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EFFECTS OF THE RESTRICTIONS OF PRACTICES USED FOR THE MAINTENANCE OF PERMANENT GRASSLANDS

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From 2004-2015, the utilised agricultural area (UAA) in Estonia increased by 25%. Half of the UAA growth arose from the increase in the area of permanent grassland temporarily not used for production purposes. The main driver of growth in such land has been single area payment (SAP) paid in Estonia since the EU accession in 2004. While subsidising the maintenance of permanent grassland not used for agricultural production is in line with the objectives of the EU Common Agricultural Policy (CAP), it fuels discussions about the effects of this policy on agricultural producers.
For every year, member states establish practices equivalent to maintenance of permanent grassland. Until 2014, in Estonia, the minimum activity for the maintenance of permanent grassland under the SAP, was harvesting the grass or chopping it and leaving on the ground. In 2015 and 2016 options for chopping and leaving the grass on the ground were restricted with an aim to target SAP more towards active land users, i.e. agricultural producers.
Both agricultural producers and non-producers maintain permanent grassland not used for production purposes. Research on the practices used by different types of actors helps in understanding the variety of practices and potential effects of restrictions of these practices. The survey data was combined with the data from the registries of Estonian Agricultural Registers and Information Board (ARIB), to analyse the potential effects of restrictions of practices on agricultural producers and the area of permanent pasture in Estonia.
The results indicate that both agricultural producers and non-producers use grass harvesting and chopping practices. Therefore, restrictions that have effect on both groups of land users are not the most efficient way of targeting SAP towards agricultural producers, and potentially reduce the area of permanent grasslands. This result would be in conflict with the aims of the CAP.

Keywords: CAP, greening, permanent grassland, Estonia, passive land use

INTRODUCTION

Agricultural land use in Estonia decreased during the post-communist transition in the 1990-ies, and started to increase again after Estonia's accession to the EU in 2004 (Viira, 2014). The increase in land use after the EU accession was driven by the higher prices of agricultural products and increasing farm payments, especially SAP. From 2004-2015, the UAA increased by 201 186 hectares (25%), reaching 993 595 hectares in 2015 (Statistics Estonia, 2017). During this period, the area of permanent grassland temporarily not used for production purposes (but eligible for SAP) increased by 103 099 hectares (5.7 times) to 125 053 hectares. Thus, more than half (51%) of the increase in UAA raised from the increase of permanent grassland temporarily not used for production purposes but maintained in good agricultural and environmental conditions (GAEC) for the future. In 2015, such land comprised 13% of the UAA in Estonia.

The 2013 CAP Reform brought changes to direct payments' scheme with the intention to enhance sustainable, socially acceptable and economically viable agricultural systems (EU, 2011; Singh et al., 2014). Starting from 2015, the applicants of SAP are obliged to apply for greening payment that is accompanied with obligations for maintaining permanent grasslands, practicing crop diversification and establishing ecological focus areas.

Based on the Regulation (EU) No 1307/2013 of the European Parliament and of the Council (EU, 2013) and the Commission Delegated Regulation (EU) No 639/2014 (EU, 2014), member states establish agricultural activities equivalent to maintenance of permanent grassland in order to maintain agricultural land in GAEC. These activities do not necessarily result in production of agricultural produce.

Until 2014, in Estonia, the minimal maintenance practices on grassland were either harvesting the grass or chopping the grass and leaving the plant residues on the ground once during the growing season (RT I, 19.02.2014). The minimal maintenance practices were changed in 2015, followed by additional changes in 2016. Chopping the grass and leaving it on the ground was restricted to 15 percent of each applicant's UAA eligible for subsidies in 2016. (RT I, 22.04.2016; RT I, 28.04.2017).

