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**System for Environmental and Agricultural Modelling;
Linking European Science and Society**

A multidimensional farming system typology

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SEAMLESS integrated project aims at developing an integrated framework that allows ex-ante assessment of agricultural and environmental policies and technological innovations. The framework will have multi-scale capabilities ranging from field and farm to the EU25 and globe; it will be generic, modular and open and using state-of-the art software. The project is carried out by a consortium of 30 partners, led by Wageningen University (NL).

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Table of contents

General information

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Executive summary

This report describes the farm typology developed for SEAMLESS. So far the work only covers the EU-15. The general approach however, should be applicable to the whole EU. It is expected that within the next year FADN data will become available to also develop the typology for the new Member States.

In section 1, the introduction, the reasons for developing the farm typology are described:

- Bridging economic, environmental and social assessments,
- Linking farming data to environmental data,
- Linking marked level modelling to farm/field level modelling,
- Stratified sampling of sample regions,
- Linking statistical sources and expert knowledge,
- Creating "Open source" data bases and
- Communicating results.

In section 2 the different dimensions of the typology are described:

- Size: Measured as the economic size of farms

- Intensity: Measured as the total output in Euro per ha

- Specialisation: Measured as the standard gross margins from different types of crops and livestock

- Land use: Measured as the proportion of the agricultural area covered by specific types of crops.

To reduce the number of farm types the two last dimensions are combined in one dimension. This is possible because not all combinations of these two dimensions are relevant. In total of 189 farm types are identified. This is the aggregate of 3 size types, 3 intensity types and 21 combined specialisation/land use types. An example of a SEAMLESS farm type is then: Small scale, low intensity, arable/cereal.

In section 3 selected results on the distribution of farms, agricultural area, livestock units and agricultural output are given. The most important farm types in terms of area managed include medium and low intensity systems, whereas the most important farm types in terms of agricultural output are the high intensity farms. Arable farm types and dairy cattle farms are the most dominant in EU-15 in terms of area managed covering 37% and 18% respectively of the agricultural area. Though they produce a relatively small share of the

agricultural output, sheep farms manage 10% of the agricultural area. The opposite is the case for the pig farms, which produce 9% of the output on less than 2% of the agricultural area. In total 175 of the potential 189 farm types are represented by more than 15 sample farms in the FADN 2003 data, which means that they can be disclosed. The importance of all these 175 is of course not equal. The 20 most important farms in terms of land use cover 56% of the agricultural area. However, the share of these 20 farms in terms of number of total farms, total livestock units and total output comes closer to one third. The 50 most important farm types in terms of land use manage 86% of the area and cover around two thirds of the farms, livestock units and output. Seen from the other end, the least important 75 farm types manage just above 1% of the area and cover less than 7% of the total farms, livestock units and output.

In section 4 future work in relation to the SEAMLESS farm typology is outlined:

- Adaptation to FADN data 1990 to 2002
- Inclusion of farm types with disclosure problems
- Extension to EU-25
- Development of a regional typology based on farm types

This work is going to be finished in the first half of 2006

Specific part

1 Introduction: Why a SEAMLESS farm typology?

The reasons for developing a farm typology in SEAMLESS are many. The main reason why the typology is needed is because it supports:

- Bridging economic, environmental and social assessments,
- Linking farming data to environmental data,
- Linking marked level modelling to farm/field level modelling,
- Stratified sampling of sample regions,
- Linking statistical sources and expert knowledge,
- Creating "open source" data bases and
- Communicating results.

Farm typologies are not a new concept. In the European Community the presentation and analyses of agricultural statistics have been linked to a common typology for several decades (see for example Regulation 79/65/EEC). However, the rationale behind this Community typology reflects the time in which it was developed and is exclusively economically based. The main criterion for the division of the farms into different types is the relative distribution of the farm income coming from different production sources (field crops, dairy cattle etc.). This reflects that the typology was decided upon in a period when the main goals of the agricultural policies were related to production and economy. However, today the objectives of the agricultural policies have been broadened more strongly towards environment, landscape and rural viability. This has recently been reinforced in the reform of the Common Agricultural Policy: De-coupling of subsidies, cross compliance, good farming practices and standards, a larger budget for rural development etc. In order to be able to assess the increasingly broader goals of the policies a typology of farms is developed in SEAMLESS enabling the integrated assessment of farming activities in which economics is only one of the dimensions considered.

One of the biggest challenges for providing the data needed for integrated assessments in SEAMLESS is the linkage of farming data to environmental data. Statistical data on the agricultural sector are generally given per administrative region, which does not allow assessments to take the bio-physically heterogeneity of regions into account. In SEAMLESS the developed typology will therefore be linked to bio-physical characteristics by allocating the farm types to sub-regional areas, with more homogenous bio-physical endowments. This will be done using information on land use, altitude, Less favoured areas etc. from other data sources. The aim is that each of the administrative regions (Nuts2) will be divided into 1-4 regions based on the bio-physical, mainly climatic, characteristics. For each of these bio-physically homogeneous regions the share of the agricultural area managed by the different SEAMLESS farm types can then be specified. PD 4.7.2 (forthcoming) will describe the methodology for the spatial allocation in detail.

