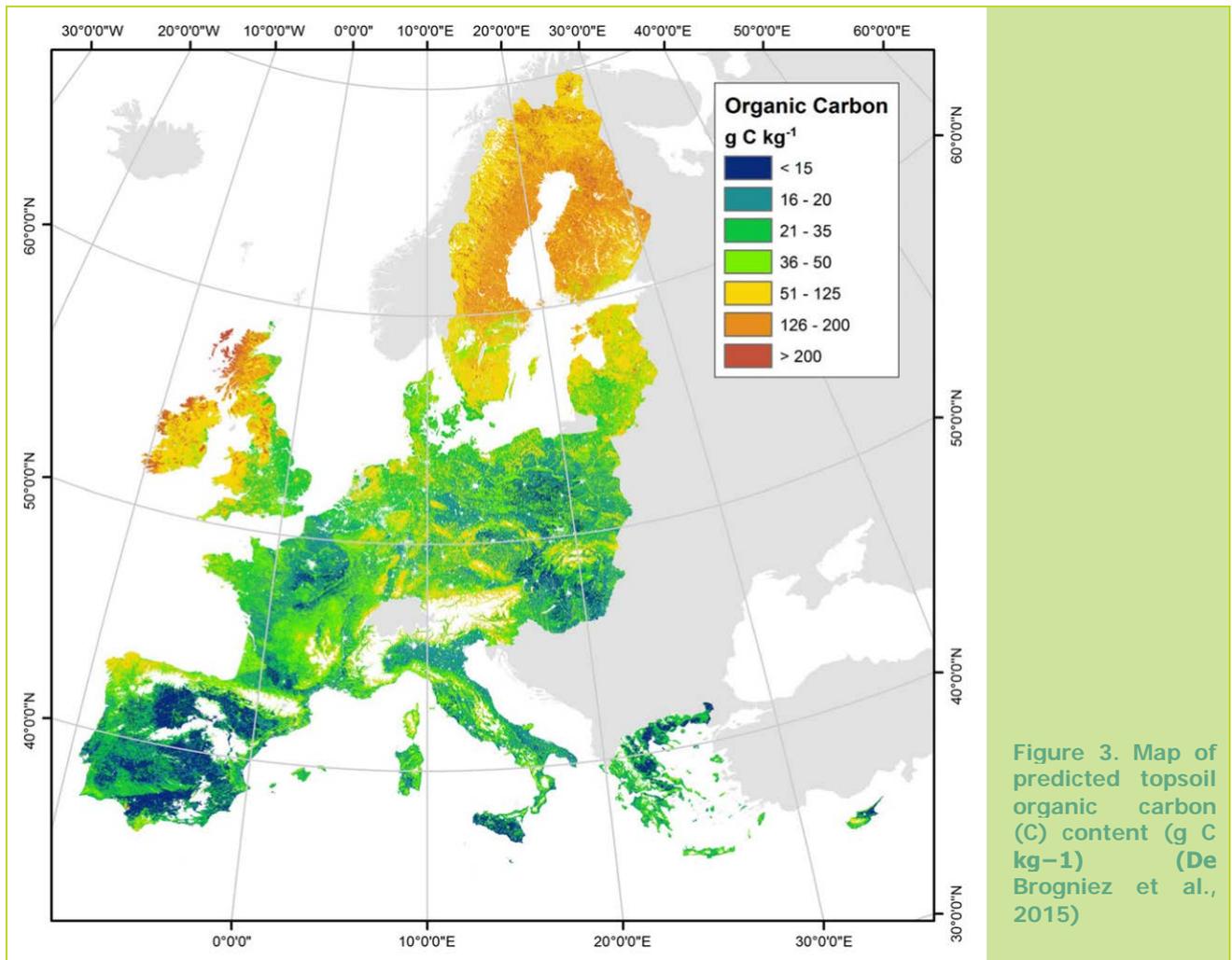


Figure 2. Factors affecting carbon (C) sequestration as a result of a change in grazing management: i) equilibrium state of C (high equilibrium state leads to more possibilities of C storage than low equilibrium state; compare a large bus with a small bus) and ii) current C stock (far from the equilibrium for any given management regime means more potential for additional C sequestration than close to the equilibrium; compare an empty bus with a full bus).

De Brogniez *et al.* (2015) created a map of the topsoil organic C content of Europe based on modelling (Figure 3). This map clearly shows the differences in organic C content between the North and South of Europe. The extent to which additional C can be taken out of the atmosphere by grasslands and stored in the soil will determine the overall role of grasslands in mitigating the impact of increased emissions.



Next to abiotic factors (climate, etc.), management factors also play a role in C sequestration in different grazing systems. The possible role of plant mixtures and native species illustrates this. They are especially relevant for sequestering C in low to medium input systems, while the effect in high input systems is limited and needs to be further tested (see text box).

The role of plant mixtures and native species on C storage

Grasslands support important and distinct biodiversity. Increased plant diversity has been reported to enhance ecosystem functioning both in natural and sown grasslands. Increasing plant diversity in low to moderate input/output grasslands can enhance yield, nutrients use efficiency and soil organic C storage, and decrease greenhouse gas emissions both from the soil and from livestock per unit of feed intake. Therefore, we can expect that managing grasslands for high plant diversity will enhance soil organic C inputs at least low to moderate input/output grasslands (Mini-paper 2, Sebastià *et al.*, 2018).

Intensification

The effect of grazing on C sequestration is rather complex and affected by the intensity of grazing (Figure 4). Many processes play a role which are each individually affected by abiotic factors and management factors. Effects of grazing are driven by plant tissue removal (defoliation), excretion (urine and dung deposits) and trampling, which exerts mechanical pressure and causes physical damage to the vegetation where animals pass repeatedly. In the short term, grazing results in a reduction in aboveground standing biomass, as well as changes in plant nutrient status. If there is much dead plant material in the sward, shading the live leaves, grazing can allow light to penetrate into the plant canopy and encourage new tiller formation, enhancing primary productivity. Conversely, if grazing is too intense or the period between successive grazing events is too short, the amount of live leaf can be reduced in the way that light interception falls, growth/carbon capture is reduced and litter production is low (i.e. reduction in C inputs to soil). Between these two extremes, there is relatively little change in growth with changes in grazing pressure. However, the quality of the herbage and the production of litter do still respond to changes in grazing pressure within this range; higher grazing pressure increases pasture regeneration, and herbage quality (as long as there is sufficient N available), but reduces litter production, and vice versa. There is a trade-off between quality (promoting animal production) and litter production (promoting C sequestration). What constitutes low/medium/high grazing pressure varies between locations and over time; the lower the pasture growth, the lower the grazing pressure or the longer the period between grazing events, and vice versa. The key aim for sustainable grazing livestock systems is to find the optimum stocking rate where the optimum grass intake coincides with a certain amount of C sequestration in the soil.

