



Research  
Council of  
Lithuania




Assessment Report of  
Comparative Expert  
Assessment of Research  
and Development Activities  
Carried out by Universities  
and Research Institutes for  
the Group of Units of  
Assessment VV\_GR\_AT

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**Assessment Report of  
the Group of Units of Assessment  
VV\_GR\_AT**

Approved by Order of the Chair of the Research Council of Lithuania No V-551 of 13 October 2023.

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## Terms & Abbreviations

**CEA** – Comparative Expert Assessment of research and development activities carried out by Lithuanian universities and research institutes

**FTE** – Full-Time Equivalent

**Institutions** – Lithuanian universities and research institutes

**RCL** – Research Council of Lithuania

**R&D** – Research and Development

**UoA; Unit(s)** – Unit(s) of Assessment

**FTE<sup>1</sup>** – the number of working hours worked during the year by a certain group of employees divided by a number of working hours in the 12 months of that year, as set by the Minister of Social Security and Labour (with a 5-working-day week). <..> The FTE unit – a person per year.

**FTE(SD)<sup>1</sup>** – the sum of the FTE of teaching staff members with a science degree divided by 3, and the FTE of research workers and other researchers with a scientific degree.

### Research areas:

**T** – Technology; **A** – Agricultural Sciences

### Universities:

**LSMU** – Lithuanian University of Health Sciences

**VDU** – Vytautas Magnus University

### Research Institutes:

**LAMMC** – Lithuanian Research Centre for Agriculture and Forestry

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<sup>1</sup> Description of the Comparative Expert Assessment of Research and Development Activities by Universities and Research Institutes approved by Order No V-1593 of the Minister of Education, Science and Sport of 2 September 2021

# 1. INTRODUCTION

## 1.1. Purpose, Scope, Goals of the Comparative Expert Assessment

The Comparative Expert Assessment of research and development activities carried out by universities and research institutes of Lithuania (hereinafter – CEA) was carried out in 2023 by Research Council of Lithuania (hereinafter – RCL) in accordance with the *Description of the Comparative Expert Assessment of Research and Development Activities by Universities and Research Institutes* approved by Order No V-1593 of the Minister of Education, Science and Sport of 2 September 2021 (hereinafter – the Description), the *Regulation on Procedures for the Comparative Expert Evaluation of Research and Development Activities Carried out by Universities and Research Institutes* approved by Order No V-486 of the Chair of the RCL of 8 August 2022 (hereinafter – the Regulation), and other related legislation.

The purpose of CEA is to provide a picture of research and development (hereinafter – R&D) performance, socio-economic impact, and the development potential of Lithuanian universities and research institutes (hereinafter – Institutions) based on their R&D activities during the period of 2018–2022.

The scope of CEA encompasses both state and non-state Institutions operating in Lithuania. All state universities (in total eleven) and all state research institutes (in total eleven as well), four non-state universities and two non-state research institutes were participating in the CEA in 2023. The Institutions or parts thereof were assessed as the units of assessment (hereinafter – UoA or Units). The CEA facilitates the comparison of R&D performance of the UoA against international standards and within the national context. It provides valuable evidence to R&D policymakers at different levels, as well as offers the Institutions involved in the assessment a significant incentive to enhance their performance.

Since 2018, the CEA has been an integral part of assessment of R&D activities of Lithuanian institutions. The annual assessment of R&D activities carried out by the Institutions together with CEA conducted every five years constitutes the Lithuanian assessment system of R&D activities. The results of the two-step assessment are used to allocate state funding for R&D activities for Institutions. The results of the CEA implemented in 2023 will determine 70% of state budget funding for R&D activities of Institutions for the subsequent five years.

The assessment results will also determine the continuity of doctoral studies as well as the new rights to carry out doctoral studies at Institutions in accordance with the *Regulations on Doctoral Studies* approved by Decision No. V-739 of the Minister of Education, Science and Sport of 18 May 2020. Moreover, the findings from the CEA might serve as a trusted source of evidence on R&D performance of the Institutions for assessments concerning other funding instruments or higher education studies.

## 1.2. Comparative Expert Assessment Organization and Assessment Criteria

The CEA relies on international peer review panels to evaluate Lithuanian Institutions' R&D activities. Using panels rather than individual peers creates a possibility for discussion and debate within the peer group and enabling comparison within the group.

The assessment is carried out on the UoA level, which is the organisationally defined structure – ranging from a whole Institution to a division of an Institution corresponding to the faculty or other formal structures of the Institution. In accordance with the Description the rules for the formation of the UoA are as follows:

- the UoA should be interrelated by common R&D activities and might operate in one or two research areas;
- the minimum size of the UoA should be no less than 5 full-time researchers with scientific degree (FTE(SD)) and the maximum size of UoA should not exceed 75 FTE(SD).

The exceptions could be made for better reflection of R&D activities in the Institution. If an Institution had a UoA with a higher number of FTE(SD) or/and UoA operated in three research areas, it should have submitted arguments and obtained RCL approval for participating with not typical composition.

Following the instructions, Institutions have formed eighty-five UoA. All these UoA were split into thirteen groups resulting from four to nine UoA per Panel. The interval of the UoA size ranged from slightly above 5 FTE(SD) to UoA of more than 150 FTE(SD). The number of research areas and research fields one UoA was operating in also varied, i. e., while most UoA operated in one or two research fields, there were outliers where Units were involved in up to five research fields. The variations in size, composition, and research areas among the UoA within each group posed challenges for comparison and required careful consideration by the Expert Panel.

The assessment of the Units is based on three criteria:

- The quality of R&D activities (weight 0.65) of UoA in the research field(s) (group of research fields);
- The economic and social impact of R&D activities (weight 0.2) of UoA;
- The development potential of R&D activities (weight 0.15) of UoA.

The quality of R&D activities is assessed either in each research field or the group of research fields within the research area while economic and social impact as well as development potential are assessed on the UoA level. Each assessment criterion is scored on a five-point scale, namely, ranging from excellent [5] to poor [1] or no R&D [0]. The description of the values of the scores for each criterion are provided in the Description. Half point scores were allowed, and that provided a possibility for more nuanced assessment when necessary.

The quality of R&D activities of the Unit is assessed following these rules: if UoA has at least 10 FTE(SD) in the research field or has between 2 and 10 FTE(SD) and has the right to provide doctoral studies (or intends to seek such right in the next 5 years) in the research field, then the research quality is assessed in the research field; if UoA does not meet these criteria, then the research quality is assessed in the group of research fields within the research area. In the latter case, the assessment considers the collective quality across the research fields within the group.

The assessment was based on the material provided by the UoA to the RCL information system “Vieversys” and covered the period 2018–2022, as well as summarized results of the annual assessment of R&D activities of Institutions (for 2018–2021) provided by RCL, alongside the information obtained during the visits of the Panels to the Institutions and meetings with the representatives of the UoA. Following the Description and the *Procedure for the Submission of Data on Results of Research and Development Activities Carried out by Universities and Research Institutes for the Comparative Expert Assessment* approved by Order No V-1593 of the Minister of Education, Science and Sport of 2 September 2021 (hereinafter – the Procedure for Submission of Data) relevant data was examined when assessing the UoA against each of the CEA criteria. In most cases the number of provided outputs for the assessment depended on the size of the UoA varying from a minimum of five to maximum of eighty-two outputs.

It should be noted that since the previous round of CEA in 2018, several organisational improvements of assessment have been made, therefore caution should be exercised when comparing the results of these two assessments. Some of them are worth mentioning:

- 85 UoA were formed and grouped into 13 Expert Panels in 2023, while the first CEA resulted in 117 UoA formed and grouped into 6 Expert Panels. The cause is mainly due to the change of rules for setting up a UoA. During the 2018 CEA, forming a UoA was allowed in only one respective research area, i. e., if the UoA operated in two research areas, it had to be split into two Units for the assessment purposes. In 2023 this restriction was eliminated, and Unit could easily operate in two (and in some cases in three) research areas. As well UoA formation was influenced by changing landscape of Institutions during the assessment period as mergers of several institutions took place: Aleksandras Stulginskis University and the Lithuanian University of Educational Sciences merged with Vytautas Magnus University since 1<sup>st</sup> January 2019; Šiauliai University was merged with Vilnius University, as well as the Institute of Law, the Lithuanian Institute of Agrarian Economics and the Lithuanian Social Research Center were merged into Lithuanian Centre for Social Sciences since 1<sup>st</sup> January 2021.
- The CEA scoring system has also undergone some changes. While five-point scales were used in both assessments, in 2023 half points were allowed, while in 2018 only whole numbers were used.
- There were some changes in the requirements for documentary input. In 2023 one list of Unit's R&D outputs for a five-year period was required while in 2018 a list of R&D outputs for each assessment year (from 2013 to 2017) and an additional list for the entire assessment period were required, resulting in a large volume of data.

### 1.3. Expert Panel for the VV\_GR\_AT Group of Units of Assessment

Expert Panel for the VV\_GR\_AT group had to assess five UoA from three Institutions:

- **Lithuanian Research Centre for Agriculture and Forestry** – 3 UoA:  
*Institute of Forestry* (abbr. LAMMC\_MI),  
*Institute of Horticulture* (abbr. LAMMC\_SDI),  
*Institute of Agriculture and Regional branches* (abbr. LAMMC\_ŽI);
- **Vytautas Magnus University** – 1 UoA:  
*VMU Technology and Agricultural Sciences* (abbr. VDU\_TAS);
- **Lithuanian University of Health Sciences** – 1 UoA:  
*Agricultural sciences* (abbr. LSMU\_Agricult).

