This article provides a fact sheet of the European Union (EU) agri-environmental indicator livestock patterns. It consists of an overview of data, complemented by information needed to interpret these data. This article on livestock patterns in the EU is part of a set of similar fact sheets, providing a comprehensive picture of the integration of environmental concerns into the Common Agricultural Policy (CAP).

Livestock patterns are defined as trends in the share of major livestock types (cattle, equidae (animals of the horse family), sheep, goats, pigs and poultry) and in the density of livestock units (LSU) on agricultural land.

**Key messages**

- In 2016, average livestock density in the EU reached 0.8 livestock units per hectare of agricultural area, ranging from 0.2 in Bulgaria to 3.8 in the Netherlands.

- Among the EU countries with high livestock density, the Netherlands reported the highest increase (+6.3 % since 2013); Bulgaria with the lowest livestock density rate in the EU increased most (+11.1 % since 2013).

- Almost half of the livestock population in the EU in 2016 consisted of cattle, one quarter was pigs, and close to one sixth was poultry.

- In 2016, more than half (55 %) of the agricultural holdings in the EU kept livestock, a decrease of one third since 2005.

**Livestock density at EU level in 2016**

The livestock density index gives an indication of the pressure that livestock farming places on the environment. In 2016, the livestock density in the EU-28 reached 0.8 livestock units (LSU) per hectare of utilised agricultural area (UAA). This was slightly higher than in the previous round of the Farm Structure Survey in 2013.

The grazing livestock density index gives an indication of the environmental pressure of livestock grazing on fodder area, which consists of fodder crops grown on arable land as well as permanent grassland. The livestock counted as grazing animals are cattle, sheep, goats and equidae (horses, donkeys and other members of the horse family). For the EU-28 as a whole, the grazing livestock density in 2016 remained at 1.0 LSU of grazing livestock per hectare of fodder area (Figure 1).
Livestock density at country level in 2016

The Netherlands had the highest livestock density of the EU Member States

The Netherlands remained the Member State with the highest livestock density, reaching 3.8 LSU/ha in 2016. Malta and Belgium also reported high livestock densities, with 2.9 and 2.8 LSU/ha respectively. The same three countries recorded the highest densities of grazing livestock in 2016, with 2.7 grazing LSU/ha fodder area in the Netherlands, 2.5 LSU/ha in Malta and 2.4 LSU/ha in Belgium. Another country with a relatively high density of grazing livestock was Cyprus, with 2.1 LSU/ha fodder area.

The lowest total livestock densities among the Member States were observed in Bulgaria (0.2 LSU/ha) as well as in Slovakia and the three Baltic countries (all 0.3 LSU/ha). However, from 2013 to 2016 the livestock density in Bulgaria increased relatively more (+11.1 %, to 0.2 LSU/ha) than in any other Member State (Figure 2). Other Member States with low livestock density but considerable relative increases were Portugal (0.6 LSU/ha, up 9.2 %) and Hungary (0.5 LSU/ha, up 7.9 %). Among the countries with high livestock density, the increase was highest for the Netherlands (up 6.3 % to 3.8 LSU/ha).

Latvia (0.4 grazing LSU/ha fodder area) was the Member State with the lowest grazing livestock density. However, several other countries reported only slightly higher grazing livestock densities. These included Estonia and Slovakia (both 0.5 LSU/ha), as well as Portugal, Croatia, Romania and Bulgaria (all 0.6 LSU/ha).

In the majority of Member States, the grazing livestock density was somewhat higher than total livestock density; only Malta, the Netherlands and Belgium, the three countries with the highest densities for both, as well as Ireland reported higher values for total livestock density.
Livestock density at regional level in 2016

Strong concentration of livestock in the regions in south and central Netherlands, the bordering regions in Germany and in north Belgium

From a regional perspective, the highest livestock densities were reported in a cluster of regions in south and central Netherlands, north Belgium and western Germany. In the Netherlands, Nord-Brabant (8.2 LSU/ha), Limburg (7.6 LSU/ha), Gelderland (5.5 LSU/ha), Overijssel (4.8 LSU/ha) and Utrecht (4.0 LSU/ha) reported the highest livestock densities. In Belgium, the livestock density was particularly high in the three provinces West-Vlaanderen (6.3 LSU/ha), Antwerpen (6.0 LSU/ha) and Oost-Vlaanderen (3.7 LSU/ha), while in Germany the Regierungsbezirke Münster and Weser-Ems stood out (both 3.8 LSU/ha). Most of these regions reported a higher livestock density in 2016 than in 2013.