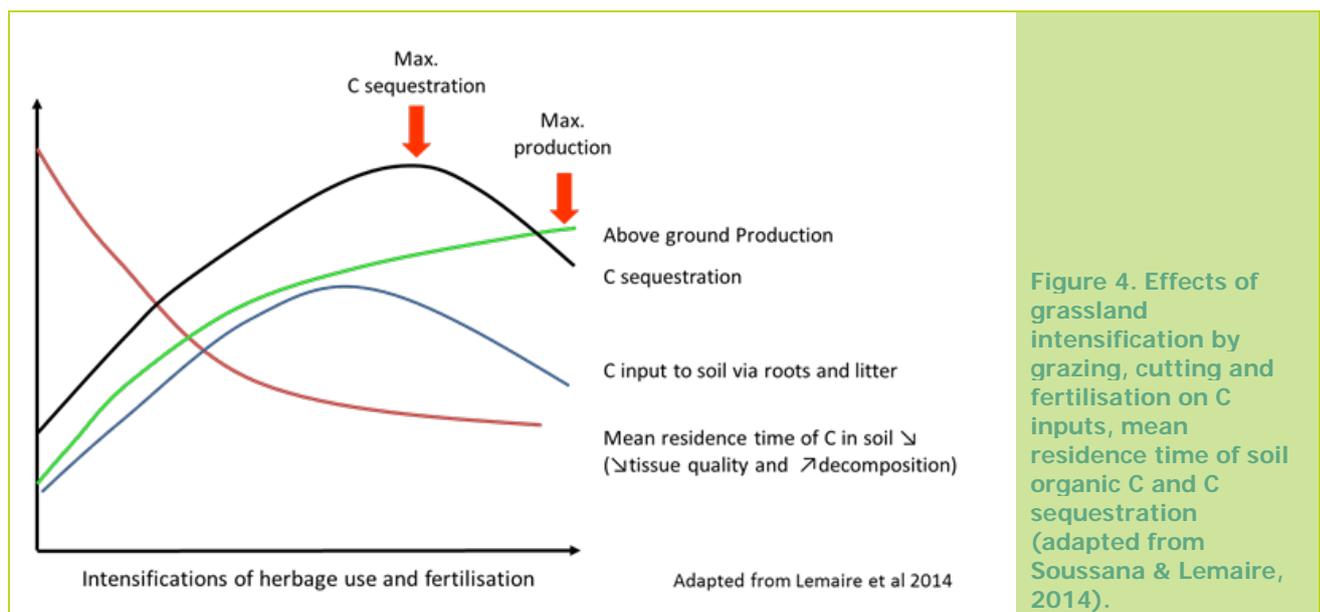


Figure 4. Effects of grassland intensification by grazing, cutting and fertilisation on C inputs, mean residence time of soil organic C and C sequestration (adapted from Soussana & Lemaire, 2014).

Examples of good practices to stimulate C sequestration

Common Agricultural Policy of the EU

The Common Agricultural Policy (CAP) is the main public instrument regarding agriculture in the European Union. The trend in the last reforms of the CAP has been towards a greener policy and the tendency is expected to continue. The first pillar of the CAP adopted in the 2013 reform, the so-called “greening” policy, includes specific grants for farmers that apply environmentally friendly management practices. It has an indirect positive effect on the sequestration of C, via the preservation of permanent grasslands.

Portuguese Carbon Fund

One example of a widespread, large-scale incentive for C sequestration in pastures took place in Portugal. Between 2008 and 2014, The Portuguese Carbon Fund (PCF), a financial instrument created by the Portuguese Government to help the country comply with Kyoto targets, financed projects for C sequestration in pastures. In two of these projects, the PCF supported the installation and maintenance of sown biodiverse permanent pastures rich in legumes through a system of payments for C sequestration. This sown pasture system consists of sowing a mix of twenty different species or varieties of mostly legumes and grasses tailor-made for particular soil, climate and use conditions, and selected for high dry matter productivity (Teixeira et al., 2015). These pastures have also been shown to sequester approximately 5 t CO₂ per ha per year (Teixeira et al., 2011). The PCF supported these pastures on a per-ton of DM basis, but also provided accompanying farmer advisory systems that ensured that the best management practices were used, maximizing the yield for feed and the C sequestration for reporting. With these projects, the area of this pasture system increased by 48,491 hectares (across 1095 farmers), and now occupies 4% of the agricultural area of Portugal.

Australia - Carbon sequestration of grazed land in the Emissions Reduction Fund

The Emissions Reduction Fund in Australia is a voluntary scheme that provides incentives for farmers and land holders to adopt new practises and technologies to reduce Australia's greenhouse gas emissions (Emissions Reduction Fund 2017). The C market fostered by government policy was launched in 2012. The federal government's Carbon Farming Initiative (Carbon Credits Act 2011) is the only compliance initiative of its kind in the world that “allows farmers and land managers to earn and sell C credits by storing C or reducing greenhouse gas emissions on the land” (Future Earth 2016). The Emissions Reduction Fund provides a methodology for the determination of C sequestration in the soils of grazed grasslands (Emissions Reduction Fund 2017). Farmers should prove via collected soil samples taken by qualified technicians and analysed by an accredited laboratory that soil C sequestration is actually achieved through a new management action (e.g. rejuvenating pastures, changing grazing pattern, changing stocking rates, applying organic or synthetic fertiliser to pastures, changing pasture irrigation). Soil C stored must be maintained until the end of the permanence period (25 or 100 years) (Emissions Reduction Fund 2017).

