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Commission recommendations for Luxembourg's CAP strategic Plan

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Recommendations to the Member States as regards their strategic plan for the Common Agricultural Policy

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1. COMMISSION RECOMMENDATIONS FOR LUXEMBOURG'S CAP STRATEGIC PLAN

In the framework of the structured dialogue for the preparation of the common agricultural policy (CAP) strategic plan, this document contains the recommendations for the CAP strategic plan of Luxembourg. The recommendations are based on analysis of the state of play, and the needs and priorities for agriculture and rural areas in Luxembourg. The recommendations address the specific objectives of the future Common Agricultural Policy (CAP), and in particular the ambition and specific targets of the Farm to Fork Strategy and the Biodiversity Strategy for 2030. As stated in the Farm to Fork Strategy, the Commission invites Luxembourg, in its CAP Strategic Plan, to set explicit national values for the Green Deal targets[1], taking into account its specific situation and these recommendations.

1.1 Foster a smart, resilient and diversified agricultural sector ensuring food security

The economic development of Luxembourg's agriculture over the past decade reflects some progress in consolidation. However, Luxembourg also faces challenges with respect to prospects for maintaining productivity growth so as to increase farm incomes, while improving competitiveness.

As in most EU countries, Luxembourg's agricultural sector is undergoing a farm consolidation process, characterised by a reduction in the number of small-sized farms, and an increase in the average size of medium-sized and large farms. As a result of the number of holdings decreasing and the size of the agricultural area slightly increasing, average holding size in Luxembourg increased from 59.6 hectares in 2010 to 70.3 hectares in 2019, making this average area one of the largest in the EU-27. The same applies to the average economic size of holdings, which reached EUR 197 360 in 2019. Despite this upward trend in the economic results of farms, data show a growing gap between farm income and income from the rest of the economy over time. This gap is even larger for small- and medium-sized farms (less than 50 hectares), which represent 47% of the entire population of agricultural holdings, and cover about 10% of the total agricultural land. In particular, the agricultural income of farms between 30 and 50 and between 50 and 75 hectares is, respectively, 30% and 71% of the national average.

In 2019, the livestock sector (milk, cattle and forage plants) represented no less than 76.3% of the agricultural production value in Luxembourg. This narrow focus of Luxembourg's agriculture is confirmed by the high degree of specialisation of agricultural holdings in livestock farming, and dairy farming in particular. Contributing to the transition to sustainable modes of production in the EU will be particularly challenging for Luxembourgish dairy farmers. In terms of productivity, Luxembourg's specialised agriculture now seems to be stabilising, after having undergone constant improvement. This is mainly due to the relative increase in labour costs in recent years. Similarly, investments in the agricultural sector decreased between 2014 and 2017, even though they remain high compared to the EU average.

At the same time, the share of the value added for Luxembourgish farmers in the food chain has fluctuated by around 10% over the years, and decreased to 8.6% in 2017, which is the lowest share of the value added captured by primary producers in the EU-27.

[1] It concerns the targets related to the use and risk of pesticides, sales of antimicrobials, nutrient loss, areas under organic farming, high diversity landscape features and access to fast broadband internet.

This weak economic position of farmers in the food chain is also characterised by a total absence of recognised producer organisations and inter-branch organisations that could help strengthen the farmers' position. In addition, the consumption of food products from organic farming (12% private food expenditure in 2020) or under quality schemes remains relatively low, and has been stagnant for almost 10 years. In this respect, it could be worthwhile to explore the potential of EU quality schemes.

In this context, Luxembourg should ensure that it maintains conditions that encourage innovation and investment in agriculture and strengthens the position of farmers in the food chain, especially given the environmental challenges that have to be faced (described in the next section). This can be achieved through a range of approaches aimed at jointly ensuring improved production efficiency and the sustainable use of resources, and at addressing the challenges created by climate change.

1.2 Bolster environmental care and climate action and contribute to the environmental- and climate-related objectives of the Union

The climate and environmental transition for agriculture in Luxembourg is particularly important due to the specialisation of the agricultural and agri-food sectors, particularly the high share of livestock in farm production.

Although the greenhouse gas (GHG) emissions of Luxembourg's agricultural sector account for only a very small share of the GHG emissions of the EU agricultural sector (0.2% in 2018), its evolution contrasts with EU developments, and further efforts are necessary to ensure that it contributes to the achievement of EU targets. While emissions of methane and nitrous oxide have decreased substantially in the EU over the past three decades, they remained stable in Luxembourg, even recording an upward trend in recent years. Measured per hectare of agricultural land, these emissions account for more than twice the EU average, mostly due the enteric fermentation of ruminants and manure management. Luxembourg should therefore focus on decreasing its emissions from the livestock sector, for instance by investing in anaerobic digestion or improved feed and manure management in line with the EU's methane strategy. In Luxembourg, forestland and permanent grassland are important carbon sinks. However, outgoing carbon flows have been greater than incoming flows in permanent grassland in recent years.

As regards the negative effects of climate on agriculture, and as is the case for other countries in the same climatic region, Luxembourg is and will be confronted with more extreme and frequent weather events such as heavy rainfall, increased heatwaves and short episodes of drought, as well as higher incidence of animal disease and pests. Droughts in recent years have had an increasing impact on agricultural yields. Native and invasive vector-borne diseases represent one of the major impacts on livestock. Luxembourg's agriculture cannot escape the need to fundamentally adapt to climate change.

Moreover, the livestock sector is responsible for the largest share of ammonia emissions in Luxembourg (94% of all ammonia emissions in 2018 are from agriculture; 82% from livestock), affecting air quality and causing nitrogen deposition into water, which is affecting ecosystems and biodiversity. Following a gradual downward trend since 1995, emissions have stabilised in recent years. Luxembourg is among the Member States considered at high risk of non-compliance with emission reduction commitments for ammonia for the 2020-2029 period, as well as for 2030 and beyond.

In addition, the latest evaluations of water quality show that Luxembourg still has a long way to go to achieve the good status/potential objectives set out in the Water Framework Directive, and agriculture is identified as generating the most significant pressure. Both the nitrogen and phosphorus surpluses in Luxembourg remain high compared to the EU average, impacting water resources. Better integration of water resource protection objectives into other policy areas such as agriculture is needed, and synergies should be optimised with policies, including the CAP.

The situation of biodiversity in agricultural areas is also critical. According to the reporting on the conservation status and trends of species and habitats under the EU Habitats Directive (2013-2018), only 16% of grassland habitat types present in Luxembourg currently have a favourable conservation status; the remaining 84% have a bad status and are further declining. This finding is corroborated by the decline of the farmland bird index from 100 in 2010 to 66 in 2018. In addition, the density of landscape features in cropland and permanent crops has remained very low in recent years. Not surprisingly, the prioritised action framework for Natura 2000 in Luxembourg indicates that both in and outside Natura 2000, there is a need to prioritise financial support to protect and preserve grasslands and arable land, wetlands and aquatic habitats. In this respect, the development of organic farming is of paramount importance. In Luxembourg, it currently occupies 4.6% of utilised agricultural area, which is below the EU average of 8%. However, a national action plan for the promotion of organic farming 'PAN-Bio 2025', issued in March 2020, aims to improve this situation and includes a target to have 20% of Luxembourg's agricultural land under organic farming by 2025.

Currently, Luxembourg's rural development programme places great importance on environmental and climate aspects. It already has 89% of its agricultural land under contracts to protect biodiversity and improve water and soil management, but their results appear to be insufficient. The impact of soil management practices may be further increased, for example by linking them to research, innovation and demonstration activities available under the forthcoming Horizon Europe mission on soil health.

1.3 Strengthen the socio-economic fabric of rural areas and address societal concerns

By seeking balanced territorial development, the CAP contributes to reducing the gap in standard of living between rural and other areas in the EU. Luxembourg's situation, however, is special. It is one of the smallest countries in Europe but its total GDP per capita is 2.5 times higher than the EU average. From a statistical point of view, given its size and population density, Luxembourg is classified as one intermediate urban region[1]. Luxembourg is also one of the Member States with the lowest levels of rural poverty and the lowest rate of youth unemployment (10%), which is still high compared to the total rural unemployment. Access to services in rural areas, and the availability and quality of infrastructure, are not a major concern in Luxembourg.

Luxembourg has the fifth highest share of young farmers in the total number of farm managers in 2016, with its figure of 8.1% being well above the 5.1% EU average. Whereas the EU trend fell between 2010 and 2016, Luxembourg experienced an increase over the same period. However, only 13% of young farmers were women in 2016, and access to factors of production is challenging for new young farmers outside family businesses; this is mainly due to the high price of land and labour. Currently, Luxembourg annually spends 1.8% of its direct payment allocation on support for young farmers. It has earmarked 2% of the rural development budget for business start-up aid

under rural development for the current programming period, well below the EU average of 3.8%.

Women in rural areas constitute 25% of the agricultural labour force but only 17% are farm managers, well below the EU average of 28%. There must be careful consideration of the specific needs of women in agriculture and rural areas in order to deliver on gender equality and close the gender gaps in employment. Furthermore, in rural areas there may be other groups with specific needs. Ensuring the protection of agricultural workers – especially seasonal and undeclared workers, and those who face a precarious existence – will play a major role in delivering on human rights as enshrined in legislation. This is an essential element of the fair EU food system envisaged by the Farm to Fork Strategy.

Rural areas in Luxembourg have unutilised capacity for the production of wood, renewable energy, and the development of the bio-economy. Moreover, Luxembourg's agricultural sector has the great advantage of outstanding research institutes in composite plastics, as well as world-leading corporations on composite materials. This comparative advantage must be exploited to the fullest to generate business opportunities in rural areas.

When it comes to responding to societal demands on food and health, two key challenges must be met by Luxembourg's agriculture: the sustainable use of pesticides, and better consideration of animal welfare. The use and risk from pesticides declined in Luxembourg by 38% over the period 2011-2018, compared to a 17% decline in the EU. However, implementation of the general principles of integrated pest management could be better promoted. Likewise, certain practices, such as the tail docking of pigs, are still routine although prohibited by EU rules, showing that there is still room for improvement in animal welfare. It might be advisable to put in place more ambitious measures to promote the best livestock management practices in animal welfare, using all available tools, including CAP policy instruments to support farmers. Furthermore, the transition towards healthier and sustainable diets needs to be actively encouraged to ensure they are adopted by as many people as possible.