The purpose of these regulations has been to preserve the agricultural land for future agricultural production. Estonia, among several other EU member states, has a high risk for land abandonment, due to low farm income levels, adaptive capacity of farms, ageing farmer population, low population density and other factors (Giannakis and Bruggeman 2015; Terres et al., 2015). The risk of land abandonment is apparent also from the large share of permanent grassland temporarily not used for production purposes. In 2016, in Estonia the share of permanent grassland at the national level decreased more than 5% compared to 2015. As a result of this change 1 722 applicants of SAP and greening payments needed to re-establish total 8 200 ha permanent grasslands in 2017. (Ministry of Rural ..., 2015, 2016; ARIB, 2016; Pärnpuu, 2017)

Although the payments for maintaining permanent grassland not used for production purposes are in line with the objectives of the CAP, discussion has risen over the influences of this policy on farmers. Subsidised passive land management by land owners, including real estate and forestry companies, may appear as a limiting factor for development of agricultural and/or bioenergy production in some regions. E.g., in Estonia the share of permanent grassland not used for production purposes is highest on two largest islands, Western coast, and North- and South-Eastern counties.

The restriction of leaving the chopped grass on the ground can be considered as an opportunity to address the land use to favoured direction. However, restrictions might result in diminished number of applicants for SAP and greening payment, thus also in decreased area of maintained permanent grassland. The share of permanent grassland to the UAA compared to the reference year must still be maintained at the national level. Also, the eligible minimal practises for the maintenance of permanent grassland are equal to all land users and natural conditions.

Therefore, the maintenance of permanent grassland is an issue of several dimensions – economic, environmental, land use policy and regional dimensions. In the current paper we aim to explore the effects of restrictions of practices used for the maintenance of permanent grasslands on the area of maintained permanent grassland in different farm types, and discuss the accompanying environmental aspects raised by applicants of SAP and greening payment.

RESEARCH METHODS

In the economic framework of this analysis, we assume that chopping the grass and leaving it on the ground is cheaper than harvesting the grass. Therefore, restrictions on permanent grassland maintenance practices increase the associated costs. In the case of constant SAP and greening payment the gross margin for maintaining permanent grasslands would decrease resulting in reduced relative profitability of permanent grassland maintenance compared to cultivation of field crops. Thus, on some fields and in the case of some farms, cultivation of field crops might become more profitable than maintenance of permanent grassland. This provides an incentive to convert the permanent grassland to arable land. Thereby increasing the likelihood that the absolute area of permanent grassland and the ratio of permanent grassland to UAA would decline below the set threshold both at the national and farm level. Also, selling and renting prices of permanent grassland may decrease. In the case of less valuable or poorly accessible plots of permanent grassland, the land owners or users may quit the annual maintenance activities and applying for the SAP and greening payment. This may reduce the area eligible for SAP and greening payment and slightly increase the payment rate (Viira et al., 2016).

From the environmental aspect, maintenance practices of agricultural land should be suitable for the particular land, taking into account natural conditions, including soil quality, water regime and biota in the area. A few studies (Liira et al., 2009; Riibak, 2011; Paal, 2014) in Estonia have investigated the influence of different management practices on biotic communities of semi-natural grasslands. Even if the effect on plant communities does not significantly differ between management types on natural grasslands (Liira et al., 2009), the prevalent view is that leaving the plant residues on the ground has negative effect on plant growth. Litter hinders the germination of seeds (Facelli et al., 1999; Rotundo and Aguiar, 2005; Hamre et al., 2010) and the smaller grass species' ability to grow. It increases the moisture level on the ground (Deutsch et al., 2010), thus increasing the risk of fungous diseases (Facelli et al., 1999). Therefore, the obligation to remove plant residues from the ground could be considered environmentally beneficial. An opposite argument is that if management stops because of restricted management practices and land is abandoned, the species richness and abundance of plants and insects (Liira et al., 2009; Noordijk et al., 2010; Maron & Jefferies, 2001) as well as the contribution of the area into ecosystem services (Holland et al., 2017) and N-retention (Maron & Jefferies, 2001) would decrease.