Success and fail factors for carbon sequestration in grazing systems

The most important factors for increasing the soil C content in grazing systems are:

- ▶ Improve the understanding of strategies towards better soil C management in grazed grasslands
- ▶ Provide guidelines for good grazing management / education / knowledge transfer
- ▶ Develop incentives to promote the adoption of the best grazing systems
- ▶ Establish monitoring schemes

Improve the understanding of strategies towards better soil C management in grazed grasslands

There is still uncertainty with respect to C storage in soils and in terms of the additional C sequestration that is possible under grazing systems (e.g. Conant *et al.*, 2017; Abdalla *et al.*, 2018; Erb *et al.*, 2018). Effects of grazing on soil organic C are highly context-specific (e.g. McSherry and Ritchie, 2013) which implies that grasslands in different regions might need to be managed differently to help mitigate greenhouse gas emissions. Good grazing management is usually good for the environment and also for people in terms of food quality and income, while poor grazing management increases the risks of degrading natural resources and yields. Improved grazing management may increase soil C content, e.g. by adjusting animal stocking rates (i.e. grazing pressure; as the ratio of biomass removed by grazing and biomass produced by an area) or periodically removing grazing livestock to prevent overexploitation. The effect may vary depending on the timing, frequency and intensity of grazing, as well as on pedoclimatic factors. Therefore, we need more insight to improve the understanding of region-specific appropriate grazing management practices that sequester C or, equally important, maintain the current C stocks in the soil.

However, it is also important to look at the full picture and not only to soil quality (e.g. Garnett *et al.*, 2017) since there is more than C when considering the analyses of greenhouse gas emissions of grazing animals. When looking at the greenhouse gas balance at farm level, animals contribute to greenhouse gas emissions via CH₄ emission from rumen fermentation and by emitting CH₄ and N₂O from manure management. But manure also leads to increased grassland yields thereby contributing to enhanced storage of soil C. Further insight into the whole C and N cycle is needed to understand the complete C and N cycle at farm level (rather than just GHG balances or just C sequestration). The Focus Group identified this as an important theme (details on possible activities, outcomes and who to involve can be found in [Annex 3](#) – section on other recommendations).

There are also some questions on specific items that need to be addressed to ensure that good grazing management practices are adopted. For example, increased plant diversity (mixing plant species, legumes, functional types or traits) has been reported to enhance yield and soil organic C in low to moderate input/output grasslands (e.g. Kirwan *et al.*, 2007; Fornara & Tilman, 2008).

However, some uncertainty lasts due to scarcity of biodiversity-function experiments that include grazing. Moreover, information is lacking on underlying mechanisms triggered by plant diversity and following different grazing managements. Thus there is need to clarify the interactive effects between grazing and plant diversity on soil C storage, and more precisely to determine if these effects are additive, multiplicative and/or species-dependent.

Provide guidelines for good grazing management / education / knowledge transfer

To optimise grazing for C, guidelines are required. Currently, a range of grazing guidelines exist in Europe, from simple to complex, and they are better developed in some regions/grazing systems than in others ([Mini-paper 3](#), Hennessy *et al.*, 2018). The guidelines focus on important issues like grazing infrastructure, herbage utilisation, regrowth intervals, stocking rate and measurement tools. Current grazing guidelines hardly consider the effects of management decisions on soil C stocks. Adopting good grazing management practices through the use of appropriate guidelines can optimise production, as well as ecosystem services, including C sequestration, from grazing land.

Next to providing guidelines, it is important to share the knowledge and work with farmers and other stakeholders in soil C management thereby stressing the benefits of soil C sequestration. The aim of this joint work is to increase farmers' knowledge and awareness of the benefits of C sequestration and of the effects of grassland management on C sequestration (details on possible activities, outcomes and who to involve can be found in [Annex 3](#) – section on other recommendations).

Develop incentives to promote the adoption of the best grazing systems

Incentives are defined here as immediate drivers of actions that foster C sequestration. Incentives to promote the adoption of the best grazing management systems must be targeted at the appropriate stakeholders ([Mini-paper 4](#), Rocha Correa *et al.*, 2018). The decision maker on the farm (the farmer) typically plays a pivotal role in most of the strategies for boosting C sequestration in pastures. It is the farmer that is in charge of managing the land. The motivations of the farmer are therefore important.

Carbon sequestration can help farmers to improve long-term soil fertility and manage natural weather variability (e.g. droughts). Despite the fact that many farmers recognize and prioritize the importance of C stocked in grassland soils, the adoption of practices that promote the accumulation of C in soils does not always happen spontaneously. One reason why are real or perceived short-term losses in productivity. Some level of incentive – monetary or otherwise (e.g. technical advisory, transferring knowledge) can help. Monetary incentives may serve as compensation for short-term losses in productivity, as payments for ecosystem services (C-sequestration), or as more indirect valorisation by consumers, industries and distributor companies.

Incentives can be policy driven (e.g. EU, national or regional policies, alleviating, simplifying actions), market driven (e.g. private production standards, voluntary C markets and funds, labelling) or farmer driven (e.g. influencing social norms and the mind-set of farmers by public campaigns; recognising the intrinsic value of C sequestration). Since improvements in grazing management and associated increases in C sequestration can be reversed, it is important that incentive schemes also take a long-term view and consider maintenance of high C stocks alongside C accumulation. Good examples of incentive schemes combine monetary and non-monetary compensation. It is important to devise long-lasting programmes to create stability for farmers.

Special attention should be paid to potential disincentives (incentives that could lead to a decrease in C sequestration). For example, building C stocks in the soil is a long term exercise, with benefits that may also require years to become apparent. In situations where land is rented for short periods, legal and financial mechanisms are required to allow the contribution that a tenant farmer makes to this process is recognized. Furthermore farmers require the research community to arrive at a better understanding of the expected effects of C storage changes on yield and grassland management. Farmers' beliefs can change through outreach and extension of information on grassland multifunctionality. It is necessary to understand the farmer's perspective of disincentives and to reduce/eliminate disincentives (details on possible activities, outcomes and who to involve can be found in [Annex 3](#) – section on other recommendations).

Finally, incentives must be assessed and monitored to ensure that there are no unforeseen negative consequences (i.e. trade-offs with other environmental criteria, for example due to antagonisms with other ecosystem services).