1.4 Modernising the sector by fostering and sharing of knowledge, innovation and digitalisation, and encouraging their uptake

Knowledge and innovation have a key role to play in helping the farmers and rural communities meet the challenges of today and tomorrow. Even though Luxembourg chose not to finance any measure linked to knowledge sharing and innovation through its rural development programme, its agricultural knowledge and innovation system (AKIS) is considered to be well-integrated and pluralistic. National funds also contribute to the creation of knowledge by public research centres, together with a technical college for agriculture.

Luxembourg is currently not participating in the European Innovation Partnership (EIP) networking activities to connect across borders and learn about other Member States' innovative practices and knowledge, as the measure for operational groups under the EIP has not been included in Luxembourg's 2014-2020 rural development programme. It would be highly advantageous to improve links between public and private advisors and to invest in their training and skills. Advisors should be supported to help capture individual grass roots innovative ideas and to develop them by setting up and implementing EIP operational group projects. Such 'innovation support services' will become obligatory for Member States post-2020.

Such an orientation should benefit from the fact that Luxembourg is among the EU leaders in digital performance and competitiveness – almost 100% of rural households in Luxembourg have access to broadband, although there has been a slight drop in recent years. A digital innovation hub for Agriculture, hunting and forestry is fully operational. Together, this can significantly contribute to supporting farmers in the challenges related to sustainable farming.

The country could capitalise on its existing capacities in digital infrastructure to promote the agricultural sector, and the transition towards sustainable agriculture and digital innovation in a tailored way. Luxembourg should also use the potential data and data technologies offered in a systematic way (by linking up to European initiatives).

1.5 Recommendations

The Commission recommends addressing the above interconnected economic, environmental/climate and social challenges, which requires concentrating the interventions of the Luxembourgish CAP strategic plan on the following actions:

Foster a smart, resilient and diversified agricultural sector ensuring food security

- **Enhancing the resilience of farms** (in particular farms between 30 and 75 ha) by improving fairness of income support towards smaller farms, which have a lower income level than the agricultural average by applying, for example, the complementary redistributive income support for sustainability and the reduction of payments.

- **Continuing the modernisation or transformation of farms**, particularly in the livestock sector **in compliance with environmental, climate and animal welfare standards**, and by supporting initiatives of groups of farmers in terms of adding value at farm level. This involves, in particular, developing and recognising producer organisations, reinforcing the position of farmers in the value chain, and tackling unfair trading practices in the food chain.

- **Improving the share of the added value of agricultural production for farmers** by supporting quality schemes, and increasing consumer interest in such quality aspects and in organic food.

Bolster environmental care and climate action, and contribute to the environmental- and climate-related objectives of the Union

- **Reducing non-CO_2 emissions from the livestock sector and soil fertilisation, and maintaining and improving the carbon storage capacity of forests and permanent grasslands, to further contribute to the EU's 2050 climate neutrality objective** by reversing intensification of grassland and arable land through an appropriate blend of voluntary interventions and obligations. In this regard, carbon farming approaches could be designed to remunerate carbon sequestration or the protection of existing carbon storage in forests and grassland.

- **Increasing the adaptive capacity of the agricultural sector in the face of climate change** by improving crop pest management, using more resistant varieties and species, applying minimal tillage to protect soils and to reduce soil erosion, and appropriate timing of field operations to avoid soil compaction.

- **Improving air quality** by reducing ammonia emissions. To that end, it is necessary to apply recommended low-emission production systems, such as livestock feeding strategies, low-emission manure spreading techniques and storage systems, and including developing biogas production where feasible. Particular attention will have to be paid to supporting the investments needed for the implementation of these techniques.

- **Improving water quality, and protecting wetlands and aquatic habitats** by minimising the impact of agriculture on the water environment through the definition of appropriate requirements and voluntary schemes. Optimised fertilisation and better nutrient management should lead, in particular, to a reduced nitrogen and phosphorous surplus, thus **contributing to the EU Green Deal target on nutrient losses.**

- **Reinforcing protection of biodiversity, and contributing to the EU Green Deal target on high-diversity landscape features** with a view to maintaining and restoring favourable conservation status of protected habitats and species in line with the prioritised action framework for Natura 2000. This should also address the decline in farmland birds and wild pollinators. Particular attention should be given to increasing incentives to farmers to ensure their engagement for biodiversity in arable areas. This includes reinforcing knowledge transfer and advice towards farmers in areas such as increasing the density and maintenance of beneficial landscape features, encouraging pest management beneficial for pollinators, and prioritising non-chemical methods.

- **Increasing the surface area under organic farming, and contributing to the corresponding EU Green Deal target**, through appropriate incentives for the conversion of farmers to organic farming. In this respect, Luxembourg needs to seek the best synergies between the national plan "PAN-Bio 2025" and the interventions financed by the CAP.

- **Enhancing multifunctional and sustainable forest management,** protection and restoration of forests ecosystems to maintain good condition of habitats and species linked to the forests, as well as preserving stocks and increasing carbon sinks in forests.

Strengthen the socio-economic fabric of rural areas and address societal demands

- **Enhancing the conditions for new, young farmers to start agricultural activity outside the family setting**, including young female farmers, by combining interventions to facilitate access to factors of production.

- **Creating employment opportunities, and improving conditions for business development in rural areas**, through targeted investments in biodiversity and climate actions on forests and forestry, as well as investments in the increased circularity of material from biomass, harvested wood products and the bio-economy.

Foster and share knowledge, innovation and digitalisation in agriculture and rural areas, and encourage their uptake

- **Reinforcing the AKIS** to enhance the sustainability performance and competitiveness of the agricultural sector, and to support Green Deal priority actions on climate change, circular economy, zero-pollution, and biodiversity. A well-functioning AKIS encourages knowledge-building and knowledge exchange, investment in innovation support services, and training of advisors and farmers. The European Innovation Partnership can be exploited to connect across borders, and to learn about other Member States' innovative practices and knowledge.

2. ANALYSIS OF AGRICULTURE AND RURAL DEVELOPMENT IN LUXEMBOURG

Among the European Member States, Luxembourg had the smallest number of agricultural holdings (1 872 in 2019). Although 15% of farms' activities have ceased over the past decade, the utilised agricultural area experienced a different trend, increasing by 2.9% between 2000 and 2010, and then stabilising at just over 131 000 hectares in 2019, or roughly half the country's territory, one of the highest proportions recorded in the EU-27. Likewise, forest area has increased in recent decades and now represents nearly 37% of the country's surface area, which means that the CAP can potentially intervene on more than 87% of Luxembourg's territory. Moreover, 95% of the total area in agricultural use is classified as mountainous or with natural constraints, and the Natura 2000 areas cover 21% of the agricultural and forest areas.

Luxembourg's agriculture is highly specialised in cattle and dairy farming and, to a lesser extent, wine-growing. This specialisation of farms is also reflected in the use of agricultural land, which is dominated by permanent grasslands and meadows (51%, fourth largest share in the EU-27), followed by arable land (47%), mainly for the production of feeding stuffs and fodder. Luxembourg is among the Member States with the highest average area and livestock per farm. Dairy cows are predominant in the livestock herd (54 000 livestock units in 2019), and their numbers have been increasing since 2013.

The importance of agriculture and forestry in the Luxembourgish economy is low compared to the EU average. In Luxembourg, both sectors employed 3 700 people, i.e. 0.8% of the working population in 2018. The agri-food sector provided jobs to 2% of the Luxembourgish active population, one of the lowest proportions among the EU Member States.

Over the last 30 years, there has been a continual internal migration away from the countryside to urban areas, and the growth of Luxembourg's service sector has been at the expense of heavy industry and agriculture. The overall economic and specific demographic context has changed agriculture into peri-urban agriculture, and resulted in very high land prices for taking over farms or for new farmers to set up. Meanwhile, Luxembourg is one of the Member States with the lowest levels of rural poverty, and neither access to services in rural areas nor the availability and quality of infrastructure is difficult.

2.1 Support viable farm income and resilience across the EU territory to enhance food security

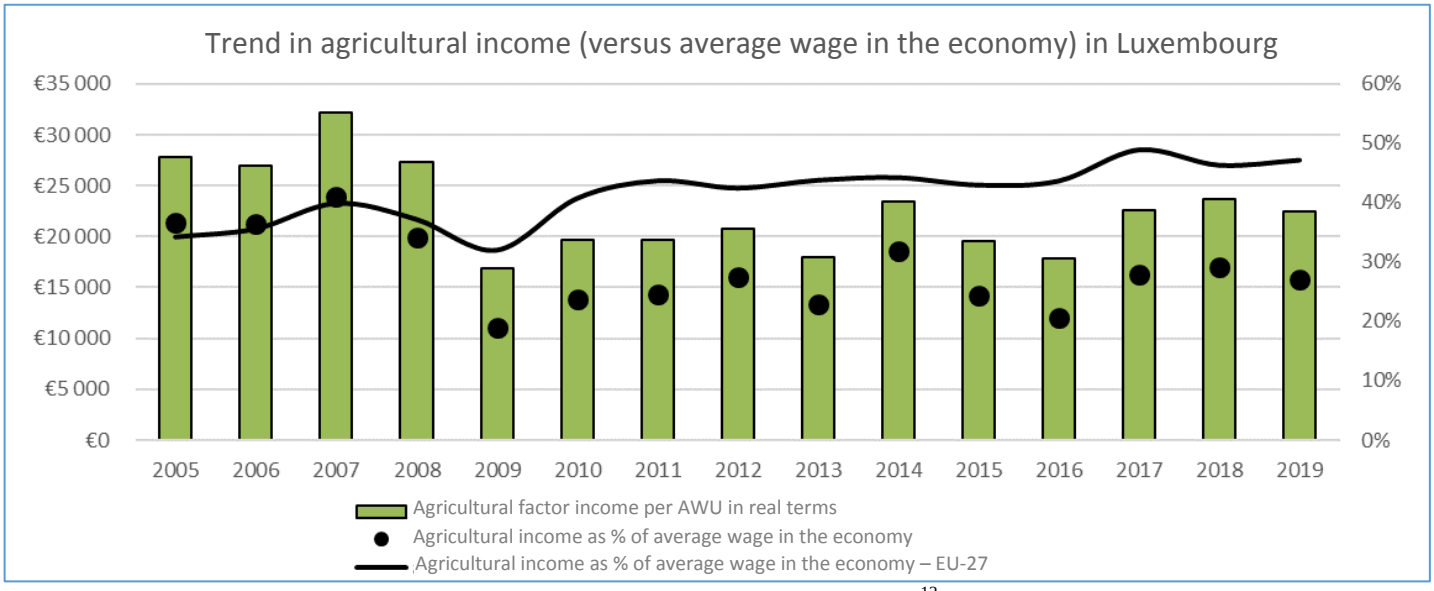
In Luxembourg, agricultural income was approximately 28% of the average wage in the whole economy between 2005 and 2019. This share fell from 41% in 2007 to just 19% in 2009, and is in general lower than the EU average[2]. Despite an overall increase of the agricultural entrepreneurial income over time, the gap with the national average wage tends to increase (the average wage increases faster).