The Units were operating in the Agronomy, Veterinary Sciences, Animal science, Forestry, Transport engineering, Environmental engineering, Mechanical engineering research fields, and considering these research fields RCL has appointed the Expert Panel members with the main responsibility to assess UoA against three criteria and provide recommendations for UoA future development. The Panel consisted of nine members affiliated with institutions abroad:

- Kaare Magne Nielsen (*Panel Chair*), Oslo Metropolitan University, Norway
- Laura Cavallarin – National Research Council (CNR), Italy
- Salvatore Cozzolino – University of Naples Federico II, Italy
- Pavel Kozak – University of South Bohemia in České Budějovice, Czech Republic
- Tadeusz Malewski – Museum and Institute of Zoology, Polish Academy of Sciences, Poland
- Luis Navarro – Valencian Institute of Agricultural Research, Spain
- Ivaylo Tsvetkov – Bulgarian Academy of Sciences, Bulgaria
- Maria Carolina Mariano Cardeira Varela – National Institute of Agricultural and Veterinary Research, Portugal

- Mauro Zarrelli – National Research Council (CNR), Italy.

#### 1.4. Assessment Organization for the VV\_GR\_AT Group of Units of Assessment

Timeline of the assessment organization for the VV\_GR\_AT Group of UoA:

**Submission of data.** Institutions participating in the VV\_GR\_AT Group submitted data on R&D activities of their UoA to the information system “Vieversys” by the 9th of March 2023 following the Procedure for Submission of Data.

**Individual assessment.** Prior to the visit to Lithuania, the data of each UoA submitted for the assessment was individually evaluated by at least three experts from the Panel. The number of experts assigned to assess each UoA would increase based on the number of research fields within the UoA. The individual assessment of the Units within the VV\_GR\_AT Group was conducted till 24th of April 2023.

**Visit to Lithuania.** The Panel members for the VV\_GR\_AT Group visited Lithuania from the 2nd to 5th of May 2023. The main objectives of the visit included discussing the results of the individual assessment within the Expert Panel, ensuring a uniform and consistent application of the assessment criteria among the Panel members; visiting and familiarizing with the academic and administrative staff, PhD students, and research infrastructure of the UoA (at least three experts from the Panel had to visit one UoA); and collectively agreeing on all scores for the Units within the group in the joint session.

**Final report.** After the visit to Lithuania, the preparation of the Panel report took place. The coordination of the preparation was done by the Panel chair. Before the submission of the Panel’s report, the institutions were given an opportunity to provide comments on the factual errors if any observed in the written justification of the scores for UoA. Taking into consideration the comments, the Panel's report has been adjusted where necessary. In addition, the Panel prepared a reply to the commenting authorities. The report was submitted to the RCL with the agreement of all Panel members.

**Appeals.** Upon receiving the final results on each Unit, the Institutions had the right to submit a substantiated appeal to the RCL if they believed there were factual errors in the justification of the UoA assessment and/or if they suspected a breach of the assessment procedures that may have affected the assessment outcome.

RCL has established an external Board of Appeal, comprised of seven members selected from the candidates nominated by the Lithuanian Research Academy, the Conference of Rectors of Lithuanian Universities, the Conference of Directors of the Lithuanian National Research Institutes, and the Ministry of Education, Science, and Sports. The Board of Appeal was responsible for determining whether the appeals adhered to the specified provisions and in case of favourable decision to examine the appeal thoroughly.

The Panel VV\_GR\_AT has received one appeal. The Board of Appeal dismissed the appeal due to non-compliance with the established appeal provisions.

**Approval of the report.** The final report of the VV\_GR\_AT group is approved by the Order of the Chair of the RCL in accordance with the Regulation.



## 2. ASSESSMENT REPORTS

### 2.1. LAMMC\_ŽI Unit of Assessment

Name of the institution	<b>Lithuanian Research Centre for Agriculture and Forestry</b>
Official abbreviation of the name of the institution	<b>LAMMC</b>
Name of the Institution's unit of assessment (hereinafter – UoA)	<b>Institute of Agriculture and Regional branches</b>
Abbreviation of the UoA name	<b>LAMMC_ŽI</b>
The scope of the UoA (FTE(SD))	<b>89,00</b>
Research area(s)	<b>A 000 - Agricultural sciences</b>

### Quality of the R&D activities by research fields (groups of research fields) of the UoA

#### Agricultural sciences

Research field	Scope (FTE(SD))	Score (points)
<b>A 001 - Agronomy</b>	<b>89,00</b>	<b>4</b>

#### Reasoned justification of the score

The UoA is very large, with 9 Departments and Laboratories, two affiliates, and two research stations in different regions of Lithuania. It has 87 researchers, equivalent to 89 FTE. This indicates that they devote almost 100% of their time to research, which is a very good indicator. Although the overall number of researchers is high, the balance between categories is skewed towards chief and senior researchers (54). There are fewer researchers and junior researchers (33). Noteworthy, there are only 7 junior researchers with a scientific degree. There is also a large number of other employees (116).

The PhD program is excellent. The Unit has increased the number of the PhD's during the period under review from 37 to 49 and 26 theses are completed. It is important to note that the number of foreign PhD students have increased to 11, which is a very good level of internationalization of the PhD program. The total number of PhDs is in line with the number of scientists in the UoA. Most of the defended theses took 4-5 years (4 years is the expected time), which is a good indication of efficiency given the difficulties of agronomic work. The PhD theses can be written in Lithuanian, in English with publications in SCI journals. The tendency is to have theses in English and with published papers. When interviewed, PhD students indicated that they have the necessary infrastructure, good advice and interaction with their supervisors and frequent seminars to present and discuss their results. Importantly, they indicated that they can easily obtain short internships in international laboratories and funds to attend international congresses to present their results.

The UoA presents 45 papers as the best research output. Most of the papers in the list are generally published in journals that are now in the Q1 quartile, and many of them are even in the D1 decile. The journals are in different research disciplines, mainly in Environmental Sciences, Agronomy, Mycology and Plant Sciences. The level of publication supports the idea that the UoA has a very good international recognition for the type

of research carried out. It should be noted that for a significant number of papers, particularly in those published in journals in the D1 decile, the share of the research output attributable to the institution is low, although it is positive that these papers were done in collaboration with other foreign and Lithuanian scientists. During the period under evaluation, the Unit has significantly increased the total number of publications in journals in the Q1-Q2 quartiles.

Reports were presented at relevant International Conferences, but also at restricted events and meetings without established history. However, there is no information on whether the presentations were made as invited or keynote lectures, oral presentations or posters.

National awards and distinctions were awarded to Unit researchers, but also to PhD students, which is a valuable feature of the achievement policy of the institution.

The UoA partake in projects funded by several national and international sources. Several of them had large budgets, particularly the EPS Soil-EU project, those from the for world-class researcher groups programme, EIP activity group projects, the Baltic research programme, LIFE and a long term applied project for soil properties monitoring. They also had smaller applied projects funded by the Ministries of Agriculture and Environment. They had several projects in cooperation with other countries, mainly in the Baltic region, which is a very good approach for internationalisation. The participation in competitive R&D projects is considered to be very good.

Overall, the quality of R&D activities is very good at the international level, but there is some room for further improvement particularly in aspects related to scientific leadership in projects and publications.

## Economic and social impact of R&D activities of the UoA

Score (points)

4

Reasoned justification of the score

The level of interaction of the UoA with business, decision makers, and society is very good. Activities are mainly focused on disseminating knowledge to farmers, private companies, consultants and national authorities through various mechanisms such as seminars, field days, and publications in the popular press. The main areas of activities are related to soil management, fertilisation, plant protection and agricultural practices, in most cases taking into account the problems posed by climatic change. Also important is the breeding of new varieties of different crops and the licencing of some of them. All these activities have had a relevant impact on the Lithuanian agriculture and also on the projection of future climate changes.

The economic and societal impact is evidenced by the demand for the UoA scientific expertise outside the institution. Members of the UoA play relevant roles in various national working groups and commissions organised by Ministries (Agriculture, Environment, Education), research agencies and universities.

The UoA provided a large number of consultancies to the public, economic entities and national authorities. They were mainly addressed to farmers and in some cases to cooperatives and consultants. The main areas were logically related to the R&D projects carried out by the UoA, such as soil management, fertilization, crop protection and agronomic practices. Some of the activities were important and very well established, reaching a number of farmers. These consultancies confirm the valid and important support to the local community and economic audience as an expert Institution within this field.

The UoA did not have very important activities in the organisation of scientific congresses. Most of the listed activities were single seminars or conferences of local interest. The few international events were mainly addressed to Baltic countries. Many of the activities described were carried out online, which is justified by the COVID pandemic.

Most of the editorial board activities were related to participation as guest editors of special issues of different journals. Some of these are in online journals in the Q1 quartile, but the majority are not in journals with a high visibility or impact index. Some participation in editorial boards of low visibility/impact journals is also listed. In general, these activities are not very relevant at the international level.

Scientists from the UoA participate in several multinational European working groups in different areas such as plant breeding, sustainable agriculture, soil science or plant genetic resources. These activities show a good level of internationalisation and are important for establishing links with scientists from different countries, which may facilitate further participation in collaborative EU projects.

The Unit has made very good efforts to disseminate scientific knowledge and developments to the society through seminars, popular press, social media, exhibitions, scientific dissemination, conferences, field days, websites, and radio. Some of the reported activities seem to be directed more to farmers than to the general public.

Many of the cooperation agreements described with other public and private entities are not considered highly relevant, because they consist only in the preparation of project proposals to be submitted to different public calls. Some cooperation agreements included were with very general objectives and to be accomplished by voluntary contributions from the partners. Importantly, they have signed several agreements for specific research activities with private entities, which contribute with the necessary funds (not quantified) to achieve the objectives and that generally own the results. The Unit has also signed licencing agreements with companies for the multiplication and commercialisation of varieties developed by the UoA.

The R&D contracts with the private sector represent a significant contribution of the total budget for projects. This is impressive and demonstrates the role of the UoA in the innovation ecosystem.

All of these activities are important for the development of Lithuanian agriculture and the Unit appears to be well committed for this. Overall, it is clear that the UoA contribute to economic and social impact.

