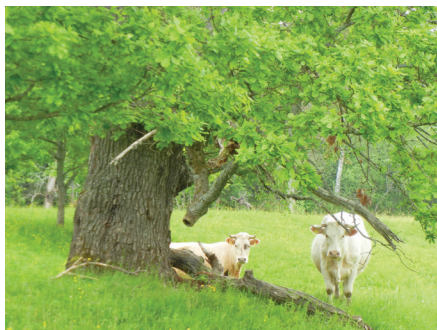


REPORT 2013/12

EVALUATION

of economics and nutrient runoff from farms
with beef production based on actual farms in
Sweden, Estonia and Latvia

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SUMMARY

A study of the farm economy and nutrient runoff connected to the farms production has been made on 6 beef farms of different sizes, 2 in Sweden, 2 in Estonia and 2 in Latvia. The farms beef production are all based on grazing of semi-natural grasslands during the summer months and the cattle are fed indoors in winter with grass-based hay and silage. A comparison has been made of the farm economy and the nutrient reduction from a beef farm where cattle are raised indoors in stalls.

If there are semi-natural grasslands that are possible to graze a beef production based on management of these grasslands give the farm a better economy and reduces nutrient runoff to the Baltic Sea, compared to raising cattle in stalls. EU's subsidies are a large part of the farms incomes and it is therefore important that the subsidies are formed and used in the best way to create the right incentives for farmers.

When using a grazing based beef production system, instead of raising cattle in stalls, the nutrient runoff to the Baltic Sea is reduced both by the use of less fodder, the kind of fodder that the cattle eat and due to the reduction of produced manure.

BACKGROUND

The agricultural sector contributes with more than 50% of the nutrient runoff to the Baltic Sea. The agricultural production around the Baltic Sea, especially in Sweden and Finland, has been intensified during the past hundred years, the Baltic countries and Poland are not far behind. Grazing cattle have been moved into stalls and the production of fodder takes place on fertilised and ploughed arable fields. To improve the status of the Baltic Sea the use of fertilizers has to be reduced, ploughing needs to be reduced and nutrients caught and recycled into the production system.

Beef is consumed by millions of people around the Baltic Sea. In Sweden about half of the beef is imported. This means that about 450 000 beef cattle (2010) are slaughtered per year in Sweden, of these cattle nearly 70% have been raised in stalls during their whole life span and given fodder with at least 60% grains from ploughed fields. The situation is not the same in Estonia and Latvia yet, where most of the beef production is still based on grazing, but the beef production is growing and there is a big risk that the situation will become similar even there. The grain comes from fertilized ploughed fields that cause a large runoff of nutrients such as nitrogen (N) and phosphorus (P).

Beef production based on grazing semi-natural grasslands and the use of grass (hay and silage) as winter fodder leads to a lot less nutrient run-off. Semi-natural grasslands are not fertilized or ploughed and the grass lays are at the most ploughed every four years. A lot less manure is also produced as the manure in the natural pastures is naturally recycled back to the pasture while the cattle are grazing during the summer months. It is important though, that the grazing cattle are kept indoors during the winter so that the manure that is produced when the cattle are fed during the winter is taken care of properly instead of leaching out into waterways. By housing the cattle indoors in stalls with functioning manure handling systems the manure can be collected and used to fertilize the grass lays. When manure is applied on grass lays the uptake of nutrients will be very fast and sufficient compared to applying it before ploughing.

Around the Baltic Sea there are large areas of semi-natural grasslands that are abandoned and could be used for grazing. By using these enormous resources of unfertilized semi-natural grasslands for an alternative production of meat nutrient runoff

to the Baltic Sea can be reduced while biodiversity is increased and an open, attractive landscape created. Beef produced on grasslands is also economical for the farmer when grasslands are used in the right way.

The SNOWBAL project has evaluated the farm economy of 6 real farms with a production of beef based on grazing of grasslands. A calculation has also been made of how much N and P is saved by using this production form. The farms are situated in Sweden, Estonia and Latvia.

METHOD

In total 6 beef farms of different sizes have been studied, 2 in Sweden, 2 in Estonia and 2 in Latvia. The farms beef production are all based on grazing of semi-natural grasslands during the summer months and the cattle are fed indoors in winter with grass-based hay and silage.