Data for this study was collected via web survey that was conducted in November 2016 among the applicants of SAP and greening payment in Estonia. According to the ARIB, the number of applicants was 15 571. The questionnaire, developed in the LimeSurvey environment, was sent to a sample of 5 611 applicants. The response rate was 30.2%, i.e. 1 692 questionnaires were returned with full or partial responses. In order to report the land use practices and the effects of restrictions of the practices on land use, multiple-choice questions were used. The respondents had an opportunity to respond on the associated environmental effects in an open text type of question. Based on the acquired data, a comparative analysis was conducted using MS Excel spreadsheet software.

Based on the registry data from ARIB, FADN farm typology (EU, 2008; 2009) and standard output coefficients provided by the Rural Economy Research Centre (2016), farm type was assigned to each respondent according to their 2015 data. In 2015, there were 18 986 beneficiaries of SAP and greening payment (Table 1). 32% of the beneficiaries were classified as those who did not grow agricultural crops and did not have any agricultural animals. Therefore, these

beneficiaries can be considered as land keepers, who maintain agricultural land and permanent grassland in a passive way. In average, they had 9.7 ha of land eligible for the SAP and greening payment, of which 93% was permanent grassland. In total, such beneficiaries maintained 19% of the permanent grassland under the SAP and greening payment scheme. Permanent grassland comprised significant proportion of agricultural land also in sheep and goat (74%), cattle rearing and fattening (65%) and mixed dairying and cattle farms (63%). Of the total permanent grassland, 21% was maintained in cattle rearing and fattening farms and 20% in dairy farms.

Table 1. Beneficiaries of SAP and greening payment in 2015 according to farm types and aggregated farm type groups used in the analysis

Code	Explanation	Number of beneficiaries	Average area under SAP, ha	Share in area under SAP, %	Average share of permanent grassland, %	Share of total permanent grassland, %
15	15 Specialist cereals, oilseeds and protein crops.	2 399	145.6	35.6	6.3	7.7
Other 1	1 Specialist field crops except 15: 161 Specialist root crops; 162 Cereals, oilseeds, protein crops and root crops combined; 163 Specialist field vegetables; 166 Various field crops combined.	1 289	23.0	3.0	15.1	1.6
2,3,6,9	2 Specialist horticulture; 3 Specialist permanent crops; 6 Mixed cropping; 9 Non-classified holdings.	395	12.7	0.5	23.0	0.4
45	45 Specialist dairying.	1 273	167.8	21.8	26.7	19.8
46	46 Specialist cattle – rearing and fattening.	1 237	75.5	9.5	65.2	21.1
47	47 Cattle – dairying, rearing and fattening combined.	593	58.1	3.5	62.5	7.5
48	48 Sheep, goats and other grazing livestock.	1 841	15.7	2.9	74.2	7.4
5,7,8	5 Specialist granivores; 7 Mixed livestock holdings; 8 Mixed crops – livestock.	3 929	42.6	17.1	26.8	15.6
Land keepers	SAP and greening payment beneficiaries, who did not grow arable crops, permanent crops, fallow, and who did not have agricultural animals.	6 030	9.7	6.0	92.7	18.8
Total		18 986	51.6	100.0	29.4	100.0

RESEARCH RESULTS

The effect of restrictions of practices used for the maintenance of permanent grasslands in different farm types depends on the current common practices among these farm types. According to the results of the survey (Figure 1), the main practices used by crop producers (farm types other 1, 15, 2, 3, 6, 9) to meet the minimum requirements were cultivation of agricultural crops, chopping the grass and leaving it on the ground, and harvesting the grass. The main practices used by animal producers (farm types 45, 46, 47, 48) and mixed farms (farm types 5, 7, 8) were grazing, harvesting the grass and cultivation of agricultural crops. Just 4-7% of farms in these farm types chopped the grass and left it on the ground. Land keepers mainly harvested the grass (41%) or chopped and left it on the ground (28%). 13% of land keepers gathered up the chopped grass. In case of 13% of land keepers, agricultural land was maintained by grazing agricultural animals owned by another farmer. Therefore, restrictions on chopping the grass and leaving on the ground affected the most land keepers and crop producers who do not have agricultural animals. As appears from table 1, the SAP and greening payment applicants in these farm types maintained a notable 29% of permanent grassland in 2015.