## The development potential of R&D activities of the UoA

Score (points)

4,5

Reasoned justification of the score

The Unit has an excellent infrastructure for agronomic research. It has all the necessary laboratory equipment for experiments and analysis, and modern environmental-controlled greenhouses and climate chambers for breeding research. Importantly, it also has all the necessary agricultural machinery and access to land surface at several sites that allow carrying out field experiments under different soil and environmental conditions. The availability of land is probably one of the main limitations of agronomy research centres. The Unit's infrastructure is available to scientists and students from other institutions. They also provide services to farmers and private companies. The GEP (Good Experimental Practice) certificate, the appropriate infrastructure and the expertise of the scientists are attractive for Lithuanian and foreign companies to

perform research on the efficacy of pesticides and fertilisers. They collaborate with other foreign and national institutions to have access to other infrastructures, such as plant phenotyping using digital technologies, the plant germplasm bank, the “decision support systems platform” for crop protection, and genomic technologies. In view of future activities related to climate change the Unit considers that needs additional infrastructures, like drought simulation equipment and root phenotyping, or an artificial irrigation system, which are obviously necessary to carry out such important research.

The Unit has 87 researchers with a women-oriented gender balance and the main age range of 35-44 years. The principles of human resources management common to all LAMMC Institutes are very good. The policy of recruiting researchers through a first public competition for a five-year contract and a second one for a permanent position is very good. There are no clear provisions for 1-2 years contracts for postdocs with budgets from well-funded projects, a situation that is also common to most EU countries. On the other hand, a general post doc programme is offered through RCL in Lithuania.

The strategic plan presented is that of the Lithuanian Research Centre for Agriculture and Forestry (LAMMC), that is the centre to which the Unit belongs. This is a state research institute that contributes to the implementation of the goals and priorities established by the Government and other agencies, and especially in the context of the EU Green Deal policy. The overall plan is very good and focuses on both basic and applied research to meet the needs of the society and the industry in a sustainable way.

The Unit’s R&D objectives are in line with general EU strategies and with climate change mitigation and adaptation. The research objectives of the different areas of the Unit (Soil, Plant Nutrition, Crop Genetics and Breeding, Integrated Pest Management, and Biodiversity) are very well described and justified, always within the framework of the EU’ strategies of Farm to Fork, Green Deal and Biodiversity. They all represent a modern approach to agronomic research. It is clear that the Unit follows and takes as reference the main international and European strategy to achieve a strong position in terms of scientific and technological statements of its own expertise and work results. In addition, there is a clear interaction between the different research areas.

In general, the UoA has a very good policy for training new researchers up to PhD level, common to all LAMMC Units. LAMMC invest in early-stage career researchers focusing on their involvement in research, increasing their international visibility and their interest in interdisciplinary research. The Unit has a clear and well-defined policy for recruiting of the new and necessary personnel, collaborating with universities, organising open days, setting up internship programs and exploiting cooperation among the educational system for PhD programs in different fields. PhDs are involved in different training, educational and work activities at both the national and international levels, with state funds for all students assuring a fixed budget for consumables, and are encouraged to participate in conferences, international internship calls and also to acquire appropriate skills for the plan budget formulation, and all management activities of their own work. There are no clear provisions for training post-docs in Lithuania or abroad.

The UoA’s self-assessment is well delivered. Strengths include the excellent infrastructure, increasing international visibility, and links with the business community. Among the weaknesses, the difficulty in attracting high-level researchers due to increasing competition with business for human resources is of particular concern. The current salary levels also limits the possibilities to hire foreign researchers. Also, the geographically dispersed research facilities of the sub-units limits concentration of efforts. This may limit the future development of the Unit. Another important issue is the insufficient number of international project applications. Opportunities include increased possibilities for international cooperation and the changes in legislation that may facilitate the simplification of bureaucratic procedures, including those related to the recruitment of foreign scientists. The major threats are the decreasing number of Master students in areas related to Unit’s research, and the increasing competition in the labour market for technical specialists, who are very important in agronomic research.

Overall the development potential of the UoA is very good to excellent. This is supported by its infrastructure and its competitive situation in attracting national, regional and international R&D funding. R&D activities are justified and linked to the needs of the sector at the national and international level. The Unit already has international collaborations and networks that allow consortium publications. Internalization is further supported by the facilities for short-term internships, both for researchers and PhD students. Furthermore, there is an extensive collaboration with the private sector. This could also add value to the PhD educational activities by training students in innovation, entrepreneurship and in understanding how ideas can be brought to market.

### **Recommendations for continuity and/or improvement of the activities of the UoA**

Although UoA researchers have an important capacity to publish papers with larger multidisciplinary groups from other foreign and Lithuanian institutions, they have a limited leading role as authors. It is recommended that they try to improve their leadership and relevance in these publications. It is also recommended that the number of publications in journals of the Q3-Q4 quartiles would be reduced.

Better participation in well-funded EU consortium research projects is desirable. To accomplish this objective it is important to increase awareness, focused use of the many scientific networking arenas presented, and develop and share skills for ideas development, application writing and presentation, and in the long run increase the number of applications with leadership of work packages and beyond.

It is recommended that the number and amount and funds for the UoA of cooperation agreements and contracts with private entities would increase.

The UoA should continue with its policy of attracting foreign PhD candidates. PhD theses should ideally be always written in English and the results should be published in SCI journals. It is also expected that the PhD students will be the first author of the papers.

A strong 1-2 years postdoctoral training program abroad should be established to improve the overall quality of researchers and researcher recruitment. If this goal is limited by legal / career constrains in the country, the UoA should promote this training period for those scientists who pass the public competition to get the first 5-year contracts.

The additional infrastructures, such as drought simulation equipment, root phenotyping or an artificial irrigation system are necessary for future activities related to climate change and all efforts should be made to obtain them.

## 2.2. LAMMC\_SDI Unit of Assessment

Name of the institution	<b>Lithuanian Research Centre for Agriculture and Forestry</b>
Official abbreviation of the name of the institution	<b>LAMMC</b>
Name of the Institution's unit of assessment (hereinafter – UoA)	<b>Institute of Horticulture</b>
Abbreviation of the UoA name	<b>LAMMC_SDI</b>
The scope of the UoA (FTE(SD))	<b>35,18</b>
Research area(s)	<b>A 000 - Agricultural sciences</b>

### Quality of the R&D activities by research fields (groups of research fields) of the UoA

#### Agricultural sciences

Research field	Scope (FTE(SD))	Score (points)
<b>A 001 - Agronomy</b>	<b>35,18</b>	<b>4</b>

#### Reasoned justification of the score

The presented research was considered scientifically sound and important for the economy. Sixteen papers and two book chapters were listed as best research outputs. Most of the papers in the list were published in journals that are now in the Q1 quartile and most of them are even in the D1 decile. They are mainly in the fields of Plant Sciences and Food and Technology. The quality of the publications is very good for the type of research carried out at the Institute. The Institute is approaching the LAMMC goal of at least one publication per year and per researcher and to improve the quality of the journals accepting to publish the research. The overall number of publications in the different quartiles and their evolution during the evaluated period is not an expected part of the evaluation process. A more detailed analyses was therefore not undertaken.

The UoA maintains a relatively stable number of PhD students with a slight increase over the evaluated period. There is a positive trend considering the number of graduated doctoral students. On the other hand, the number of PhD students from abroad is remarkably low. Most of the theses were defended within 4 years, which is a good indication of the quality of the supervision.

The UoA has participated in a good number of high-profile international events. However, there are no clear indications to what extent the presentations were provided as posters, oral contributions or invited talks. This lack of specification limits the opportunity to consider scientific impact and leadership. This may also be explained by limited instructions of how the information should be presented as part of the evaluation.

Several awards were received as a consequence of the R&D activity. The majority are national ones, followed by international and regional. Scholarships for young PhD students are included. The number of awards is significant given the size of the UoA and indicate impact and visibility.

Most of the competition-based R&D projects are linked to European programs and initiatives, and to a lesser extent with regional/national ones. With the exception of the SMART projects, funding is moderate to

modest. The listed projects are within relevant areas of research of the UoA. A higher activity level and participation in EU funded consortia will contribute to develop the research of the UoA further.

According to the information provided, it can be concluded that the activity of the UoA is carried out at a high level, and the obtained results are for the main parts recognized at the international level. There is a positive trend in graduated PhD students. In contrast, the level of internationalization expressed as the number of students/staff visits coming from abroad is near absent. There is clearly room to develop internationalization as a reliable indicator of the scientific attractiveness and educational quality of the UoA's R&D activity. Considering the national and international awards for R&D results, it seems the UoA achievements are mostly recognized and acknowledged at the national level. The above-mentioned considerations provide the reasons for positioning the R&D activity of the UoA between good and very good.

## Economic and social impact of R&D activities of the UoA

Score (points)

4

Reasoned justification of the score

The socio-economic impact of the UoA's R&D is very good. Activities are focused to transfer of technology to SMEs and small growers in various areas, with special emphasis on aspects related to functional foods, new food products, pest management and breeding of new varieties of different crops. These areas are important for socio-economic development. Some of the activities have a high project value, e.g., the cooperation with other Baltic countries or the breeding of new varieties.

The UoA is well represented with experts contributing to different state governing bodies, councils and management structures as well as being members of different commissions, agencies, chambers and the Academy of Sciences. Such sharing of expertise showcases the need for the UoA's competence in different sectors of society.

A high number of consultations were provided to farmers and some SMEs. The main areas of activity were related to integrated plant protection, good agronomic practices and environmental protection, which all are very important in the context of the EU's policy "From farm to Fork".

The UoA has organized different types of scientific events - national, international and virtual conferences, a couple of national seminars and one with international attendance, and a meeting of a European network.

Most editorial board activities were related to participation as guest editors of special issues of different journals, most of them of with limited visibility/impact index.