No other regions in the EU-28 reported a livestock density above 3.0 LSU/ha. There were also no other comparable geographical clusters of regions with high livestock densities. However, individual regions such as Malta (which at NUTS2 level is a single region), Bretagne in France, Lombardia in Italy and Cataluña and Galicia in Spain all reported livestock densities of between 2.0 and 2.9 LSU/ha. The same applied to the Province of Limburg in Belgium and Friesland in the Netherlands.

At the other end of the range, the lowest livestock densities were registered in regions with capital cities such as Vienna, Paris, Helsinki and Brussels, tourist destinations such as Jadranjska Hrvatska and Algarve, as well as areas that have a high share of rough grazings (very extensive grasslands) such as the Scottish Highlands.
Focus on the structure of the livestock population

The total livestock population in the EU remained stable from 2013 to 2016; the importance of the different livestock types also remained roughly the same.

In 2016, there was a total of 131 million livestock units (LSU) in the EU-28; about one half (49.0 %) were cattle, one quarter (25.2 %) were pigs and close to one sixth (15.8 %) were poultry. Overall, there were only marginal changes from 2013 to 2016 in the stocks of LSU and in the shares of the different types of livestock in the total stock in the EU-28.

In absolute terms, France had the highest number of total livestock units (22.1 million LSU), followed by Germany (18.2 million LSU), Spain (14.4 million LSU) and the United Kingdom (13.3 million LSU). On the other hand, the lowest number of LSU was reported in Malta (32 470 LSU).

Almost half of the livestock population in the EU in 2016, measured in livestock units, consisted of cattle.

In 2016, cattle was the main type of livestock (in LSU) in 23 of the Member States, making up half or more in 14 countries. In particular, cattle dominated in Luxembourg (83.9 %) and Ireland (82.4 %). Cattle also made up around two thirds of the livestock (in LSU) in Estonia, Slovenia, Lithuania and Latvia. In contrast, less than one quarter of the livestock population in Greece and Cyprus was composed of cattle.
Pigs accounted for two thirds (66.8 %) of the livestock population in Denmark in 2016; this was by far the highest proportion in any Member State. The only other Member States where pigs constituted more than one third of the livestock population were Belgium (39.9 %), Spain (39.3 %), Germany and the Netherlands (both 35.6 %) and Cyprus (35.3 %). In Denmark, Cyprus and Spain pigs were the largest category of livestock. At the opposite end of the scale, pigs accounted for only a small share of the livestock population in Ireland, Greece and the United Kingdom (6.3 %, 8.1 % and 8.4 % respectively).

Poultry accounted for the largest share of the livestock population in Hungary; sheep for the largest share in Greece

Poultry was the third most important category in a majority of the Member States. Hungary stood out with a share of poultry of 37.0 % in the livestock population, making poultry the main category in its livestock population measured in LSU. The share of poultry lay above 20 % also in Malta (24.2 %), Poland (23.6 %), Slovakia (20.8 %) and Italy (20.4 %).

Greece was the only country where sheep constituted the largest category of livestock (39.1 %); the United Kingdom reported the next highest share of sheep, one quarter (25.0 %). In 21 Member States the share of sheep was less than 10 %.

As for goats, Greece (16.8 %) and Cyprus (9.9 %) were the only Member States to record shares of more than 3 % in the total livestock population (in LSU).

Agricultural equidae, i.e. animals of the horse family, did not account for more than a minor share of the livestock in any of the Member States. Romania (6.0 %), Bulgaria (4.9 %) and Sweden (4.7 %) were the only countries where the share of equidae exceeded 4 % of the total livestock population.