The average factor income fluctuated at around EUR 22 000 between 2005 and 2019, which is higher than the EU average[3]. On average, direct payments formed 34% of the agricultural factor income in 2018[4]. Payments under rural development (except investment support) bring on average an additional 27%[5]. In Luxembourg, rural development support is significant for certain sectors, notably for cereals, oilseed and protein crop farmers, milk and cattle[6].

The agricultural factor income broadly increases with physical farm size (except for the smallest farms which are mainly wine producers), whereas the direct payment per hectare is stable. The differentiation of direct payments per hectare is light[7], and there are still large differences in income between medium-sized farms (below 75 hectares) and large farms. In particular, the agricultural factor income of farms between 30 and 50 hectares and between 50 and 75 hectares is, respectively, 30% and 71% of the country average (wine growers excluded)[8]. To be noted that the farm accountancy data network sample for farms of less than 30 hectares lacks representativeness.

Income increases consistently with economic farm size, while the direct payment per hectare is again rather stable[9]. The income per worker varies between the different sectors with higher income for the milk and wine sectors in recent years, and lower income in other grazing and mixed sectors. However, all sectors went through fluctuations in income over time. The direct payment per hectare is also comparable between different sectors, although the wine sector has a slightly higher direct payment per hectare than average.[10]

Farm incomes fluctuate greatly due to climate change and other issues. This leads to a need to deploy risk management instruments and strategies. As far as crop insurance covering climatic risks is concerned, uptake in Luxembourg is higher than 50% of farms[11].



Source: DG AGRI based on EUROSTAT[12]

2.2 Enhance market orientation and increase competitiveness, including greater focus on research, technology and digitalisation

The importance of agriculture in the Luxembourgish economy has gradually diminished over the years. The gross value added of the agricultural sector was EUR 117.4 million in 2019, down slightly compared to 2017 and 2018[13]. Its share of the total gross value added of the Luxembourgish economy represented less than 0.2% in 2019, lower than the EU average (1.8%) and that of neighbouring countries. It has steadily decreased over the decades from 0.7% in 2000 to 0.3% in 2010.

Milk and forage plants are the sub-sectors with the largest output value in Luxembourg, followed by cattle, pigs and wine. In 2019, the livestock sector (milk, cattle and forage plants) represented not less than 76.3% of the agricultural production value in

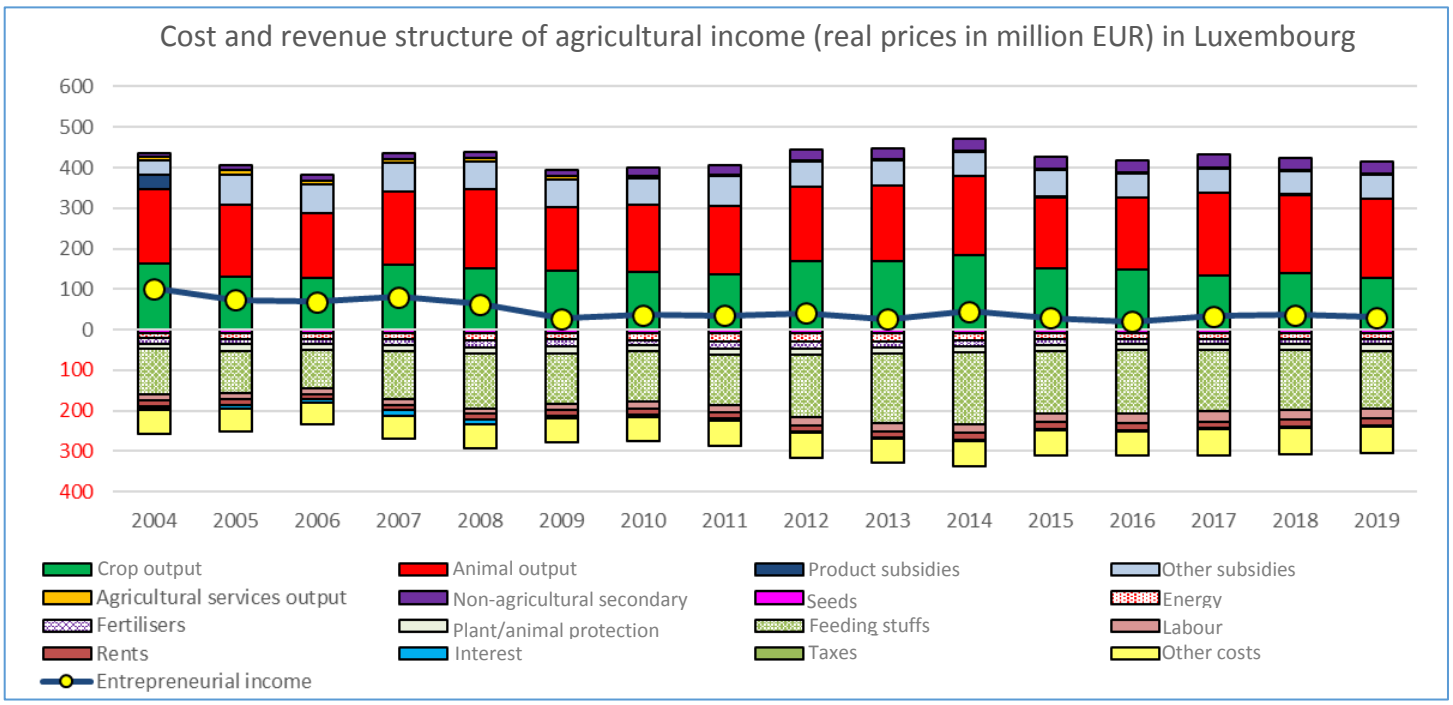
Luxembourg. This focus of Luxembourg's agriculture is confirmed by the high degree of specialisation of agricultural holdings in livestock farming and dairy farming in particular. In terms of both the number of holdings and the standard output[14], dairy farms were the most common; they accounted for 39% of the country's farm population and 47% of the standard output in 2018[15]. The second highest proportion according to the number of farms was those specialised in cattle-rearing and fattening (18%), followed by vineyard holdings (16%), and those dedicated to sheep, goats and other grazing livestock (12%).

As in most EU countries, the Luxembourgish agriculture sector is undergoing a farm consolidation process characterised by a reduction in the number of small-sized farms and increase in the average size of medium and large-sized farms. In 2019, farms with at least 50 hectares of agricultural land were the most common; they represented about half (53%) of the entire population of agricultural holdings, and covered around 90% of the country's agricultural land. Between 2010 and 2019, only farms larger than 100 hectares increased in number, by nearly 17%[16].

In terms of agricultural productivity, Luxembourg, after experiencing an increase, seems to be stabilising. Agricultural productivity in Luxembourg, measured by total factor productivity, increased by 8% between 2012 and 2018, close to the average agricultural productivity growth in the EU 27 over the same period. This is mainly due to an increase in labour productivity. In 2019, there were 2 278 full-time farmers in Luxembourg. When adding to these the family members, part-time farmers, and agricultural workers, the total agricultural employment in Luxembourg reached 5 616 individuals in 2019. Available national statistics[17] indicate that while the family labour force has slightly decreased during the last decade, the number of agricultural workers has increased by 58%. This explains why the relative share of labour costs slightly grew in the overall cost structure of the sector between 2005 and 2019[18].

Investments in the Luxembourgish agricultural sector, measured by gross fixed capital formation, decreased between 2014 and 2017, and amounted to EUR 111 million in 2018. Nevertheless, this represents 89.8% of the gross value added, the third highest share in the EU-27, and it is significantly above the EU-27 average (around 31%), indicating an overall positive investment attitude among the Luxembourgish farmers compared to their European peers. Under the current rural development programme, 16% of EU rural development support is dedicated to restructuring and modernisation.

The sector is well integrated in European markets. Although agriculture is a minor part of the Luxembourgish economy, exports from the agricultural sector account for 8.1% of Luxembourgish exports[19]. However, the negative agricultural trade balance has deteriorated over the last decade.