The UoA researchers have been selected as Guest editors in various scientific journals in the field of horticulture. Some of the researchers are members of Editorial Advisory boards.

Researchers from the UoA are members of, or taking part in, activities in various influential European structures and programs. These (COST, ISHS, EUFRIN, Biodiversa, ECPGR Berries, etc.) are active in areas such as plant breeding, horticulture, fruit trees, genetic resources and biodiversity. Partaking in these activities are important for establishing scientific networks and links with scientists from different countries.

The UoA uses various approaches for popularizing its scientific activities (public media channels, social networks, printed materials, participation in exhibitions, TV shows, radio interviews, e-catalogues, thematic

lectures and seminars for broad audiences, elementary school students, and recommendations). It is commendable that they integrate project outcomes in specialized courses for students in High Schools and University programs.

The UoA is quite active in making agreements/contracts with various public entities and companies (BioHumus, Gruppo FOS, Agrodronas, Genomica, JSC 'Ecoextraction, etc.), that shows the Institute is an attractive partner for joint R&D collaborative activities. Also, the UoA has non-monetary collaborations with companies, generally related to the exchange of knowledge in R&D or carrying joint investigations with complementary contributions from the parties.

The activity of the UoA is structured in three departments plus three laboratories. The Institute has at its disposal solid and well-developed scientific facilities. The Open Access Centre (OAC) for modeling of Fruits and Vegetables Processing Technologies is a powerful structure with unique equipment (8 walk-in growth chambers with controlled environment), where various measurements and analyses might be done in pursuit of development and commercialization of new food products. The Unit is very well equipped with the modern devices for wide use of molecular techniques and application for omics technologies. The cryopreservation facilities installed are unique in the Baltic States. They have enabled development of protocols for long-term storage of different important crops (sour cherry, strawberry, potato, garlic, tobacco, etc.). Field trials are carried out in a large experimental orchard with an area of 5 ha. Infrastructural elements for application of integrated pest management system, sensory properties research, biochemical composition of fruits and vegetables are also available. The R&D infrastructure is available for studies under approved regulations.

The UoA carries out interdisciplinary activity, offering conditions for preparing Bachelor and Master Theses as well as internships to other Lithuanian Universities. The UoA has a well-developed collaboration with the Plant Gene Bank for accessing collections of important crops (onion, red beat, cabbage, etc.) as well as to filed collections from plum, apples, pears and other fruit species. The crop breeders from the UoA might use Gene Banks of other countries for scientific purposes as well. The scientists could take further advantage from the use of the Virtual library of the Centre. The Centre allows searching many subscribed databases and open access resources. The Unit interacts with international partners through joint scientific projects (Horizon 2020, EUREKA, COST) and have the option to further develop the use of partners' infrastructures. Through the Lithuanian RDI Liaison Office in Brussels the UoA has the opportunity to bring together and promote collaboration between important players from the industry, policy-making and innovation (national or from EU), which results in projects e.g., 'NordForsk'. The researchers with scientific degrees are quite uniformly distributed between the age groups, which is a prerequisite for a balanced continuity and transferring experience and competencies among research staff. The gender balance is in favour of women.

There is evidence that the UoA is closely connected not only with academic institutions, but also with the business and public sector. The general impression of the socioeconomic impact of the R&D activity it as a high level performer. It affects positively societal development and deserve more than a very good rate.



## The development potential of R&D activities of the UoA

Score (points)

4,5

Reasoned justification of the score

The UoA has a very good state-of-the-art infrastructure and competent research staff for carrying out both basic and applied research in horticulture. In addition to modern laboratory equipment, the Institute also have functional growth chambers, controlled greenhouses, a semi-industrial fruit and vegetable processing plant and an orchard for field trials. They also have access to other R&D infrastructure, like the plant gene bank, electronic publications and databases, as well as general infrastructure available in the country.

The distribution of employees by age and gender is good – most of them are in mid-career, but some of them are at age over 55 what should be taken into consideration in the recruitment of talented new researchers. The number of upcoming retirements in the UoA is a risk, given the loss of a significant number of researchers with long experience and hence the capacity to implement the Strategic operating plan of the UoA.

The principles of human resources management, which apparently are common to all LAMMC Institutes, are very good. The policy of recruiting scientists in a first public competition for a five-year contract and a second one for a permanent position is excellent. On the other hand, there is no provision for 2-3 years contracts for postdocs with budget from well-funded projects, a situation that is also common to other EU countries.

The strategic plan presented is that of the LAMMC, to which the Unit belongs. This is a state research institute that contributes to the implementation of the goals and priorities established by the Government and other agencies, and especially in the framework of the EU Green Deal policy. The overall plan is very good and focuses on both basic and applied research to meet the needs of the society and the industry in a sustainable way.

The descriptions of the research objectives of the UoA are well explained, although the justification is rather general. They are in line with the EU “Farm to Fork” strategy. They include the current research lines of the different departments of the UoA.

The self-assessment highlights strengths that include the excellent infrastructure and links with business community. Among the weaknesses, the difficulty in attracting high-level scientists due increasing competition with business for human resources is of special concern. This may limit the future development of the UoA. Also important is the fact that there is a low number of acquired international projects. Opportunities include increased possibilities for international cooperation and the changes in legislation that may facilitate the simplification of bureaucratic procedures, including those related to the recruitment of foreign scientists.

## Recommendations for continuity and/or improvement of the activities of the UoA

The main recommendations focus on further development of scientific leadership and the need to further develop internationalisation processes. Although the UoA researchers have an important capacity to publish papers with larger multidisciplinary groups from other foreign and Lithuanian institutions, they have a limited role as leading principal investigators or senior authors. It is recommended that they try to improve their relevance in these projects and publications. The presented publications have very good scientific quality. It

is encouraged to continue the focus and effort towards publications in journals in the Q1-Q2 quartiles and to increase the proportion of papers developed and coauthored with international partners. More effort should be put in developing opportunities for raising the number of PhD students, including internationalisation through foreign students, as well as for opening post-doctoral positions and internships abroad. These efforts would raise the international competence, as well as quality and visibility of the R&D activities. A long-term post-doc period abroad should become a clear expectation/requirement for applying to academic staff positions. It also suggested to implement a technology-scouting approach within the UoA, to support researcher in patenting and IP management of research results that have the potential to be transferred to production areas.

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### 2.3. LAMMC\_MI Unit of Assessment

Name of the institution	<b>Lithuanian Research Centre for Agriculture and Forestry</b>
Official abbreviation of the name of the institution	<b>LAMMC</b>
Name of the Institution's unit of assessment (hereinafter – UoA)	<b>Institute of Forestry, LAMMC</b>
Abbreviation of the UoA name	<b>LAMMC_MI</b>
The scope of the UoA (FTE(SD))	<b>25,57</b>
Research area(s)	<b>A 000 - Agricultural sciences</b>

## Quality of the R&D activities by research fields (groups of research fields) of the UoA

### Agricultural sciences

Research field	Scope (FTE(SD))	Score (points)
<b>A 004 - Forestry</b>	<b>25,57</b>	<b>3,5</b>

#### Reasoned justification of the score

The UoA is the Institute of Forestry. The activity of the UoA is structured in five departments/laboratories. The UoA has 25.57 FTE. The number of doctoral students or other employees is 16 FTE. The Institute contribute to the education of 9 to 14 PhD students every year. Approx 9 PhD theses were defended in the period 2018-2022, which is good given the size of the UoA. The completed PhD theses often include 2 papers published in recognized IF journals. On the other hand, the PhD students do not always have first authorship. For the period 2018-2022, 8 doctoral students were from abroad showing a positive trend for internationalization.

Overall, the quality and the production of the top publications presented is at the standard level of their European peers. The selected list of scientific contributions outlines the effort in direction of relevant topics such as forestry, forest plant breeding, biotechnology, sustainability of forest ecosystems and climate change, forest health, air pollution impact on trees, social and economic problems in the forestry sector, forest policy, forest soil science, plant nutrition, microbiology and plant pathology, forest plant genetic resources. Almost all scientific publications listed have been published in very good profile journals (Q1). Several papers are co-authored by foreign researchers pointing at a good level of internationalization. On the other hand, the contribution of UoA members to the publications is sometimes limited and often appear as co-authorships.

The awards given to researchers of the UoA are mostly national, with one exception (L'Oreal Baltic Fellowship Programme). Some of the awards (and scholarship) are to students. Scientific and educational achievements of UoA were awarded by many institutions, among them by Seimas of the Republic of Lithuania, Lithuanian Academy of sciences, Ministry of Agriculture, Ministry of Education, Science and Sports and Ministry of Environment of the Republic of Lithuania. One of the senior researchers has received approx. 1/3 of all awards.

The participation at relevant international conferences is good. The listed contributions to such activities (congresses, symposia, conferences and a meeting of an IUFRO working party) are good. At the Panhellenic Forestry Congress, a UoA scientist was key speaker. However, only very few listed activities were as invited and as key speakers over the last 5 years.

Beyond one editor in-chief role, the peer-review based editorial activities are not very prominent. Activities are mainly in local journals or in Journals with limited visibility demonstrating a still limited international recognition and reputation.

The UoA scientists are part of good scientific networks including World Federation of Scientists, NordGen Forest, The Foundation for Forest Science Research. One scientist was elected as the Vice Chair of the Lithuanian Academy of Sciences.

The UoA reported partaking in 13 international and national projects, half of them by international funding (Horizon 2020-Research and Innovation Framework Programme, LIFE, Baltic Research Programme, EIT). The role taken is often as participant and there is potential to develop scientific leadership roles further.

Overall, the quality of the listed research output is assessed to be good to very good. The quality is considered strong at the national level but with room for further development at the international level. The international recognition, visibility and reputation is still limited. The given assessment reflects current achievements, taking into account both the good quality of the research output as well as the need to further develop scientific leadership at the international stage.