In SEAMLESS modelling will be applied at a variety of spatial scales. Two of these are the market level (CAPRI model) and the farm level (FSSIM model). The SEAMLESS farm typology will be used to link these two levels, not necessarily be modelling the same set of farm types, but by ensuring that the results of modelling at one level can be (dis)aggregated to the other level of modelling. If for example more farm types can be modelled at the farm level than at the market level, it should be ensured that the farm types used at the market level consist of a specific set of farm types from the farm level. In this way it can be ensured that modelling input and output of different models can be linked. In principle any farm type could be modelled together with any farm type, but the multidimensionality of the SEAMLESS farm typology (see below) facilitates the grouping of the modelling output to farm types that are homogeneous in terms of the farm type dimensions. E.g. if the market level model tells us that the income of a certain group of farms changes it is interesting to know whether this applies to intensive of extensive farms. Overall it is clear that for the modelling at market level the grouping of farms according to size and specialisation is most meaningful, whereas a better understanding of potential environmental impacts of farming can be created by connecting changes in farming to intensity and land use dimensions.

Within the duration of the current project (end 2008) it will not be possible to apply the detailed farm models to the entire territory of the European Union. It is envisaged that 20-30 sample regions will be covered. To maximise the usability of the modelling approaches and results, the sample regions will be selected taking the heterogeneity in farming and bio-physical endowment in the whole EU into account. If these sample regions are carefully selected it will be more easy to up-scale the modelling approaches and results in the sample regions to the entire EU territory. To provide the necessary basis to come to a representative selection of sample regions it is crucial to first create a good overview of the heterogeneity in farming and related bio-physical endowment in the EU. The farm typology is one means of obtaining this overview. It will be used to describe the pattern of farming at the regional level. This will for example help to identify dominant farm types or specific mixes of farm types per region. This will facilitate that the selection of sample regions includes regions that represent the diversity of farm types and the pattern of farm type mixes in the EU.

The European datasets on farming such as Farm Accountancy Data Network (FADN) and Farm Structural Survey (FSS) cannot provide all the data on farm management that are needed for the modelling at farm level in SEAMLESS. Examples of data that are not available in these European datasets are fertiliser and livestock management practices. It is therefore envisaged that this kind of information will have to be collected by consulting farm advisors and researchers at regional or national level. In order to make the collected information operational and to link to the information in the EU-wide datasets the farm typology will be used as a framework for collecting this additional data.

It is an explicit goal of SEAMLESS to develop a framework that can be distributed widely. The modelling software developed will therefore be based on open source standards. However, this approach has limited value if not accompanied by providing databases that also can be distributed freely. Specifically in relation to the agricultural statistical data this creates some complications. The data from FADN is collected from 48.034 sample farms (2003). However due to disclosure rules, the data can only be used and presented for groups of farms with 15 or more sample farms. It is therefore unavoidable to group the farms into farm types to be able to use and distribute the data.

Finally, the farm typology is not only a useful tool for analyses. Also when the modelling results and assessments are to be presented and disseminated a farm typology is a useful tool. It will support the simplification and visualisation of the results which is crucial for the communication of the project results and will make the presentation more powerful. Ideally the farm typology also provides the user with a framework for linking the model results and assessments to the knowledge of the user on the real situation "on the ground".

2 The SEAMLESS farm typology

2.1 The structure of the typology

The logic behind the Community typology already in use in both FADN and FSS is, in correspondence with the original purpose, strictly economic. To some degree it also reflects the land use on the farms, though this is translated into economic values at a regional level and not expressed in hectares. Apart from this aspect the environmental relevance of the typology can be assumed to be limited. Also the links from the Community typology to social issues is very limited. In earlier work alternative typologies have been tested on limited groups of farms. This is the case for grazing livestock farms, for which a typology was developed in the project European Livestock Policy Evaluation Network (ELPEN) (Andersen et al., 2004). A similar approach was applied in a project for the European Environmental Agency aiming to identify farms managing High Nature Value farmland (Andersen et al., 2003 and EEA/UNEP, 2004). Finally, the approach has also been used in the IRENA operation for elaborating indicators on the development of farming in EU-15 (EEA, 2005). In SEAMLESS we build on the experience from these projects.

In SEAMLESS it has been decided that the typology shall build on information on specialisation, land use, scale of production and intensity. A typology is always a simplification of the reality, but together these four aspects of the farms should provide a framework that bridges economic, environmental and social aspects of farming. To streamline the typology, that is to keep the number of farm types manageable, the two dimensions specialisation and land use have been combined as described below.

By choosing the dimension mentioned above it is also given that the typology must be based on data from FADN as this is the only data set covering the entire territory of EU that includes information on all the dimensions. The typology was designed based on analyses of data for 2003 and thereafter applied to previous years.

2.2 The size dimension

The size of a farm is an important dimension in relation to economic as well as social aspects of farming. Small farms, with or without additional income from other sources than farming, often react differently to policy measures and/or market changes than larger farms and might, in many cases, contribute to the viability of rural areas in other ways than the larger farms.