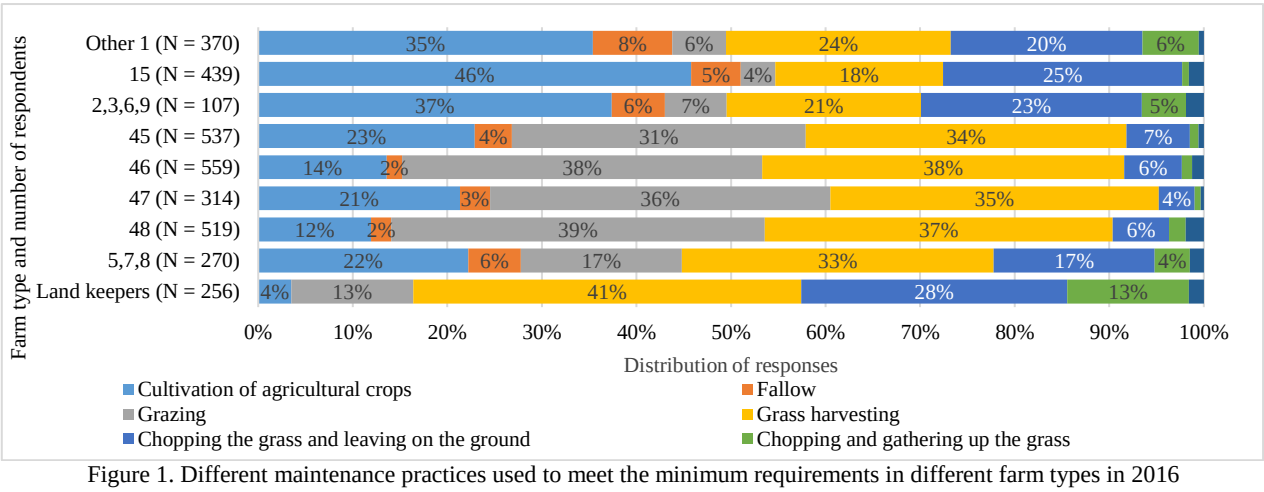

Figure 1. Different maintenance practices used to meet the minimum requirements in different farm types in 2016

One of the aims of restricting the practices used for the maintenance of permanent grasslands was to direct more agricultural land from passive to active use. The survey results indicate that most of the SAP and greening payment applicants did not change their land use in 2016 (Figure 2). Among crop producers (farm types 15 and Other 1) and mixed farms (types 5, 7, 8) there were more SAP and greening payment applicants who reduced the area of grassland and increased the area of agricultural crops. Up to 10% of applicants in each farm type (12% in the case of land keepers) noted that they reduced the area of maintained agricultural land and reduced the area under the SAP and greening payment. Among the crop producers (farm type 15) and animal producers (types 45, 46, 47 and 48) there were more applicants who bought or rented additional agricultural land, because there were more offers on the land market. Therefore, while restrictions of practices used for the maintenance of permanent grassland somewhat improve the land use extension possibilities for cattle farmers, the other effect is that some of the grassland is converted to cropland and some neglected.

