November 2011

Country Report

for Sweden

Implementation and status of priority measures

Baltic Compass WP3

DRAFT

Cover Note

In order to keep the focus of the data collection narrow, we are not interested in collecting information on EU regulatory requirements that are common to the BSR. Instead please focus on those requirements that are specifically national or local in design. For example, do not cover Nitrates Directive requirements that are common BSR (eg N-limit) but DO cover the way that action plans have been devised, what they include and how they operate.

To avoid repetition, if the information you are supplying in a section is common to several measure then please provide a description on one form only and then make links back to this form.

Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)

1. Promoting long-term grass cultivation of arable land

Cultivation of grass or legume/grass crops on arable land with high/low inputs of nitrogen (N) and phosphorus (P) and high/low outputs of feed, food or other services can reduce nitrogen and phosphorus leaching and surface run-off losses as well as soil erosion, compared with annual crops on arable land.

Crop rotations including **permanent grass or legume/grass crops** can decrease N leaching with 50%, compared with crop rotations dominated by annual crops.

Describe this measure in your country if different : Grassland cultivation was conducted on totally 1 120 808 hectares year 2009. On 888 800 hectares the grassland was harvested and on 178 210 hectares the grassland was grazed.

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  - *a) specify quantity and unit:* 900 000 hectares of cultivated grassland and 41 000 enterprises
  - *b) if applicable, what year to be realized?* 2013
  - *c) give reference(s):* The Swedish rural development programme 2007-2013
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 10
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: the goals concerning area with grassland are linked to the goals of preserving an open landscape with a high abundance of variation.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:At country level the goal is easy to reach as grassland cultivatiotraditionally is the most abundant crop on arable land (43% of the area). However, the amount of produced milk is decreasing rapidly in almost the whole area of nitrate vulnerable zone (last 4 years reduction with 5-15%) which means that the number of dairy farms is decreasing and consequently the land use will be changed. Only in Kalmar and Gotland counties the amount of produced milk is increasing. the cultivation of maize on dairy farms has last years increased. If the cultivation of maize become more established this will decrease the area of grassland on dairy farms. The legislation of keeping dairy cattle on grasslands for grazing during the grazing period has been questioned last years. If there is a change so that more dairy cows can be kept indoors all the year around the land use will be changed.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☐ *or regional* ☒ *rules*

***Reference(s)** to legislation:*The Swedish board of Agriculture rules and general guidance (SJVFS 2004:62, updated version 2010:55) (SJVFS 1998:915).

Comments: Grassland is also one of the crops accepted to use to reduce nitrogen leaching.

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*The Swedish rural development programme 2007-2013.

Comments: Whole Sweden has a basic subsidy level. The subsidy level can be increased depending on if the farm also has livestock production and depending on if the farm is located in nitrate vulnerable zone.

2. Vegetative cover in autumn and winter of arable land

Annual winter crops, such as winter wheat or winter rape, can provide a vegetative cover that actively takes up available nitrogen and phosphorus from the soil more efficient than annual spring crops at a seasonal period with high precipitation and cool climate.

Catch crops can be under-sown in the main crop, simultaneously with, or just after the sowing of this crop. When the main crop is harvested, the catch crop has an established root system ready to take up nitrogen from the soil during late summer and autumn. Nitrogen that otherwise could have been leached is then taken up and incorporated into plant material. The catch crop is then ploughed-in as late as possible in autumn or in spring. Perennial ryegrass (*Lolium perenne* L.) as a catch crop is an effective measure to reduce N leaching in spring cereal crop production. The use of catch crops has reduced N leaching by 50% or more in several studies. The effect of the catch crop on N leaching depends on precipitation and drainage conditions, available N amounts in soil and how successful the establishment of the catch crop was.

Describe this measure in your country if different : Approved crops for arable land to be regarded as autumn- or winter-covered are; 1. grass, 2. autumn oilseed crops, 3. winter cereals, 4. sugar beet, feed sugar and feed beet, carrots, beetroots and other similar root crops, 5. perennial fruit and berry crops, 6. short rotation forestry, and 7. catch crops.

Arable land which is lying fallow following the cultivation of cereals and oilseed crops may also be counted as autumn or winter-sown, but only if the land lies fallow from when cereal crops come into ear or from flowering in the case of oilseed crops.

For arable land to be regarded as autumn- or winter-covered, main crops and any catch crops for which growth will be stopped during the next spring season must be sown; 1. by 5 October in the counties of Östergötland, Jönköping, Kronoberg, Kalmar, Gotland and Västra Götaland, and 2. by 15 October in the counties of Blekinge, Skåne and Halland.

In order for arable land to be considered autumn-sown, the cultivation of grass, perennial fruit and berry plants, short rotation forestry and catch crops sown before 1 August must be stopped; 1. no earlier than 10 October in the counties of Östergötland, Jönköping, Kronoberg, Kalmar, Gotland and Västra Götaland, and 2. no earlier than 20 October in the counties of Blekinge, Skåne and Halland. In the counties of Blekinge, Skåne and Halland, arable land sown before 20 August with catch crops in the form of white mustard and fodder radish may be considered autumn-sown. The growth of white mustard and fodder radish may be stopped no earlier than 20 October. Arable land lying fallow after cereal and oilseed crops may be cultivated or controlled chemically no earlier than 10 October.

In order for arable land to be considered autumn or winter-sown; 1. the growth of catch crops sown on or after 1 August must be stopped at the earliest during the following spring season, and 2. the growth of grass and catch crops containing more than one quarter of

legumes in terms of surface area of plant cover must be stopped no earlier than during the following spring season.

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  - *a) specify quantity and unit:* 240 000 hectares of catch-crops
  - *b) if applicable, what year to be realized?* 2013
  - *c) give reference(s):* the Swedish rural development programme 2007-2013
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 5
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it? 8
"0"=Impossible; "10"=Very good

Comments: he possibilities to fulfill the goal is valuated in The year report 2009 of the Swedish rural development programme 2007-2013.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:In Sweden year 2009 the area with catch-crops which recieved environmental subsidies was 62 836 hectares and the area with a combination of catch-crops and spring tillage which recieved environmental subsidies was 45 077 hectares. The judgement is that it will be easier to reach the goal because the amount of compensation to the farmer is increased from year 2010 and the regional areas that can apply for the environmental subsidy is extended from year 2010 (Appendix 2 Report 2010:10 Swedish Board of Agriculture)

Is this measure regulated in legislation? *If "Yes"; national* ☐ *or regional* ☒ *rules*

***Reference(s)** to legislation:*The Swedish board of Agriculture rules and general guidance (SJVFS 2004:62, updated version 2010:55).

Comments:

Is this measure entitled to economic subsidy? *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*the Swedish rural development programme 2007-2013.

Comments:

3. Soil tillage management

3.1. Reducing soil tillage by conversion from ploughing to minimal or no cultivation management systems or conversion from deep ploughing to shallow ploughing can reduce mineralization of organic matter in soil. Type of techniques can be, i.e. using discs or tines to cultivate the soil, or direct drill into stubbles (no-till).

