



BioBio indicator factsheet

## Average Stocking Rate (AvStock)

Refers to Chapter 8 'Management related indicators' of the Guidebook 'Biodiversity Indicators for European Farming Systems'

## Average Stocking Rate (AvStock)

### Description

Livestock density on the farm, i.e. number of livestock in relation to the farm area.

**Unit of measurement:** Number of livestock units (LU) per Utilized Agricultural Area (UAA).

**Sub-indicator** is 'Average stocking rate per ha forage area' (AvStockF)

It is a **pressure indicator**. Stocking rates tend to be lower on organic farms (maximum limits set under the organic regulations EC 834/2007 and EC 889/2008). This is due to restrictions on inputs such as fertilisers, pesticides and imported feed concentrate to boost feed production. Animal medicines are also restricted as they are often used to support artificially high stocking levels which have detrimental effects on biodiversity. Lower stocking rates result in decreased defoliation and treading, positive impacts on the pasture species mix and productivity and positive impacts on bird habitats and ground dwelling mammals (Dennis et al. 2009)<sup>1</sup>.

### Surveyor skills

Data collection can be done by technical staff (farm interviews, retrieval from databases). For data validation, skills in the interpretation of livestock data and corresponding background knowledge are necessary to examine the plausibility of both the input and output variables.

### Data collection method

If livestock dynamics on the farms is continuously reported to national databases, aggregated data (total livestock units per farm and year) may be retrieved from these reports. If these records are not available, basic data must be collected in farm interviews according to a questionnaire. The reporting year should be identical with the year of the biodiversity survey, i.e. the data should be collected after the official reporting year has been concluded.

### Calculation method

Input variables:

- livestock categories ( $L_i$ )
- livestock units for each livestock category ( $LU_i$ )
- average number of animals by livestock category on the farm (for one calendar year) ( $N_i$ )
- number of days per year that a particular livestock category spent on the farm ( $d_i$ ); this excludes the time spent on external (summer) pastures.
- forage area on the farm ( $A_f$ ): annual and perennial fodder crops, pastures.

$$\text{AvStock} = \sum (N_i \text{ LU}_i \text{ d}_i / 365) / A_{\text{UAA}}$$

$$\text{AvStockF} = \sum (N_i \text{ LU}_i \text{ d}_i / 365) / A_f$$

If the total annual livestock units per farm ( $LU_t$ ) is available from official livestock databases, the above formula can be abbreviated to



*Grazing cattle in Spanish dehesas. Photo: Gerardo Moreno, UEX*

$$\text{AvStock} = \text{LU}_t / A_{\text{UAA}}$$

$$\text{AvStockF} = \text{LU}_t / A_f$$

The coefficients for livestock units were based on EU agricultural statistics.<sup>2</sup>

### Results from BioBio case studies

Stocking rates on livestock keeping farms ranged from below 0.5 LU / ha forage area in Dutch horticulture farms, grassland farms in the Hungarian case study, and Dehesas in Spain to values above 2.0 LU / ha forage area on German mixed farms. Farms of the Dutch, the Swiss, the Welsh (grassland), and the German case study were quite variable and values of stocking rate covered a range of approx. 2 LU / ha forage area (see graph).

### Synergies with other indicators

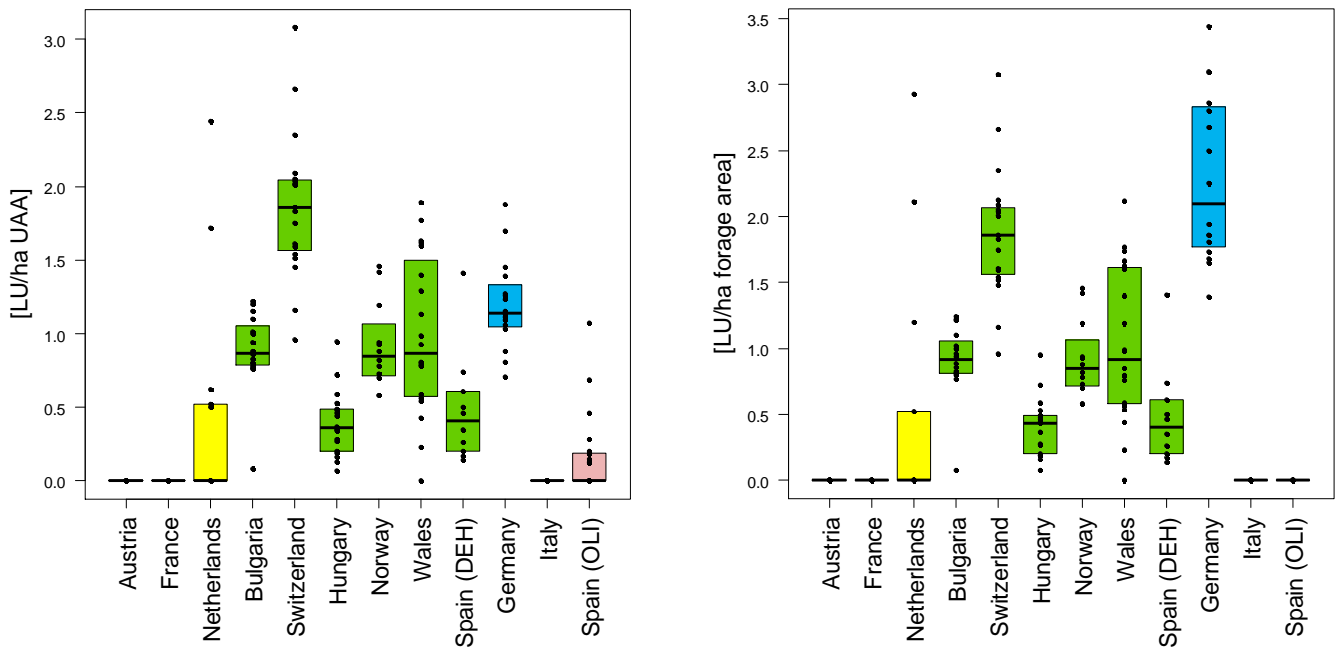
This indicator has synergies with 'N-Input' (incl. 'N-balance') and 'Grazing intensity'. Data can be recorded with the same set of questionnaire forms.