Focus on the agricultural holdings with livestock in 2016

More than half of the agricultural holdings in the EU kept livestock

There were 5.7 million agricultural holdings (farms) with livestock in the EU-28, compared to 10.5 million farms in all. This meant that more than half (54.8 %) of EU farms were keeping livestock. Between 2005 and
2016, the total number of farms in the EU (not including Croatia, as 2005 data are not available for comparison) decreased by 28.6 %. Over the same period, the number of farms with livestock fell even stronger, by well over one third (-37.6 %).

**In Ireland, more than nine in ten holdings kept livestock in 2016**

Three quarters or more of the farms kept livestock in Ireland, Slovenia, Luxembourg and Romania, with the United Kingdom just short of three quarters. The highest figure was reported in Ireland, where more than nine in ten farms (92.0 %) kept livestock in 2016. On the other hand, less than 30 % of the farms kept livestock in Italy, Spain, Cyprus and Malta, with the lowest figure reported in Italy 13.5 %.

**The number of holdings and holdings with livestock both fell; in most countries, the decrease in number of holdings with livestock was greater**

Overall, the total number of farms fell in all Member States except Ireland between 2005 and 2016. All Member States except Malta reported fewer farms with livestock in 2016 than in 2005; the number of farms with livestock in Malta increased marginally (+30 farms) despite a fall in the total number of farms. In the United Kingdom and Cyprus, the share of farms with livestock increased only because the total number of farms fell more than the number of farms with livestock. Over the period 2005-2016, the number of farms with livestock was down by more than one third in the majority of Member States. The strongest decreases in the number of farms with livestock were reported by for Slovakia (72.2 %) and Bulgaria (71.9 %), but the number of farms keeping livestock more than halved also in Estonia, Lithuania and Poland.

![Figure 4: Farm holdings with livestock, EU-28, 2005-2016](source)

Source data for tables and graphs

- Livestock patterns statistics

**Data sources**

**Indicator definition**

Livestock patterns are defined as trends in the share of major livestock types (cattle, sheep, goats, pigs and poultry) and density of livestock units (LSU) on agricultural land.
Main indicator

- **Total livestock density** (livestock units/hectare of utilised agricultural area)

Supporting indicator

- Number of animals (cattle, equidae (animals of the horse family), sheep, goats, pigs and poultry)
- Share (%) of major livestock types (cattle, equidae, sheep, goats, pigs and poultry) in total livestock population
- **Grazing livestock density** (grazing livestock units/hectares of fodder area)

Links with other indicators

This indicator has links to a number of other AEI indicators that describe developments in some of the main contributory factors.

Data used

Livestock patterns are described on the basis of data from the **Farm structure survey (FSS)**. The FSS is carried out by all EU Member States; it is conducted consistently throughout the EU with a common methodology at a regular base and therefore provides comparable and representative statistics on livestock and land use across countries and time, at regional levels (down to NUTS 3 level). Every three or four years the FSS is carried out as a sample survey, and once in ten years as a census.

The unit underlying the FSS is the **agricultural holding**, a technical-economic unit under single management engaged in agricultural production. Until 2007, the FSS covered all agricultural holdings with a UAA of at least one hectare (ha) and those holdings with a UAA of less than one hectare if their market production exceeded certain natural thresholds. From 2008 onwards, the thresholds for agricultural holdings changed to cover a range of physical thresholds. This has an impact on the comparability of data across time. More information about the thresholds can be found in the background article **Farm structure survey – survey coverage**.

Data on livestock are also available from annual livestock statistics. The **livestock survey**, a frequent and specialized survey, provides information about the livestock population in the European Union (EU) at national and regional level. It is conducted once a year, in December, in all Member States.

Data on land use are also available from crop statistics. Crop statistics are collected consistently throughout the EU with a common methodology annually and therefore provide comparable and representative statistics on land use across countries and time, at national level. Data on land use from this data source might however differ from data collected by FSS, due to differences in data collection methods and populations.

Methodology

Holdings are counted as **holdings with livestock** when they have cattle, goats, sheep, pigs, poultry, equidae, rabbits, beehives or other livestock. The livestock in livestock units (LSU) is calculated as the sum of the LSU of cattle, goats, sheep, pigs, poultry, equidae and rabbits. Holdings with livestock and no LSU are holdings which have beehives or other livestock.