Source: EUROSTAT. [aact_eaa01]

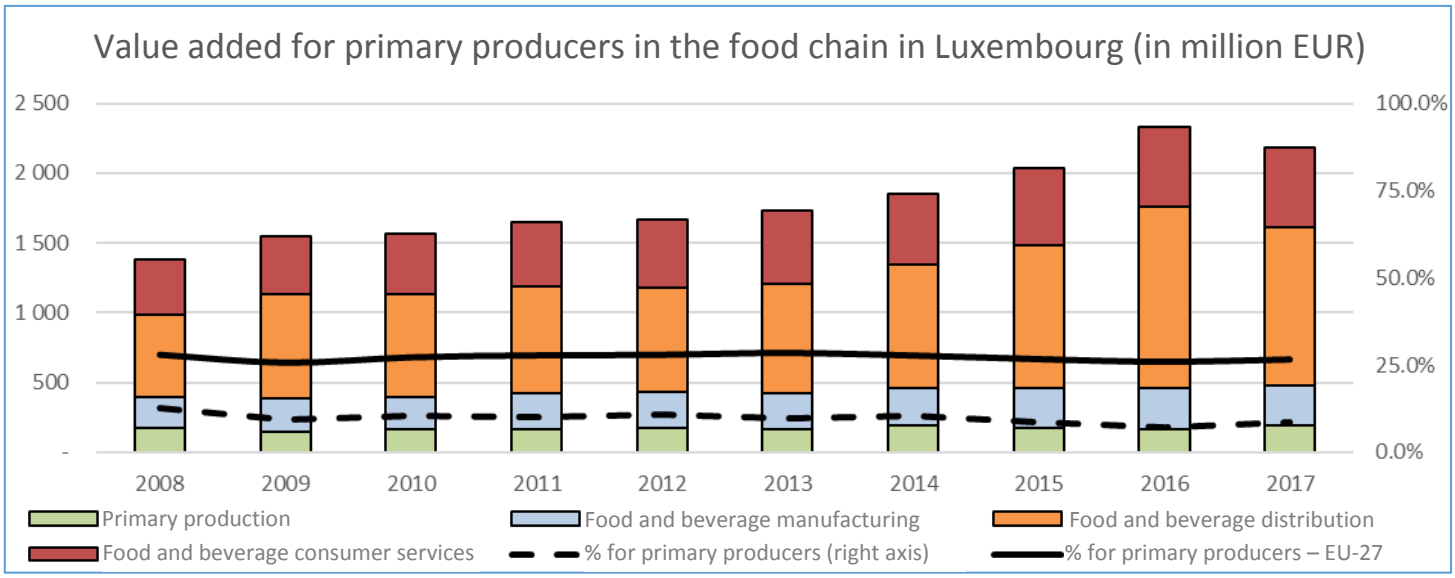
2.3 Improve farmers' position in the value chain

The share of the value added for primary producers in the food chain is fluctuating at around 10% in Luxembourg. It decreased to 8.6% in 2017 while there was a significant increase of the total value added of the agri-food sector at that time. The food and beverage distribution services get the lion's share[20]. The share of the value added that goes to Luxembourg's farmers is the lowest in the EU. Two third of Luxembourg's farms are run by a farm manager working more than 50% of his/her working time on the farm and without other income activities. Dairy farms represent the bulk of professional enterprises in Luxembourg[21]. Agriculture in Luxembourg is specialised in dairy (34.5%), forage plants (25.4%) and cattle (17.3%), which represented more than 75% of Luxembourg's agricultural output in 2017. Wine (5.1%), pigs (6.8%) and cereals (5.5%) represented above 5% in the agricultural output. Vegetables, horticulture and fruits represented less than 2%.

Luxembourg is one of the three EU countries that do not have any recognised producer organisations (PO). Luxembourg has no inter-branch organisations (IBOs) either. However, more than 85% of cow milk deliveries in Luxembourg were managed by a processing cooperative in 2016[22]. Luxembourg is one of the few Member States that have only recently started to transpose legislation against Unfair Trading Practices[23] or to create a national voluntary framework to address such practices[24].

Luxembourg is among the EU countries with the highest population density and has, by far, the highest GDP per capita in the EU[25]. Luxembourg's consumers express expectations in terms of local and quality food products[26]. There are five registered protected quality signs (PDO/PGI) in Luxembourg, among which one in wine and four in animal products (butter, honey, and two related to pig meat). Further development of EU quality schemes would strengthen the farmers' position in the value chain, generating more value added. In 2018, the share of total organic area in total utilised agricultural area (UAA) was about 4.6% in Luxembourg, well below the EU average of 8%. Since 2011, the share of private food expenditure devoted to organic products has stagnated

between 10 and 14% of total grocery spending with no real boom lately[27]; more than EUR 200 is spent per capita per year on organic products. Currently, Luxembourg has only 148 organic farmers, including 19 beekeepers, 15 vegetable growers, 15 wine growers, 11 fruit growers, and 164 operators in organic food chains. The figures show only a minimal increase; the organic farming sector continues to stagnate in Luxembourg[28].



Source: CAP Result indicator RPI_03[29]

2.4 Contribute to climate change mitigation and adaptation, as well as sustainable energy

In 2018, the share of greenhouse gas (GHG) emissions from the agricultural sector (mostly non-CO_2 emissions) was 5.7% of total GHG emissions in Luxembourg, representing less than 0.2% of GHG emissions in the EU agricultural sector[30]. These agricultural emissions remained stable (-0.7%) between 1990 and 2018, while they decreased by 20.6% during the same period in the EU. They even have an upward trend in recent years (+ 7% between 2013 and 2018). Measured per hectare of agricultural land, they are more than twice the EU average[31], and the fourth highest in Europe due to the large livestock sector and the level of intensity (45% of agricultural area under high farming intensity in 2017[32]). Most of the non-CO_2 emissions are from enteric fermentation of ruminants (58%) and agricultural soils (27%)[33]. Manure management is responsible for 13% of GHG emissions.

As regards the Land Use, Land Use Change and Forestry (LULUCF) sector, the high share of permanent grasslands (51% of total agricultural area in 2017) explains the high level of carbon storage in the country's soils. The sequestration of carbon by grassland is higher than the emissions from croplands. However, grassland sinks decreased between 2013 and 2018. Peatlands cover only 0.1% of soils[34]. Forests, counting for 37% of the country's total area, constitute the main carbon sink[35]. Since 2013, net LULUCF removals have fallen by 62%[36].

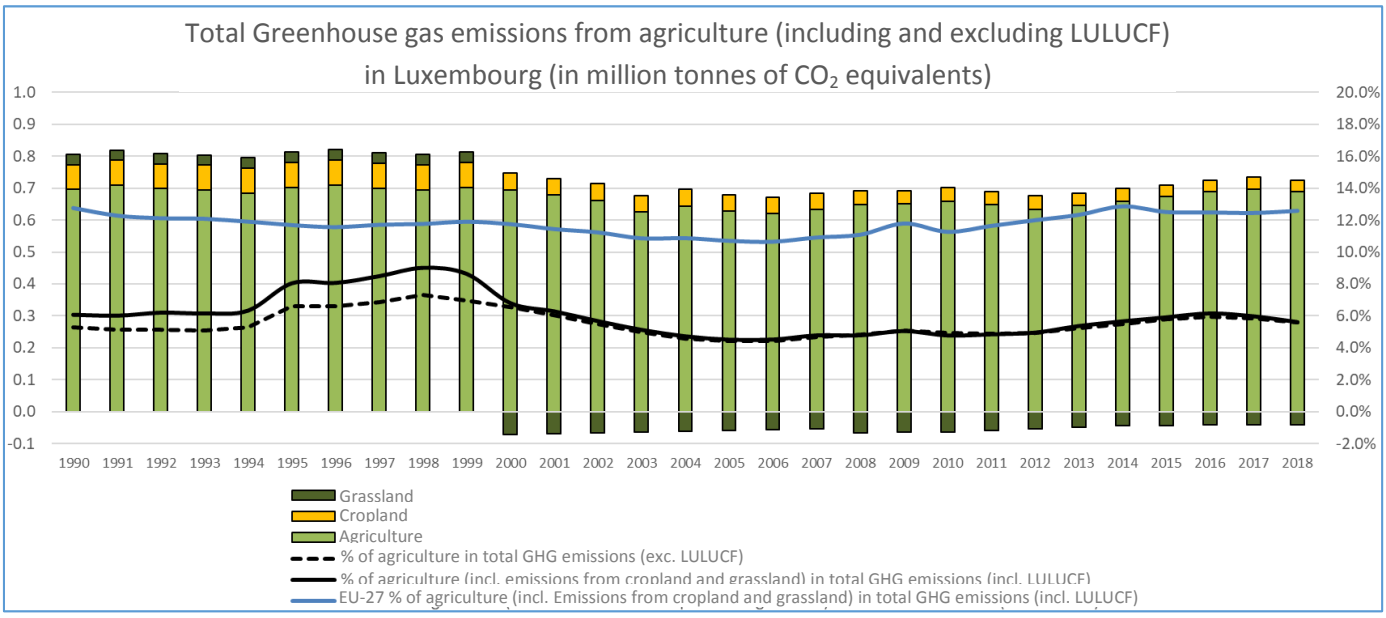
Overall, in 2018, the share of combined emissions from agriculture, cropland and grassland in Luxembourg was 5.6%, lower than the EU average (12.6%) due to the small dimension of agriculture.

Luxembourg shows an upward trend in the production of renewable energy from forestry biomass per hectare. The share of production of renewable energy from forestry (52% in 2018) is higher than the EU average. Moreover, 11.5% of the total renewable energy production comes from agricultural biomass. The use of renewable energy in agriculture and forestry was 11% in 2016[37]. Energy consumption in agriculture, forestry and food industry has the lowest share in total final energy consumption (0.6%) in the EU. However, between 2009 and 2015, the consumption of energy in the food industry increased by more than 8% annually.

Luxembourg's integrated national energy and climate plan for the period 2021-2030 stresses different mitigation measures such as reducing the use of nitrogen fertilisers, promoting environmentally-friendly techniques for spreading manure, as well as covering slurry containers. The plan also promotes biogas as an energy source, extensification of agricultural land use, and the development of organic farming.

The national climate adaptation strategy and action plan points to the following threats: invasive alien species, increase in extreme weather events, increase in domestic harmful organisms, extension of the growing period, deterioration of soil fertility, soil structure and stability and soil erosion. For forestry, tree species composition, modification, and the acceleration of forest soil transformation are pointed out. The strategy proposes to implement several adaptation measures, such as developing insurance services.

Luxembourg's Rural Development Programme places great importance on environmental aspects and already has 87% of the agricultural land under contracts to protect biodiversity, 16% of agricultural land to improve water management, and 20% of agricultural land to improve soil management. This is done through agri-environment climate measures (AECM), organic farming, payments under the Water Framework Directive, and payments for areas facing natural constraints. However, Luxembourg's planned expenditure on investments in livestock management in view of reducing GHG and/or ammonia emissions will not be met during this programming period[38].