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: A reduction in N leaching from the root zone is quantified, corresponding to -375 tonnes of N. A goal of 180 000 hectares with reduced soil tillage.
  b) if applicable, what year to be realized? 2013 (reduced N leaching) and 2016 (hectares)
  c) give reference(s): Andersson et al. 2010. Åtgärder för minskade utsläpp. Bilaga 2. SJV, Jönköping. 189 sidor.
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 7
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it? 10
"0"=Impossible; "10"=Very good

Comments: Andersson et al (2010) judge that the incitaments for reduced soil tillage are large concering the ability for the farmer to save costs for fuel (diesel). The Swedish board of agriculture has information material about of how reduced soil tillage can reduce leaching of nitrogen (Reducerad jordbearbetning, jordbruksinformation nr. 28. 2008).

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

3.2 Time-of the year effects. By postpone tillage actions from autumn to spring, the mineralized nitrogen will be available for uptake by the established spring crops, which also will provide surface cover.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes • *If "Yes";* *a) specify quantity and unit:* 100 000 hectares *b) if applicable, what year to be realized?* 2013 *c) give reference(s):* The Swedish rural development programme 2007-2013 • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit*: *2. To what extent is this measure implemented today in relation to goal set above?* 1 *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* 8 *"0"=Impossible; "10"=Very good*
Comments: Possibilities to fulfill goal linked with the goals for catch-crops.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:Swedish board of agriculture conclude that the potential for spring tillage instead of autumn tillage is about 368 000 hectares with light soils and spring sown crops, i.e. much more than the goal set. Difficulties concerning spring tillage can be higher costs and risk of soil compaction due to bad timing (Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.).

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*
***Reference(s)** to legislation:*
Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*
***Reference(s)** to subsidy rules:*The Swedish rural development programme 2007-2013.
Comments:

4. Fertilisation management

4.1. Adapting amounts applied for both chemical fertilizer and manure.

Animal density is a tool to express the number and type of animals kept at the farm in relation to the arable area available for spreading their manure. The tool is used to balance amounts of produced N and P in manure to available spreading area at the farm in order to avoid surplus application of N and P with manure.

Considering crop requirements of N and P in the fertilising plan is a prerequisite for avoiding excessive applications. Nitrogen and P content in manure shall be considered in the fertiliser plan in order to adapt the need of chemical fertilizers and avoid excessive applications.

Sampling and analysing N and P in manure gives information of the N and P concentration and the distribution of plant available-N and organic-N. Then the effect

of the manure can be valued in the fertilising plan. Manure characteristics can vary a lot. Liquid manure is a general term that denotes any manure from housed livestock that flows under gravity and can be pumped. Liquid manure can have a high proportion of plant available N (NH4-N + NH3-N) of total-N content. Solid manure is a general term that denotes any manure from housed livestock with large amounts of bedding that does not flow under gravity, cannot be pumped but can be stacked in a heap. Solid manure can have a high proportion of organic-N of total-N content.

Sampling and analysing N and P in arable soil gives information of soil fertility concerning these nutrients, which should be considered in the fertilising plan in order to avoid excessive fertilizer applications or deteriorated soil fertility.

Describe this measure in your country if different : Considering crop requirements of N and P In vulnerable zones the application of nitrogen via fertilisers must be restricted so that it does not exceed the quantity that may be considered necessary to best exploit the production capacity of the site for the crop in question. As regards agricultural holdings, the need for fertiliser nitrogen for the expected crop yield must be calculated taking into account the livestock manure's long-term effect, the fertilisation effect, any humus soil and the application of livestock manure and other organic fertilisers to the year's crop.

When calculating the need for fertiliser for an individual crop, the point of departure shall be the expected crop yield for the field in question. The calculation must take account of the items listed in Annex 6. The calculation must be documented through a crop management plan or equivalent. Fertiliser shall be applied on the basis of this calculation. (SJVFS 2009:82)

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit: The advisory program Focus on Nutrients has a goal to include farms representing 930 000 hectares.

2. To what extent is this measure implemented today in relation to goal set above? 7
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it? 9
"0"=Impossible; "10"=Very good

Comments: Today the advisory program Focus on nutriens includes farms representing 665 000 hectares. www.greppa.nu

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:The cost of N and P in chemical fertilizers influence the value of the manure.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☒ *rules*

***Reference(s)** to legislation:*Maximum number of livestock units which can be kept per hectare of accessible application area for various types of livestock is regulated in SJVFS 2006:66. Calculation of the need for fertiliser for a crop is regulated in SJVFS 2009:82). It

is recommended that the content of easily accessible nitrogen in manure can be determined by analysing the ammonium nitrate content. (SJVFS 2010:55). It is recommended that arable land included in the crop rotation should be sampled regularly to determine the phosphorus content of the soil (SJVFS2010:55).

Comments:

Is this measure entitled to economic subsidy? ☐ *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

Reference(s) *to subsidy rules:*The swedish rural deveopment programme 2007-2013 has subsidies for sampling manure and soil.

Comments:

4.2. Calculating nutrient balances on farm- and/or field level

Calculating N and P inputs/outputs and balances on farm and/or field level is a performance tool and a policy tool for assessing the environmental impact. The tool can also be used to monitor and evaluate the impacts of alternative manure and chemical fertilizer management practices and technologies on N and P use at the farm. When farm N and P balances can be linked to within-farm N and P sources and flows, there is a good possibility to identify the weakest link and possible improvements on the farm. The tool can be used to assess the risk of ammonia losses from manure management and the risk of N leaching losses to water.

Describe this measure in your country if different : It is recommended that a balance calculation can be used to determine the phosphorus content of livestock manure (SJVFS 2010:55). Attention should then be paid to the phosphorus content of the following items:

Inputs to the balance

• Fodder (also to offspring if these are included with the mother)

• Any livestock bought in and growing on the holding

Outputs from the balance

• Products supplied (milk, meat, eggs, leather, etc.)

• Livestock and slaughter animals sold

The difference between the inputs to and outputs from the balance is considered the amount of phosphorus released with the livestock manure.If the phosphorus content of the livestock manure has been determined using a balance calculation, these calculations should be documented. The calculations should be kept for at least six years.

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: Reduced amounts of P, N and NH3-N corresponding to- 4 tonnes of P, -410 tonnes of N from the root zone, -250 tonnes of NH3-N from manure management.
  b) if applicable, what year to be realized? 2016
  c) give reference(s): BSAP described in SNV Report 5985 page 93.
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 7
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Sveriges åtagande i Baltic Sea Action Plan. Förslag till nationell åtgärdsplan SNV Report 5985. Naturvårdsverket Stockholm. 279 sidor.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:The advisory programme Focus on Nutrients offer free advisory service to farmers and is financed with environmental taxes such as tax on chemical fertilizers. However, the taxes were removed 1 january 2010. Therefore the future financing of Focus on Nutrients is uncertain.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☒ *rules*

***Reference(s)** to legislation:*The Swedish Board of Agriculture rules and general guidance (SJVFS 2004:62) on environmental concerns in agriculture as regards plant nutrients

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

4.3. Avoiding the spreading of chemical fertilizers and manure during high-risk periods.

The timing of chemical fertilizer and manure application is a key factor to have a high plant nutrient use efficiency. Poor timing is one of the most important sources of large N leaching loads.

Describe this measure in your country if different : In nitrate vulnerable zones it is prohibited to apply any fertilizers from 1 November to 28 February.