The total livestock density measures the stock of animals (cattle, sheep, goats, equidae, pigs, poultry and rabbits) expressed in LSU per hectare of utilised agricultural area. Livestock numbers are converted into livestock units using specific coefficients. A livestock unit (LSU) is a reference unit which facilitates the aggregation of livestock from various species and ages. Livestock units are not calculated for bees and other livestock.

The utilised agricultural area (UAA) is the total area taken up by arable land (including temporary grassland and fallow land), permanent grassland, permanent crops and kitchen gardens. It should be noted that common land is included in FSS in some countries and this has an impact on the comparability of data on land use. More information on this can be found in the background article on **Farm structure survey – common land**.

The grazing livestock density measures the stock of grazing animals (cattle, sheep, goats and equidae) expressed in livestock units (LSU) per hectare of fodder area. The fodder area is the sum of fodder brassicas and roots, forage plants and permanent grassland (excluding permanent grassland no longer used for production or
eligible for subsidies).

Context
Introduction

Livestock patterns helps to interpret the relation between agricultural livestock production and the environment by describing the types and numbers of animals raised in an area. This fact sheet uses livestock density as an indicator of the pressure of livestock farming on the environment. The impacts of livestock farming vary depending on the intensity of farming. Extensive grazing regions can for example be biodiversity hotspots\(^1\), but when the pressure of livestock production has gone beyond the adsorptive capacity of the resource base, water and air pollution occur.

Total livestock density, defined as the ratio of total livestock (including battery (indoor) animals such as pigs and poultry) to the total utilised agricultural area (UAA) of a farm, region, or country, is therefore an indicator of the intensity of livestock production. While grazing of herbivorous livestock (bovines, sheep and goat) is a mandatory feature of organic farming, in “zero hectare” farms\(^2\)\(^3\)animals are kept indoors and are fed with harvested fodder, or a concentrated diet of grain,\(^4\) and other supplements. Granivores (pig and poultry) are usually fed with specific feedstuffs. As a result, farms raising granivores do not necessarily need agricultural land. Between 2013 and 2016, the number of zero hectare farms grew with 31 % in the EU, from 164 000 to 214 000\(^3\).

Policy relevance and context

The Common Agricultural Policy (CAP) consist of several instruments that affect livestock patterns in different ways. Farmers are encouraged to continue playing a positive role in the maintenance of the countryside and the environment. Livestock units (LSU) is one of the forty-five CAP context indicators that have been identified to describe the general context in which policy measures are designed, planned and implemented. They form part of the Monitoring and Evaluation Framework for the CAP 2014-2020, and are used in Rural Development Programmes for a comprehensive overall description of the current situation of the programming area.

CAP funding measures may directly and indirectly influence the livestock patterns. The decoupling of direct payments in the 2003 reform\(^4\) led to an increase in farm specialisation from the year 2004 to 2009\(^5\). About 33 % of farms classified as “Mixed livestock farms” in 2004 migrated to more specialised sectors (in particular specialist livestock, i.e. focusing on one livestock species) in 2009. About 34 % of farms classified as “Mixed crops-livestock” in 2004 migrated to higher-specialised sectors in 2009, expanding cropping or breeding activity. With regard to livestock farms with land, the grazing livestock stocking rate per hectare decreased in almost all types of farms. This extensification may however only be apparent, since the greater increase in agricultural area for fodder crops (compared with the variation in livestock units) may conceal the substitution of animal feed purchased outside the farm with animal feed crops produced on the farm (choice determined by the change in relative prices). In livestock farms without land specialised in granivores, the number of livestock units shrunk considerably (-16.5 % between 2004 and 2009) probably due (at least partly) to farms not being able to address the increase in cereals price by expanding their own production of livestock feed crops.

\(^1\)Jedicke, E., Metzner, J., Unse, L., Extensive grazing – Sustainable nature conservation on pastures in the EU, the German federation and its federal states, 2010.

\(^2\)Farms with livestock but no utilised agricultural area.