The size of farming can be measured in different ways: total number of hectares, herd size in livestock units or heads, output in tonnes or in Euros. As SEAMLESS aims to facilitate assessments across different sectors it was decided to use the economic output as basis for this dimension of the typology. Assessments across sectors still need to be done with caution, but it still provides a better ground for comparison than if livestock units or hectares were chosen. In order to be able to link to the existing definitions already implemented in the

agricultural statistics it was decided to base this dimension on the calculated standard gross margin (SGM) which can be used to determine the economic size of farms. The SGM of a crop or livestock item is defined as the value of output from one hectare or from one animal less the cost of variable inputs required to produce that output. In the agricultural statistics the SGM is calculated by the national statistical bureaus based on regional standard values for each crop and livestock item based on 3 years averages. This again is summarised per farm and expressed in terms of European Size Units (ESU), where 1 ESU corresponds to 1,200 Euro. It might be argued that the calculated SGMs do not reflect the diversity in output of the farms as this is blurred by using standard values in the calculations. However, in the SEAMLESS typology this aspect is included through the intensity dimension.

Using the same thresholds as in the agricultural statistics and taking into account that the number of farm types should be restricted, the size classes as presented in Table 1 are used in the typology.

Table 1: Types in the size dimension and definitions

Size type	Definition
Small scale	< 16 European size units (ESU)
Medium scale	=> 16 ESU and < 40 ESU
Large scale	=> 40 ESU

2.3   The intensity dimension.

The intensity of farming is an important dimension in relation to both the economic output and, especially, the environmental performance of a farm. Farms farming at a low intensity level – low input and normally low yields – are generally likely to have a lower pressure on the environment, than farms farming at a high intensity level. In specific cases it might even be that the maintenance of important farmland habitats through extensive farming practices is a pre-condition for the conservation of landscape values and biodiversity. This can both be the case in relation to extensive grazing systems and extensive arable systems. Permanent grasslands for example, especially the extensive semi-natural grasslands, are important habitats for the large number of species of different biota that rely on these habitats (see e.g. Evans, 2000; Anger et al., 2002; Foppen et al. 2000 and Bruinderink et al. 2003; Osterman, 1998). Vickery et al (2004) has shown that declines in farmland bird populations in the UK continue and that this is certainly related with the quantity and quality of habitats available, especially the gaps in resource provision in agricultural landscapes. Vickery shows that the creation of non-cropped habitats and field margins and so called 'arable pockets' in grassland regions and 'grassland pockets' in arable regions could be effective measures to support bird biodiversity. The importance of extensive farmland habitats is also clearly acknowledged in European policy. In the Mid-term review of the CAP the presumption was introduced not to convert permanent grassland with a maximum flexibility of 10% grassland loss per MS (EC Regulation 1782/2003). Natural and semi-natural grassland formations are an important group of habitats listed in the Annex I of the Habitat Directive. High Nature Value (HNV) farmland areas are now required to be targeted in rural development support. On the other hand, one should also be aware that low intensity in some cases can have negative effect on

the environment. This is for example the case in relation to under-grazing and encroachment and in relation to some types of soil erosion.

The intensity of farming can be measured in different ways: Level of inputs, level of outputs or yields. As for the size dimension it was decided to base the intensity dimension on economic values, to be able to compare across different agricultural sectors. Since across sectoral comparisons are more easy when using a dimension based on output instead of inputs, the first was chosen. On the input side there is a big difference between for example arable systems, where the input intensity is linked to land management and use of fertilisers and crop protection, and livestock systems, where the intensity is linked to stocking density and feeding strategies. The total output is defined as the total of output of crops and crop products, livestock and livestock products and other output in monetary terms. In contrast to the SGM used to define the size types, this is based on the real figures per farm. To define the types the output is related to the agricultural area and expressed as output per ha. See also Appendix 2 for a more detailed description of the computation of the total output. Furthermore, we have chosen to include all farms without agricultural land in the group of high intensity farms. These farms have to have husbandry as they would not be in the statistics without an agricultural production. But without any land the husbandry is kept in stables.

Table 2: Types in the intensity dimension and definitions per year. The threshold values are adjusted according to PPI (Producer price indices, total agricultural production, deflated). Farms with no agricultural land is included as high intensity farms in all years.

	Total output per ha, €			PPI 1)
	Low intensity	**Medium intensity**	**High intensity**	
1990	< 691	=> 691 and < 4147	=> 4147	134
1991	< 672	=> 672 and < 4031	=> 4031	130
1992	< 618	=> 618 and < 3707	=> 3707	120
1993	< 586	=> 586 and < 3516	=> 3516	114
1994	< 587	=> 587 and < 3521	=> 3521	114
1995	< 590	=> 590 and < 3541	=> 3541	115
1996	< 582	=> 582 and < 3495	=> 3495	113
1997	< 565	=> 565 and < 3393	=> 3393	110
1998	< 539	=> 539 and < 3232	=> 3232	105
1999	< 509	=> 509 and < 3056	=> 3056	99
2000	< 515	=> 515 and < 3093	=> 3093	100
2001	< 528	=> 528 and < 3167	=> 3167	102
2002	< 501	=> 501 and < 3006	=> 3006	97
2003	< 500	=> 500 and < 3000	=> 3000	97

1) Sources: http://europa.eu.int/comm/agriculture/agrista/table_en/agri.htm   for 1995 to 2003 and http://epp.eurostat.cec.eu.int/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL &screen=detailref&language=en&product=Yearlies_new_agriculture&root=Yearlies_new_agriculture/ E/E1/E13/eda34064 for 1990 to 1994. The figures for 1990 to 1994 have been slightly adjusted to match for 1995.