Fertilizers should be applied at a time when the crop absorbs as much as possible of the added nutrients.

Fertilizers which contain a large percentage of easily accessible nitrogen (e.g. slurry or urine) should not be applied during the autumn or before sowing winter cereals. Nor should such fertilizers be applied during the autumn before spring sowing in southern and

central Sweden.

Liquid manure and urine should, if possible, be applied to growing cereals or before sowing in the spring. Application before the sowing of winter oil crops may also be an acceptable alternative.

In the vulnerable coastal zones, the vulnerable zones in the inland areas of the counties of Västra Götaland and Östergötland, the vulnerable zones around Lakes Hjälmaren and Mälaren, in the county of Gotland and on Öland, livestock manure and other organic fertilisers may be applied from 1 August to 31 October only in growing crops or before autumn sowing. Application in catch crops is not permitted.

In vulnerable zones, a maximum of 60 kg of easily accessible nitrogen per hectare may be applied before autumn sowing of oilseed. Within the same areas, a maximum of 40 kg of easily accessible nitrogen per hectare may be applied before other autumn-sown crop. Applied easily accessible nitrogen should be adjusted for the needs of the autumn-sown crop.

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country: It would be desirable to spread all liquid manure at spring and at summer in growing crops. Today autumn sown crops recieve a manure application and spring sown crops recieve manure application.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☐ *or regional* ☒ *rules*

***Reference(s)** to legislation:*The Swedish Board of Agriculture rules and general guidance (SJVFS 2004:62) on environmental concerns in agriculture as regards plant nutrients.

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

4.4. No or reduced P-fertiliser for high soil P fields or part of fields.

When the soil P values increase beyond agronomical optimum ranges, there is a reasonable consistence pattern whereby P leaching increase significantly. However, P leaching has large spatial and temporal variations and can be influenced by several factors interacting with each other. It is therefore important to consider site-specific factors to be able to find measures to reduce P leaching.

Describe this measure in your country if different : The recommendations are: Basic manuring with phosphorus should be avoided if at all possible. On soil of P-AL III class and above no more phosphorus should be added than that removed with the crop. However, in cultivation systems which involve the application of solid manure or sewage sludge it can be difficult to avoid higher amounts of phosphorus than each crop actually needs, and when growing certain crops with a high phosphorus requirement, for example potatoes, it may be appropriate to add more phosphorus than that removed with the crop. If extra phosphorus has been added in any one year by spreading solid manure or sewage sludge or by manuring crops such as potato, the phosphorous fertiliser applied to subsequent crops should be reduced accordingly.

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit: Maximum 22 kg P/ha and year. Not as an average for a 5-year period.

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Own judgement (Salomon 2011-03-25)

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country: In practice dairy and pig farms with maximum allowed animal density has a larger inflow of P (through purchased feed), than outflow of P with sold products which means a higher P application/ha than removed with the crop yield. Also, soils on this type of farms has P-AL class IV and V due to high historical P fertilization, which means no need of basic manuring with P.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☐ *rules*

***Reference(s)** to legislation:*Maximum number of livestock units which can be kept per hectare of accessible application area concerning P for various types of livestock is regulated in SJVFS 2006:66.

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

Reference(s) *to subsidy rules:*

Comments:

5. Improved spreading technology of manure and chemical fertiliser

5.1 Site-specific dosage. In all fertiliser application, the use of **Global Positioning System** (GPS) signals for the purpose of determining the device's current location on earth can improve the possibilities for a controlled and proper distribution. GPS devices provide latitude and longitude information, and some may also calculate altitude. GPS in combination with **steering aid systems** means that the fertiliser can be spread with a minimum of bare spots and overlaps. The simpler variant of the steering aid system is called **guidance**, where a ramp with a series of LEDs shows whether the driver is located right on line or if he should adjust to the right or left. **Auto steer** is an automated steering system where the driver does not need to actively steer the vehicle except perhaps in curves or when turning. With the use of GPS technology, it is also possible to map different properties in the field, and later on use this information e.g. for **site specific spreading** of fertilisers.

Describe this measure in your country if different : Information given below refers to steering aid systems. Site specific spreading has not reached any high impact in Sweden, since it would need processing of a lot of data and also there is an uncertainty of how to utilize the results for proper fertilisation strategies.

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit: 50% of all fertilasation operations

2. To what extent is this measure implemented today in relation to goal set above? 4
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it? 10
"0"=Impossible; "10"=Very good

Comments: Steering aid systems have during the last years had a marked breakthrough in Sweden. The interest from farmers is big, and most of new bigger tractors are prepared for easier installation of steering aid systems. Systems are also sold separately for mounting on existing machinery.

Expert sources: Hugo Westlin, DataVäxt AB & Gunnar Lundin, researcher, JTI - Swedish Institute of Agricultural and Environmental Engineering .

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*The Swedish rural development programme 2007-2013.

Comments: Investment support thrugh the Swedish RDP is possible but it is up to each county board to descide if they wish to support the technology

5.2 Combined drilling is when seeding and fertilisation is done with one and the same machine in one working operation. A drilling machine with normal distance between the drill coulters is equipped with coulters for chemical fertilisers placed in front of the drill coulters between every other row. Fertiliser coulters are placing chemical fertiliser a few centimetres deeper than the seeds.

Chemical fertiliser placed at this depth, provides good conditions for the crop to take up the added nutrients. This procedure is, in addition to time savings and a better nutrient utilization, reducing competition for plant nutrients from weeds and reduces the risk of nutrient surface runoff. Phosphorus in fertilizers binds quickly to soil particles and is thus less exposed to leaching.

The recommended nitrogen ration at a given harvest level can be reduced by 10 kg N / ha, if combined drilling is applied (Albertsson, 2010). Leaching will probably be reduced by 1-2 kg N/ha compared with other fertilization techniques.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit: 100 % of spring seeded crops.

2. To what extent is this measure implemented today in relation to goal set above? 6
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it? 7
"0"=Impossible; "10"=Very good

Comments:

About 60% of arable land with cereals and oil-seed are sown in spring.

Expert source: Gunnar Lundin, researcher, JTI - Swedish Institute of Agricultural and Environmental Engineering

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

The time taken to have all the seeds placed into soil will be longer when using combine drilling. This could imply that a larger share of seeds are drilled in non-optimal condition.

Combine drilling machines means higher investment.

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

5.3 Incorporation of manure and chemical fertiliser may be achieved with equipments such as discs or cultivators depending on soil type and soil conditions. Usually the incorporation is done in a separate working operation. The manure/ chemical fertiliser must be completely incorporated within the soil to achieve maximum efficiency. As regards liquid manure, incorporation should be made quickly after spreading as ammonia losses takes place immediately after spreading.

This method will help to prevent the exposure of manure to the surface runoff and drain-flow losses. It will also increase the utilisation of manure nutrients compared with surface application.

Describe this measure in your country if different : Provision applicable throughout the country:Mineral urea-based fertiliser spread on bare soil must be incorporated or ploughed under within four hours of application.

Provision applicable outside the nitrate vulnerable zones: Livestock manure and other organic fertilisers applied from 1 December to 28 February must be ploughed under within 12 hours.

Livestock manure applied to bare soil in the counties of Blekinge, Skåne and Halland must be incorporated within four hours.