\(^3\)Eurostat, Farm Structure Survey, Main livestock indicators by NUTS 2 regions (ef. lsk_main).

\(^4\)The 2003 reform of the CAP cut the link between subsidies and production. Farmers started to receive instead an income support, on condition that they look after the farmland and fulfil food safety, environmental, animal health and welfare standards.

\(^5\)https://ec.europa.eu/agriculture/evaluation/market-and-income-reports/structural-effects-direct-support-2013_en
The cross-compliance was introduced in 2003. One of its elements is the respect of legislative standards, called “Statutory Management Requirements” or SMR. SMR1 is the Nitrates Directive, which concerns protection of waters against pollution caused by nitrates from agricultural sources. It provides a general framework for livestock farming through the designation of Nitrate Vulnerable Zones and through the rules on spreading of manure to minimise nutrient leaching and its environmental consequences.

Under the 2013 CAP reform, the so called “Greening” introduced environmental obligations for farmers and Member States. One of them is to maintain permanent grassland, for carbon sequestration and biodiversity, which can indirectly influence livestock levels through providing grazing/fodder areas.

Rural development measures funded by the CAP also influence livestock pattern. This can be as well directly as indirectly through funding productive investments (which subsidises equipment and infrastructure needed for intensification), agri-environmental-climate payments, animal welfare payments or compensations to farmers in Natura 2000 areas which usually imposed a maximum livestock density.

Livestock has an impact on greenhouse gas (GHG) emissions. The EU Effort Sharing Legislation (Regulation (EU) 2018/842) sets targets for the reduction of GHG emissions from a number of sectors, including agriculture. The Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants and the Convention on Long-range Transboundary Air Pollution (CLRTAP) set limits for nitrogen oxides and ammonia (NH3) emissions for EU countries; livestock production is the main source for NH3 emissions.

Finally, national policies (e.g. support to biogas productions), as well as global markets and international trade policies can influence livestock patterns.

**Agri-environmental context**

Cropping and livestock patterns influence natural resources (soil, water and air) and delivery of ecosystem services (carbon sequestration, water quality and quantity, air quality, etc.). A mosaic of different types of crops and grassland, such as mixtures of arable and permanent crops can make EU landscapes more attractive and provide greater habitat diversity for farmland species.

Grazing by livestock has created the landscape and habitat diversity of pastoral farming systems, which remain particularly important in the mountainous regions of Europe. Without grazing by livestock, especially cattle and sheep, most of these valued agricultural landscapes would disappear. Extensively managed permanent grassland with low grazing livestock densities provide habitats for many specialised plant and animal species.

---

6 Cross-compliance refers to the notion that there is a link between receipt of CAP support by farmers and respect of a set of basic rules related to the main public expectations on environment, public and animal health, as well as, animal welfare.


8 DG Agriculture and Rural Development, Agriculture and rural development Evaluation study of the payment for agricultural practices beneficial for the climate and the environment (“greening” of direct payments), 2017.


species\textsuperscript{12,13}. But low total and grazing livestock densities could also indicate a risk of land abandonment which may result in the loss of environmental diversity, while high grazing livestock densities could indicate overgrazing with increased risks of soil erosion and nutrient surpluses.

The total livestock density reflects the pressure on the environment from manure. Exports of manure and manure processing to reduce nutrients are non-significant in most countries, and storage capacity of manure is limited, so increases in livestock units per ha UAA lead to increased manure-spreading on the area concerned. Excessive manure-spreading could increase nutrient surpluses. Intensive livestock systems, especially pig and poultry production, are one of the main sources of potential nutrient surpluses, with associated environmental impacts on air and water.

A high number of animals per ha could also lead to intensification of fodder production and imports of animal feedstuffs to meet the feed requirements of the animals. Such imports are an external source of nutrients and therefore leads to additional emissions of NH\textsubscript{3}and nutrient surplus of soils. High total livestock densities are therefore associated with pressure on the environment in general and air and water quality in particular. Low total livestock densities could indicate high specialisation on crop production and insufficient provision of manure, which could increase the need for industrial fertilisers which contribute to GHG emissions through its production.