Establish monitoring schemes

Effective monitoring of soil C ([Mini-paper 5](#), Teixeira *et al.*, 2018) is required to document the provision of C sequestration services by farmers/land managers. There are two main viable ways to do this: (1) measure the soil organic C content or the soil organic matter directly over time and use these data to estimate the change in C stocks (gold standard), and (2) register farm activities or indirect indicators of farm activities, calculate their potential for increasing C storage, and monitor the activities rather than the soil. Usually the latter is a cheaper approach due to less intensive sampling, but it relies either on prior data or on modelling to identify relevant farming practices and quantify their effect. Direct measurements using soil sampling and analysis or indirect measurements using remote sensing have to be made over long periods of time if the change in C sequestered is to be described accurately. Relying on long-term measurements alone for guiding land management is therefore impractical for farmers and policymakers. For this reason, a combination of the two options is required. Ultimately the best monitoring system must respond to the reasons for measuring C and the stakeholders involved.

5. What can we do?

Ideas for Operational Groups

“Grazing for Carbon” would greatly benefit from the initiation of Operational Groups where the different stakeholders work and learn together on concrete, practical solutions to problems or innovative opportunities. The Focus Group “Grazing for Carbon” identified a number of relevant ideas for Operational Groups. These ideas were further shaped in an interactive session. Title and objectives of the ideas are given in [Table 1](#). A more detailed version of these ideas (including possible activities, outcomes and who to involve) can be found in [Annex 3](#).

Table 1. Ideas for Operational Groups related to the theme “Grazing for Carbon”, as identified by the Focus Group “Grazing for Carbon”.

Operational Groups	Objectives
Effectiveness of monitoring	Development of quick, low-cost and easy to apply monitoring techniques that help farmers and advisors in their management decisions to enhance C sequestration and allow the farm level to be linked to the landscape level for sustainability assessment
Farmer’s management of species, importance of sown diversity, local species and legumes	<ul style="list-style-type: none"> •Optimal choice of (local) seed-mixtures to support C sequestration, N fixation, resistance to extreme weather events, species persistence etc., in specific regions •Maximize the C sequestration potential of the mixed forest /grassland (agroforestry/silvopastoral) systems
Guidelines for production and persistence of multispecies swards under grazing	Promote best quality and persistence of swards, showing positive and negative effects of different practices (sown diversity, N, irrigation, mulching, harrowing, grazing management)
Convert traditional management to alternatives such as conservation management, low N input management, silvopastoral management	Increase plant and animal production, soil quality and biodiversity by converting traditional management to alternative/conservation management
Agro-forestry landscapes and additional monetizable ecosystem services and C sequestration	Design successful silvopastoral systems: to optimise the design of landscapes (e.g. planting of landscape elements including trees/hedgerows) to increase productivity of grazing animals, trees/fruit, C sequestration and other ecosystem services (biodiversity, nature related touristic activities)
Improve long term pasture productivity and fertility through rotational grazing	Maintain the pasture for as many years as possible while maintaining the level of available feed and promoting soil quality

Research needs from practice

Next to the ideas that could be explored in Operational Groups, there are also a number of research needs from practice that have to be addressed in order to successfully implement “Grazing for Carbon”. These research needs have been identified by the Focus Group and are summarised in [Table 2](#). A more detailed version of these research needs (including possible activities, outcomes and who to involve) can be found in [Annex 3](#).

Table 2. Research needs from practice related to the theme “Grazing for Carbon”, as identified by the Focus Group “Grazing for Carbon”.

Research needs from practice	Objectives
Carbon sequestration in relation to other ecosystem services	<ul style="list-style-type: none"> • To understand the links between C sequestration / organic matter and other ecosystem services like soil quality, and biodiversity • To develop robust indicators to monitor different ecosystem services at the same time
Meta-analysis on effect of grazing system on C sequestration	<ul style="list-style-type: none"> • To compile current knowledge on how different grazing systems affect soil C sequestration • To determine the best grazing systems for C storage under different pedoclimatic conditions
Species, mixtures and combinations of traits under different environmental conditions and grazing practices	<ul style="list-style-type: none"> • To identify region-specific appropriate species / cultivars of species / mixtures of species for grazing • To determine the impacts of grazing (stocking rate, grazing frequency, grazing intensity) on the productivity and persistence of mixtures and components of mixtures and on soil C • To identify the best mixtures of species and plant functional traits to maintain or increase soil C under different grazing systems / pressures / pedoclimatic conditions
Holistic approach: trade-offs with grazing	<ul style="list-style-type: none"> • Identify trade-offs and synergies between C sequestration and other services (biodiversity, soil quality, GHG emissions etc.) • Identify best grazing management to optimise ecosystem services for local conditions
Assessment of effectiveness of incentives	<ul style="list-style-type: none"> • To understand how farmers can be motivated to manage grassland for C sequestration (via monetary incentives, information, etc.) • To understand the effect of incentives on long-term C sequestration
Guidelines to optimise animal production while maintaining or increasing soil C	<ul style="list-style-type: none"> • To functionally link the processes driving animal production and changes in soil C • To deploy a tool / Decision Support System that enables farmers to test the consequences of changes of farm management at local level and to ensure agroecosystem sustainability
Effect of grazing intensity and nutrient fertilization on C:N:P:S ratios in plants and on C sequestration	<ul style="list-style-type: none"> • To understand the effect of grazing intensity and nutrient fertilisation on C:N:P:S ratios in plants, GHG emissions and C sequestration in contrasting grazing systems and under different pedoclimatic zones • To understand C losses and C gains in grazing systems • To minimise nutrients escaping from the nutrient cycle on the farm
Intrinsic motivation of farmers / mind-set of farmers	<ul style="list-style-type: none"> • To understand farmer behaviour, farmer motivation and decision making in the adoption of grazing systems that preserve or sequester C • To understand, learn from, and work together with, farmers, particularly in systematizing what motivates a farmer to change a method or practice

Research needs from practice	Objectives
Monitor the relations between grazing practices and soil organic matter content for different regions in Europe	<ul style="list-style-type: none">• To establish a robust monitoring system with common protocols and simultaneously locally adapted where needed• To get information about soil organic content for different regions of Europe• To optimise soil organic content in different regions of Europe• To reach equilibrium of soil organic content through optimal grazing management in different soil conditions

6. Conclusions and recommendations

In conclusion, it is clear that grazing systems are important for C storage. The Focus Group “Grazing for Carbon” recommended that optimal grazing management should focus on both

- ▶ additional C sequestration (where possible) and
- ▶ preserving current C stocks

There are still knowledge gaps about the best way to manage grazing systems for C across the different environments in Europe today and in the future under climate change, and about the mechanisms behind the practices and the solutions. On the other hand, some known C sequestration practices could be tested in Operational Groups and put into practice. To support additional C sequestration and to maintain current C stocks, the Focus Group identified ideas for Operational Groups and research needs from practice (they are described in detail in [Annex 3](#)).