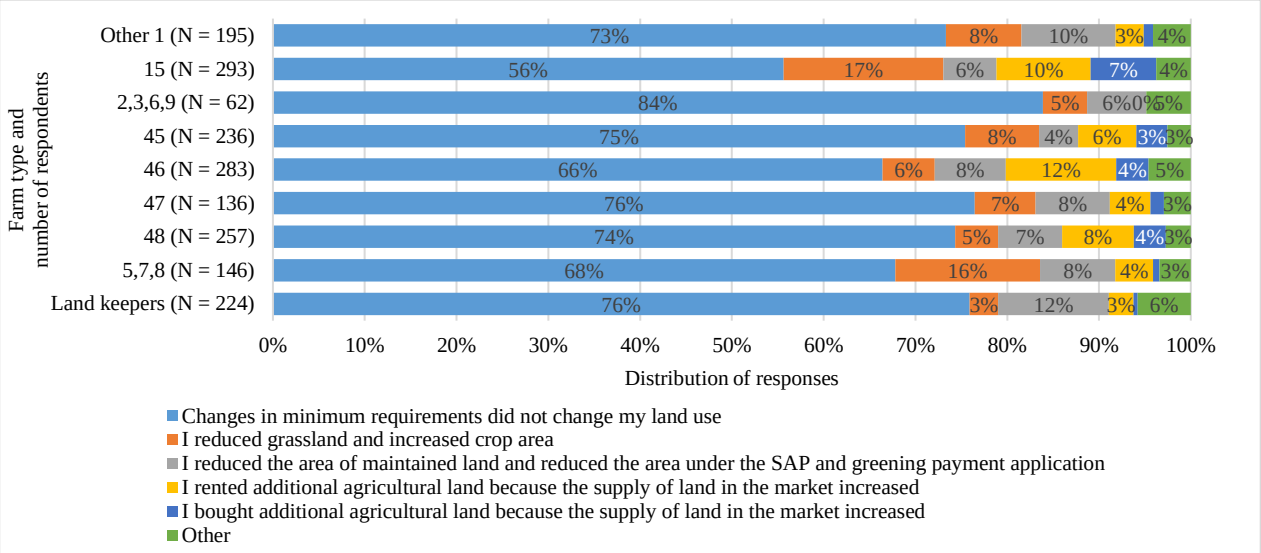

Figure 2. Effects of restricted minimum maintenance requirements on the land use in different farm types in 2015

The main obstacles to meet the requirements of either grass harvesting or gathering up the chopped grass, were the absence of the appropriate machinery and equipment, and lack of economic rationale for doing so. These were the main problems for the crop producers (farm types other 1, 15, 2, 3, 6, 9), mixed farms (farm types 5, 7, 8) and land keepers. In the case of animal producers (farm types 45, 46, 47, 48) the absence of appropriate machinery or lack of economic rationale was not a major problem. This indicates that the crop producers and land keepers have opted for the cheapest land maintenance practice, i.e. grass chopping. As the farms in these farm types usually do not have agricultural animals, they do not have incentives for forage production (grass harvesting or gathering up the chopped grass).

At the time of conducting the survey, one of the options for the future was prohibition of leaving the chopped grass on the ground. Therefore, the respondents were asked about the potential effects of this additional restriction on their future land use. About 40-60% of the crop producers (farm types other 1, 15, 2, 3, 6, 9), mixed farms (types 5, 7, 8) and land keepers indicated that probably they will reduce their agricultural land and give up maintenance of some grasslands or rented land (Figure 3). However, 10-20% of the respondents from these farm types indicated that they will increase their agricultural land via renting or purchasing additional land. 12-14% of the crop producers (farm types Other 1 and 15), would increase the share of agricultural crops in their total land use.

Almost 40% of the animal producers (farm types 45, 46, 47, 48) indicated that if leaving the chopped grass on the ground is forbidden, they would either buy or rent additional agricultural land. At the same time, 20-30% of the animal producers indicated that they would reduce their agricultural land use because they would quit maintenance of some grasslands and give up some of the rented land. About one third of the animal producers would not change their land use after the additional restrictions on leaving the chopped grass on the ground. Therefore, further restrictions on leaving the chopped grass on the ground would probably result in reduced area of permanent grassland in crop producing farm types and expansion of agricultural land in farm types specialised on animal production.