Storage, management and application of manure also leads to emissions of air pollutants such as NO\textsubscript{x} and NH\textsubscript{3}, and emission of fine particles with a diameter of 2.5 $\mu$m or less (so-called PM2.5). Release of ammonia from animal husbandry and fertilizer use is a leading cause of air pollution, especially in large parts of Europe\textsuperscript{14}

Livestock production generates the largest share of food-related greenhouse gas (GHG) emissions\textsuperscript{15} both directly through enteric fermentation in ruminants and through emission related to manure. Livestock farming is a food production process with relatively low calories or proteins produced per area (as compared to vegetal protein crops such as cereals or pulses). On the other hand, ruminants are able to convert for humans inedible biomass into high quality food on land that otherwise not always could be brought into agricultural production\textsuperscript{16}.

Other articles

- Agri-environmental indicators - dashboard
- Agri-environmental indicators - background
- Cropping patterns - fact sheet
- Farm structure survey (FSS)

\textsuperscript{12}Brak, B.H., Hilarides, L., Elbersen, B.S., van Wingerden, W., Extensive livestock systems and biodiversity: The case of Islay \textit{. Alterra Report 1100, Wageningen, 2004.}


\textsuperscript{14}Andrea Pozzer et al., 'Impact of agricultural emission reductions on fine-particulate matter and public health', \textit{Atmospheric Chemistry and Physics , 2017. (DOI: 10.5194/acp-17-12813-2017 )}

\textsuperscript{15}Gerber P. J. et al., Tackling climate change through livestock: a global assessment of emission and mitigation opportunities, Food and Agriculture Organization of the UN, 2013.

Tables

- Cross-cutting topics - Agri-environmental indicators

Livestock density index (tai09)

- Agriculture (t_agr)

Farm structure (t_ef)

Agricultural holdings with livestock (tag00124)

Agricultural production (t_apro)

Livestock and meat (t_apro_mt)

- Number of dairy cows (tag00014)
- Number of bovine animals (tag00016)
- Number of sheep (tag00017)
- Number of pigs (tag00018)
- Animal populations by NUTS 2 regions (tgs00045)

Database

- Agriculture (agri)

Agriculture and environment (aei)

Share of main livestock types in total livestock units (LSU) by NUTS 2 regions (aei_ef_ls)

Farm structure (ef)

Main farm indicators by NUTS 2 regions (ef_mainfarm)

Farm indicators by agricultural area, type of farm, standard output, legal form and NUTS 2 regions (ef_m_farmleg)

Farm land use by NUTS 2 regions (ef_landuse)

Main farm land use by NUTS 2 regions (ef_lus_main)

Main livestock indicators by NUTS 2 regions (ef_lsk_main)

Farm structure - 2008 legislation (from 2005 onwards) (ef_main)

Key farm variables (ef_kv)

Key variables: area, livestock (LSU), labour force and standard output (SO) by type of farming (2-digit) and NUTS 2 regions (ef_kvftreg)

Overview - Farm livestock (ef_ols)

Livestock: number of farms and heads of animals by type of farming (2-digit) (ef_olsuft)

Livestock: number of farms and heads of animals of different types by agricultural size of farm (UAA) and NUTS 2 regions (ef_olsaareg)

Livestock: number of farms and heads of animals by livestock units (LSU) of farm and NUTS 2 regions (ef_olsureg)

Agricultural production (apro)

Animal production (apro_anip)

Poultry farming (apro_ec)

Livestock and meat (apro_mt)

Livestock (apro_mt_ls)
Dedicated section

- Agri-Environmental Indicators
- Agriculture - Overview

Publications

- Agriculture, forestry and fishery statistics - 2018 edition

Methodology

- Structure of agricultural holdings (ef_esms)

Legislation

- Commission Communication COM(2006)508 final - Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy
- Commission Staff working document accompanying COM(2006)508 final

External links

- European Commission
  - DG Agriculture and Rural Development
    * CAP at a glance
    * CAP indicator dashboard
    * Agriculture and the environment
    * Rural development
    * CAP Context Indicators - Livestock Units
  - DG Environment
    * Reduction of national emissions of atmospheric pollutants
    * Nitrates Directive
    * High Nature Value farming