It is not possible to establish a direct link between the level of intensity and the impact on the environment. The selection of the specific threshold values is therefore to some degree arbitrary. To reach 3 different intensity levels we aimed to have threshold values around 75% below average and 50% above average total output per hectare in 2003. The final definitions chosen are presented in Table 2. The threshold values have been adjusted for the specific years according to producer price indices for total agricultural production in EU-15 to take into account the change in prices over time.

Again with some caution, using the total output per ha enables cross sectoral assessments. It should however be kept in mind that the typology is a generalisation. The resulting farm types can still vary considerably in environmental performance and ultimately in the impact on the environment. However, the dimensions and thresholds chosen should at least enable to identify farms with an environmental performance more comparable to the farms that are of the same farm type than with the farms belonging to the other types.

2.4   The specialisation dimension

The specialisation on agricultural activities is an important characteristic of a farm. The economic performances as well as the likely future choices on management are closely linked to specialisation (see IRENA indicator Specialisation in EEA, 2005). To some degree also the environmental impact of farming depends on specialisation – valuable landscapes are more often associated with grazing livestock than with arable farming for example (see e.g. Evans, 2000; Anger et al., 2002; Bokdam, 2002; Nagy, 2002; Heath, et al., 2000; Bignal & McCracken, 1996 & 2000; Osterman, 1998; Tucker and Evans, 1997). But within the different specialisations, extensive as well as intensive farms can be found resulting in very different levels of pressure on the environment.

Specialisation has been the basis of the well established Community typology of farms used in FADN as well as for FSS. This typology has also been used extensively for economic modelling – for example at marked level using the CAPRI model. As this model is going to be adapted to SEAMLESS, it is feasible to use the community types in this dimension of the SEAMLESS farm typology. This also enhances the linkage to work outside SEAMLESS, for example in the European Commission, where the use of the community typology is very common.

The Community typology builds, as explained under the size dimension, on calculated Standard gross margins. This means that the typology can be used across the different agricultural sectors. The different farm types are then defined based on the share of the total SGM that comes from a specific agricultural activity, which can be types of livestock or crops. In the Community typology this is detailed in four hierarchical levels depending on the degree of specialisation or on specific agricultural activities. In SEAMLESS we have chosen to include information from only the two highest levels of the Community typology and the level used differs from farm type to farm type as can be seen in Table 3. This again was a decision taken to keep the total number of farm types manageable and at the same time aiming to include the heterogeneity of farming across the territory of the EU.

Table 3: Types in the specialisation dimension with definitions and reference to codes in Community typology

Specialisation type	EU-code	Definition
Arable systems	1 + 6	> 2/3 of SGM from arable or (> 1/3 of SGM from arable and/or permanent crops and/or horticulture)
Dairy cattle	4.1	> 2/3 of SGM from dairy cattle
Beef and Mixed cattle	4.2 and 4.3	> 2/3 of SGM from cattle and < 2/3 of SGM from dairy cattle
Sheep, Goats and mixed grazing livestock	4.4	> 2/3 of SGM from grazing livestock and < 2/3 of SGM from cattle
Pigs	5.1	> 2/3 of SGM from pigs
Poultry and mixed Pigs/poultry	5.2	> 2/3 of SGM from pigs & poultry and < 2/3 of SGM from pigs
Mixed farms	7	All other farms
Mixed livestock	8	> 1/3 and < 2/3 of SGM from pigs & poultry and/or > 1/3 and < 2/3 of SGM from cattle
Permanent crops	3	> 2/3 of SGM from permanent crops
Horticulture	2	> 2/3 of SGM from horticultural crops

2.5 Land use dimension

Land use is an important issue in relation to especially the environmental impact of farming. For the livestock farms the land use reflects the feeding strategy of the farm ranging from highly intensive arable crops to extensive grasslands. For arable systems it ranges from farms with rotations including fallow as management strategy and mixed farms with a diverse cropping pattern to highly monoculture cereal farms and farms with highly specialised, intensive crops.

These different land use types are included in the types presented in table 4. As can be seen also a land use type called land independent is included. This is livestock farms that have no or only limited land available compared to the herd size. This is not in all cases strictly a land use type, but it represents an important farm type and for technical reasons it is important to distinguish this type, as many calculations based on agricultural area otherwise produce erroneous results.