DRAFT

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: Regulation on incorporation of manure within 12 hours in the counties of Götaland and parts of Svealand can reduce ammonia losses with 800 tonnes.
  b) if applicable, what year to be realized? not specified
  c) give reference(s): Andersson et al. 2010
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: A regulation of incorporate manure would cost 4 SEK/kg saved ammonia nitrogen and predicts that the farm has tillage tools. A regulation would also include digested manure from biogas plants (Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.).

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:Incorporation can be made with tillage tools available at the farm. However, the operation of spreading manure and fast incorporation demands two sets of tractors and equipments and to organise this at the field takes longer time.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☒ *rules*

***Reference(s)** to legislation:* National legislation concerning incorporation: SJVFS 2009:82. Regional legislation concerning incorporation SJVFS 2010:55).

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*The Swedish RDP 2007-2013

Comments: Investment support up to 30% of investment cost, optional for each county board to support or not.

5.4 Liquid manure. Distribution uniformity of liquid manure has improved significantly with the introduction of **band spreading** technology, where the manure is discharged just above ground level in strips or bands through a series of hanging or trailing pipes attached to a boom. As the liquid manure is distributed laterally via a ramp, good lateral distribution uniformity is achieved. The spread in the longitudinal direction can also be kept at a constant level by means of the pumping equipment which is part of the equipage. Some newer spreaders are also equipped with a **control system** that automatically adjusts the output to the driving speed, which will keep the application rate to the desired level.

Injection of liquid manure means that it is applied directly into the active layer of soil, either in open or in closed slots. In the latter case manure is fully covered after injection, by closing the slots with press wheels or rollers fitted behind the injection tines. Closed-slot injection is more efficient than open-slot for decreasing the ammonia emission. To obtain this added benefit, soil type and conditions must allow effective closure of the slot.

Describe this measure in your country if different : In the counties of Blekinge, Skåne and Halland one of the following methods must be used when spreading slurry on growing crops:

1. bandspreading or another similar technique through which the fertiliser is applied directly to the ground under the plant cover,

2. using a fertiliser injection applicator or other similar technique through which the fertiliser is applied directly into the ground,

3. techniques in which 1 part fertiliser is diluted with at least half a part water prior to application, or

4. techniques in which application is followed by irrigation with at least 10 millimetres water. Irrigation must commence no later than four hours and be finished no more than twelve hours after the start of application. If it rains the rainfall may be deducted from the minimum 10 millimetre requirement.

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  - *a) specify quantity and unit:* 50% of liquid manure (and urine) spread with band spreading. 6% of liquid manure (and urine) spread with shallow injection.
  - *b) if applicable, what year to be realized?* 2016
  - *c) give reference(s):* Andersson et al. 2010.
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 8
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it? 10
"0"=Impossible; "10"=Very good

Comments: the goals are set concerning liquid manure and not for for urine.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:*Andersson et al. (2010) make the judgement that the use of bandspreading techniques is slowly increasing in whole Sweden and therefore no further regulations or subsidies are necessary outside Blekninge, Skåne and Halland.(Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor).

Is this measure regulated in legislation? Yes *If "Yes"; national* ☐ *or regional* ☒ *rules*

***Reference(s)** to legislation:*The Swedish Board of Agriculture rules and general guidance (SJVFS 2004:62) on environmental concerns in agriculture as regards plant nutrients

2010:55.

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

5.5 Solid manure. In solid manure handling, **disintegration equipment** has been developed that breaks the manure better and gives greater working width and more uniform spreading laterally. Distribution of solid manure in the longitudinal direction and opportunities to set the intended application rate still leaves much to be desired.

Describe this measure in your country if different : In the counties of Blekinge, Skåne and Halland solid fertiliser applied to bare soil from 1 October to 31 October must be ploughed under within four hours.

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Today 52% of solid manure is incorporated within 24 hours. 30% of the solid manure is incorporated immediately.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:Today 31% of solid manure is spread in growing crops which probably is grasslands. This opportunity must be possible in the future so a goal could be that 70% of solid manure is incorporated within 4 hours (SCB, 2010).

Is this measure regulated in legislation? Yes *If "Yes"; national* ☐ *or regional* ☒ *rules*

***Reference(s)** to legislation:*Regional legislation concerning incorporation SJVFS 2010:55).

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

5.6 Manure spreading and NH_3 emissions – general measures. Variables significantly affecting NH_3 emissions after spreading of manure are soil water content, air temperature, wind speed, manure type, dry matter content of manure, total ammoniacal nitrogen content of manure (TAN=NH_3-N+NH_4-N), application method and rate and manure incorporation. Losses of NH_3 can vary between 3 to 90% of the NH_4-N applied with manure.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? • *If "Yes";* *a) specify quantity and unit:* *b) if applicable, what year to be realized?* *c) give reference(s):* • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit:* *2. To what extent is this measure implemented today in relation to goal set above?* *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* *"0"=Impossible; "10"=Very good*
Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation? *If "Yes"; national* ☐ *or regional* ☐ *rules*
***Reference(s)** to legislation:*
Comments:

Is this measure entitled to economic subsidy? *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*
***Reference(s)** to subsidy rules:*
Comments:

6. Avoiding the application of chemical fertilisers and manure to high-risk areas

Examples of high risk areas on arable land are those: with a significant slope, with flushes draining to a nearby watercourse, soils with cracks over field drains, fields adjacent to water or fields with phosphorus values beyond agronomical optimum ranges.

Describe this measure in your country if different : General recommendations are: Fertiliser should not be applied to snow-covered soil outside vulnerable zones. Fertiliser should not be applied to frozen soil if there is a risk that fertiliser will be lost through surface run-off during rainfall, thawing of the frozen soil or snow melting. The risk of run-off losses through cracks in the frozen soil should also be taken into account.

Fertiliser should not be applied if there is a risk that, due to the soil conditions, for example a slope, the fertiliser may be washed into nearby surface water or pollute groundwater.

In areas of variable water levels, the application of fertilisers should be avoided if there is a risk of loss due to the soil being flooded or becoming waterlogged.

In nitrate vulnerable zones it is prohibited to:

1. apply fertiliser to waterlogged or flooded soil;

2. apply fertiliser to snow-covered soil,

3. apply fertiliser to frozen soil.

In vulnerable zones, fertilisers must not be applied to farmland closer than two metres to the edge of a watercourse or lake.

The manure which livestock excrete onto the soil when grazing must not be included in the calculation of the fertiliser applied. (SJVFS 2009:82)

In vulnerable zones, fertilisers must not be applied to farmland adjacent to watercourses or lakes or where the slope of the land towards the water exceeds 10% (10/100).

The manure which livestock excrete onto the soil when grazing must not be included in the calculation of the fertiliser applied.

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: More strict rules will result in a reduced N and P leaching from the root zone, corresponding to -30 tonnes of N and -2 tonnes of P.
  b) if applicable, what year to be realized? 2013
  c) give reference(s): Andersson et al. 2010
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:The more strict rules run from 1 january 2010. The calculation of the expected reduction in N and P leaching depends on that the rules will be followed.