EVALUATION OF ECONOMICS

The evaluation of the farms economics is based on the actual numbers in the book keeping of 2011 and 2012. In some cases large areas of semi-natural grasslands have just been restored and have not yet been incorporated in EU's agri-environmental subsidies. In these cases a calculation has been made of what sum the farm will receive for these newly restored areas based on the guidelines and rates of subsidies 2012. The cattle that are raised on the beef farms are in most cases beef cattle, on one farm bulls from dairy breeds are raised. The cattle are assumed to be kept indoors 7 months per year. The cattle on the comparative conventional farm are assumed to be bulls from dairy cows. These bulls are assumed to be kept indoors 12 months of the year.

The income has been calculated on:

- subsidies from single area payments on arable fields (grass lays) and semi-natural grasslands
- agri-environmental payments for semi-natural grasslands
- other subsidies connected to the fields and grasslands and the cattle grazing these, such as subsidies for organic farming and subsidies for less favoured areas for some farms

The costs have been calculated on:

- buying fodder, services (veterinary, spreading manure etc.), expenses for production (fencing, gates etc.), fuel, electricity, insurances (buildings, machines, cattle, workers), bookkeeping, rental of land, other costs (consumption materials)
- buying in cattle where applicable

Costs for working hours and costs for winter housing has not been used in the calculations as these costs differ largely between farms and over time. Costs for purchasing or leasing machines are not included.

EVALUATION OF NUTRIENT RUNOFF CONNECTED TO FODDER

A calculation of how much the nutrient runoff is reduced by using a grazing based beef production model compared to raising the same number of cattle per year in stalls has been done. The calculations are based only on the production of fodder for the two different production models. Calculations are based on numbers from Sweden on what the cattle are fed and slaughter age. The numbers presented are the amounts of N and P that actually end up in waterways.

Assumptions used in the calculations for actual farms:

- 30 months old when slaughtered
- winter fodder is 100% hay and/or grass silage
- grass lays are ploughed every 4 years
- cattle graze semi-natural grasslands 5 months per year

Assumptions used in the calculations for comparative farm with bulls raised in stalls:

- 16 months when slaughtered
- fed with 60% grains and 40% grass silage
- no grazing

Runoff from fodder calculated from:

- Runoff of N and P from Swedish arable land when ploughing. Normal runoff from 22 regions in Sweden with varying climates, productions, fertilisation levels and production levels. Estimated nitrogen-leaching losses represent root-zone leaching, i.e. nitrogen that has passed through the root zone and is no longer available for plant uptake. Root-zone leaching may be regarded as the gross load entering surface water and ground water from agricultural land, before retention. For phosphorus, estimated leaching losses include both root-zone leaching and losses through surface runoff.¹
- Field run-off from barley and oat production
- Run-off from grass lays ploughed every 4 years

EVALUATION OF ECONOMICS AND NUTRIENT RUNOFF ON MODEL FARMS

EVALUATION OF SWEDISH FARM 1

The farms production form is raising suckling cows of lighter beef breeds, mainly Hereford and crossbreeds of these. Most of the yearlings are sold for further rearing. The farm is organic. The cow house is built with resting cubicles and a barn scraping system with no need for straw. Grass for winter fodder is produced on the arable land. 154 ha of semi-natural grasslands are grazed of which 92 ha are forest pastures.

The income from grazing semi-natural grasslands is a large part of the total income, 80%. The sale of meat is only a small part of the farms economy with about 20% of the income. This means that the farm is totally dependent on different forms of agri-environmental subsidies that are paid out each year. The subsidies for grazing semi-natural grasslands are 53% of the total subsidies and organic farming make up 13 % of the subsidies on the farm. The farms income is totally based on grazing semi-natural grasslands.

Farm facts

Cattle, number 71

- 27 suckling cows
- 22 young cattle
- 22 yearlings

Arable land with grass lays, ha 52
Arable land with grain, ha -
Pastures, ha 139

Year 2013	Farm 1 SE with grazing cattle	Farm with cattle raised in stall	Difference
No. Cattle on farm	71		
Grazed semi natural grasslands (ha)	154	0	
No. Cattle sold	16	16	
% subsidies of income	80		
% sale of cattle of income	20		
Total income/cattle/year (EUR)	843	642	
N run-off from fodder (kg)	20,6	130,5	109,9
P run-off from fodder (kg)	0,91	4,4	3,49

Fig 1. Actual Swedish farm 1 compared to the same number of cattle being raised indoors on a conventional farm and fed with about 60% grains.

¹Johansson et al.