Source: European Environmental Agency. As in EUROSTAT [env_air_gge]

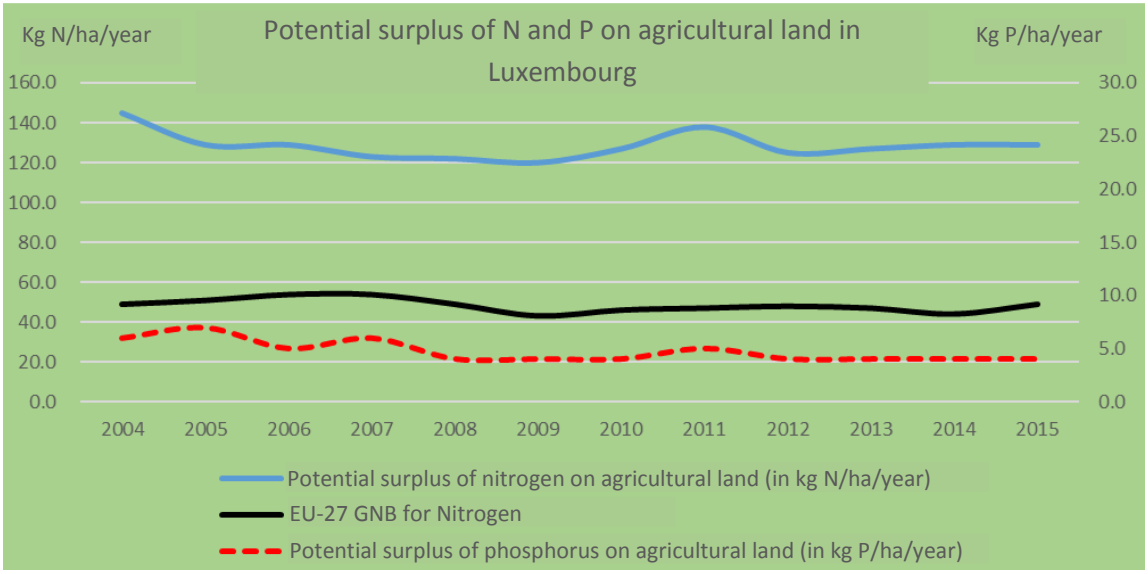
2.5 Foster sustainable development and efficient management of natural resources such as water, soil and air

Luxembourg's agricultural sector was responsible for nearly 94% of the country's ammonia emissions in 2018, mainly from livestock (82%). Following a gradual downward trend since 1995, emissions have stabilised in recent years[39]. Luxembourg is among the Member States considered at high-risk of non-compliance with emission reduction commitments for ammonia, for 2020-2029 (1% reduction as compared to the 2005 level), as well as for 2030 and beyond (need for reduction of 22% compared with 2005 level)[40].

The quality of soil, expressed as the soil organic carbon content in soils, is low compared to the EU average. The mean soil organic carbon content in arable soils is 24.2g/kg (2015), compared to 43.1g/kg for EU-28[41]. According to the RUSLE2015 model, Luxembourg has an average soil loss rate by water of 2.1 tonnes per hectare per year, compared to the EU average of 2.5. This indicates that soil erosion is medium to low on average[42]. The estimated agricultural area affected by severe water erosion is moderate to low in Luxembourg[43]. Conventional tillage is practiced on 66% of arable land, and the share of maize in arable land is increasing, which increases the risk of soil erosion and surface run-off[44].

The gross nutrient balance provides an estimate of the potential water pollution. The past trends for nitrogen (N) and phosphorus (P) surplus are shown in the graph below. The estimated nitrogen and phosphorus surplus in Luxembourg of 100.0 kg/N/ha and 5.0 kg/P/ha in 2015 remains high compared to the EU average of 46.5 kg/N/ha and 0.5 kg/P/ha[45]. Half of the groundwater stations in Luxembourg in 2017 were of poor chemical quality[46]. In 2017, the Environmental Implementation Review (EIR)[47] identified improving water quality and reducing nitrate pollution as the main challenges for Luxembourg in implementing EU environmental legislation (Water Framework Directive and Nitrates Directive). Over the period 2012-15, 87.5% of monitoring stations of surface water were reported as being eutrophic and hypertrophic. The proportion of river water bodies in good ecological status/potential decreased from 7% in the first River Basin Management Plans to 3% in the second. 97% of surface waters had less-than-good ecological status, and all surface water bodies are failing to achieve good chemical status. For groundwater, all water bodies are in good quantitative status, while 50% are failing to achieve good chemical status. Diffuse agricultural pollution is the most significant pressure on groundwater bodies, and is among the pressures on surface water.

As regards fresh water abstraction, Eurostat's (ESTAT) estimate shows very low quantities compared with other Member States[48].



Source: EUROSTAT [aei_pr_gnb][49]

2.6 Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes

Luxembourg's farmland bird index shows a decline, with a value of 66 in 2018 (as compared to the baseline of 100 in the year 2010), slightly below the EU average of 70 in 2018[50]. For cropland, a key biodiversity indicator is the skylark (Alauda arvensis); between 1980 and 2018, its national population decreased by around 50%, while its population fell by around 30% between 2007 and 2018. For tree orchards, a key biodiversity indicator is the little owl (Athene noctua); between 1980 and 2018, its national population decreased by around 60%, while strong nature conservation efforts have resulted in a small increase in more recent years.

The share of agricultural areas in Natura 2000 is important in Luxembourg (21% in 2016), compared to an EU-28 average of 11% (the share of forest area in Natura 2000 is 42% compared to an EU average of 23%)[51]. This means that the impact of agricultural activities on biodiversity has to be followed very closely. Natura 2000 covers 27% of the national territory.

The conservation of agricultural habitats in grassland is unsatisfactory, which is a matter of concern in view of the large proportion of permanent grassland areas in Luxembourg. According to reporting on the conservation status and trends of species and habitats under the EU Habitats Directive (2013-2018), only 16% of grassland habitat types present in Luxembourg are currently in favourable conservation status; the remaining 84% are in "bad" status and are further declining.

Moreover, species in cropland and tree orchards are on a continuously decreasing trend (1980-2018), with a small increase in the short term for orchards following strong nature conservation efforts.

As regards Ecological Focus Areas (EFA), the share is around 18% of arable land (2019), which is above the minimum 5% required. But Luxembourg also heavily uses catch crops (81%) and nitrogen -fixing crops (11%) for fulfilling EFA requirements (as the majority of Member States do)[52]. The percentage of non-productive is still very limited, even if the share of buffer strip (1.3%) is above the EU average (0.9%).

The share of land under contracts supporting biodiversity and/or landscape and forest is high (89% in 2020), indicating good farmer awareness of biodiversity. However, the Luxembourgish authorities indicate a lack of analysis and evaluation of the effectiveness of these contracts, and a clear risk of too little effort by agricultural stakeholders to support environmental policy[53].

The Prioritised Action Framework (PAF) for Natura 2000 in Luxembourg identifies the major challenges facing Luxembourg's agriculture with regard to biodiversity:

- For grasslands, the main pressures identified are land use intensification (fertilisation, early and too frequent mowing, overgrazing) and abandonment (followed by shrub encroachment); measures to maintain, manage, restore and extend the area of species-rich grasslands; measures to preserve and protect wetlands, aquatic habitats, and groundwater. The area of grassland that is managed for conservation purposes is considered to be insufficient to ensure the maintenance of sufficiently robust populations of typical grassland species (birds, invertebrates, etc.). Substantial areas of dry grasslands and hay meadows have been lost in recent decades. Outside Natura 2000, the same measures are needed to restore the favourable conservation status of these habitats and their species at a national level. Species -specific measures are needed in agricultural areas, both inside and outside Natura 2000, to restore their favourable conservation status e.g. dry-wall restoration measures for reptiles or pond creation and wetland restoration for amphibians. In terms of governance/administration, capacity/training support is needed for forest and agricultural advice.

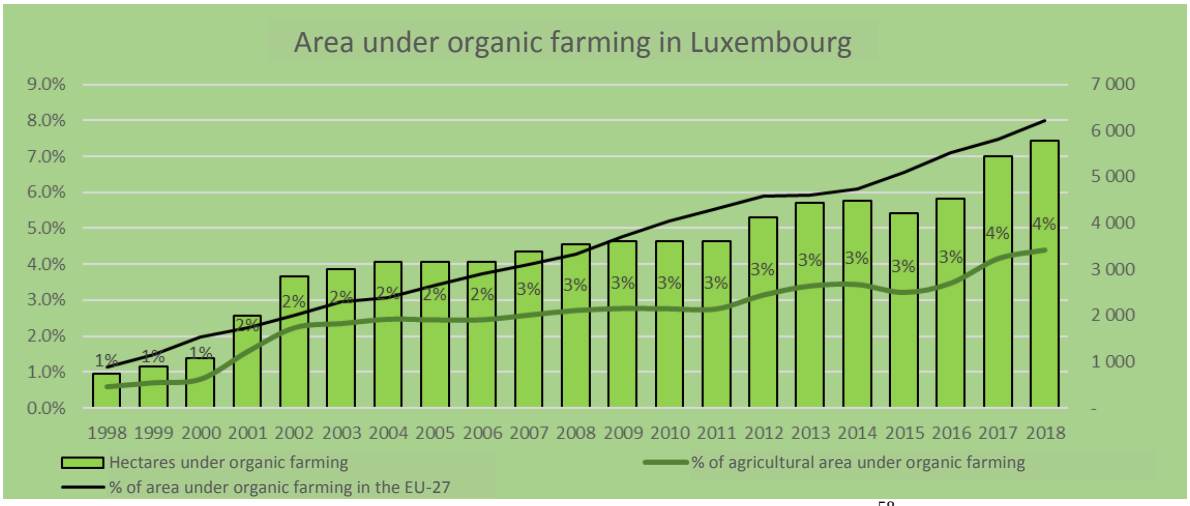
- For cropland and permanent crops, the main pressures identified are excessive use of pesticides; high sowing densities; lack of landscape features; removal of permanent crops (tree orchards); land consolidation and increasing farm sizes, all impacting on the populations of common farmland birds. The intensification of arable land is also one of the main challenges.