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☒ *rules*

***Reference(s)** to legislation:*National and regional legislation is in SJVFS 2010:55.

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

7. Measures to optimize soil pH and improve soil structure

Measures to improve soil fertility and soil structure can increase the crop's plant nutrient use efficiency and decrease the risk of N and P leaching and surface run-off. Such measures can be liming for improved soil structure or liming for optimizing soil pH.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  - *quantity and unit:*

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments:

*Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:*Liming for improved soil structure is mentioned as a measure to decrease P losses from clay soils. A few results from Swedish research projects are available which indicate a decreased P leaching from a clay soil after liming. However, knowledge is lacking and therefore Swedish board of agriculturen cannot estimate the potential, costs and effects of this measure (Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.).

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☒ *or regional* ☐ *subsidy rules*

Reference(s) *to subsidy rules:*Förordning (2009:381) om statligt stöd till lokala vattenvårdsprojekt

Comments: National water founding is available for structural liming but it is optional for each county board if they want to support it.

8. Adapted feeding

8.1 Adopting phase feeding of livestock

Livestock at different growth stages or stages of the reproductive cycle have different optimum nutritional requirements. Greater division and grouping of livestock on the basis of their feed requirements allows more precise formulation of individual rations. This increases the animal's nutrient use efficiency and results in reduced excreted amounts of nitrogen and phosphorus in fresh animal faeces and urine.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  - *quantity and unit*:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation? *If "Yes"; national* ☐ *or regional* ☐ *rules*

Reference(s) *to legislation:*

Comments:

Is this measure entitled to economic subsidy? *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

Reference(s) *to subsidy rules:*

Comments:

8.2 Reducing dietary nitrogen and phosphorus intakes

Farm animals are often fed diets with higher than recommended contents of nitrogen and phosphorus as a safeguard against a loss of production arising from a deficit of these nutrients. A surplus intake of nitrogen and phosphorus is not utilised by the animal and is excreted with faeces and urine, leading to a larger N and P content in the manure. Therefore a ratio balancing of nutrients in feed is a key factor to both ensure animal health and production requirements and minimizing adverse environmental impacts. To improve nutrient use efficiency purchased as well as home-produced feed components need careful management and analysis of nutrient content and dietary value.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: A reduction of 14 kg N in faeces and urine/dairy cow & year.
  b) if applicable, what year to be realized? Andersson et al. 2010 give no year.
  c) give reference(s): Gustafsson A. (2001) Högre kväveeffektivitet i mjölkproduktionen genom ändrad utfodring – vad är möjligt att uppnå? Rapport nr 4999, Svensk Mjölk, Stockholm.
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: The potential is given for dairy cows. (Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor).

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country: Gustafsson (2001) has analysed possibilities for better N utilization in dairy production and conclude that a reduction of 10-20% of the N amount in faeces and urine is possible without a reduction in milk production/cow. A goal of 28-30% N efficiency in the cow is possible to reach. In practice N efficiency varied between 21-35% at 20 dairy farms. The variation depended on that the cow did not utilize the protein in feed efficiently and that the farmer fed surplus amounts of protein in feed.

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

8.3 Phytase supplementation

Supplementation of synthetic phytase to pig feed reduces the need for the addition of mineral phosphate. Phytase increases the availability of phosphorus in the feed and allows total phosphorus contents to be reduced without affecting productivity. With the addition of phytase the phosphorus content of the feed can be reduced by up to 30% for pig feed.

Describe this measure in your country if different : In the regulations of maximum number of livestock units which may be kept per hectare of accessible application area for various types of livestock it is allowed to keep a larger number of laying hens in coops, free laying hens and pullets per hectare if phytase is added to the feed.

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Phytase or other supplements to reduce N and P content in faeces and urine is not mentioned as potential measures and the effect of the use today is not quantified in (Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor).

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:Statistics on the usage of today in pig and poultry production? An evaluation of the effect of the usage?

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☐ *rules*

***Reference(s)** to legislation:*The Swedish Board of Agriculture rules and general guidance (SJVFS 2004:62) on environmental concerns in agriculture as regards plant nutrients 2010:55, Annex 5.

Comments:

Is this measure entitled to economic subsidy? *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*

***Reference(s)** to subsidy rules:*

Comments:

8.4 Wet feed and fermentation

Endogenous phytase in grain can be activated by wetting the pig feed some time before feeding thereby reducing or even eliminating the need for mineral phosphorus supplementation. This means that pig production with wet feed systems should be able to utilise feed with lower phosphorus content than normally recommended.

Fermentation of the feed can reduce the need for mineral phosphate supplementation. Fermentation occurs naturally in wet feed after a certain amount of time. The fermentation process is difficult to manage and the method is still to be developed.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? • *If "Yes";* *a) specify quantity and unit:* *b) if applicable, what year to be realized?* *c) give reference(s):* • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit:* *2. To what extent is this measure implemented today in relation to goal set above?* *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* *"0"=Impossible; "10"=Very good*
Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation?	*If "Yes"; national ☐ or regional ☐ rules*
***Reference(s)** to legislation:*	
Comments:	

Is this measure entitled to economic subsidy?	*If "Yes"; national ☐ or regional ☐ subsidy rules*
***Reference(s)** to subsidy rules:*	
Comments:	

9. Reducing ammonia losses in stable

Key emissions to air from animal housing emissions are ammonia (NH_3), odor and dust. The level and variation of ammonia emissions from animal housing are determined by many factors, which also interact. Factors influencing ammonia emissions from animal housing are:

- Increased nitrogen use efficiency.
- Decreased emitting areas with manure in the stable.
- Avoiding high temperature in stable and manure
- Adapting airflows along manure surfaces.
- Use and choise of bedding material.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: 20 % of pig and pultry houses clean part of the outgoing air from ammonia. Double the present amount of peat used as litter in animal houses, preferable with solid manure management, which can result in a reduction in ammonia -N losses corresponding to 800 tonnes..
  b) if applicable, what year to be realized? 2020
  c) give reference(s): Andersson et al. 2010
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 0
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Today no techniques are in use for cleaning outdoor air from animal houses. Therefore the implementation is set to 'Not at all'(Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor).

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country: Cleaning of air relevant for pig and poultry houses only as these houses are 'closed' with a more specific air outlet. Difficulties with the technique is high investment costs as well as costs for support and electricity (Andersson et al. 2010). However, Swedish board of agriculture says that it is possible already today for authorities to claim that large pig and poultry houses clean outgoing air from ammonia, smell and dust when the authority gives permission to run the business..

Today the use of peat as litteris small in agriculture, corresponding to 200 000 - 300 000 m3/year. Sweden has large areas with peat and the yearly growth of this peat corresponds to 20 million m3. Peat mining is questioned concerning the negative impact on biological diversity and climate change and therefore a sustainable mining strategy is a prerequisite to be accepted (Germundsson C. (2006) Strötorvsanvändning i djurstallar – en litteraturgenomgång. Examensarbete inom lantmästarprogrammet. Projektrapport nr 6,

Institutionen förjordbrukets biosystem och teknologi, Sveriges lantbruksuniversitet, Alnarp). However, peat used as litter in animal house or at storage of solid manure has a significant reducing effect on ammonia emissions (Karlsson S. & Torstensson G. (2003) Strängkompostering av hästgödsel. JTI-rapport Lantbruk & Industri 313, JTI – Institutet för jordbruks- och miljöteknik, Uppsala; Malgeryd J. & Karlsson S. (1996) Minska ammoniakförlusterna vid hantering av fast ochflytgödsel. Teknik för lantbruket 56, JTI – Institutet för jordbruks- och miljöteknik,Uppsala; Steineck S., Svensson L., Jakobsson C., Karlsson S. & Tersmeden M. (2000) Hästar –gödselhantering. Teknik för lantbruket 82, JTI – Institutet för jordbruks- och miljöteknik, Uppsala).