Farm facts

Cattle, numer 230

- 150 suckling cows
- 80 yearlings

Arable land with grass lays, ha 110

Arable land with grain, ha -

Pastures, ha 253

EVALUATION OF SWEDISH FARM 2

The farmer is a modern farmer that works as a grazing entrepreneur who lets his cattle graze valuable semi-natural grasslands all over the County. The farms production is based on buying in calves from a dairy farm that are used to graze semi-natural grasslands while reared for slaughter. The farm is organic. The cattle buildings are simple with deep straw bedding. Straw for deep straw bedding is bought in from neighbouring farms. 253 ha of grasslands are grazed of which a smaller part is forest pasture. Grass for winter fodder is produced on the arable land. A large part of the income comes from subsidies, 73%. The subsidies for grazing semi-natural grasslands are 55% of the total subsidies, organic farming make up 10% of the subsidies. The beef production is based on buying in calves, therefore this cost is a lot larger than it would be on a farm where the cattle herd is self-recruiting.

Year 2013	Farm 2 SE with grazing cattle	Farm with cattle raised in stall	Difference
No. Cattle on farm	230		
Grazed semi natural grasslands (ha)	214	0	
No. Cattle sold	80	80	
% subsidies of income	63		
% sale of cattle of income	33		
Total income/cattle/year (EUR)	795	642	
N run-off from fodder (kg)	103	652,4	549,4
P run-off from fodder (kg)	4,5	22,1	17,6

Fig 2. Actual Swedish farm 2 compared to the same number of cattle being raised indoors on a conventional farm and fed with about 60% grains.

Farm facts

Cattle, numer 330

- 130 suckling cows
- 85 young cattle
- 115 yearlings

Arable land with grass lays, ha 275

Arable land with grain, ha -

Pastures, ha 300

EVALUATION OF ESTONIAN FARM 1

The farms production model is based on cattle grazing coastal meadows. Young bulls are sold for slaughter and heifers are kept to increase and improve the heard. The farm has various mixed breeds, but Aberdeen Angus and Simmental are most common. On the farm there is about 330 cattle including 130 suckling cows. The farm is organic.

During the winter the cattle are housed in a closed state pig farm and have partly converted it into a modern cow house with deep straw bedding. The farm has no straw so some straw is purchased and some of the hay is used for deep straw bedding. The cattle graze 300 ha of which 250 ha are coastal meadows.

Year 2013	Farm 1 EE with grazing cattle	Farm with cattle raised in stall	Difference
No. Cattle on farm	330		
Grazed semi natural grasslands (ha)	300	0	
No. Cattle sold	71	71	
% subsidies of income	67		
% sale of cattle of income	33		
Total income/cattle/year (EUR)	342		
N run-off from fodder (kg)	91,4	579	487,6
P run-off from fodder (kg)	4	19,6	15,6
N run-off from no manure handling	7800		
P run-off from no manure handling	2600		

Fig 3. Actual Estonian farm 1 compared to the same number of cattle being raised indoors on a conventional farm and fed with about 60% grains.

Incomes on the farm are totally related to grazing of semi-natural coastal areas. Subsidies make up 67% of the incomes connected to the cattle. Sale of cattle contributes to the rest of the income. Still, 2/3 of the subsidies comes from single area payment and support for organic production.

EVALUATION OF ESTONIAN FARM 2

The farms production model is based on cattle grazing coastal meadows. Young bulls are sold for slaughter and heifers are kept to increase the heard. The heard is based on Aberdeen Angus. The farm has 79 suckling cows but the goal is to reach up to 100 suckling cows in a few years. The cattle graze 177 ha of semi-natural grasslands. Winter fodder and hay for bedding is produced on 253 ha of grass leys. The farm is organic. The farm is completely dependent on grazing semi-natural grassland. Almost all incomes come from subsidies of various kinds connected to grazing these.

Farm facts

Cattle, numer 227

- 79 suckling cows
- 83 young cattle
- 62 yearlings
- 3 bulls

Arable land with grass lays, ha	253
Arable land with grain, ha	-
Pastures, ha	212

Year 2013	Farm 2 EE with grazing cattle	Farm with cattle raised in stall	Difference
No. Cattle on farm	79		
Grazed semi natural grasslands (ha)	177	0	
No. Cattle sold	11	20	
% subsidies of income	93		
% sale of cattle of income	7		
Total income/cattle/year (EUR)	489		
N run-off from fodder (kg)	14,2	89,7	75,5
P run-off from fodder (kg)	0,6	3	2,4

Fig 4. Actual Estonian farm 2 compared to the same number of cattle being raised indoors on a conventional farm and fed with about 60% grains.