### Estimated effort and costs (labour effort required, analysis)

An average of 8 hours per farm must be calculated for the collection of the BioBio farm management indicators as laid down in the BioBio field handbook. This includes the farm interview, data processing and data check. However, there is considerable variation in time effort depending on the complexity of farms and the implementation (telephone interviews or farm visits).

<sup>1</sup> Dennis P. et al., 2009, [Conceptual foundations for biodiversity indicator selection for organic and low-input farming systems. BioBio Report](#)

<sup>2</sup> Community Committee for the Farm Accountancy Data Network (FADN), [Definitions of Variables used in FADN standard results. RI/CC 882 Rev.8.1.](#)



**Range of stocking rates in BioBio case study farms: livestock units per ha UAA (left) and livestock units per ha forage area (right)**

Legend: the colour of the bars signify the type of land management. Yellow: arable including horticulture; green: grassland; blue: mixed arable and grassland; pink: tree-based systems.

Remark: Spain (OLI): no data on grazing area was available for this case study, therefore no indicator 'AvStockF' calculated.

**Correlation with other indicators**

Stocking rate mostly had no significant relation to species indicators. A few negative correlations occurred: with 'Vascular Plants' in the German Mixed farming case study, with 'Wild Bees and Bumblebees' in the grassland case studies in Switzerland and Norway, and with 'Spiders' in Norway. The only positive correlation found was with 'Earthworms' in Bulgarian grassland farms.

**Average stocking rate change as an indicator**

A significant change in stocking rate has implications for nutrient management on the farm. An increase in indicator value can alter the nitrogen status on farmland because of the higher inputs from grazing animals or farmyard manure that will be recycled on farmland.

**Strengths and weaknesses**

There are difficulties in capturing the livestock dynamics in on-farm surveys, particularly in countries where farmers are not yet obliged to report livestock data to official databases on a regular basis. In these cases, it is recommended to record both the number of animals per livestock category and the number of animals produced (i.e. leaving the farm). For data quality checks, these data are helpful in examining the ratio of different livestock categories (younger and older animals) and, thus, the plausibility of the data.

In case farmers are continuously reporting livestock changes to a central database, annual data are available for each farm from database reports. Total livestock units per farm are documented and can be directly used for the calculation of livestock-related indicators. Gathering comprehensive primary data, as listed under 'Calculation', will not be necessary.

Difficulties occur if the animals are kept part of the year on common grazing land (e.g. summer farms, outfields). These common grazing lands cannot be attributed to individual farms. The time the animals spend on common grazing lands must be excluded, otherwise the indicator overestimates the livestock unit per hectare of farm land.

This factsheet is part of the Guidelines **Biodiversity Indicators for European Farming Systems**.

More detailed information on the set of indicators developed in the EU FP7 research project BIOBIO (Biodiversity indicators for organic and low input farming systems, KBBE-227161) is given in a printed report, published as ART Publication Series Nr. 17. The report can be downloaded from the [BioBio website](#).

Printed versions can be ordered at [www.agroscope.admin.ch](http://www.agroscope.admin.ch) or at Agroscope, Reckenholzstrasse 191, 8046 Zurich, Switzerland

## BioBio Indicator Factsheets

### Genetic diversity

Breeds: Number and amount of different breeds

CultDiv: Number and amount of different varieties

CropOrig: Origin of crops

### Species diversity

Plants: Vascular plants

Bees: Wild bees and bumblebees

Spiders: Spiders

Earthworms: Earthworms

### Habitat diversity

HabRich: Habitat richness

HabDiv: Habitat diversity

PatchS: Average size of habitat patches

LinHab: Length of linear habitats

CropR: Crop richness

ShrubHab: Percentage of farmland with shrubs

TreeHab: Tree habitats

SemiNat: Percentage of semi-natural habitats

### Indirect management indicators / parameters

EnerIn: Total direct and indirect energy input

IntExt: Intensification/Extensification - Expenditure on inputs

MinFert: Area with use of mineral fertiliser

NitroIn: Total nitrogen input

FieldOp: Field operations

PestUse: Pesticide use

AvStock: Average stocking rate

Graze: Grazing intensity