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*
***Reference(s)** to legislation:*
Comments:

Is this measure entitled to economic subsidy? No *If "Yes"; national* ☐ *or regional* ☐ *subsidy rules*
***Reference(s)** to subsidy rules:*
Comments:

10. Storage of manures

Adequate collection and storage facilities provide the possibility to choose a time to apply manure to fields when the crops can utilize N and P and there will be fewer occasions when lack of capacity forces the farmer to spread manure at unsuitable times.

Manure storage must be of such a quality that it prevents N, P and manure losses. The main influencing factors on the ammonia losses from storages are manure properties (pH, dry matter content) temperature and wind conditions, filling technology, storage time, and for liquid manure storage ratio surface: volume, crust formation and mixing methodology.

Ammonia losses can be sharply reduced if the air directly above the liquid manure store is prevented from circulating. A method that efficiently reduces NH_3 losses is to cover the liquid manure stores with, for instance, a roof, a floating plastic cover or a stable natural crust. If the liquid manure storage is filled underneath the cover, this can be kept intact even during filling, which reduces the risk of NH_3 losses.

From storages with solid manure, especially if composting take place with high temperatures, NH_3 losses could be high. Peat included in the bedding material will reduce NH_3 losses during storage. Roofs on solid manure storages could be an effective measure to reduce ammonia losses from solid manure storages. Additionally, a roof keeps rainwater away, which could prevent nutrient leakage from the manure pad if it has insufficient or lacking drainage leading to a collection pit.

Describe this measure in your country if different :
Section 4: Section 6 of Ordinance (1998:915) on environmental concerns in agriculture lays down requirements for minimum livestock manure storage capacity. Agricultural holdings with an annual average of no more than two livestock units are exempted from these requirements. Storage facilities for livestock manure on farms or other undertakings should be of at least sufficient size for the manure to be stored during periods and weather conditions when it may not be applied or when application is unsuitable, or until the manure can be dealt with

in a different way.

In areas outside vulnerable areas, where applicable the following points should be taken into account when determining storage volume:

• Quantity of faeces and urine excreted. Factors such as species on the basis of the type of production, number of animals, diet and stocking density should be taken into account when calculating the quantity of faeces and urine excreted.

• Addition of litter.

• Water inflow due to wastewater, washing-up water and cleaning water and in the form of precipitation falling on to storage areas or other areas which are drained to storage tanks.

• Conversion losses that entail diminishing volumes of fertiliser during the storage period in systems with large amounts of litter.

Section 4a. In vulnerable areas, where applicable the following points must be taken into account when determining storage volume:

• Quantity of faeces and urine excreted. Factors such as species on the basis of the type of production, number of animals, diet and stocking density should be taken into account when calculating the quantity of faeces and urine excreted.

• Addition of litter.

• Water inflow due to wastewater, washing-up water and cleaning water and in the form of precipitation falling on to storage areas or other areas which are drained to storage tanks.

• Conversion losses that entail diminishing volumes of fertiliser during the storage period in systems with large amounts of litter. (SJVFS 2009:82)

Section 4b: In vulnerable zones, records must be kept of how the storage volume in accordance with Section 4a has been calculated. The records must be kept, and be accessible, for as long as the calculations continue to apply to the holding. (SJVFS 2009:82)

Section 5: Section 7 of Ordinance (1998:915) on environmental concerns in agriculture contains requirements governing the design of storage spaces for livestock manure. (SJVFS 2010:1)

Section 5a: Slurry and urine containers must have a stable natural crust or other covering which effectively reduces ammonia losses. If a natural crust or other covering on a container is broken or damaged it should be restored as soon as possible. (SJVFS 2010:1)

If the natural crust on a slurry container is damaged or broken when stirring or spreading the manure a stable natural cover should have been restored within 14 days. If the container is completely emptied a somewhat longer time is acceptable if the manure level in the container is so low that for practical reasons it is not possible, for example, to mix in solid manure or straw. In the event of the container being emptied, the restoration period should be counted from when manure starts being put into the container. A stable natural crust on a urine container should be restored within 7 days following spreading.

If another covering, such as a roof, is damaged it must be repaired within 14 days. If this is not practically possible an alternative covering should be used in order to minimise ammonia losses during the period needed to repair the damage to the original covering.

Section 5b: Urine and slurry containers must be filled with urine and slurry under cover,

except when filling before a natural crust has reformed. (SJVFS 2010:1)

Section 5c: Urine and slurry containers may be refilled from above with non-pumpable manure provided the opening in the cover is kept as small as possible so as to minimise ammonia losses. (SJVFS 2010:1)

Section 5d: The provisions of Sections 5a-5c apply only to holdings which have more than 10 livestock units in:

1. The counties of Stockholm, Uppsala, Södermanland, Östergötland, Jönköping, Kronoberg, Kalmar, Gotland, Blekinge, Skåne, Halland and Västra Götaland, and

2. flat land in the counties of Värmland, Örebro and Västmanland.

Annex 4 to these rules indicates which areas in the counties of Värmland, Örebro and Västmanland are to be considered flat land. (SJVFS 2010:1)

Section 6: Fertiliser stored inside the animal housing, for example in bedding, must be included in the storage capacity for livestock manure.

Section 7: Livestock manure storage capacity may not include interim outdoor storage directly on the ground.

Undertakings which are not covered by Section 7 of the Ordinance on environmental concerns in agriculture should have storage facilities for livestock manure which are designed in an acceptable way in terms of seepage and run-off from the storage site. If there is a risk of leachate from stored manure harming human health or the environment, the space should be designed to prevent leakage and run-off into the surroundings. A risk of harm to human health or the environment is considered to exist in particular if surface water or groundwater is contaminated via run-off or leakage from the storage site.

The location of the storage site for livestock manure and other organic fertilisers should be selected such that

• any seepage from the storage site has as little negative impact as possible on the surrounding area, for example that the manure is not washed into nearby surface water and does not pollute groundwater,

• there is no adverse affect on the health of nearby residents, e.g. in the form of odours or flies.

In order to ensure there is no seepage or run-off from a storage facility for livestock manure the storage facility should be regularly inspected in order to detect and repair any defects.

Temporary storage in fields

Livestock manure or other organic fertilisers should be temporarily stored in covered pits in fields only if the manure can be piled at least 1 metre high. The storage time should always be kept to a minimum. If the manure has a high plant nutrient, in particular nitrogen, content (for example poultry manure or cattle manure mixed with a small amount of straw), it should be temporarily stored in fields primarily in direct connection with the spring tillage or during the summer and early autumn before autumn-sowing. During early spring and late autumn this storage period should be limited to one, or no more than a few, weeks. Manure mixed with a large amount of litter and which can be piled to 2 metres high, manure with a low nutrient content or composted manure may be stored for a slightly longer time.