Open answers about the environmental effects of maintenance of permanent grassland (i.e. agricultural landscapes) resulted in several different opinions. The arguments differed depending on the natural conditions in the respondent's region. In the regions with high soil fertility, farmers were against passive land use in the form of minimal land maintenance. Respondents in poor natural condition regions emphasised the need for preserving the agricultural landscape. Most frequently expressed opinions are presented in Table 2. Abundance of respondents judged the abandonment of land maintenance to have the largest negative effect on environment. Following environmental benefits from land maintenance were pointed out: 1) grasslands, alvars, flood meadows, coastal meadows and wooded meadows are preserved; 2) natural plant cover provides habitats, food and shelter for animals and birds; 3) maintenance of grasslands prevents from the invasion of woody shrubs and trees; from spreading weeds; also decreases the risk of landscape fires.

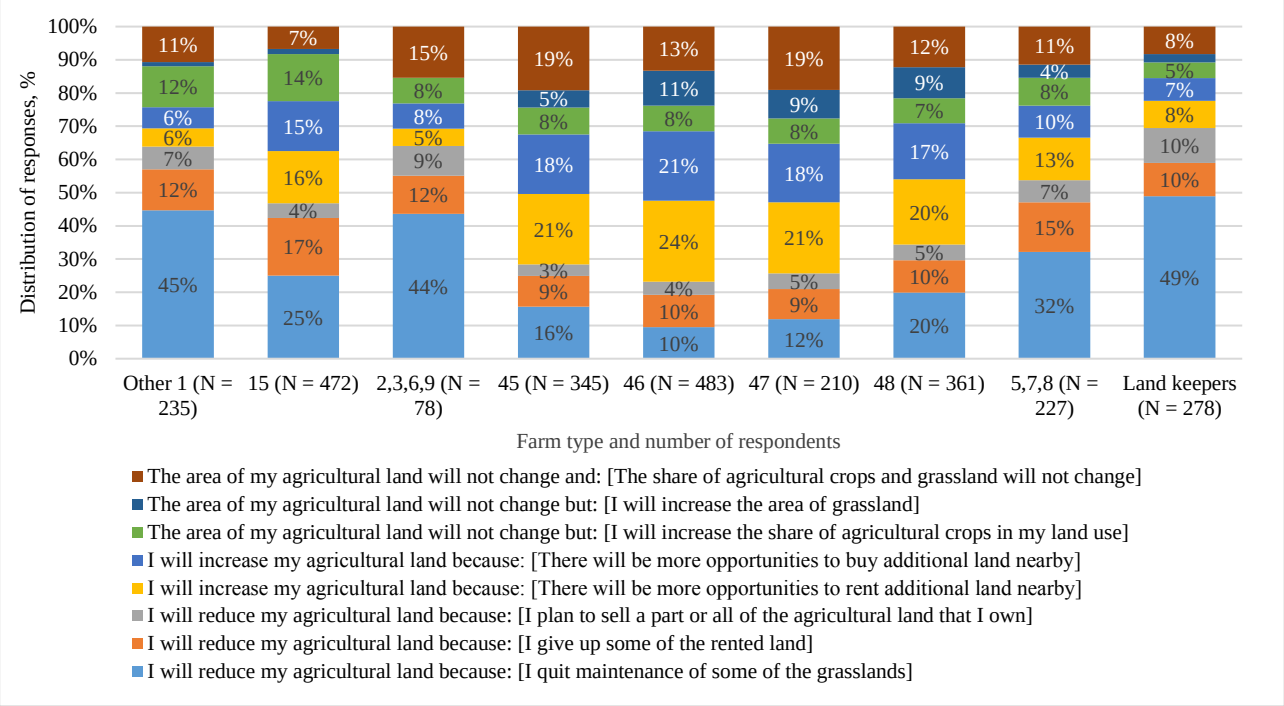

Figure 3. Potential effects of future prohibition of leaving the chopped grass on the ground

Table 2. Most frequent answers from the SAP and greening payment applicants about the environmental impacts of maintenance practices on grassland