After some considerations we decided to use round figures as threshold values. In a general typology for the whole EU, the selection of the threshold values will always be a compromise between two starting points. Firstly, to cover the heterogeneity in farming in the EU but also changes in this heterogeneity in time. Secondly, to create a simple enough typology that is practical for the purpose of the SEAMLESS project and the presentation of the results.

Table 4: Land use types and definitions. The FADN codes for the crops are given in Annex 1.

Land use type	Definition
Land independent	Utilised agricultural area (UUA) = 0 or LU (Livestock units)/ha (hectare) => 5
Horticultural	(> 0 UAA or LU/ha<5) and >= 50% of UAA in horticultural crops
Permanent crop	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and >= 50% of UAA in permanent crops
Temporary grassland	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and >= 50% of UAA in grass and >= 50% Temporary grass)
Permanent grassland	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and >= 50% of UAA in grass and < 50% Temporary grass)
Fallow land	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and >= 12.5% Fallow)
Cereal	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and < 12.5% Fallow) and >= 50% Cereals
Mixed crop	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and < 12.5% Fallow) and < 50% Cereals and < 25% of arable land in specialised crops.
Specialised crop	(> 0 UAA or LU/ha<5) and < 50% of UAA in horticultural crops and < 50% of UAA in permanent crops and < 50% of UAA in grass and < 12.5% Fallow) and < 50% Cereals and >=25% of arable land in specialised crops.

2.6 Combined land use and specialisation

Three size types, three intensity types, 10 specialisation types and 9 land use types combined results in potentially 810 types. It is not feasible to involve so many potential farm types in a modelling approach as SEAMLESS. Furthermore such a large number of farm types will also create more conflicts with the disclosure rules of FADN, since the larger the number of farm types the higher the chances that the separate types will not be represented by at least 15 sample farms, certainly if data are to be used and presented at lower than national and even administrative regional levels.

Table 5: The 21 combined specialisation and land use types

Specialisation type	Land use type
Arable	Cereal
Arable	Fallow
Arable	Specialised crops
Arable	Others
Dairy cattle	Permanent grass
Dairy cattle	Temporary grass
Dairy cattle	Land independent
Dairy cattle	Others
Beef and mixed cattle	Permanent grass
Beef and mixed cattle	Temporary grass
Beef and mixed cattle	Land independent
Beef and mixed cattle	Others
Sheep & Goats	Land independent
Sheep & Goats	Others
Pigs	Land independent
Pigs	Others
Poultry and mixed Pigs & Poultry	All
Mixed farms	All
Mixed livestock	All
Horticulture	All
Permanent crops	All

A combination of the specialisation and land use dimensions enabled the reduction of farm types. Since several combinations of these two dimensions do not exist anyway the integration of the two dimensions will not lead to much loss of information. For cattle farms it is for example relevant to highlight the grassland component of land use, whereas this is not relevant for arable farms. Focussing on the relevance and also to some degree the low number of farms of certain types in the FADN, 21 combined specialisation/land use types were chosen (see Table 5).

2.7 Overview of the complete SEAMLESS farm typology

The complete SEAMLESS typology consists of the dimensions describe above: Size, intensity and specialisation/land use. An overview of the complete typology is given in Figure 1.

An example of a SEAMLESS farm types is: Small scale, low intensity, arable/cereal.

In total 189 farm types are included in the typology which is mutually exclusive which means that all farms in the European Union belong to one, and only one, of the types.

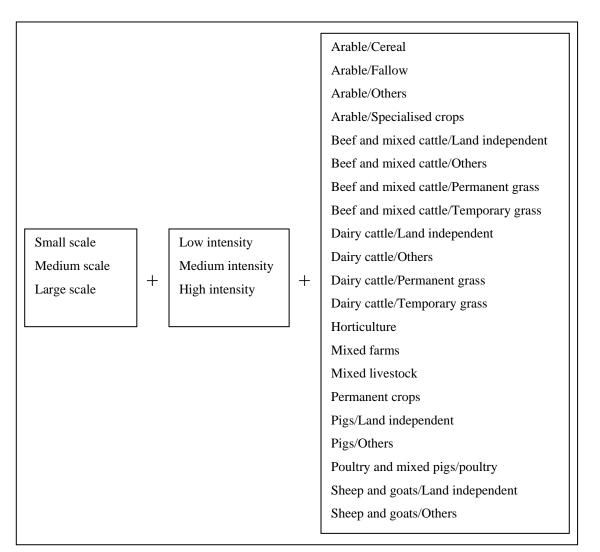| Small scale Medium scale Large scale	+	Low intensity Medium intensity High intensity	+	Arable/Cereal Arable/Fallow Arable/Others Arable/Specialised crops Beef and mixed cattle/Land independent Beef and mixed cattle/Others Beef and mixed cattle/Permanent grass Beef and mixed cattle/Temporary grass Dairy cattle/Land independent Dairy cattle/Others Dairy cattle/Permanent grass Dairy cattle/Temporary grass Horticulture Mixed farms Mixed livestock Permanent crops Pigs/Land independent Pigs/Others Poultry and mixed pigs/poultry Sheep and goats/Land independent Sheep and goats/Others

Figure 1: Overview of SEAMLESS typology of farms.