## Economic and social impact of R&D activities of the UoA

Score (points)

4

Reasoned justification of the score

The economic and social impact of R&D activities are considered very good. The UoA is involved in a range of activities that justifies this assessment. The UoA researchers has been or are expert members of different panels, commissions and boards for municipal, local authorities and the National Organization for the Environment and Renewable Energy. Moreover, experts take part in various influential structures and programs operating in the forestry field both at European level (e.g. EPSO, COST, EUFORGENE, European Forest Institute (EFI)) and worldwide (e.g. IUFRO, FAO, UNESCO).

The researchers of the UoA are also active in organizing conferences, training schools and public events for the dissemination of forestry science. For instance, the UoA organized the International Union of Game Biologists (IUGB) Congress, "Quo vadis Silvae", The Forest Genetic Monitoring Training School, three workshops and other meetings. The UoA has been involved in several activities in popularization of forest, including with schoolchildren. In collaboration with EPSO (European Plant Science Organization), LAMMC organizes open days "Fascination of Plants Day". Public dissemination of science is carried out at the national level through papers in popular press and at the monthly journal for forest owners and society "Mūsų girios".

Representatives of the UoA are contractors in agreements with various parties and public entities which demonstrates the Institute is a desired partner for joint R&D activities.

The listed contributions also shows that the UoA provides critical services and support to forest management, to the development of wood modifying eco-friendly technology, and to the improvement of timber production, etc. For instance, the UoA scientists provided consultation, disease diagnostics and advisory

services multiple times to the Swedish Forest Agency, Forestry Research Institute of Sweden and several Swedish forestry companies. The insight and outcomes of these activities are not fully reflected in the listed publication record.

Examples of projects with impact and utility includes "BenchValue - Benchmarking the Sustainability Performances of Value Chains" that was used by the Ministry of the Environment for preparation of draft resolutions, as well as projects on developing interactive maps of development phases of the bark beetle which is necessary for forest managers to timely proceed the preventive measures against *Ips typographus*, as well the recommendations for State Plant Protection Service for preventive and monitoring of a pathogenic bacterium, as well as the project "Dynamic changes and restoration of soil properties, fungal and insect communities following clearcutting and biomass utilization in pine ecosystems" that were used by the Forest Policy Group of the Ministry of the Ministry of Environment in the decisions of legal acts

Overall, is it assessed that the economic and social impact of R&D activities of the UoA is very good and is internationally recognized - however continued focus on developing broader international recognition, influence and impact is expected.

## The development potential of R&D activities of the UoA

Score (points)

4

Reasoned justification of the score

The UoA has at its disposal a range of high-quality infrastructure to support its research activities This include two research stations and five laboratories—including Phytotrone, climatic chambers and a large greenhouse area (4000 square meters). The UoA is well equipped to carrying out various experimental studies. The intention to make the Center for Plant Genetics and Biotechnologies part of the European and Nordic Plant Phenotyping networks is a commendable strategic move to allocate resources for research and strengthen research networks.

The UoA and LAMMC access various recognized worldwide databases (Science Direct, Springer, Taylor & Francis, etc.) that are important for the continued internationalization.

The UoA manages the Centre for Plant Genetics and Biotechnologies (AGBC), which consists of five structural units containing well-equipped laboratories with modern experimental research facilities. The AGBC provides conditions conducive to international cooperation and strengthen the developmental potential of the UoA.

The UoA has strong collaborations within LAMMC as well as with other national institutions (Vytautas Magnus University, Kaunas Technology University, Lithuanian University of Health Sciences, Klaipėda University). This sharing of expertise is important for realizing the developmental potential of the UoA. Moreover, it provides recruitment of future staff through collaboration on Bachelor and Master level education.

There is potential for further development of the quality of the PhD training activities. This includes the use of English language in the preparation of the thesis and publications. This would increase interest, relevance and broaden readership and feedback opportunities.

There is developmental potential for the UoA to improve the scientific level of the research activities. Many published papers (non-included in the top list) are in online journals with limited reputation in the research

field. The top presented publications were mostly co-authored rather than being the results of the in-house research. The latter demonstrating room for further development of research leadership.

The developmental potential of the R&D activities of UoA, that are planned in accordance with the strategic plan of the Center of Agriculture and Forestry, seem realistic.

The number of researchers with scientific degrees within the age limit 35-55 prevails over the rest age groups and the gender balance is favourable.

Overall, the UoA shows a clear positive trend, demonstrate awareness of limitations, shows strategic direction, and hence has the potential for further improving the performance and visibility at the international level.

### **Recommendations for continuity and/or improvement of the activities of the UoA**

The quality of the UoA research activity can benefit from continued focus on internationalization - which can be achieved by means of:

- PhD thesis based on published manuscripts in English language international journals with recognized peer-review processes and visibility. The PhD student should routinely be the first author of papers;
- Continued focus on research from the UoA being designed, planned for and published in good/high visibility IF journals and with a higher author share contribution;
- Efforts to develop scientific leadership by UoA researchers as principal investigators in large projects;
- Take further advantage of the many international scientific networking arenas (e.g., conferences and scientific association membership activities) to enhance the participation in international R&D projects.

It is also recommended to merge the 2 spaces allocated to the laboratory of molecular genetics to rationalize the work of DNA extraction and sequencing. The interface between ecology and genetics (i.e., ecological genetics) can be improved in terms of strengthening the internal cooperation.

The potential of novel cutting-edge technologies can be further realized. This include further exploring unmanned aerial vehicles-UAV, digital twins, etc. The UoA can develop its role in developing tools and insights needed for realizing the concept of precision forestry.

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## 2.4. VDU\_TAS Unit of Assessment

Name of the institution	<b>Vytautas Magnus University</b>
Official abbreviation of the name of the institution	<b>VDU</b>
Name of the Institution's unit of assessment (hereinafter – UoA)	<b>VMU Technology and Agricultural Sciences</b>
Abbreviation of the UoA name	<b>VDU_TAS</b>
The scope of the UoA (FTE(SD))	<b>75,28</b>
Research area(s)	<b>T 000 - Technology, A 000 - Agricultural sciences</b>

### Quality of the R&D activities by research fields (groups of research fields) of the UoA

#### Technology

Research field	Scope (FTE(SD))	Score (points)
<b>T 004 - Environmental Engineering</b>	<b>23,25</b>	<b>4</b>

#### Reasoned justification of the score

The Environmental Engineering research field investigates several topics, such as the reduction of greenhouse gas (GHG) emissions in the food chain and the development of innovative technologies for sustainable precision seeding, treating water discharge, selective harvesting of cereals contaminated by mycotoxins, and producing biodiesel. The quality of scientific publications selected for evaluation by the research field is very good, with the majority of papers published in Q1 journals and approx. 25% in Q2 journals. The IF ranges from 4 to 10 and half of the total number of papers with high/very high citation intensity. The international recognition is good, as indicated by the participation in international conferences worldwide and by the international awards received. A moderate share (approx. 25%) of selected projects with the greatest impact are EU (H2020, Interreg, ERA-NET).

A total of 18 PhD theses were defended in the period 2018-2022, which is to be expected given the size of the UoA. Almost all of the theses were written in English. Considering the overall FTEs of personnel working in research, the number of PhD students and theses defended/year can be further expanded. Further internationalization of the PhD program should be considered.

The UoA has listed participation in a good number of high-profile international conferences. The merits of such participation, beyond scientific updates and networking, is difficult to access as the proportion of invited presentations is hard to determine from the submitted data. Several UoA members received various awards, mainly at the national level. In some cases, they received certificates of appreciation or honours from foreign institutions. The listed awards support the notion that the Environmental Engineering research field of the UoA has achieved a very good technical reputation.

The research field participated in projects funded by several sources and some of them with large budgets, in particular the EPS Soil-EU project, those from Horizon 2020, Smart, Interreg Baltic, and EUREKA. The other projects, generally from national sources, had intermediate to low supportive funds. The projects generally

had an applied approach and were related to reduction of GHG emissions, precision agriculture, impact of climatic change in aquatic ecosystems, and alternative biodiesel. Several projects were in collaboration with other countries, which is recognized, and is a good scientific and strategic approach for developing quality through internationalisation. A higher participation level in well-funded EU consortia and research projects is desirable. Nonetheless, the participation in competitive R&D projects is commendable.

Overall, the quality of the research activities is considered very good and the field is strong and recognized at the international level within its area of research. There is room for further development of the scientific leadership, internationalisation of research and educational activities as well as presenting the research in journals with higher visibility and broader audiences.

Research field	Scope (FTE(SD))	Score (points)
<b>T 009 - Mechanical Engineering</b>	4,84	3

#### Reasoned justification of the score

The Mechanical Engineering research field is very small and there is limited time devoted to research with a calculated 4.84 FTE(SD). Despite the small size, the researchers are involved in a broad range of projects dealing with e.g., the development of new technologies for sustainable precision seeding, the design of innovative wood extraction and transportation vehicles, selective harvesting of cereals contaminated by mycotoxins, the reduction of air pollution in livestock farming, for designing of technological and structural solutions for innovative barns for dairy cows.

Four PhD theses were defended in the period 2018-2022. Almost all theses were written in English. The PhD candidates are often first authors on papers. Considering the low FTE, the number of PhD students and defended/year thesis is adequate. However, completion time is up to 7 years.

The quality of scientific publications selected for evaluation is good, with approx. 60% of papers published in Q1 journals, 40% in Q2 journals, (IF ranging from 4.6 to 7.3), 20% of papers with good citation intensity. Publications are overall, in well-recognized, field-specific, international peer-reviewed journals. The listed research outputs comprise 5 different contributions to Elsevier journals within the specific field. The interactions within the other UoA's topics are not developed to its full potential.