EVALUATION OF LATVIAN FARM 1

The farms production model is based on grazing semi-natural grasslands. Young cattle are sold in the autumn for slaughter. Cows and yearlings are kept over the winter. The heard is a mix of breeds with some Abredeen Angus. The herd has 29 suckling cows.

44 ha of semi-natural grassland are grazed of which 40 ha are forest pastures. The semi natural pastures are located in areas which are flooded every spring and are not suitable for crop production. The total area of grass leys is 120 ha. The grass lays are located further from the farm on land that does not get flooded.

Farm facts

Cattle, numer 59

- 29 suckling cows
- 6 young cattle
- 11 yearlings
- 2 bulls

Arable land with grass lays, ha	120
Arable land with grain, ha	-
Pastures, ha	84

Year 2013	Farm 1 LV with grazing cattle	Farm with cattle raised in stall	Difference
No. Cattle on farm	59		
Grazed semi natural grasslands (ha)	44	0	
No. Cattle sold	27	27	
% subsidies of income	73		
% sale of cattle of income	27		
Total income/cattle/year (EUR)	593		
N run-off from fodder (kg)	34,8	220,2	185,4
P run-off from fodder (kg)	1,5	7,5	6
N run-off from no manure handling	368		

Fig 5. Actual Latvian farm 1 compared to the same number of cattle being raised indoors on a conventional farm and fed with about 60% grains.

The Single area payment make up 28% of the subsidies, organic farming 31 %, Maintaining of Biodiversity in Grassland and Natura 2000 payments 22%, Areas with handicaps 14% and Direct payments 4%. Incomes from organic farming and land use linked to biodiversity are more than half of the subsidies. Income from sold animals is 29% of the income of the beef production. The mayor part of the incomes comes from subsidies.

Farm facts

Cattle, number 119

- 61 suckling cows
- 0 young cattle
- 55 yearlings
- 3 bulls

Arable land with grass lays, ha	158
Arable land with grain, ha	-
Pastures, ha	87

EVALUATION OF LATVIAN FARM 2

The farms production model is to rear pedigree Charolais cattle and sell young pure breed heifers to other farms. 61 suckling cows graze semi-natural grasslands.

The farm is dependent on semi natural grasslands for their living. All incomes come from subsidies of various kinds are linked to these. The cattle buildings are simple buildings with deep straw bedding. Income from the sale of the pedigree animals is relatively high, 53% of the total income. The incomes from subsidies are 47%.

Year 2013	Farm 2 LV with grazing cattle	Farm with cattle raised in stall	Difference
No. Cattle on farm	61		
Grazed semi natural grasslands (ha)	87	0	
No. Cattle sold	62	62	
% subsidies of income	47		
% sale of cattle of income	53		
Total income/cattle/year (EUR)	826		
N run-off from fodder (kg)	79,8	505,6	425,8
P run-off from fodder (kg)	3,5	17,1	13,6

Fig 6. Actual Latvian farm 2 compared to the same number of cattle being raised indoors on a conventional farm and fed with about 60% grains.

CONCLUSIONS

If there are semi-natural grasslands that are possible to graze these give the farm a better economy and reduces nutrient runoff to the Baltic Sea, compared to raising cattle in stalls. EU's subsidies are a large part of the incomes. On the studied farms 70-90% of the farms income connected to beef production came from subsidies. In Sweden the agi-environmental subsidies connected to managing semi-natural grasslands are a large part of the subsidies, 50-70%. In Estonia and Latvia the subsidies for semi-natural grasslands are less, here the studied farms had at the most 30% of the subsidies coming from the grazing semi-natural grasslands.

The income from grazing is an important part of the farms economy and should be optimized. The farm examples are based on cattle that are 30 months at slaughter. This means that the cattle graze two summer seasons compared to cattle that are 24 months at slaughter which only graze one summer.

The income per animal and year is lower in Estonia than in Latvia. The expenditures for costs on the farms in relation to the income from sales of the animals are larger in Estonia than in Latvia. Possibly the two farms studied in Latvia have good sales channels and have managed to sell their cattle to a good price despite the sales market to Turkey collapsing. One of the Latvian farms sells pedigree cattle which give a good income per cattle.

Nutrient runoff to the Baltic Sea is reduced both by less fodder, the kind of fodder that the cattle eat and the reduction of produced manure. The reduction of runoff of N from fodder production is reduced about 6,5 times and of P about 5 times when winter fodder is reduced and grass based instead of grain based². When the cattle are kept in stalls 7 months per year instead of 12 months leads to a reduction of more than 40% less manure per cattle.