3 Selected results on the SEAMLESS farm types

In this section we present selected results on the distribution of farm types at EU-15 level. More detailed results and a data base with the first extractions from FADN based on the typology can be found on gis.slnet.dk/ SEAMLESS.

In table 6 it can be seen that large scale farms as defined in the typology include approximately one quarter of the farms, but manage almost two thirds of the area and almost 80% of the livestock. Almost half of the farms are small scale, but they only manage 15% of the area and 6% of the livestock. Consequently large farms account for 73% and small scale farms only for 11% of the total output from farming.

Table 6: The share of the farms, area, livestock units (LU) and output covered by the different size types, intensity types and specialisation/land use types.

	Share of farms %	Share of area %	Share of LU %	Share of output %
Small scale	49.5	15.2	6.3	10.7
Medium scale	24.4	24.3	16.6	16.7
Large scale	26.0	60.5	77.1	72.7
Low intensity	11.8	23.6	6.2	2.9
Medium intensity	53.4	61.6	39.0	37.9
High intensity	34.8	14.8	54.9	59.2
Arable/Cereal	12.4	18.6	2.2	9.4
Arable/Fallow	4.4	8.8	0.5	2.5
Arable/Others	6.3	6.1	1.1	4.8
Arable/Specialised crops	5.0	3.7	0.6	4.4
Beef and mixed cattle/Land independent	0.3	0.1	0.9	0.5
Beef and mixed cattle/Others	1.8	1.6	2.2	1.0
Beef and mixed cattle/Permanent grass	3.8	6.5	5.4	1.6
Beef and mixed cattle/Temporary grass	0.9	1.6	1.7	0.7
Dairy cattle/Land independent	0.4	0.2	1.4	1.3
Dairy cattle/Others	6.9	7.6	10.8	10.2
Dairy cattle/Permanent grass	5.7	7.5	10.1	7.7
Dairy cattle/Temporary grass	2.2	2.8	3.4	3.3
Horticulture	27.2	7.7	0.4	14.1
Mixed farms	6.6	11.0	11.8	8.5
Mixed livestock	2.3	2.7	8.9	4.2
Permanent crops	3.7	0.5	0.0	8.9
Pigs/Land independent	0.9	0.6	10.8	4.4
Pigs/Others	1.2	1.3	10.7	4.7
Poultry and mixed pigs/poultry	1.0	0.5	9.0	3.7
Sheep and goats/Land independent	1.1	0.1	1.1	0.6
Sheep and goats/Others	6.0	10.4	7.2	3.5

Source: EU-FADN – DG AGRI G-3, SEAMLESS adaptation.

As also can be seen the low intensity farms manage almost a quarter of the agricultural area, but produce only 3% of the output. The 35% of the farms that are defined as high intensity on the other hand manage 15% of the area and produce almost 60% of the output.

Arable farm types are the most dominant in EU-15 in terms of area managed covering more than one third of the agricultural area. Of the arable farm types cereals are the most dominant covering half of the agricultural area. Dairy cattle farms also manage a large share of the agricultural area (18%). The most important dairy cattle farm types are permanent grassland and others with an equal share of the agricultural area. Though they produce a relatively small share of the agricultural output (4%), sheep farms manage 10% of the agricultural area. The opposite is the case for the pig farms, which produce 9% of the output on less than 2% of the agricultural area.

In Table 7 the 10 most important farm types in terms of share of agricultural area managed are shown. The most important farm type is large scale, medium intensity, arable/cereal, as farms of this type manage 12% of the agricultural area in EU-15. But, as also can be seen, the share of the farms of this type is relatively small, as only 3% of the farms are of this type. One other farm type manages more than 5% of the agricultural area: Large scale, medium intensity, mixed farm. On the top ten list of farm types, the first 6 are held by large scale farms indicating that there is a strong relationship between area size and economic size. Seven of the farm types on the list are medium intensity and no high intensity farm types are present. This indicates a link between land availability and intensity. A variety of specialisation/land use types are among the 10 most important farm types in terms of area managed. However, beef cattle, pigs, poultry, mixed livestock, horticulture and permanent crop farm types are not listed. In total the 10 most important farm types manage 40% of the agricultural area and cover 13% of the farms, 18% of the livestock units and 21% of the output.

Table 7: Share of farms, area, livestock units (LU) and output for the 10 most important farm types in EU-15 measured by share of agricultural area

Size	Intensity	Specialisation/land use	Share of farms %	Share of area %	Share of LU %	Share of output %
Large	Medium	Arable/Cereal	2.7	11.6	1.6	5,9
Large	Medium	Mixed farms	1.7	5.7	5.0	3,8
Large	Medium	Dairy cattle/Permanent grass	1.8	4.0	4.9	3,2
Large	Medium	Dairy cattle/Others	2.1	3.8	4.1	3,4
Large	Low	Sheep and goats/Others	0.2	2.9	0.9	0,2
Large	Medium	Arable/Others	0.7	2.6	0.5	1,3
Medium	Low	Sheep and goats/Others	0.5	2.4	0.9	0,2
Medium	Medium	Arable/Cereal	2.2	2.4	0.2	1,2
Large	Medium	Arable/Fallow	0.5	2.3	0.2	1,0
Large	Low	Arable/Fallow	0.3	2.2	0.1	0,3
Total top ten			12.7	39.9	18.4	52

Source: EU-FADN – DG AGRI G-3, SEAMLESS adaptation.