Finally, the Focus Group recommended that emphasis is put on the success and fail factors for increasing the soil C content in grazing systems:

- ▶ Improve the understanding of strategies promoting better soil C management in grazed grasslands
 - Develop good grazing management strategies for different conditions (soils, weather, etc.)
 - Link C sequestration to other ecosystem services to manage trade-offs and synergies
 - Incorporate a holistic view of the grasslands and grazing systems, considering livestock, crops and soil related issues, to align perceptions between farmers, scientists and policy makers
- ▶ Provide guidelines for good grazing management/education/knowledge dissemination
 - Include practices that promote soil C sequestration in grazing guidelines
 - Work with farmers to mutually benefit from multiple sources of knowledge and awareness of the benefits of C sequestration and of the effects of grassland management on C sequestration
- ▶ Develop incentives to promote the adoption of good and appropriate grazing systems
 - Identify appropriate incentives for promoting soil C sequestration in the context of viable farms
 - Provide a range of incentives that reflect the varied mind-set and motivation of farmers because they are the decision-makers on the farm
- ▶ Establish monitoring schemes for C storage
 - Measure soil C as an essential step towards assessing the contribution of specific practices
 - Select the right monitoring combination of i) sampling through direct measurements and ii) registration of farm activities or indirect indicators of farm activities that have potential to increase C storage

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Annex 1: Members of the Focus Group

Name of the expert	Profession	Country
Chabbi Abad	Expert from agricultural organisation, industry or manufacturing; researcher	France
Cordovil Claudia	Farmer; land owner; researcher	Portugal
De Vlieghe Alex	Farm adviser; researcher	Belgium
Die Dean Manuel	Farmer; land owner	Portugal
Hennessy Deirdre	Researcher	Ireland
Hutchings Nicholas	Researcher	Denmark
Klumpp Katja	Researcher	France
<u>Koncz Peter</u>	Adviser	Hungary
Kramberger Branko	Researcher	Slovenia
Newell Price Paul	Adviser; farm adviser; researcher	United Kingdom
Poilane Alice	Farm adviser	France
Richmond Robert	Farmer	United Kingdom
Rocha Correa Pedro	Land owner; adviser; innovation support agent; researcher	Spain
Schaak Henning	Researcher	Germany
Schönhart Martin	Farmer; researcher	Austria
Sebastiá María Teresa	Researcher	Spain
Svoboda Pavel	Farmer; land owner; student	Czech Republic
<u>Teixeira Ricardo</u>	Expert from agricultural organisation, industry or manufacturing; researcher	Portugal
van Eekeren Nick	Researcher	Netherlands
van Rijn Cornelis	Farmer	Netherlands
Facilitation team		
<u>van den Pol-van Dasselaar Agnes</u>	Coordinating expert	Netherlands
<u>Desimpelaere Koen</u>	Task manager	Belgium
<u>Marin Alexandre</u>	Backup task manager	France

You can contact Focus Group members through the online EIP-AGRI Network. Only registered users can access this area. If you already have an account, [you can log in here](#). If you want to become part of the EIP-AGRI Network, [please register to the website through this link](#).

Annex 2: List of mini-papers

1. The effects and trade-offs associated with approaches to sequestering C in different grazing systems ([Mini-paper 1](#), Van Eekeren *et al.*, 2018)
2. The role of plant mixtures and native species on C storage ([Mini-paper 2](#), Sebastià *et al.*, 2018)
3. General guidelines for optimal grazing, to be adapted and adopted in different parts of Europe ([Mini-paper 3](#), Hennessy *et al.*, 2018)
4. Incentives to promote the adoption of the best grazing systems. ([Mini-paper 4](#), Rocha Correa *et al.*, 2018).
5. Effective monitoring of soil C as a tool for soil quality evaluation ([Mini-paper 5](#), Teixeira *et al.*, 2018)

Annex 3: Operational Groups, research needs from practise and other recommendations

Objectives, activities, outcomes and who to involve are given for each topic

Ideas for Operational Groups

Effectiveness of monitoring

OBJECTIVES

- Develop quick, low-cost and easy to apply monitoring techniques that help farmers and advisers in their management decisions to enhance C sequestration, and that allow the farm level to be linked to the landscape level for sustainability assessment

ACTIVITIES

- Data mining / use all available sources of data (literature, advisers, digital soil maps, satellite data, etc.)
- Field experiments and demonstration sites
- Important to use a bottom-up approach rather than a fundamental approach

OUTCOMES

- Tools for monitoring and mapping of data (landscape, regional and national level)
- App-based decision making tool

WHO TO INVOLVE

- Universities
- Advisers/official extension services
- Government / policy makers
- Farmers
- Industry

Farmer's management of species, importance of sown diversity, local species and legumes

OBJECTIVES

- Optimal choice of (local) seeds mixture to support C sequestration, N fixation, resistance to extreme weather events, species persistence, etc. in specific regions
- Maximise the C-sequestration potential of the mixed forest /grassland systems (agroforestry/silvopastoral)

ACTIVITIES

- Create a database of possible / usable species including availability and price
- Predict the climate change influence on grasslands (estimate the expected climate variance in relation to the range of species that can cope with it)
- Species selection / evaluation
- Optimisation of sown diversity in mixtures for local adaptation under changing climatic and management conditions
- New native species testing for their feeding quality, and soil/climate adaptation
- Local species, but not restricted to local species
- Stress the importance of cooperation between farmers and researchers
- Run long-term experiments on commercial and research farms
- Consider and trial traditional grassland management practices (e.g. hay seeding, conservation agriculture)
- Compare effects of grazing management on species persistence (animal type, rotational versus continuous, length rest period, winter management, etc.)
- Preserve niches of more natural pasture vegetation to increase gene pool, including site specific forest/grassland systems with native species and increased pasture density