- In addition, the PAF indicates the need to devote significant resources to monitoring/reporting and communication with stakeholders. It also reveals a monitoring objective for pollinating insects.

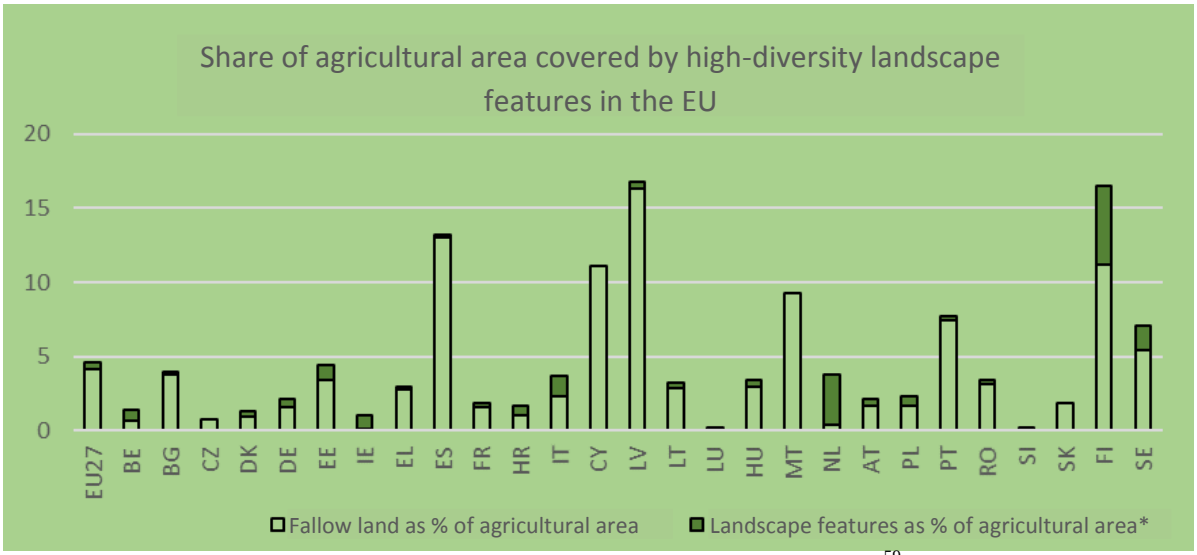
- Lessons learned from the past[54] include the fact that current incentives to farmers are insufficient to ensure their engagement, at a sufficient scale, to preserve and bring back biodiversity in arable areas. Recurrent issues include a lack of communication of monitoring data from biodiversity studies; biodiversity contracts towards agricultural stakeholders (advisers, unions), and coherence of agri-environment-climate measures / biodiversity related actions. A clear risk is linked to the poor incentive to create new biotopes, combined with the risk of a decrease of ecological corridors due to increased farm size.

Luxembourg organic farming areas (4.6%)[55] are below the EU-27 average (8%). Therefore, Luxembourg initiated (in early-2020) its ambitious PAN-Bio 2025 plan, a national action plan to promote the visibility of organic food to society, to increase the interest of farmers to convert to organic production, and to develop market measures to increase organic supply and demand. The final objective is to achieve 20% of agricultural land under organic farming by 2025[56]. ESTAT data on the area under conversion as a percentage of the total organic area can give an indication of potential growth in this sector in the years to come. It shows that Luxembourg has one of the lowest growth

potentials in this regard with a share of around 11% under conversion in 2018. As a share of total UAA, the area under conversion is below 1%[57].



Source: EUROSTAT [org_cropar_h1] and [org_cropar][58]



Source: EUROSTAT [org_cropar_h1] and [org_cropar][59]

** Linear elements considered here: Grass margins, shrub margins, single trees bushes, lines of trees, hedges and ditches. This estimation is to be taken with caution because of methodological caveats.*

2.7 Attract young farmers, and facilitate business development in rural areas

Luxembourg has the fifth highest share of young farmers in the total number of farm managers in 2016 at 8.1%, well above the 5.1% EU average[60]. Whereas the EU trend decreased between 2010 and 2016, the numbers for Luxembourg increased over the same period. The ratio of young managers to elderly is double that of the EU average. However, only 13% of young farmers were women in 2016.

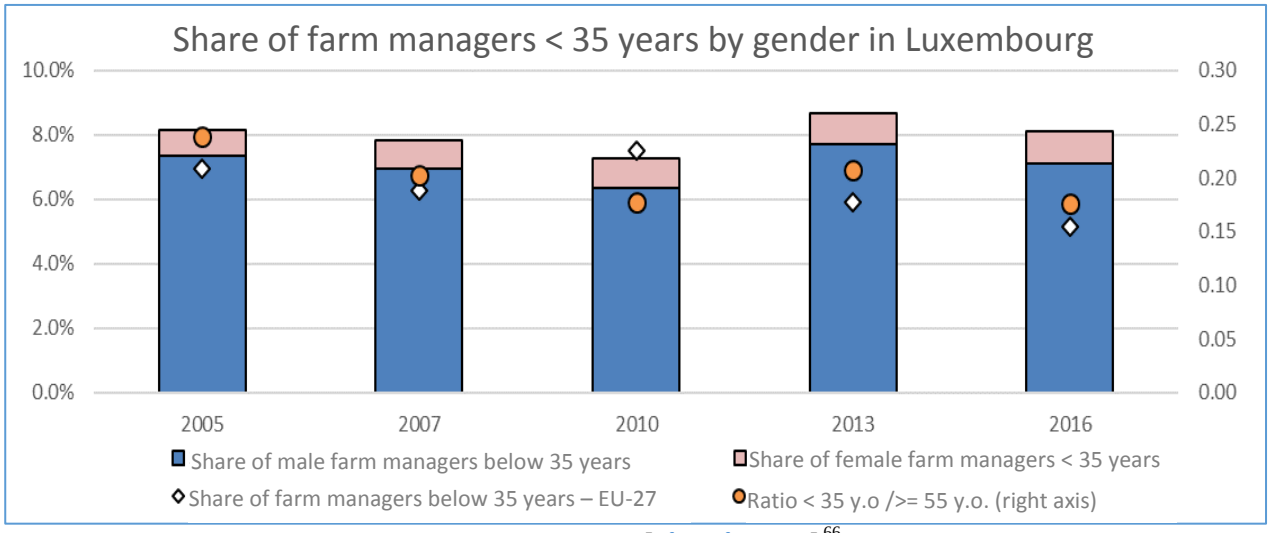
In the period 2005-2016, the number of holdings of young farmers has decreased (-7%), while the land area has increased (25%), and standard output has more than doubled (112%)[61]. This trend is more positive than in the majority of Member States. This means that in Luxembourg, each young farmer has on average an 87 ha farm with a standard output of more than EUR 270 000, which places Luxembourg considerably above the EU average[62]. Moreover, the average economic farm size in Luxembourg is the highest in the

age class of 25 to 34 years old. In view of its well-developed financial services, access to capital is not a huge problem for young farmers.

The large majority of holdings in Luxembourg are family-type farms, and therefore access to land is not a major constraint to those who take over the family farm[63]. Nevertheless, access to factors of production is challenging for the installation of new young farmers outside the family, mainly due to the high prices of land and labour. Farm sector attractiveness is also challenged by significantly higher income levels in other sectors.

The share of farm managers below the age of 35 with at least a basic level of agricultural training is above average in in EU. Moreover, several specific training opportunities exist for those intending to setup as a young farmer.

Luxembourg annually spends 1.8% (close to the 2% ceiling) of the direct payment envelope on support for young farmers (above the EU average of 1.3%)[64]. Luxembourg also earmarked 2.2% of the rural development budget for business start-up aid under rural development for the current programming period, well below the EU average of 3.8%[65]. Additionally, there are several national measures for generation renewal, mainly to support the takeovers of farms by young people (bonuses, reimbursement of registration fees, favourable tax framework and top-up in investments, etc.).



Source: EUROSTAT [ef_m_farmang][66]

2.8 Promote employment, growth, social inclusion, and local development in rural areas, including bio-economy and sustainable forestry

In order to achieve balanced territorial development, the CAP aims to reduce the gap in the standard of living between rural and other areas in the EU. Luxembourg's situation, however, is special as it is one of the smallest countries in Europe but its total GDP per capita is 2.5 times higher than the EU average[67].

Between 2014 and 2017, Luxembourg was the only Member State where the employment rate declined after the 2010 financial crisis[68]. The employment rate in rural areas is equal to the average employment rate in Luxembourg, and is slightly below the EU-average rural employment rate (66.3% vs 68.4% in 2019)[69]. However, in 2017 Luxembourg had one of the lowest rates of youth unemployment: 10.2% in rural areas,

below the EU average of 14.6%[70]. Concerning the situation of women in rural areas, they constitute one quarter of the agriculture labour force but only 17% are farm managers, well below the EU average of 28%[71].

The poverty rate in rural areas is 17.4%, below the total poverty rate and shows a decreasing trend of 1.2pp since 2017/18[72]. Luxembourg remains one of the Member States with the lowest levels of rural poverty. The percentage of 0.9% of the population working in the primary sector is one of the lowest in the EU[73]. People at risk of poverty or social exclusion in rural areas in 2018 was lower than in cities and towns but has been slightly increasing since 2005 (14.5-18%)[74].

In terms of education, the situation in Luxembourg is very positive as more than half of farm managers have completed their studies[75]. The percentage of young people in neither employment nor education and training is 6.3%[76].

Luxembourg is among the MS with the highest foreign-born population percentage in the rural area. It is the highest if only the EU-national population is considered at 34%, which is well above the EU average of 2.5% in 2019[77]. In addition, the risk of poverty of migrants compared with the native population is higher (2017, 14% vs 6%)[78] but this is not a pressing issue, considering the situation in other Member States with high migrant populations.