As can be seen from Table 8, the picture is quite different when the importance of the farm types is measured in terms of share of the agricultural output. Only four farm types (large scale, medium intensity, mixed; large scale, medium intensity, dairy cattle/others; large scale, medium intensity, arable/cereal and large scale, medium intensity, dairy cattle/permanent grass) are present in both Table 7 and 8. Only large scale farm types are represented on the

list based on the share of the output and most of the farm types are managed at high intensity. Finally, pigs, horticulture and permanent crop farm types are on the list based on output, which was not the case for the list based on share of agricultural area managed.

Table 8: Share of farms, area, livestock units (LU) and output for the 10 most important farm types in EU-15 measures by share of output

Size		Specialisation/land use	Share of farms %	Share of area %	Share of LU %	Share of output %
Large	High	Permanent crops	1.3	0.3	0.0	7,2
Large	High	Horticulture	2.1	1.4	0.1	7,2
Large	Medium	Arable/Cereal	2.7	11.6	1.6	5,9
Large	High	Dairy cattle/Others	1.5	1.8	4.4	4,8
Large	High	Pigs/Others	0.8	0.9	9.1	4,2
Large	High	Pigs/Land independent	0.7	0.5	9.7	4,2
Large	Medium	Mixed farms	1.7	5.7	5.0	3,8
Large	Medium	Dairy cattle/Others	2.1	3.8	4.1	3,4
Large	Medium	Dairy cattle/Permanent grass	1.8	4.0	4.9	3,2
Large	High	Poultry and mixed pigs/poultry	0.6	0.3	7.2	3,2
Total top ten			15.3	30.3	46.1	84

Source: EU-FADN – DG AGRI G-3, SEAMLESS adaptation.

In total 175 of the potential 189 farm types are represented by more than 15 sample farms in the FADN 2003 data when presented at Member State level. The importance of all these 175 farm types is of course not equal, as it can be seen in table 9. The 20 most important farms in term of area managed cover 56% of the agricultural area. However, the share of the farms, livestock units and output for the same 20 farm types come closer to one third (30 – 36%). The 50 most important farm types in terms of area managed, manage 86% of the area and cover around two thirds of the farms, livestock units and output (64 -68%).

Seen from the other end, the least important 75 farm types manage just above 1% of the area and cover less than 7% of the farms, livestock units and output.

It should be remembered that farm types that are not that important at EU-15 level might be more important at a regional level. These results are not presented here, but can be seen on gis.slnet.dk/ SEAMLESS. Overall it is clear that the biggest difference occur in farm type mixes between Scandinavia, North-western Europe and the Mediterranean and between lowland areas and mountainous areas. It is also expected that once the typology is expanded to the new Member States the differences between the farm type mixes will become even bigger.

Table 9: The accumulated share of farms, area, livestock units (LU) and output covered by farm types sorted by size of area

No. of farm types sorted by size of area	Accumulated share of farms %	Accumulated share of area %	Accumulated share of LU %	Accumulated share of output %
10 largest	12.8	39.8	18.4	20.6
20 largest	35.8	56.3	30.1	33.1
30 largest	45.7	69.2	41.9	49.7
40 largest	52.1	78.6	61.3	59.3
50 largest	67.9	85.7	63.9	65.1
60 largest	75.0	90.2	76.9	73.9
70 largest	83.1	93.5	85.4	85.8
80 largest	86.0	95.8	89.4	89.7
90 largest	90.3	97.3	91.5	92.6
100 largest	92.8	98.3	93.6	94.1
110 largest	94.8	99.0	95.0	96.4
120 largest	97.4	99.4	97.1	98.3
130 largest	98.9	99.7	98.8	99.2
140 largest	99.4	99.9	99.3	99.6
150 largest	99.7	100.0	99.6	99.9
160 largest	99.9	100.0	100.0	100.0
170 largest	100.0	100.0	100.0	100.0
All 175	100.0	100.0	100.0	100.0

Source: EU-FADN – DG AGRI G-3, SEAMLESS adaptation.

4 Future work

4.1 Adaptation to older FADN data

In the next step of the work the typology will be tested on data from 1990 to 2002. The critical issue is whether the threshold values used for size and especially intensity can be used for all years or if a price correction needs to be added.

Work on this issue will be carried out before the 30th of June 2006.

4.2 Farm types with disclosure problems at the regional level

The results presented in section 3 only cover farm types with 15 or more sample farms at EU-15 level. In the data set to be included in the first prototype of SEAMLESS-IF the farm types will be described at the regional level for the 100 agricultural regions used in FADN. When moving to this level the problem of disclosure will increase as the chance to find at least 15 sample farms of a certain type in a smaller geographical entity reduces significantly.