Maintenance practice	Positive impacts	Negative impacts
Grass harvested	Prevented invasion of woody shrubs and trees; preserved grasslands and natural environment; diversified natural environment; maintained and increased biodiversity.	Destroyed or worsened living conditions for birds and small animals; decreased nutrient stock in soil through grass harvesting; thinner humus layer; deteriorated soil fertility.
Grass chopped and left on the ground	Prevented invasion of woody shrubs and trees; nutrients are kept on [poor soil] grasslands; increased soil fertility; humus layer built thicker.	Hindered biodiversity; destroyed or worsened living conditions for birds, small animals, insects; chopped grass left on ground yearly increases excessively the (rich soils) humus balance; increased prevalence of plant diseases; decreased plant species richness and density.
Grass chopped and gathered up	Prevented invasion of woody shrubs and trees.	Decreased nutrient stock in soil; deteriorated soil fertility; diminished humus layer; destroyed or worsened living conditions for birds and small animals; environmental hazard when left to rot by the field or under the forest.

The prevalent opinion about harvesting the grass (either cut or chopped) was that this practise has no negative effect on the environment only when the biomass is properly used. When the collected grass is not used, it harms the environment in many ways: 1) work operations incorporate fuel consumption and emission of pollutants; 2) the grass put together with cord, net or plastic remains stored by the fields or under the forest for many years, hence polluting the environment.

CONCLUSIONS AND DISCUSSION

EU accession and adoption of the CAP brought about changes in agricultural land use in Estonia. From 2004-2015, the area of permanent grassland temporarily not used for production purposes (but eligible for subsidies) increased by 5.7 times and comprised 13% of UAA in 2015. While maintenance of permanent grasslands is one of the objectives of the CAP and its greening measures, it has given ground to passive use of agricultural land in Estonia. Until 2014, the minimum requirements for maintaining agricultural land in GAEC were grass harvesting or chopping and leaving the grass on the ground. Since 2015, the leaving the chopped grass on the ground was restricted with an aim to direct more agricultural land into active use, and limit the SAP and greening payments paid to land keepers for passive land use. The opinion frequently expressed by active farmers in Estonia, that agricultural land is a valuable resource and should be used for production purposes, is consistent with results from other countries, where farmers find the simple maintenance of land less meaningful for themselves (Kvakkestad et al., 2015),

The results of the survey indicate that in addition to land keepers, chopping and leaving the grass on the ground is a common land maintenance practice also in case of crop producers and to a lesser degree in case of animal producers.

Therefore, restrictions of practices used for the maintenance of permanent grassland affect also active farmers and cannot be considered as fully efficient in directing the agricultural land into more active use.

In 2015 and 2016, many crop producers and mixed farms reduced their grassland area and increased the area under agricultural crops. In addition, some crop and animal producers reduced their agricultural area. The fact that Estonia did not manage to meet the obligation of maintaining the proportion of permanent grassland in 2016, resulted in 1722 beneficiaries of SAP and greening payments who had to restore 8200 ha of permanent grassland in 2017. This indicates that restrictions of the practices used to meet minimum requirements for the maintenance of agricultural land, had negative effects on the preservation of permanent grasslands and increased the abandonment of agricultural land.

However, farmers specialised in animal production indicated that after the restrictions came into force, they have more opportunities for renting or buying additional agricultural land for farm expansion. As Estonia is a net exporter of live cattle and dairy products, most of the increasing animal production would probably be exported. Therefore, additional efforts are needed to strengthen functioning of the respective supply chains.

While harvesting the grass, as opposed to chopping and leaving it on the ground is considered environmentally more beneficial, both practices have their pros and cons. In addition, in some wet plots, only lighter chopping machinery and equipment can be used. Therefore, there is no clear environmental justification for one or the other practice. However, it is clear that quitting the maintenance and abandoning the permanent grassland can, from the environmental point of view, be regarded as a negative outcome.

If the permanent grassland is aimed to be maintained, the respective payments should be competitive with gross margins from crop production in the respective regions. Alternatively, promotion of cattle production increases the agricultural output from the permanent grasslands and ensures their maintenance.

Maintenance of permanent grasslands within the framework of SAP and greening payments is a complex issue where economic, environmental, regional and land use policy aspects need to be considered and balanced. The future analyses on this issue should include perspectives of land use and climate policies.

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