Rural areas in Luxembourg have unutilised capacity for the production of wood, renewable energy, and the development of the bio-economy and tourism. Its forest area represents 36.5% of the territory; of around 88 000 hectares, almost 100% is available for wood supply[79]. However, the extent of forest and other wooded land remained almost unchanged (-0.2%) between 1990 and 2015. As regards tourism, the majority of accommodation is located in rural areas, however, the total number decreased by 10% between 2012 and 2017[80]. From 2008 to 2018, Luxembourg's share of renewables in total primary energy supply more than doubled from 3.3% to 7.5%. In 2018, around 60% of the total renewable energy production in Luxembourg came from agriculture and forestry, and this share is slowly growing since 2015[81]. The turnover in bio-economy per person employed is slowly increasing, and was higher than the EU average in 2015 (EUR 184 502 vs EUR 119 000)[82]. In terms of turnover per sector, the largest share was in food and beverages at 63% in 2015, with agriculture coming second at 23%.

In Luxembourg, there are five LEADER groups, which cover practically the whole rural area of the country. In the 2014-2020 programming period, LEADER has been co-financing several projects, totalling EUR 7 million (7% of total RDP),[83] mainly to maintain social cohesion, create new jobs, and support social, cultural, tourism and economic initiatives to benefit rural areas.

An important feature of the Luxembourgish political system is its commitment to social dialogue. The role of social partners is enshrined in legislation. Policy dialogue is made easier by the small size of the country and its resulting close proximity between policymakers and leaders of labour and management. It thus contributes to the economic and social stability of the country. Moreover, Luxembourg has one of the lowest levels of distrust in the EU[84].

2.9 Improve the response of EU agriculture to societal demands on food and health, including safe, nutritious and sustainable food, as well as animal welfare

Luxembourg already shows a decreasing trend with regard to the use of a number of inputs that are targeted in the Farm to Fork Strategy.

As regards pesticides, a national action plan on their sustainable use has been in place since the end of 2017. Luxembourg will be the first Member State to ban the use of glyphosate (as from 31/12/2020). The data published by the Luxembourg authorities for Harmonised Risk Indicator 1[85], monitoring pesticide use for 2018, show a decrease of 38% compared to the reference period 2011-2013. Although this is better than at EU level (- 17%), Luxembourg can do more in enforcement to ensure the implementation of integrated pest management by all professional users. Most of the reduction appears to be in the use of herbicides but further details as to the type of pesticides or the required analysis have not been published. The trend for EU Harmonised Risk Indicator 2 reflects the overall number of emergency authorisations granted since 2011, which is reducing, though individual emergency authorisations (such as in 2018), make it difficult to discern a clear trend.

Animal welfare is another priority area for the Farm to Fork Strategy, which is also vital for the sustainability of food systems. The main issue already identified in a Commission letter to the responsible services[86] was that tail docking of pigs is still a routine practice, although this is prohibited as a routine measure by EU rules. The percentage of pigs reared with intact tails has barely changed since 2016, and conditions on farm must improve if the number of tail-docked pigs is to start to decrease. The challenge for Luxembourg will be to make significant efforts to comply with these rules.

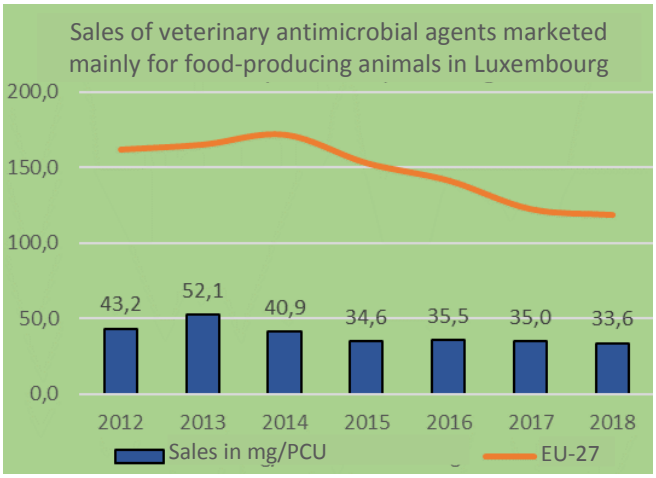
Antimicrobial resistance (AMR) is a priority area for the Farm to Fork Strategy with a 50% target reduction in sales of antimicrobials for farmed animals and in aquaculture by 2030. A 2014 law makes the provision of data on antimicrobial sales to the competent authority mandatory[87]. The tenth ESVAC Report in 2020 shows a downward trend in the use of Veterinary Medicinal Products in Luxembourg with 33.6 mg/PCU (2018) being well below the EU average[88].

Although available data suggest that the use of antimicrobials in animals is relatively low, this may be an underestimation of total use given that antimicrobials supplied to farmers by veterinarians based in neighbouring Member States are not included in these data. However, in 2018 Luxembourg has implemented a national strategy for the use of antibiotics in relation to the one health strategy. This 2018-2022 national plan[89] focuses on the principle of prevention, monitoring and recommendations for the use of antimicrobials in animal productions. This plan will contribute to raising awareness about AMR. It should also improve AMR surveillance data, which was rather limited[90].

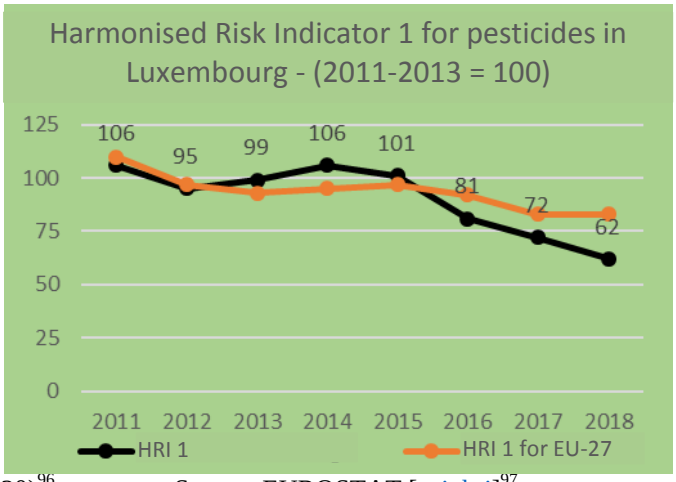
Luxembourg's eating habits do not seem to correspond to national recommendations for a healthy diet[91]. The consumption of meat[92], in particular red and processed meat[93], remains high, and that of fruits and vegetables rather low. In addition, a significant percentage of the Luxembourgish population is overweight or obese[94].

A shift towards healthy diets in Luxembourg, in line with national recommendations, would therefore be likely to help reduce rates of people with overweight or obesity, as well as the incidence of non-communicable diseases, while simultaneously seeking to reduce the overall environmental impact of food systems.

Luxembourg has a new national waste and resource management plan to reduce food waste by at least 50% by 2022, which will require a commitment from private households, gastronomy and all food chain actors.[95] In this plan, not enough attention is given to food loss and waste occurring at the primary production level and the early stages of the supply chain (including lack of data). This could be tackled by extending the new national food waste prevention programme (as required by Article 29(2a) of the Waste Framework Directive 2008/98/EC) to be prepared after 2022.



Source: DG AGRI after ESVAC, Tenth ESVAC Report (2020)[96]



Source: EUROSTAT [aei_hri][97]

2.10 Cross-cutting objective on knowledge, innovation and digitalisation

Luxembourg has chosen not to finance its needs in terms of knowledge sharing and innovation via its Rural Development Programme but through national funds. The Law of 17 June 2016[98] on support to sustainable development of rural areas complements the RDP. Chapter 17 specifies the financial support linked to knowledge sharing and advisory services. The agricultural chamber coordinates the training and advisory programmes. Luxembourg does not take part in the European Innovation Partnership Network.

The Chamber of Agriculture coordinates the different AKIS actors. Luxembourg's AKIS has been described as relatively integrated in the Country Report[99] from the ProAkis project (2014). The main actors are the public sector (Ministry of Agriculture and its agencies, providing advisory services), public research centres, the technical college of agriculture for research and education, the agricultural chamber. Several farmers' organisations such as Convis (a farming association specialised in plant and animal production), Biog (organic farming association) and FILL (Fördergemeinschaft Integrierte Landbewirtschaftung Luxembourg, the association to promote integrated agriculture) are also involved. Private companies also act as providers of product-related advisory services. In 2014, there were 30 advisors in Luxembourg.

Little information is available about networking activities organised at the national or regional level to connect research actors, such as universities and partners of Horizon 2020 projects with farmers, advisors and rural businesses. The future national CAP network can play a much bigger role in promoting synergies between the CAP and European Research Area (ERA). The best way to do this is to keep in close touch with the Horizon National Contact Point and to intensify the dissemination of information on the EIP website. Moreover, when collecting and sharing information, the CAP can finance interventions that help to make use of up-to-date scientific information for agricultural practices. This could be done, for example, through the CAP network and its

knowledge platforms and knowledge reservoirs or by setting up advisory back offices where the latest knowledge and innovation is collected and shared with field advisors and farmers.