POTENTIAL FOR THE BALTIC SEA

In Sweden 100 000 hectares of semi-natural grasslands are managed by grazing today. It is estimated that there is at least another 270 000 ha of semi natural grasslands in need of management, in total more than 370 000 hectares.

In Estonia 26 500 hectares of semi-natural grasslands in Natura sites are managed today. There is at least 60 000 ha of semi-natural grasslands in protected areas that need management. There are also unmanaged areas outside of protected areas. In total it is estimated that there is at least a total of 100 000 ha of semi-natural grasslands in need of management.

In Latvia 31 300 ha of semi natural grasslands are managed by RDP today. It is estimated that there is at least another 100 000 ha of semi-natural grasslands in need of management, in total more than 150 000 ha.

It is estimated that there are 3,5 million hectares of semi-natural grasslands that could be grazed around the Baltic Sea. If these grasslands were used for grazing instead of beef being produced indoors in stalls, where cattle are fed a lot of grains, the net runoff to the Baltic Sea can be reduced with 30 000 ton N/year and 1300 ton P/year, which is 28% and 10% of BSAPs reduction requirements³.

DISCUSSION

Production of meat from unfertilised semi-natural grasslands reduces the use of fertilisers and the amount of manure compared to conventional meat production that is dependent on large amounts of cultivated grains. When cattle graze unfertilised semi-natural grasslands during 5 months of the year and the cattle are fed, during the winter, with locally produced hay and/or silage. This means no use of grains.

The farms that have been studied all graze in marginal areas where animal production always has been important part of the farm production, earlier mainly milking farms. The semi-natural grasslands cannot be ploughed and crops not be sown, instead these grasslands are grazed by cattle.

FODDER

The largest nutrient runoff from arable fields occurs when the fields are ploughed. Arable fields where grass is grown for winter fodder are usually not ploughed more than every four years, or even less often. This gives a large reduction of nutrient runoff compared to fields with grains that are ploughed yearly.

Farmers have started to show an interest in lengthening the period of time between ploughing the grass leys. With more suited plant species and by sowing seed directly into the grass ley without ploughing it is possible to lengthen the life span of the grass ley and drastically reduce the runoff of nutrients from the leys. The farmer's work and fuel use is also reduced with less ploughing.

² Calculations based on numbers from www.greppa.nu

³ Helcom 2007

MANURE

The grazing cattle also reduce the amounts of manure drastically. If the cattle graze 5 months of the year the amount of manure is reduced with more than 40%. When the cattle graze during the summer months, without getting extra feed, a natural balance is created between the grazing of grass and the manure that is spread by the cattle. The grassland will take up the manure naturally and no nutrient leaching from the manure will occur.

The cattle do need to be kept indoors during the winter when there is no growth in the grassland and the cattle are fed with fodder. The manure needs to be collected and stored during the winter season so it does not leach into waterways in spring when the snow melts and there is flooding. If the cattle are kept out doors in winter the pastures will also get trampled leading to more runoff.

Manure from cattle, which is produced during the winter and collected in manure handling systems, also has a large economic value and reduces use of fertilisers. When the manure is taken care of it can be used in the farms production or sold to neighbouring farms instead of the manure being washed away into waterways in the spring.

To be able to collect the manure in an effective way the farms need good manure handling systems and stalls where the cattle eat and the manure is collected. Smaller farms in marginal areas do not themselves have the economic capacity to create a big enough surplus so that they can bare the costs of investing in modern stalls and manure handling systems. Economical support for stalls and manure handling systems is therefore very important.

BIODIVERSITY

Another environmental benefit of producing beef on grasslands is the maintenance of high biodiversity on semi-natural grasslands. Semi-natural habitats are among the most threatened in Europe as a lot of grasslands are growing over. Intensified agricultural production, which started during the post war period, has moved a lot of cattle away from semi-natural grasslands indoors or on to arable land,

EU SUBSIDIES

In Sweden one has chosen to put a large part of the subsidies on agri-environmental measures for biodiversity in semi-natural grasslands. On the studied Swedish farms the income from subsidies for biodiversity vary but make up somewhere between 50-70% of the subsidies. This is an important measure as it gives the farmer an economic incentive to let the cattle graze semi-natural grasslands instead of arable fields. The results from the farms studied in this analysis and other analyses⁴ shows that there is a good economy for the farmer if there are semi-natural grasslands to graze for which there are higher subsidies.