The following points should be observed when temporarily storing livestock manure or

other organic fertilisers in fields:

• The pit should be located on the field on which the fertiliser will be applied. If the fertiliser is again stored on the same field the storage site should be moved within the field and the same spot should not be reused for 5 years.

• The amount of fertiliser should not be greater than is considered appropriate with regard to the nutrient requirement of the field in question.

• The storage site should be chosen or arranged so as to avoid seepage as a result of leaching or surface run-off from the manure during thawing or heavy rain and to ensure that there is no risk of surface water or the drinking water supply becoming contaminated.

• The fertiliser should not be stored in a place where there is a risk of flooding, water collecting or a high groundwater level during the storage period.

• The type of soil at the storage site should be such that it prevents rapid penetration through the soil profile.

• The fertiliser should not be stored directly above known drainage pipes.

• Application of the fertiliser should not damage the ground.

• The storage site should be chosen or situated such that nearby residents are not inconvenienced by odours or flies.

Composting in fields

Livestock manure in farms which require storage facilities under Ordinance (1998:915) on environmental concerns in agriculture should be composted primarily in facilities which comply with storage requirements.

However, manure which can be piled to at least 2 metres high and which needs to be composted prior to application may be composted in covered pits in fields. The following points should be observed when composting in this way:

• Composting should be carried out primarily during the summer (April to October). However, this is less important for manure mixed with large quantities of litter, e.g. horse manure.

• Manure should be spread at the earliest available opportunity once the material has finished composting.

• Any surplus compost after October should be covered with an impermeable material. However, horse manure or similar containing a high quantity of straw does not have to be covered.

• The same composting site must be used only for a limited time period.

• The compost should be placed on actively farmed arable land and on the field on which manure will subsequently be applied. If the same field is used for storage the composting site should be moved in the field and the same spot not be reused for 5 years.

• The site should be sown with crops as soon as possible after the fertiliser has been removed.

• The storage site should be chosen or arranged so as to avoid seepage as a result of leaching or surface run-off from the manure during thawing or heavy rain and to ensure that there is no risk of surface water or the drinking water supply becoming contaminated.

• A site on which there is a risk of flooding or of water collecting during the composting

period should not be used for storage.

• The type of soil at the site should not be such that there is rapid penetration through the soil profile. Sandy soil should therefore be avoided. Heavier soils can be surface-worked prior to composting to avoid rapid penetration through cracks and wormholes.

• The groundwater level on the site should not be too close to the surface and there should be no risk of the groundwater rising to the surface during the composting period.

• The compost should not be placed on a site which acts as a replenishment area for the abstraction of drinking water.

• Composting should not be carried out directly above known drainage pipes.

• Application of the fertiliser should not damage the ground.

• The composting site should be chosen such that nearby residents are not inconvenienced by odours or flies.

• The compost should be arranged in a way that promotes composting, for example by adjusting the amount and distribution in the pit to avoid a lack of oxygen.

1. Is there any official quantified goal that states to what extent this measure should be implemented? No

- *If "Yes";*
  - *a) specify quantity and unit:*
  - *b) if applicable, what year to be realized?*
  - *c) give reference(s):*
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit: A closed cover on storages with urine and digested manure

2. To what extent is this measure implemented today in relation to goal set above? 10
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: 98% of liquid manure storages and 94% of urine storages are covered with accepted methods including natural crust (SCB, 2010. Use of fertilisers and animal manure in agricutlure in 2008/09. MI30SM1002. Statistics Sweden. 102 pages)

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:Almost all liquid manure pits and urine pits has a cover according to what covers are permitted. A future goal is then to have a more efficient cover on storages with urine and digested manure, i.e. not only a cover of a natural crust but a more closed cover (Andersson et al. 2010).

Is this measure regulated in legislation? Yes *If "Yes"; national* ☒ *or regional* ☒ *rules*

***Reference(s)** to legislation:*Section 6 of Ordinance (1998:915) on environmental concerns in agriculture lays down requirements for minimum livestock manure storage capacity. Agricultural holdings with an annual average of no more than two livestock units are exempted from these requirements.

General guidance on Section 5a of Swedish Board of Agriculture rules (SJVFS 2004:62)

on environmental concerns in agriculture as regards plant nutrients

General guidance on Chapter 2, Sections 3-4 of the Environmental Code .

General guidance on Chapter 26, Section 19 of the Environmental Code, Section 5 of Ordinance (1998:901) on self-inspection by operators and Section 7 of Ordinance (1998:915) on environmental concerns in agriculture

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

Reference(s) *to subsidy rules:*The swedish rural deveopment programme 2007-2013.

Comments: Investment support is possible for investments that aims at creating a larger storage capacity than required or if the enhancment is needed due to larger livestock. This is also optional for each County Board if they choose to support the investment or not.

11. Constructed wetlands for nutrient reduction/retention

11.1 Sedimentation ponds

Small surface flow wetlands designed primarily to retain phosphorous. This is achieved by retaining eroded phosphorous bound to aggregates and particulate materials in the run-off water by optimizing the conditions for sedimentation processes. To some extent phosphorous and other nutrients are reduced due to biological and chemical decomposition and transformation processes as well as plant uptake.

A sedimentation pond is suitable for establishment in highly intensive small-scale agricultural areas. The ponds are relatively small representing approximately 0.1 – 0.5 % of the run-off area. The sedimentation pond is constructed for instance by widening a section in a ditch into a sedimentation pond slowing down the speed of the run-off water hence increasing sedimentation.

A sedimentation pond is often designed as a serial combination of (i) a sedimentation basin with a water depth of 1-1.5 m representing 20-30% of the total area of the sedimentation pond where the main sedimentation of larger particles takes place, followed by (ii) a wetland filter covered with typical wetland plants providing good conditions for sedimentation of smaller particles. In case the area is highly sloped it is suitable to include an overflow area followed by a second wetland filter prior to the outlet to further induce the sedimentation efficiency.

The accumulated sediments in the sedimentation basin need to be removed on regular basis for maintenance.

Describe this measure in your country if different :

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1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  a) specify quantity and unit: Ponds representing 300 hectares to 2013 and 500 hectares year 2016.
  b) if applicable, what year to be realized? 2013 and 2016
  c) give reference(s): The Swedish rural development programme 2007-2013. Andersson et al. 2010.
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 0
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:The investment costs are high and the costs for maintaining the P sedimentation capacity is unknown (Malgeryd, J., Albertsson, B., Folkesson, Ö. & De Maré, L. 2008. 64 Åtgärder inom jordbruket för god vattenstatus. Rapport 2008:31. Jordbruksverket, Jönköping. 140 sidor.)

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*From year 2010 there are within county priority measure a specific subsidy for construction of ponds for P sedimentation, corresponding to 300 000 SEK/hectares (Andersson et al. 2010).

Comments: Optional for each County Board if they choose to support or not

11.2 Constructed wetlands

Large free water surface wetlands are designed and constructed primarily for removal of nutrients, e.g. nitrogen and phosphorous and other pollutants from run-off water through sedimentation, biological and chemical transformation and degradation and plant uptake. Constructed wetlands have additional benefits, i.e. improved biodiversity, water storage capacity, resource recovery, irrigation possibilities and production of crop biomass.