OUTCOMES

- Guidelines for farmers/advisers/government with regard to choosing the best possible mixture of seeds for grasslands
- Database of experimental plots and results in combination with farmers testimony
- New pasture combinations
- Higher resilience of pastures to drought and flood events
- Protocols for sown diversity in mixtures as a tool for climate change mitigation and adaptation

WHO TO INVOLVE

- Farmers
- Private sector (seed merchants)
- Scientists in agriculture (to run test fields/plots)
- Advisers
- Plant breeders for choices on species and varieties

Guidelines for production and persistence of multispecies swards under grazing

OBJECTIVES

- Promote best quality and persistence of swards, showing positive and negative effects of different practices (sown diversity, N, irrigation, mulching, harrowing, grazing management)

ACTIVITIES

- Review existing guidelines with respect to C sequestration and multispecies swards
- Compare grazing methods to establish the effect on species persistence – specific to regions – rest periods, grazing intensity, slow season management
- Long-term experiments in collaboration with farmers, testing the effect of different grassland management practices, as well as the viability of a continental-scale sown diversity scheme based on plant functional types

OUTCOMES

- A set of general guidelines for sward management, in combination with monitoring the conditions to which they apply to allow the countries/farmers to choose the best options for each individual scenario
- Decision making tools to help farmers adopt multispecies swards
- Better integration of guidelines and research studies

WHO TO INVOLVE

- A group of farmers (dairy, beef or sheep) (to establish swards)
- Advisers and technicians (to collect samples)
- Scientists (forage) (for protocols and analyses of data)
- Farmers who graze their livestock
- Policy to disseminate and implement local guidelines

Convert traditional management to alternatives such as conservation management, low N input management, silvopastoral management

OBJECTIVES

- Increase plant and animal production, soil quality and biodiversity by converting traditional management to alternative/conservation management

ACTIVITIES

- Define conventional management, define alternative management
- Study the long-term differences between conventional management and alternative management (grass productivity, animal productivity, soil fertility in terms of soil organic matter, resilience in adverse weather and costs)
- Focus on maintaining plant cover in space and time
- Study the behaviour of farmers and how to change it, include the effect of group-thinking and emotions
- Education and PR campaign
- Define measures to better conserve and enhance soil organic matter levels

OUTCOMES

- Better soil quality, higher soil OM and better drainage → higher production
- Sustainable low losses systems
- More trees for potential C sequestration, biodiversity, profitability and diversification benefits; more conservation
- Guidelines to give farmers confidence to change system with results to show it works
- Rational explanation of advances of alternative systems of grasslands management
- A sociological and psychological change in farming

WHO TO INVOLVE

- Farmers
- Government
- Sociologists
- Psychologists
- PR firms
- Associations
- Extension services and researchers

Agro-forestry landscapes and additional monetizable ecosystem services and C sequestration

OBJECTIVES

- Designing successful silvopastoral systems: to optimise the design of landscape elements (including planting of landscape elements including trees/hedgerows) to increase productivity of grazing animals, trees/fruit, C sequestration and other ecosystem services (biodiversity, nature related touristic activities)

ACTIVITIES

- Measure results of agroforestry in terms of overall ecosystem services: C, water, production, wildlife, tree production (wood, forage, fruits)
- Identify synergies and trade-offs
- Test for marketing of products (e.g. fruits)
- Experiments with optimal composition of species
- Develop financial models to set-up agroforestry (e.g. crowd funding), this is needed since trees grow slowly and financial benefits are only available in the long-term

OUTCOMES

- Guidelines for the development of more integrated farming systems with the aim of wider results (solutions will be site-specific, need to focus on the methods used and improve dialogue between actors)
- Insight into the need for funding to encourage adoption and management changes for public benefits
- Special land protected products

WHO TO INVOLVE

- Landscape management with multi-actors
 - Farmers, foresters
 - Advisers
 - Researchers
 - Government
 - Market parties
 - Financial experts
 - Commercial experts

Improve long term pasture productivity and fertility through rotational grazing

OBJECTIVES:

- Maintain the pasture for as many years as possible while maintaining the level of available feed and promoting soil quality

ACTIVITIES

- Test different rotations (different animal species and plant species combinations) on a farm that will be split into several fields
- Test different pasture types with annual and permanent species, and compare mono and multispecies swards
- Test annual fertilisation, tillage and test irrigation/drainage where applicable
- Link to weather data and test adaptation to weather conditions in a year
- Continue rotation testing with mechanisation, re-seeding, etc.
- Landscape scale management since farmers need new areas to rotate

OUTCOMES

- The best contributions of annual grazing systems plus plant species combinations (monocultures and mixtures) to obtain good quality feed, along with highly persistent pasture/grassland
- Considering that this is a region specific objective with region specific constraints, local issues need to be considered to obtain a set of efficient grass / animal / fertilisers combinations

WHO TO INVOLVE

- Farmers and farmers associations
- Seed selling companies
- Research
- Fertiliser companies

Research needs from practice

Carbon sequestration in relation to other ecosystem services

OBJECTIVES

- To understand the links between C sequestration / organic matter and other ecosystem services like soil quality and biodiversity
- To develop robust indicators to monitor different ecosystem services at the same time

ACTIVITIES

- Multidisciplinary research
- First step would be to kick-off long-term cooperation between universities / science sector and farmers in specific regions
- Literature review
- Identification of knowledge gaps
- Develop monitoring / sampling methods
- Identify indicators of ecosystem services
- Long-term experiments in different pedo-climatic conditions with measurements of ecosystem services
- Modelling and validation

OUTCOMES

- Correlation between organic matter / C sequestration and other ecosystem services
- Robust indicators and harmonised monitoring methodologies for ecosystem service delivery
- Real functional models including environmental conditions

WHO TO INVOLVE

- Researchers: soil, crop production, ecology, economists
- Advisers
- Farmers
- Grassland agronomists

Meta-analysis on effect of grazing system on C sequestration

OBJECTIVES:

- To compile current knowledge on how different grazing systems affect soil C sequestration
- To determine the best grazing systems for C storage under different pedoclimatic conditions

ACTIVITIES

- A review of the literature on the effect of grazing systems on C sequestration
- Contact authors for more detail / clarification
- Meta-analysis to disentangle different effects of grazing systems / statistical analyses of compiled data
- Standardise factors
- Identify knowledge gaps
- Look for examples of system changes on farm to monitor and add in to existing reviews
- Transdisciplinary workshops to check outputs
- Disseminate the knowledge obtained