In Estonia and Latvia one has instead chosen to support agriculture via single area payments and organic farming which is a large part on the income from subsidies on the farms. Subsidies for biodiversity and Natura 2000 areas only make up 22-35 % of the subsidies. This is still an important incentive and an income connected to the cattle on the farms, often more than the sale of meat.

A threat to the production of beef on semi-natural grasslands is the insecurity of how EU's subsidies will be in the future. Without enough subsidies for semi-natural grasslands, combined with a worry concerning the changing rules of the subsidies a lot of farmers will abandon their and own and/or rented semi-natural grasslands and instead invest in simpler production models.

⁴Hessle et al. 2009

MARKET

It is important to have more than one market for the sale of meat. An example is the sale of cattle from Estonia and Latvia to the Turkish market where the prices were high giving good profit. But the market has abruptly been closed during the last two years for the Baltic countries. Those who had parallel markets could take up these. On the studied farms in Estonia and Latvia this has affected the income from sales of meat on the farms.

It is also possible to improve the farms economy by selling beef to local concepts or concepts of beef from semi-natural grasslands. These concepts can sell the beef for a better price when labelled and certified giving the farmer some more income per kg sold meat.

COSTS FOR WORK, BUILDINGS AND MACHINES

The work cost of the daily work with handling the cattle has not been included in the calculations as the actual working cost and hours are difficult to calculate on the actual farms. The farms with grazing cattle that grow slower have a higher work cost per animal per year. If the working cost is high the profit of the farms based on grazing go down compared to the bulls raised in stalls. It is important to take this into consideration so that the working hours are reduced per animal by for example building rational cattle buildings and planning pastures and divisions of pastures in such a way that the daily working hours with the cattle is low. Less ploughing of grass leys also reduces work.

In the calculations the cost for cattle buildings and machinery have not been included. The costs for buildings and machines vary a lot between farms and over time. In Estonia and Latvia the purchase of machines are subsidised with the aim of building up a more effective fleet of agricultural machines. If these costs for buildings and machines were included the results would probably probably vary more between the farms and countries depending on the cost for buildings and machines. When planning the farms buildings it is important to build rational, low cost buildings. Machines that are only used for short periods of time during the year, such as a muck spreader, can be shared between farms to minimise machine costs.

POTENTIAL AREA OF GRASSLANDS

The calculated area of potential semi-natural grasslands is based on the official numbers from each country. These numbers are probably low and it is very probable that there are even more semi-natural grasslands that can be restored and used for grazing. Semi-natural grasslands have not been completely mapped and the definition of semi-natural grasslands vary in between countries in the statistics.

REFERENCES

Hessle, A., Dahlström, F., Wallin, K. 2009. Långsam stut på naturbete eller snabb ungtjur? Fakta jordbruk, nr 3 2009. SLU, Uppsala

Nötkött, aktuellt om svensk nötköttsproduktion. 2:2011

Jamieson, A. 2013. Baltic Beef – a handbook for beef production. 2013. Upplandsstiftelsen Report 2013/11

Johansson, H. et al. 2008. Läckage av näringsämnen från svensk åkermark – Beräkningar av normalläckage av kväve och fosfor 1995 och 2005. Naturvårdesverket Rapport 5823 & Bilagor till Rapporten

HELCOM 2007. Baltic Sea Action Plan. HELCOM Ministerial Meeting, Krakow, Poland, 15 November 2007

Karlsson, L. et.al. 2012. Betesmarker och slåtterängar med miljöersättning. Jordbruksverket Rapport 2012:41

Statistics from Swedish Board of Agriculture. www.jordbruksverket.se

Estonian Nature Conservation Plan to 2020 (2012)

Greppa näringen. www.greppa.nu

The Agricultural Research Centre. www.pmk.agri.ee

Valuation of the RDP 2007-2013 Agri- Environment Payments measure for maintenance of semi-natural grasslands//Lauku attistības programmas (LAP) 2007-2013 Agrovides apakšpasākuma "Bioloģiskās daudzveidības uzturēšana zālājos" novērtējums. Latvijas Valsts Agrārās Ekonomikas Institūts. Rīga, 2013

Format for a prioritized action framework (PAF) for Natura 2000 For the EU Multiannual Financing Period 2014-2020

Oral information from farmers

Oral information from Hushållningssällskapet och LRF-konsult

A study of the farm economy and nutrient runoff connected to the farms production has been made on 6 beef farms of different sizes, 2 in Sweden, 2 in Estonia and 2 in Latvia.



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