A number of contributions to various international conferences are listed with the large majority as oral presentations. The list of main national and international awards received for R&D shows three recognitions in 2018-2019 and 2020. These are the Medal "For Merits to the Lithuanian Village" (2019), Acknowledgment from the Director of the Lithuanian Standardization Department (2020) and Aleksandras Stulginskis University certificate of science contest winner, 2018. However, they mainly indicate achievements at the national/local level.

The highlighted competitive R&D activities indicate that the Mechanical Engineering field have taken part in 5 different programs at national level (3/5) and also in EU programs such as H2020-EU3.2 and ERA-NET (2/5). The focus of the activities was not fully positioned within the field of study of Mechanical Engineering.

Overall, the field of assessment is strong and the research quality of the carried out activities is nationally recognised. There is room for further development of the scientific leadership, internationalisation of research and educational activities as well as presenting the research in journals with higher visibility and broader audiences.



Research field	Scope (FTE(SD))	Score (points)
<b>T 003 - Transport Engineering</b>	3,25	2,5

Reasoned justification of the score

The field has a total of 9 researchers and teaching staff with 3.25 FTE(SD). The overall time spent on research activities within this field is therefore low. In an international context, the size of the field is considered too small to have a significant research impact. The research is aimed at the development of innovative lubricants and at innovation in technology for crop protection & maintenance. The research activities appear to have limited interactions with the other UoA's research topics but rather address very specific subject areas.

Only one PhD thesis was defended during the period under review, which is low even when considering the small FTE of the field. The data on the total number of active PhD students stabilises around 2 students, which is low when considering the need for a critical mass for peer learning among the students.

In the period evaluated, the field published papers in SCI journals, many of them were in online MDPI journals. The quality of selected scientific publications is quite heterogeneous, with approx. 40% of papers on Q1 journals, 40% on Q2 and 20% on Q3. 1/5 paper has a very High IF and high author share attributable to the institution. The quality of scientific dissemination is considered satisfactory.

The international profile is quite limited, since participation to the listed conferences is for the large majority related to the Baltic or regional area and scientific awards limited to the national level. The required data format does not provide insight into what extend reports presented at conferences were a result of international peer recognition or as a result of registration and attendance. There is a certificate of science contest and acknowledgement from of Director the Lithuanian Standardization Department. These do not specify the merit behind the awards.

Only two competitively funded programs are reported and both related to national level funding schemes and program Calls (Researcher Group project and Agriculture, food, rural development and Fisheries R&D). Participation in well-funded EU consortia and research projects will be desirable in the future.

The overall assessment of this field is satisfactorily to strong at the national level but with very limited international recognition. Overall levels of activities are limited, - partly a result of the limited field size.

There is room for further development as to international scientific leadership, more integration into international research networks and arenas, and attraction of more international students and research environments.

Group of research fields within the research area	Scope (FTE(SD))	Score (points)
<b>T 002 - Civil Engineering</b>	8,09	3
<b>T 006 - Energetics and Power Engineering</b>		

Reasoned justification of the score

The Energetics and Power Engineering, Civil Engineering research unit is quite small, with 8 FTE(SD) in research provided by a total of 20 researchers and teaching staff. The researchers are involved in quite different research topics, such as sustainability in water and hydropower production, the reduction of GHG emissions in the food chain, and innovation in drainage systems.

A clear focus on contribution to PhD training is not present for this research field. It is encouraged to increase attention to this opportunity. The constraints to recruitment and funding is nevertheless recognized. An increased contribution to PhD level training can be considered important from many perspectives, including

the contribution to scientific developments made by dedicated full-time researcher, building competencies for recruitment, as well as bringing in motivated new talent and fresh ideas.

The quality of scientific publications selected for evaluation is considered good, referring to the publication year, 2 out of 5 were published in Q2 and 3 in Q1 ranked journals. Approx. 40% of papers are published in low IF journals and a similar level in high IF journal. Two of the 5 listed papers are published in a journal that is now Q3 in the area of Material Science and Environmental Science. 4 out of 5 in Elsevier/Springer Edited journals and 1 in MDPI. Their quality is considered satisfactory.

The level of active participation at international conferences is high. Scientific awards are mainly received at the national level. The listed awards refers to the fields of hydraulic, energy, agricultural and land management and appreciate work both at the professional and educational levels.

The research field has received international funding, as most (approx. 60%) of the selected projects with the greatest impact are funded within EU competitive programs such as H2020 and Life. Moreover, reported national R&D programs suggest a good capability of funds attraction, when considering the unit size.

Overall, the assessment finds that the research fields, given the limited size, deliver research output with some visibility at the international level. The research field is somewhat competitive for research funding but only nationally and regionally. The submitted data suggest limited international competitiveness and leadership. There is room for development of PhD training, more integration into international research networks and arenas, developing international scientific leadership, as well as to attract more international students and research environments.

## Agricultural sciences

Research field	Scope (FTE(SD))	Score (points)
<b>A 001 - Agronomy</b>	22,23	3,5

### Reasoned justification of the score

The Agronomy research field carries out activities in the area of soil, crop and food science. In particular, the field is involved in interdisciplinary activities aimed at studying Soil C sequestration and soil biodiversity and the impact of environmental and climate change on the productivity, biodiversity, and sustainability of agroecosystems. The unit size is relatively large, with 22.23 FTE(SD).

Eleven examples of research outputs were provided. The quality of scientific production selected for evaluation is good, with 80% of papers published in Q1 journals, IF ranging from 3.9 to 7.6, and with a moderate-good citation intensity. These are published in well-recognised, field-specific, international peer-reviewed journals, some are very good quality, but others were considered less relevant in online MDPI journals.

Altogether, 14 PhD theses have been defended during the period under review. This is a reasonable number for the size of the field. The average time to defend the thesis was over five years, which can be explained by enrolment of both full and part-time students. The international quality of PhD studies is growing. The language of the PhD theses has switched mostly to English. The theses from recent years includes mainly two ISI papers but rarely in top journals. The PhD candidate is not always the first author on thesis papers. Unfortunately, the level of internationalisation of the PhD training is limited and there are very few foreign PhD students. A strategy to involve international students in the PhD cohort is now being developed and should be expanded further as an integral part of the overall research activities.

The unit is taking part in two H2020 projects, and received various other competitive funds including EJP, Interreg, Ekshagastiftelsen (SWE), and several from regional and national funding programmes. This is suggestive of a good capability of contributing to and attracting funds at least at the national level.

Research outputs were generally presented at well-recognised international conferences, but others at conferences without an established history. However, there is no information on whether the presentations were made as posters, oral presentations or invited talks. This does not allow a proper evaluation of the merits of the reports presented at conferences. On the other hand, attendance provides opportunities for networking and understanding the research front.

A number of awards has been received by the UoA as an appreciation of the various work in agriculture related fields. The distinctions awarded to scientists are mainly national. It is difficult to assess their competitive merits.

Overall, the research field delivers education, research output at the national level with some international recognition. The field is competitive for research funding nationally and regionally. There is room for further development as to international scientific leadership, more integration into international research networks and arenas, and attraction of more international students and research environments.

Research field	Scope (FTE(SD))	Score (points)
<b>A 004 - Forestry</b>	<b>13,62</b>	<b>4</b>

#### Reasoned justification of the score

The number of FTE personnel is relatively high and equal to the 13.62 FTE(SD) average, with 9.31 FTE and 12.94 FTE, respectively, for the research and teaching staff with a scientific degree. Thus, the staff seems quite significant and consistent at all levels. The total number with a scientific degree is significant (28). There is a good number of other employees and doctoral students (22 persons for a total of 15.94 FTE).

The Forestry research group is very active in international networking and collaboration, which has resulted in high research activity in the field of sustainable forest management and monitoring of forest dynamics and ecosystems. The quality of scientific production selected for evaluation is very good, with approx. 85% of papers published in Q1 journals, IF ranging from 3.1 to 10.7 and good/ very good citation intensity. 30% of the selected papers have excellent citation intensity and reveal participation in a consolidated international network of top players in the field. The high internationalisation level is also confirmed by the involvement in international projects, with more than 70% of the selected projects with the most significant impact being funded within EU competitive programs (H2020, ERA-NET, LIFE) and by the participation in international conferences worldwide. One of the H2020 projects, Forest 4.0, is coordinated by VMU, with a notable budget of almost EUR 20 mil. The ambitious project has great potential to innovate forest management using an AI and internet of things approach.

Considering the FTE of personnel working in research, the number of PhD students and theses defended/year is medium/low given the high activity level and size of unit. Altogether, 10 PhD theses were defended in the period 2018-2022. It is a positive development that in the recent years theses have been written in English, and are based on research published as CA WoS level papers. There is nevertheless room for designing and supervising research that can reach the top journals. The PhD candidate is not always the first author. The average time to defend the theses was close to 6 years which could be justified by the methods used or relevance of the results, but this is not often the case. In this evaluation period, the field has not enrolled any foreign PhD students, indicating the absence of a focus on internationalisation.

Most reports were presented at well-recognised international conferences. The referred reported contributions to conferences are in the EU and at two key international events in Brazil. The activities support the international level of output from the research initiative taken by the research field. However, there is limited information on whether the presentations were made as posters, oral presentations or invited talks. The requirements for the submitted data format do not allow full consideration of the scientific leadership behind the reports presented at conferences.

The awards for R&D activity are limited to the national level and are mainly from National Academy of Science-related sources for disseminative activities. Distinctions awarded to scientists are mainly national and, in some cases, for presentations at congresses of young scientists. It is difficult to further assess their scientific merits.

Overall, the Forestry research field contributes to PhD training, has research output that is recognized at the international level, and is considered competitive for research funding. For funding, this includes recognition as a partner as well as coordinator for EU funds. The quality is hence considered very high. There is room for further development as to international scientific leadership, more integration into international research networks and arenas, and attraction of more international students and research environments.