To remedy this shortcoming we are planning to build a database where the farm types with less than15 sample farms are represented by an aggregation of farms that include farms of the same type from other regions. At the lowest level this could be farms from the most similar neighbouring regions, at the highest level it could be farms at Member State level.

This work is closely linked to the work in Task 4.7 on allocation of farm types and will be reported in PD 4.7.1.

The work on this issue will be carried out before the 1st of May 2006.

4.3 Expansion to EU-25

So far the work on the typology has been based on data for EU-15, as FADN data is not yet available for the new Member States. It is envisaged that the typology can be used in the new Member states without adaptations.

The work on this issue will be carried out as soon as data for the new member states become available. At the moment this is expected to happen mid 2006.

A detailed planning of this work cannot yet be made given uncertainty about when data will become available.

4.4 A typology of regions based on pattern of farm types

As mentioned in the introduction, a typology of regions based on the pattern of farm types will be developed to facilitate the selection of 20-30 sample regions. The typology will be

developed using cluster analyses on the distribution at the regional level of the agricultural area on the farm types in the SEAMLESS farm typology.

The work on this issue will be carried out before the end of February 2006.

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Glossary

European Size units   European Size Units The economic size of farms is expressed in terms of European Size Units (ESU). The value of one ESU is defined as a fixed number of EUR/ECU of Farm Gross Margin. Over time the number of EUR/ECU per ESU has changed to reflect inflation. Used in FADN to identify size classes.

FADN   Farm Accountancy Data Network of the European Union (FADN) has been established since 1965. The aim of the network is to gather accountancy data from farms for the determination of incomes and business analysis of agricultural holdings. Based on sample farms covering information on farms in EU-25.

FSS   Farm Structure Survey data are used to collect information on agricultural holdings in the Member States at different geographic levels (Member States, regions, districts) and over periods (follow up the changes in agricultural sector), thus provide a base for decision making in the Common Agricultural Policy. Responsible Institution at EU level is Eurostat.

Livestock units   Number of equidae, cattle, sheep, goats, pigs and poultry etc. present on holding in annual average terms, converted into livestock units corresponding to 1 dairy cow.

Standard gross margin   The standard Gross Margin (SGM) of a crop or livestock item is defined as the value of output from one hectare or from one animal less the cost of variable inputs required to produce that output. It is used in FADN to identify farm types and size classes.

Appendices

Appendix 1: FADN codes for crops used in the typology

	FADN code (K-)	Aggregate FADN code
Horticultural crops	136 to141	KHOR
Permanent crops	152 to159	KFRU + KOPC
Temporary grass	147	
Grass	147+150+151	
Fallow	146	
Cereals	120 to126 + 128	KCERRI
Arable	Sum(120 to 159)-138-141-(149 to 159)	
Specialised crops	126+130+131+133+ 134+135+333+136+ 137+140+142+143+ 139	

A full description of the variables and codes can be found at DGagri website:
http://forum.europa.eu.int/Public/irc/agri/rica/library?l=/fadn_committees/ricc/ricc882rev6_pdf/_EN_1.0_&a=d

Appendix 2: Reference to FADN regarding the definition of total output

SE131	Total output	Total of output of crops and crop products, livestock and livestock products and other output: Sales and use of (crop and livestock) products and livestock + change in stocks of (Crop and livestock) products + change in valuation of livestock - purchases of livestock + various non-exceptional products	SE135 + SE206 + SE256
SE135	Total output crops & crop production	= Sales + farm use + farmhouse consumption + (closing valuation - opening valuation).	[K120(7..10)..148(7..10)] - [K120(6)..148(6)] + [K150(7..10)..161(7..10)] - [K150(6)..161(6)]
SE206	Total output livestock & livestock products	livestock production + change in livestock value + animal products. Livestock production = Sales + Household consumption - Purchases It is calculated for equines, cattle, sheep, goats, pigs, poultry and other animals. Change in livestock valuation = value at closing valuation - value at opening valuation. For animals which are present on the holding for more than one year, the value corresponding to the increase in volume is estimated. Animal products = Sales + Household consumption + Farm use + (Closing valuation - Opening valuation). The products are: milk and milk products from cows, ewes, goats, wool, hens' eggs, other animal products (stud fees, manure, other eggs, etc.) and receipts from animals reared under a service contract (animals not owned by farmer) and honey	[E51(2..3)..58(2..3)] - [E51(1)..58(1)] + [K162(7..10)..171(7..10) + K313(7..10)] – [K162(6)..171(6) + K313(6)] + (J) + (L) + (M) + (P)
SE256	Other output	Leased land ready for sowing, receipts from occasional letting of fodder areas, agistment, forestry products, contract work for others, hiring out of equipment, interest on liquid assets necessary for running the holding, receipts of tourism, receipts relating to previous accounting years, other products and receipts (e.g. production of fixed assets).	K149(7..10) + [(K172(7..10)..K181(7..10)] – K149(6) - [K172(6)..181(6)]

For further reference see:

http://forum.europa.eu.int/Public/irc/agri/rica/library?l=/fadn_committees/ricc&vm=detailed&sb=Title