OUTCOMES

- Database on grazing systems and soil organic C across environments and under different grazing / climatic conditions
- List of positive and negative impacts of grazing systems on C sequestration
- Better understanding of which factors have the greatest influence on C sequestration in grazing systems, in contrasting pedoclimatic regions
- Scientific papers

WHO TO INVOLVE

- Research: grassland, environmental
- Policy people to disseminate results to
- Agricultural colleges
- Farmers

Species, mixtures and combinations of traits under different environmental conditions and grazing practices

OBJECTIVES

- To identify region-specific appropriate species / cultivars of species / mixtures of species for grazing
- To determine the impacts of grazing (stocking rate, grazing frequency, grazing intensity) on the productivity and persistence of mixtures and components of mixtures and on soil C
- To identify the best mixtures of species and plant functional traits to maintain or increase soil C under different grazing systems / pressures / pedoclimatic conditions

ACTIVITIES

- Experiments in different regions where yields, quality, soil C etc. are monitored
 - Cultivar evaluation under grazing, both for monocultures and mixtures
 - Mixture experiments, e.g. number and type of species, sowing rate, establishment method, plant functional types
 - Grazing experiments, e.g. persistence, sward composition, herbage production, animal 'acceptance'
- Study the effect of establishing species mixtures versus continuing with permanent pasture
- Develop grazing management guidelines

OUTCOMES

- List of appropriate species / plant functional types / combinations of species and plant functional types (mixture) for different regions and soil types
- List of key components to consider when developing species mixtures and grazing strategies
- Grazing management guidelines including best number of species in a mixture, sowing rates and

- WHO TO INVOLVE
- Researchers
- Forage industry, seed merchants, fertiliser industry
- Advisors / extension officers
- Teachers / colleges
- Farmers / discussion groups

Holistic approach: trade-offs with grazing

OBJECTIVES

- Identify trade-offs and synergies between C sequestration and other services (biodiversity, soil quality, GHG emissions etc.)
- Identify best grazing management to optimise ecosystem services for local conditions

ACTIVITIES

- List and prioritise effects to be examined through consultation with stakeholders (farmers, advisers, researchers, industry, policy makers)
- Review current evaluation systems to identify gaps / deficits
- Meta-analysis on both published and 'grey' literature
- Cost-benefit analysis
- Forums with stakeholders (participatory approach)

OUTCOMES

- Tool to quantify effect of grazing on ecosystem services that can be used for decision making
- A broader perspective of pasture based animal production (away from the narrow view of climate change)
- Knowledge transfer
- Scientific paper

WHO TO INVOLVE

- Holistic view is necessary, manage conflicts
- Farmers
- Advisers
- Researchers
- Industry
- Policy makers

Assessment of effectiveness of incentives

OBJECTIVES

- To understand how farmers can be motivated to manage grassland for C sequestration (via monetary incentives, information, etc.)
- To understand the effect of incentives on long-term C sequestration

ACTIVITIES

- Identify a limited number of relevant groups / types of farmers
- Interview farmers
- Identify in a participatory stakeholder process which incentives are adopted in the field, both in Europe and outside Europe
- Establish methods like randomised control trials for data collision of the effectiveness of incentives (test different options)
- Monitoring of incentives to assess effectiveness including cost-benefit analysis

OUTCOMES

- Segmentation of effective incentives per farmer type
- Well-founded policy recommendations
- Better understanding of unintended effects

WHO TO INVOLVE

- Farmers
- Researchers (to compile information and assess effectiveness)
- Policy makers
- Economists
- Sociologists

Guidelines to optimise animal production while maintaining or increasing soil C**OBJECTIVES:**

- To functionally link the processes driving animal production and changes in soil C
- To deploy a tool / Decision Support System that enables farmers to test the consequences of changes of farm management at local level and to ensure agroecosystem sustainability

ACTIVITIES

- Link local feed ration, feed supply calculation and animal production to C and N flows
- Develop tools to show the consequences of farm management and recommend best management practices
- Include total GHG emissions and economics in the tool

OUTCOME

- A software tool that links farm management to changes in soil C
- Better understanding by farmers of the link between feeding, production and soil C

WHO TO INVOLVE

- Researchers
- Farmers
- Feed industry
- Farm advisers
- Education
- Policy makers

Effect of grazing intensity and nutrient fertilization on C:N:P:S ratios in plants and on C sequestration**OBJECTIVES**

- To understand the effect of grazing intensity and nutrient fertilisation on C:N:P:S ratios in plants, GHG emissions and C sequestration in contrasting grazing systems and under different pedoclimatic zones
- To understand C losses and C gains in grazing systems
- To minimise nutrients escaping from the nutrient cycle on the farm

ACTIVITIES

- Literature review to show what is already known and to provide hypotheses for experiments
- Plot and field level experiments on C:N:P:S in soil, plant and animal for different soil types and different regions, e.g. to study
 - grazing intensities
 - N, P and S fertilisation strategies
 - organic / mineral fertilisers
 - dynamics of patches with drone images, showing dung and nutrient dynamics
 - effect of grazing on the turnover of roots

OUTCOMES

- Experimental results provide insight in C:N:P:S ratios
- Fertilisation strategies
- Minimum environmental pollution: N (NO₃, NH₄, N₂O₂, N₂, N₂O), P or even S

WHO TO INVOLVE

- Farmers and advisers
- Researchers
- Fertiliser industry
- Dairy companies
- Meat industry

Intrinsic motivation of farmers / mind-set of farmers**OBJECTIVES**

- To understand farmer behaviour, farmer motivation and decision making in the adoption of grazing systems that preserve or sequester C
- To understand, learn from, and work together with, farmers, particularly in systematizing what motivates a farmer to change a method or practice

ACTIVITIES

- Multi-actor approach with e.g. transdisciplinary workshops, farmers` interviews, socio-economic analyses, polls and sessions with farmers` groups and other relevant actors
- Identification of barriers that prevent farmers to adopt the best management practices
- Farmer discussion groups led by advisers to determine the barriers to change (link to other transitions in the farming system)
- Peer interaction / motivation through demonstrations with early adopters (pilot studies) and analyses of decisions made following the interaction
- Education sessions
- Showing success cases (quantify the effect including cost benefit + field visits + evaluation)