## Economic and social impact of R&D activities of the UoA

Score (points)

3,5

Reasoned justification of the score

The thematic areas and key activities of the UoA are related to sustainable development solutions including such areas as reduced greenhouse gas emissions, forest genetic resources and management, and soil and water management. Forest, agriculture and livestock management and biogas production are the main areas, which correspond with the R&D projects carried out by the Unit. In several cases, the production of new knowledge is highlighted and there are also examples of building road maps, and step change pathways as well as investigation, identification or recommendation of new opportunities and approaches or proposed solutions.

The UoA researchers are involved in a range of nationally and internationally funded projects with very good impact. The total funding of the selected projects is several mill. of which around half is internationally funded. The applied research activities address a wide range of topics of relevance to society, such as bioeconomy, agroecology, and forestry, including soil science, agronomy and food science. The research may have a significant impact on Lithuanian agriculture and to ecosystem management but currently it has limited international recognition including the fields of Technology. The wide range of projects is possible since the activities are carried out by small teams of researchers, leading to some fragmentation of research efforts.

The panel observes externally funded research activities in biodynamic agriculture that can assist in understanding its performance as a production method. The further development and strategic focus areas into biodynamic agriculture remains unclear.

A high number of contract-based research and development agreements with the private sector was observed, mainly at the national level.

The demand for UoA expertise outside the institution provides evidence for the economic and societal impact. Consultancies were provided mainly in areas such as soil management, precision agriculture, forest

management, fertilisation, crop damage, machinery, and livestock and fish farm management to private companies and national authorities. There is nevertheless room for strengthening expertise by developing more synergy between the science and technology research areas of the UoA.

The broader set of users of the UoA expertise include the Academy of Science, associations, unions, societies, federations, centres, boards, commissions, councils, and ministerial work for policy development etc. Some of the activities were also offered in other countries/international settings. The representation of UoA researchers in national and international working groups or commissions is very good and creates societal impact at various levels, mainly national.

Participation in several international and national committees shows a good level of internationalization and participation in the activities of international scientific communities. Scientists from the UoA participate mainly as board members and, in some cases as experts, academy members, or national representatives in various European working groups in various fields related to the research topics of the UoA. In general, they are members or experts, but there are also several cases of chairing the groups. These activities are important for establishing links with scientists from different countries, which may facilitate further participation in collaborative EU projects.

Participation in editorial boards of international peer-reviewed scientific journals is observed but limited. UoA scientists were members of several Editorial Boards (including editor-in-chief) and have been guest editors in online (mostly MDPI) Journals. In general, only part of these activities (i.e., those of Editors in well-established journals of major publishers) were considered to be relevant at the international level. Several of the journals in the Q1 quartile (Agronomy, Energy, Forests, Plants, European Journal of Forest Research), but the majority of services are offered journals that do not have with a high visibility / impact index.

The UoA has an impressive range of communication activities. The sphere of interactions with users/developers, public policy and the private sector is clearly extensive. The Unit has hence made very good efforts to disseminate scientific knowledge and developments to society through popular press, lectures, social media, exhibitions, and TV. Some of the reported activities (seminars, training courses, etc.), seem to be more oriented to farmers and experts than to the general public. The UoA has organised many scientific events. They mainly consisted of 1-3 day Seminars, Conferences, and Symposia. The activities were aimed at national, regional or international audiences. Some of the activities were carried out online, which is also justified by the COVID pandemic. The Unit also collaborated in organising some International Conferences held in other countries. How the communication efforts are maintained, developed and function is not immediately clear. A clear communication plan seems key to continue to engage with relevant stakeholders.

## The development potential of R&D activities of the UoA

Score (points)

3,5

Reasoned justification of the score

The VMU Operational Strategy for the period 2021-2027 is well described and it appears in line with the European front of agriculture research. It provides a strategic vision for the future and integrate with new study programs. The recent coordination of the project “FOREST 4.0 for the Creation of the Centre of Excellence in Smart Forestry” and similar larger international initiatives have the potential to support the establishment of VMU as a European Centre of Excellence for agriculture and forest research.

The UoA is located on the campus of VMU Agriculture Academy and it operates a very large number of specialised laboratories for the different sub-Units/Fields, as well as experimental stations. The UoA is strategically located in a complex of four buildings and is expanding thanks to new R&D grants and the creation of the newly established Bioeconomy Research Institute. The University operates in the Nemunas Valley, which is an Integrated Science, Studies and Business Centre created to develop Lithuanian agriculture, forest and food sector. This setting and co-location provides a conducive environment for cooperation with the private sector and also serves as a hub for specific technical competence to national and local authorities. The UoA also has access to other national and international infrastructures through agreements with other Lithuanian universities. In summary, The Unit appears to have the infrastructure, location and the necessary facilities to carry out its present and future research objectives.

The number of researchers of different ages is balanced. The UoA (and VMU) acknowledges there is the need of increasing the number of scientific publications in the Q1 and Q2 quartiles by at least 50%. This is more evident in some research fields. It is noted that steps should also be taken to increase the Unit contribution to manuscripts as leading authors and PIs.

Overall, the UoA is clearly increasing its international visibility and networking. Further efforts are encouraged to increase the recruitment of foreign PhD students and researchers. Moreover, to increase the level of internationalization by supporting research stays at leading institutions abroad with fellowships.

Some critical issues may prevent the UoA to fully develop its potential, among these are the excessive fragmentation of the research lines due to the interests of the subunits and their small sizes. It will be important to build a critical mass of active and motivated researchers to have impact also at the international level - this is urgent in the Technology area. Talent development and recruitment is limited by the number of PhD and postdoc training positions as well as due to low number leaderships in high-level international projects. In the near future, the UoA will also need to address technology transfer issues, strengthening intellectual property management and foster a culture for innovation that develop the advantages of its strategic location.

The assessment based on the current performance the human resources, strategy, organisation of activities and infrastructure of the UoA reveals a clearly positive developmental path and it is concluded that the overall UoA has the potential for very good ratings at the international level in the next 5 years. As noted in the assessment of the various fields provided above, there is a variation between good and very good between the research fields.

## **Recommendations for continuity and/or improvement of the activities of the UoA**

The integration of three universities (Vytautas Magnus University, Lithuanian University of Educational Sciences, Aleksandras Stulginskis University) in 2021 has produced exceptional changes in the VMU Agriculture Academy, with outlined new directions and strategic goals, establishing an operational strategy for the period 2021-2027, in which the UoA is included.

The Unit's R&D objectives are in line with general EU strategies and with sustainable agroforestry and climate change mitigation and adaptation, in this regard, the UoA has clear potential to hold its position at the national and local levels as a key and competent player for societal development and policy making.

The main recommendation to improve existing areas for improvement include:

- Increase the scientific benefits from internationalization through developing a dedicated plan for the abroad training of PhD students and post-docs for talent selection and development as well

as long-term institutional staff development. This will be fundamental to the growth of quality, the international spirit and operational context of the researcher community, allow a higher recognition at the international level, and offer more possibilities for future cooperation and partaking in international programs.

- Provide incentives to avoid fragmentation of research lines. This is a concern for small sized fields. The recommendation is to develop activity that creates more synergy among the different research fields focusing on joint research activities with more transversal scientific and technological features.
- Increased focus on selection of, and training of talent and support research careers that include research leadership training. The recommendation is to establish a systematic training program for early-stage researchers in an international research environment, with clear focus on research leadership skills.
- To develop strategic development of strong research groups with potential to take on leadership of high-level international projects. This will require development of institutional strategies that unique identifies competitive advantages of the UoA, including infrastructure, services and talent/expertise, to units that are increasingly recognized as attractive collaborators and successful in attracting competitive funding.
- A dedicated organizational structure that support the construction of proposals for EU or other competitive funding schemes is needed. This to support hypothesis formation/problem formulation, to develop ideas, and to design methods / solutions based on the assets of the UoA, in a collective/collaborative setting.
- A key recommendation, made clear from the onsite visit, is the unused potential for collaborative actions among the different units of the UoA. There is room for better integration of technological expertise within the Agricultural research area. It is important to focus the development of the UoA at both the scientific and the technological level to achieve recognised international position.

## 2.5. LSMU\_Agricult Unit of Assessment

Name of the institution	<b>Lithuanian University of Health Sciences</b>
Official abbreviation of the name of the institution	<b>LSMU</b>
Name of the Institution's unit of assessment (hereinafter – UoA)	<b>Agricultural sciences</b>
Abbreviation of the UoA name	<b>LSMU_Agricult</b>
The scope of the UoA (FTE(SD))	<b>53,25</b>
Research area(s)	<b>A 000 - Agricultural sciences</b>

### Quality of the R&D activities by research fields (groups of research fields) of the UoA

#### Agricultural sciences

Research field	Scope (FTE(SD))	Score (points)
<b>A 002 - Veterinary Sciences</b>	<b>32,92</b>	<b>4</b>

#### Reasoned justification of the score

The Unit of Assessment of the Agricultural Sciences of LSMU covers two research fields (Veterinary Sciences and Animal Sciences), with having a dominating R&D activity in the first one. The research team in the Veterinary Sciences consists of 19 researchers (11.75 FTE) with a scientific degree and 74 persons (63.5 FTE) as teaching staff with a scientific degree (26 professors, 12 associated professors and 36 lectures). The quality of the scientific publications selected is good, with papers published mostly in Q1 (81%) and Q2 (19%) journals, with moderate/good citation intensity, except for 18% of papers with high citation intensity. The quality and internationalization of PhD studies is also growing, with language of the PhD theses switching from Lithuanian to English.

The number of defended PhD theses have a negative trend during the period 2018-2021, but the number of those defended in 2022 year restores the values from 2019-2020. The number of full-time PhD students during the period is relatively stable, excluding that in 2022. PhD students from abroad are missing and only a limited number of students left for long-term internships abroad. Most publications are in the MDPI journals and there is a need to shift the publication strategy towards also other international peer reviewed journals by different publishers. The selected contributions to international conferences (one in South Africa and the rest in European countries) were delivered as oral presentations. Scientific and educational achievements of UoA have been awarded mostly by national institutions. Most of R&D projects with highest impact are nationally funded, but international collaborations are also well represented, as indicated by the good share of EU (Horizon 2020 and other European programs) active projects.