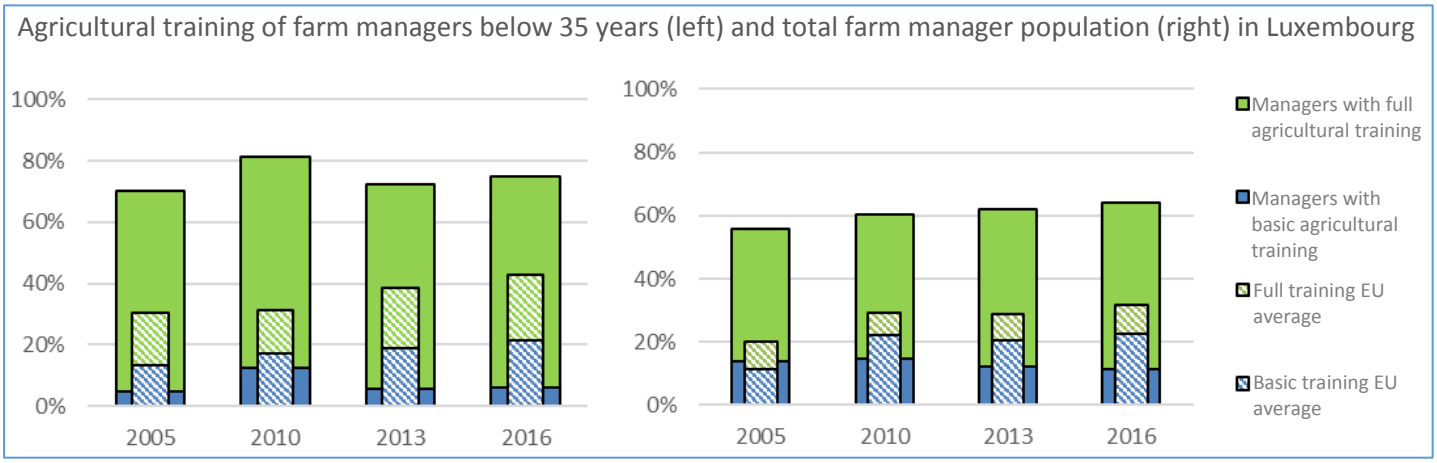
In Luxembourg in 2016, 53% of farm managers had a full agricultural training, which represents a rise of almost 10 percentage points over the past decade. This share is the highest in the EU-27, and is also very high for farmers under 35 years old (69% vs 21.69% in the EU). Luxembourg also has the fourth highest training rate in the EU with a total of 64% of farmers that have received at least basic agricultural training[100]. Moreover, farmers who are pursuing their studies in agronomy abroad bring a very wide range of knowledge in the agricultural sector[101]. Training in digitalisation could also be developed for both supply and demand.

The percentage of rural households in Luxembourg with access to fast broadband is almost 100%[102] and therefore the internet is accessible. Furthermore, in rural areas, more than 70% of the population has at least basic digital skills, if not more advanced, which places Luxembourg in the top five in the EU[103]. Overall, Luxembourg performs well when it comes to the digital transition.

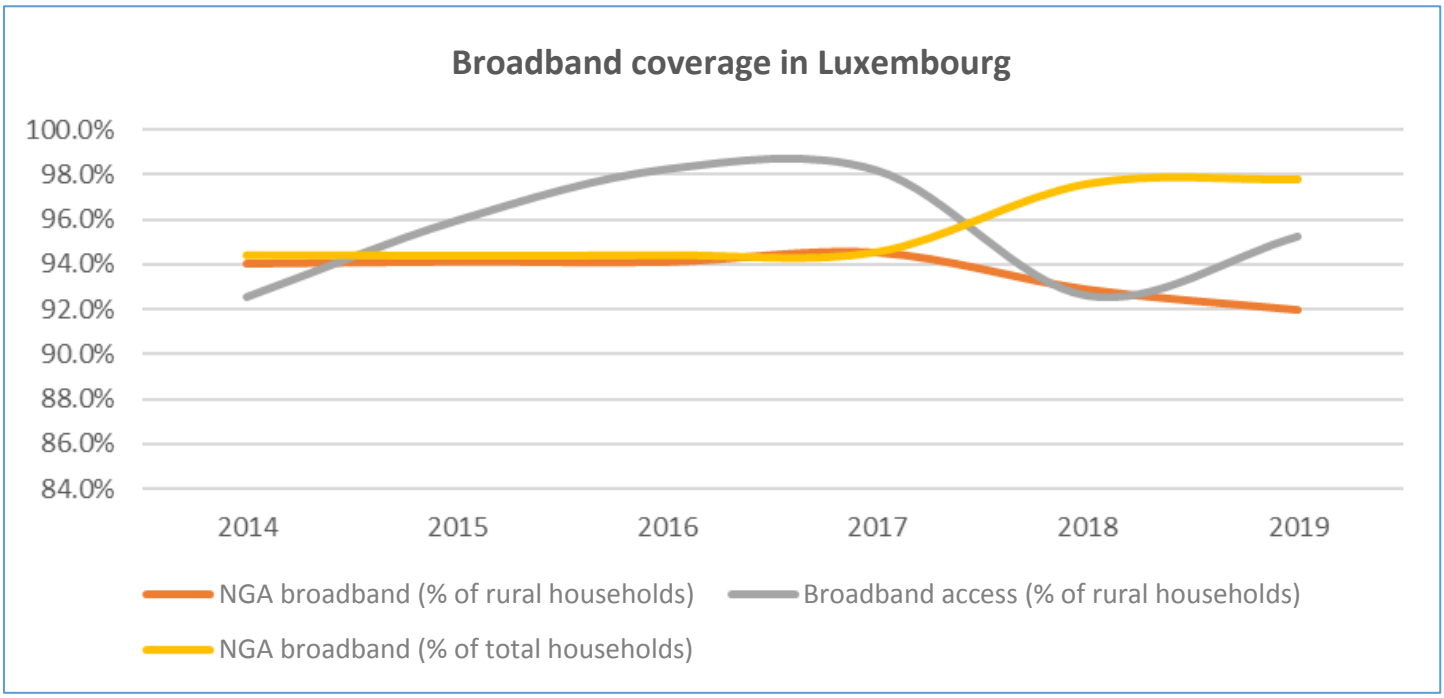
Digitalisation in rural areas could enable, among other things, precision farming and modern methods to reduce the use of fertiliser and phytosanitary products as well as the increased use of drones and robots. Luxembourg is among the EU leaders in digital performance and competitiveness[104], especially in connectivity, integration of digital technologies and human capital, use of internet services, integration of digital services, and digital public services. In Luxembourg, there is one fully operational Digital Innovation Hub in the area of agriculture, hunting and forestry[105].

There is room for improvement in some aspects of digitalisation[106]. Luxembourg has not yet opted for the use of satellite-based means to monitor CAP implementation[107], even though the Luxembourgish data-driven innovation strategy[108] refers to how space technologies, data and services could help agriculture to benefit from improved land use. At farm level, Luxembourg has witnessed rapid development of digitalisation, but there are certain weaknesses, such as a lack of data networking[109].

As regards the bioeconomy, Luxembourg's agricultural sector has the great advantage of outstanding research institutes in composite plastics, as well as world leading corporations on composite materials. One of the areas worthy of additional research and analysis is to determine the added value for farmers in cultivating feedstock and/or gathering a percentage of residues for use in the bioplastic materials industry.



Source: EUROSTAT [ef_mp_training][110]



Source: DESI individual indicators [desi_1b1_fbbc][111]

[1] Please note that there are different ways to define "rural areas". The text above is based on the so-called "urban-rural typology" in line with the CAP common context indicators. However, according to the definition based on the "degree of urbanisation typology", in Luxembourg 77.8% of the territory are rural areas and 32.4% of the population lives in rural areas. Source: Eurostat

[2] European Commission. *Common Agriculture Policy context indicator C.26 Agricultural entrepreneurial income.* Income based on EUROSTAT [aact_eaa04], [aact_ali01] and [aact_eaa06], adding back the compensation of employees to the entrepreneurial income and divided by the total number of annual working units. Note: 2019 data estimated. The Average wage in the economy based on EUROSTAT [nama_10_a10_e] thousand hours worked using employees' domestic concept and [nama_10_a10], item wages and salaries.

[3] European Commission. *CAP context indicator C.25 Agricultural factor income.* Based on EUROSTAT [aact_eaa04], [aact_ali01] and [aact_eaa06]

[4] European Commission. *CAP indicators – Data explorer*. CAP Result indicator RPI_ 01 Share of direct support in agricultural income.

[5] Directorate General for Agriculture and Rural Development own calculations based on FADN 2017 data (C26) – reworked FADN standard report

[6] Directorate General for Agriculture and Rural Development own calculations based on FADN data (up to 2018).

[7] Directorate General for Agriculture and Rural Development own calculations based on FADN (Farm Accountancy Data Network) data (2015) and CATS (Clearance of Accounts Trailing System) data (up to 2017)

[8] Directorate General for Agriculture and Rural Development own calculations based on FADN data (up to 2018)

[9] Farm Accountancy Data Network. FADN Standard reports. YEAR.COUNTRY.SIZ6 and own calculations (up to 2018

[10] Farm Accountancy Data Network. FADN Standard reports. YEAR.COUNTRY.TF14 and own calculations (up to 2018)

[11] ECORYS and Wageningen Economic Research *Study on risk management in EU agriculture* 2017, p. 141

[12] Same as endnote 2

[13] EUROSTAT. [aact_eaa06].

[14] The standard output of an agricultural product (crop or livestock), abbreviated as SO, is the average monetary value of the agricultural output at farm-gate price, in euro per hectare or per head of livestock.

[15] FADN 2018

[16] SER, Enquête structure des exploitations, 2019

[17] SER, Enquête structure des exploitations, 2019

[18] Eurostat and Directorate General for Agriculture and Rural Development, 2019, Statistical factsheet Luxembourg

[19] Directorate General for Agriculture and Rural Development, based on COM EXT data.

[20] Directorate General for Agriculture and Rural Development based on Eurostat. https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/by_country/documents/analytical_factsheet_lu.pdf

[21] Ministère de l'Agriculture, de la Viticulture et de la Protection des consommateurs, *L'agriculture luxembourgeoise en chiffres 2016.* https://statistiques.public.lu/fr/publications/thematique/entreprises/agriculture-en-chiffres/lux-landwirtschaft-fr.pdf

[22] Jo H.M. Wijnands, Jos Bijman, Tanja Tramnitzke, European Commission, *Analyses of the Functioning of Milk Package provisions as regards Producer Organisations and collective negotiations*, JRC technical reports, 2017.

[23] Ministère de l'Économie, *Projet de loi portant transposition de la directive (UE) 2019/633 du Parlement européen et du Conseil du 17 avril 2019 sur les pratiques commerciales déloyales dans les relations interentreprises au sein de la chaîne d'approvisionnement agricole et alimentaire*.https://www.cc.lu/uploads/tx_userccavis/5588_PL_Pratiques_deloyales_dans_le_secteur_alimentaires_PL_5588SMI.pdf

[24] European Commission. *Commission Staff Working Document – Initiative to improve the food supply chain (unfair trading practices)* SWD(2018) 92 final.

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