OUTCOMES

- Specific mechanisms to encourage farmers to adopt practices that sequester C
- Better understanding of the type of 'message' farmers respond to
- Video – testimony of successful farmers

WHO TO INVOLVE

- Farmers
- Social scientists
- Grassland agronomists
- Behavioural scientists / psychologists
- Economists
- Agricultural educators (schools, colleges, universities)

Monitoring links between practices and soil organic matter content for different regions in Europe**OBJECTIVES**

- To establish a robust monitoring system with common protocols and simultaneously locally adapted where needed
- To get information about soil organic content for different regions of Europe
- To optimise soil organic content in different regions of Europe
- To reach equilibrium of soil organic content through optimal grazing management in different soil conditions

ACTIVITIES

- To look which monitoring methods (field measurements, remote sensing, etc.) are the most common in Europe and choose the best (costs should be taken into account)
- Scientifically plan sufficient number of samples taken in different regions
- Field experiments / demonstration sites investigating specific practices (grazing intensity, stocking rate etc.) for C sequestration
- Meetings with farmers
- Meetings with official entities responsible for environmental monitoring

- Make monitoring data available to the public and easily available for management decisions, selling C credits, and marketing products

OUTCOMES

- One monitoring method for the whole of Europe
- Clear communication
- Guidelines for management, both general guidelines and guidelines for specific pedoclimatic conditions
- Analytical methods to measure soil organic C content (one standard method plus other alternative methods for different regions / climates)
- Option to valorise C sequestration based on one monitoring system
- List of effects of a range of practices on soil organic content in different regions (increase, maintain, decrease)

WHO TO INVOLVE

- Scientists
- Advisers
- Farmers
- Laboratories

Other recommendations

Model and assess the whole C and N cycle

OBJECTIVES

- To understand the complete C and N cycle at farm level (rather than just GHG balances or just C sequestration)
- To assess the effects of management on the complete C and N cycle

ACTIVITIES

- Review existing models / identify gaps or deficits in existing models
- Determine pools and fluxes within the grazing system for C and N for different soil types
- Test model responses to management (mowing, grazing, legumes, forage quality etc.) and provide uncertainties
- Model effects of environmental changes

OUTCOMES

- Improved understanding of key processes and mechanisms involved, including uncertainties
- Coupled C and N models in grazed systems across environmental conditions

WHO TO INVOLVE

- Researchers

Work with farmers and other stakeholders in soil C management; stressing the benefits of soil C sequestration

OBJECTIVES

- To increase farmers' knowledge and awareness about the benefits of C sequestration
- To increase farmers' knowledge and awareness about the effects of grassland management on C sequestration

ACTIVITIES

- Include the topic C sequestration in farmers' education curricula
- Develop suitable education material and guidelines in a manner that is understandable for farmers
- Describe practices that lead to losses of C and gain of C
- Identify best practices – examples which are easy to demonstrate and which lead to production and resilience of the system
- Field excursions and field trips (visiting commercial farms and research sites to demonstrate best practices)

- Develop case studies on farms, quantify effects of management on C sequestration
- Use participatory methods where farmers have an active voice and are not just passive takers of information
- Training
- Learn from farmers

OUTCOMES

- A programme which combines educational material and 'hands-on' activities (e.g. field trips), and which explicitly contains feedback loops, first, to allow to better understand the farmers needs and perspectives and, second, to involve farmers in the public discussion in a participatory approach
- Increased knowledge at the farm level
- Higher awareness of potential benefits and treats
- Better recommendations through farmers feedback
- Exchange of best practices
- Efficient use of scientific findings in practical farming

WHO TO INVOLVE

- Teachers
- Advisers
- Researchers
- Farmers
- Farmer unions / representatives
- Land-owners
- Land-managers
- Also we need the wider population to understand benefits of soil C and why farmers practice certain methods

Disincentives

OBJECTIVES

- Reduce/eliminate disincentives
- Understand the farmers` perspective of disincentives

ACTIVITIES

- Identify potential disincentives (e.g. rented land, land use change as a result of climate change, demands made by different authorities regarding agricultural activities, institutional disincentives)
- Evaluate potential disincentives in a participatory process involving farmers, understand and list disincentives and information gaps and how to address them

OUTCOMES

- Identification of conflicts and barriers; and potential synergies
- Recommendations on how to address disincentives (short term and long term)

WHO TO INVOLVE

- Farmers
- National policy makers
- European policy makers
- Education
- Scientists



The European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) is one of five EIPs launched by the European Commission in a bid to promote rapid modernisation by stepping up innovation efforts.

The **EIP-AGRI** aims to catalyse the innovation process in the **agricultural and forestry sectors** by bringing **research and practice closer together** – in research and innovation projects as well as *through* the EIP-AGRI network.

EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI:

- ✓ the EU Research and Innovation framework, Horizon 2020,
- ✓ the EU Rural Development Policy.

An EIP AGRI Focus Group* is one of several different building blocks of the EIP-AGRI network, which is funded under the EU Rural Development policy. Working on a narrowly defined issue, Focus Groups temporarily bring together around 20 experts (such as farmers, advisers, researchers, up- and downstream businesses and NGOs) to map and develop solutions within their field.

The concrete objectives of a Focus Group are:

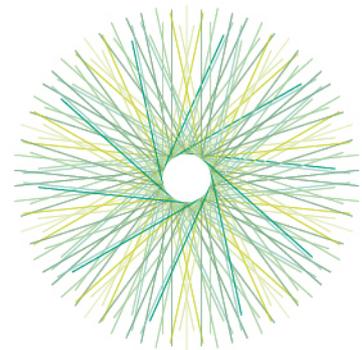
- ✓ to take stock of the state of art of practice and research in its field, listing problems and opportunities;
- ✓ to identify needs from practice and propose directions for further research;
- ✓ to propose priorities for innovative actions by suggesting potential projects for Operational Groups working under Rural Development or other project formats to test solutions and opportunities, including ways to disseminate the practical knowledge gathered.

Results are normally published in a report within 12-18 months of the launch of a given Focus Group.

Experts are selected based on an open call for interest. Each expert is appointed based on his or her personal knowledge and experience in the particular field and therefore does not represent an organisation or a Member State.

*More details on EIP-AGRI Focus Group aims and process are given in its charter on:

http://ec.europa.eu/agriculture/eip/focus-groups/charter_en.pdf



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