Constructed wetlands are established, or re-established, to receive water from large run-off areas in arable as well as agricultural areas. The run-off area should be represented by at least 50 percent intensive agricultural land use with the constructed wetland covering approximately 0.5–4 % of the total run-off area.

An important characteristic is the establishment of typical emerges and submerges wetland vegetation. A constructed wetland provides heterogenic water regimes and environments. It is common with a mixture of areas with (i) permanently high water level, more or less covered with typical wetland vegetation, as well as (ii) periodically waterlogged areas with low water level. The water regime can also vary over the year.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  - *a) specify quantity and unit:* 6000 hectares
  - *b) if applicable, what year to be realized?* 2013
  - *c) give reference(s):* Andersson et al. 2010
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above? 1
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:Until 2010 the farmer had subsidies for 90% of the investment costs. the farmer has had to pay planning costs so far which has not been popular. The farmer can apply for subsidies to compensate costs for maintaining the effect of the wetland. The value of arable land has increased which means that it is not attractive to convert arable land to wetland.

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*The swedish rural deveopment programme 2007-2013.

Comments: Optional for each County Board if they choose to support or not

12. Buffer-zones along water areas and erosion sensitive field areas

Buffer zones are uncultivated areas between fields and water courses, main ditches, ponds, lakes or gulfs. Buffer zones are also to be implemented in erosion sensitive field areas such as around surface water wells or surrounding field areas with high ground water levels.

Buffer zones reduce the speed of water surface run-off mitigating losses of eroded aggregates, soil particles, and particulate phosphorous and other soil borne pollutants. They also decrease the risk of freshly spread manure and pesticides to reach the water environment. Buffer zones are an especially important measure in areas with eroding problems. Buffer zones also provide conditions for biological and chemical transformation of pollutions as well as plant uptake.

The buffer zones are under permanent plant cover of dense grass or vegetation. Buffer zones are situated on former agricultural land and have a width of 5-20 m. They are not allowed to be cultivated, fertilized or sprayed with herbicides or pesticides. The vegetation should be kept dense and plants should be established if needed for maintenance.

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? Yes

- *If "Yes";*
  - *a) specify quantity and unit:* A reduction of P losses from the root zone corresponding to 12,5 tonnes of P.
  - *b) if applicable, what year to be realized?* 2013
  - *c) give reference(s):* Andersson et al. 2010
- *If "No", what is your expert opinion of the desirable level in 5 years?*
  quantity and unit:

2. To what extent is this measure implemented today in relation to goal set above?
"0"=Not at all; "10"=Goal already reached

3. If goal is not reached; how do you judge the possibilities to fulfill it?
"0"=Impossible; "10"=Very good

Comments: Andersson, R., Bång, M., Frid, G. & Paulsson, R. 2010. Åtgärder för minskade utsläpp. Bilaga 2. Rapport 2010:10. Jordbruksverket, Jönköping. 189 sidor.

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:It is possible to apply for subsidies today for grassland and those 6-20 meters of strips next to water bodies, but it is not well utilized. From year 2010 the farmer can apply for subsidies for having protection zones at fields with high risk of P losses. However, no large utilization of this possibility is expected as the rules of how to place the protection zone at the field can make the farming too complicated (Malgeryd personal communication 2009).

Is this measure regulated in legislation? No *If "Yes"; national* ☐ *or regional* ☐ *rules*

***Reference(s)** to legislation:*

Comments:

Is this measure entitled to economic subsidy? Yes *If "Yes"; national* ☐ *or regional* ☒ *subsidy rules*

***Reference(s)** to subsidy rules:*The swedish rural deveopment programme 2007-2013.

Comments:

Added measure; no and title

Description of measure

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? • *If "Yes";* *a) specify quantity and unit:* *b) if applicable, what year to be realized?* *c) give reference(s):* • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit:* *2. To what extent is this measure implemented today in relation to goal set above?* *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* *"0"=Impossible; "10"=Very good*
Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation?	*If "Yes"; national ☐ or regional ☐ rules*
***Reference(s)** to legislation:*	
Comments:	

Is this measure entitled to economic subsidy?	*If "Yes"; national ☐ or regional ☐ subsidy rules*
***Reference(s)** to subsidy rules:*	
Comments:	

Added measure; no and title

Description of measure

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? • *If "Yes";* *a) specify quantity and unit:* *b) if applicable, what year to be realized?* *c) give reference(s):* • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit:* *2. To what extent is this measure implemented today in relation to goal set above?* *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* *"0"=Impossible; "10"=Very good*
Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation?	*If "Yes"; national ☐ or regional ☐ rules*
***Reference(s)** to legislation:*	
Comments:	

Is this measure entitled to economic subsidy?	*If "Yes"; national ☐ or regional ☐ subsidy rules*
***Reference(s)** to subsidy rules:*	
Comments:	

Added measure; no and title

Description of measure

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? • *If "Yes";* *a) specify quantity and unit:* *b) if applicable, what year to be realized?* *c) give reference(s):* • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit:* *2. To what extent is this measure implemented today in relation to goal set above?* *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* *"0"=Impossible; "10"=Very good*
Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation?	*If "Yes"; national ☐ or regional ☐ rules*
***Reference(s)** to legislation:*	
Comments:	

Is this measure entitled to economic subsidy?	*If "Yes"; national ☐ or regional ☐ subsidy rules*
***Reference(s)** to subsidy rules:*	
Comments:	

Added measure; no and title

Description of measure

Describe this measure in your country if different :

1. Is there any official quantified goal that states to what extent this measure should be implemented? • *If "Yes";* *a) specify quantity and unit:* *b) if applicable, what year to be realized?* *c) give reference(s):* • *If "No", what is your expert opinion of the desirable level in 5 years?* *quantity and unit:* *2. To what extent is this measure implemented today in relation to goal set above?* *"0"=Not at all; "10"=Goal already reached* *3. If goal is not reached; how do you judge the possibilities to fulfill it?* *"0"=Impossible; "10"=Very good*
Comments:

Comments on why the goal is easy/difficult to reach, what are the most important parameters in your country:

Is this measure regulated in legislation?	*If "Yes"; national ☐ or regional ☐ rules*
***Reference(s)** to legislation:*	
Comments:	

Is this measure entitled to economic subsidy?	*If "Yes"; national ☐ or regional ☐ subsidy rules*
***Reference(s)** to subsidy rules:*	
Comments:	

List of used words

Agricultural land (also **agricultural area**) denotes the land suitable for agricultural production, both crops and livestock.

Arable land is land under temporary agricultural crops, temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category.

Permanent crops - land cultivated with long-term crops which do not have to be replanted for several years; land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified under "forest")

Permanent meadows and pastures - land used permanently (five years or more) to grow herbaceous forage crops, either cultivated or growing wild (wild prairie or grazing land).

References

Pain B. and Menzi H., 2003: Glossary of terms on livestock manure management 2003. RAMIRAN Network, 59 pp. Copies available from: H. Menzi, Swiss College of Agriculture, Laenggasse 85, CH-3052, Zollikofen, Switzerland. harald.menzi@shl.bfh.ch

Definitions of agricultural words can be found in the FAO glossary http://faostat.fao.org/

Albertsson, B., 2010. Riktlinjer för gödsling och kalkning (Guidelines for fertilizing and liming). Jordbruksverket Jönköping. 84 pages. www.sjv.se

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