Even in case some post-COVID effects could have negatively affected the R&D activity, it seems some future attempts should be done in increasing the number of PhD students and stabilizing the number of timely defended PhD theses at a higher level. The lack of PhD students from abroad is an indicative sign for



insufficient attractiveness of this type of education offered. A strategy for increasing the number of long-term internships of PhD students abroad has to be developed as well.

Additional efforts should be put in ideation, development and preparation of competitive international projects, which could bring more funding, while keeping the activity in searching potential fruitful partnerships with national economic entities. It could be concluded that for the assessed period, the UoA demonstrates high level of R&D activity and as such it is internationally recognized. At the same time, there is potential for improving the quality of the R&D activity focusing on PhD students, recruitment of PhD students from abroad, and more leadership and coordination of high-quality projects within EU scientific frameworks/ programs.

Research field	Scope (FTE(SD))	Score (points)
<b>A 003 - Animal Sciences</b>	20,33	4

#### Reasoned justification of the score

The Animal Science research field performs relevant R&D activities mainly focused on: (i) innovation in livestock production for addressing climate change problems, also by means of exploring animal genetics and biodiversity (ii) innovation in food production and food sustainability. The research unit has a consolidated national recognition and an international perspective. The quality of scientific publication selected for evaluation is very good, with 90% of papers published on Q1 journals with moderate to good citation intensity, being the papers in the Food Science field the most cited. Altogether, 17 PhD theses were discussed in the period. No PhD students from abroad were active in the evaluation period. The average time to defend the thesis was five years, with few exceptions, which is considered adequate.

The overall number of PhD students is rather low, when compared to researcher FTE units. The outputs of the PhD theses and the overall scientific production appear to be quite heterogeneous among the two areas of Food Science and Livestock production/animal nutrition. For the latter, there is still the need to shift the publication strategy towards international peer reviewed journals belonging to the highest quartile. In contrast, the research activities in Food science are internationally oriented, as evidenced by the doctoral theses documentation, and characterized by high productivity both from a quantitative and a qualitative point of view. To support career development, it is recommended that the PhD candidate is first author on publications that is part of their thesis.

In general, during the period under evaluation, researchers have significantly increased the total number of publications in journals in the Q1-Q2 quartiles. The unit is highly involved in international networking, as indicated by the very good share (around 50%) of EU active projects in the evaluation period (H2020 and other EU programmes, such as ERA-NET and Interreg actions), among the projects with the greatest impact.

In addition, the Unit was very active in fundraising also at the national level, with a number of projects funded by several regional and national programmes. However, other international aspects are limited, such as international individual recognition, in terms of scientific leadership in the field of interest, and lack of PhD students from abroad. The research outputs were mostly presented at well-recognized international conferences. Taking into consideration all the above, the unit R&D activity could be positioned as very good, with opportunities for improvement in some areas.

## Economic and social impact of R&D activities of the UoA

Score (points)

4,5

### Reasoned justification of the score

The economic and social impact of the UoA is significant both the national and international level, being more marked in the Veterinary Sciences field. The UoA researchers are involved in a range of nationally and internationally funded projects with relevant economic and social impact. Total funding of the reported projects with the largest socio-economic impacts is around EUR 3.5 mil., of which around EUR 1 mil. being internationally funded.

The research activities address topics of great relevance to the society and for consumers, such as mitigation of climate change effects, innovation and sustainability in food production and challenges deriving from emerging zoonoses and antimicrobial resistance. The UoA researchers were actively involved as experts and consultants to public and private bodies providing support and advice in the field of expertise. In particular, researchers of the UoA provide science-based recommendations to the Ministry of Agriculture and the State Food and Veterinary Service. That is a sign that UoA researchers are socially acknowledged and very well recognized at national level. At international level, the UoA staff is involved in relevant EU scientific association, as representatives of Lithuania or as individual members and in EU committees and working groups, mainly in the veterinary science area.

The Unit's researchers are also advisors and consultants either to public and economic entities or farmers on different topics/ issues concerning animal health and welfare, animal nutrition, disease prevention measures, farm husbandry, etc. Some of the labs are an important hub for diagnostic support to farm veterinarians. Researchers are editorial and scientific boards members of series of thematic scientific journals covering Veterinary and Animal science topics, but participation in editorial boards of international peer reviewed scientific journals is still limited (62% of selected participations). The Unit publishes its own scientific journal ('Veterinarija ir zootechnika') and some of the researchers have key positions in the managing body.

During the evaluation period, the UoA has organized different kinds of scientific events aimed at dissemination to the general public, mostly at national level. Also, relevant educational events targeted to special audiences such as postgraduate courses and thematic online webinars have been carried out in the evaluation period. The scientific achievements were also popularized by TV and radio broadcasting. Noteworthy is the active participation of employees in Science Festivals, where information is disseminated on most recent achievements in animal macro and microanatomy science, and by practical demonstration of anatomical and histological specimens. The UoA and its subdivisions have also performed notable farm extension services activities, in collaboration with the Ministry of Agriculture, in order to transfer of knowledge and skills to farmers and to perform on farm research.

The available information supports the role of the UoA as a well-accepted and greatly valued actor, not only within the academic community, but also in the public and private sector. The UoA research carried out in the evaluation period had relevant impact at both social level and in essential aspects of the economy, thus making the Unit well accepted and a greatly valued partner for joint R&D activities and newly emerging social initiatives requiring expert knowledge. In terms of the essential economic and social impact generated by its R&D activities, the unit could be ranked as deserving more than a very good score.

## The development potential of R&D activities of the UoA

Score (points)

4

Reasoned justification of the score

The UoA has undergone an essential upgrade of the scientific infrastructure during the establishment of the Integrated Science, Studies and Business Centre (valley) 'Nemunas' in 2011-2015. The UoA can now offer advanced, state-of-the-art research equipment and laboratories, in the areas of cellular and molecular biology, histology and immunocytochemistry, feed and food analysis, climate chambers for farm animal studies, as well as large-scale research infrastructures. The use of infrastructures is regulated on the basis of 'Open access' under defined rules, which will contribute to the strengthening of research groups and will promote area for research cooperation.

The future planned infrastructural upgrade will be focused on the development of a modern experimental dairy farm. All these infrastructural upgrades are supposed to increase the competitiveness of the UoA at national and international level. The research groups of UoA have opportunities for accessing scientific infrastructure of different local and foreign institutions through cooperation based mostly on mutual agreements in the framework of joint projects.

Most of the teaching staff (67%) is in a high productivity age (35-54 years). The age distribution of researchers is bimodal and seems a bit unbalanced at the expense of the experienced highly productive workers, with 42% of staff being 55 years or older and 22% younger than 34 years. The human resources management principles of the UoA appears to be adequate for motivating and attracting new personnel. The PhD students appear to be effectively supervised and very motivated in pursuing scientific excellence. They receive autonomy support and proper training for research scientific dissemination at international standards.

The vision for development of the R&D potential for the next years is based on the approved strategic research priorities, which combine horizontal and vertical integration of the Veterinary medicine and Animal husbandry faculties together with the Animal Science Institute. The R&D priorities are in line with research priorities set at EU and global level, with special relevance of the "One health approach" for the study of sustainability in animal production, of zoonoses and of antimicrobial resistance topics. The general functionality of the UoA has been exhaustively analysed by SWOT, with the preparation of competitive proposals for application in well-funded international projects being pointed out as one of the most important future opportunities.

In the context of the existing infrastructure, human resources, strategic vision and the prioritization, the potential for further successful development of the UoA R&D activities could be estimated as very good. Nevertheless, although the idea of integration of structural units within the UoA seems promising in terms of the potential networking opportunities, it is at the same time a bit challenging due to need for developing new interconnections. More effort can be put in development of opportunities for raising the number of PhD students, in particular international recruitment of talent, as well as for opening up of higher number of post-doctoral positions and internships abroad, which would raise the level of internationalisation, visibility of the R&D activities, and long-term institutional development.

## Recommendations for continuity and/or improvement of the activities of the UoA

The main recommendations regard the scientific leadership and the internationalisation process. The very good scientific quality of the selected publications and the effort made by researchers in increasing the total number of publications in journals in the Q1-Q2 quartiles and with international partners should be maintained. It is encouraged to not incentivise publishing in Q3/Q4 journals. In particular, papers deriving from PhD theses work should routinely be published only in quality journals and with the leading author role of the student.

Also, the publication strategy should consider the quality of the peer review process and broader understanding of the many international peer reviewed journals by different publishers. More effort should be put in developing opportunities for raising the number of PhD students, as well as for opening post-doctoral positions and internships abroad, which would raise the internationality, visibility and quality of the R&D activities and foster co-authorship in international contexts. A long-term post-doc period abroad can be considered a requirement for applying to positions as academic staff. It also suggested to implement a technology-scouting approach within the UoA, in order to support researcher in patenting and intellectual property (IP) management of research results that have the potential to be transferred to production areas.

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### 3. FINDINGS

#### **Organisation of evaluation and administrative support**

The RCL is commended for the professional arrangement of all aspects of the evaluation. The information provided, the communication, travel and meeting arrangements supported the evaluation process. The full adherence to the clear distinction of roles was highly appreciated. The panel had freedom to operate with open discussions leading to the provided assessments. The RCL focused on ensuring the evaluation guidelines were followed, clarified technical issues, and arranged the practical aspects of the site visits in collaboration with the UoAs.

#### **The overall quality of research fields and its level of internationalisation**

The UoAs and research fields varied considerably in the number of research personnel and their dedicated time to research, number of supportive staff, and number/sites of facilities. The UoAs were evaluated according to the evaluation criteria confirmed by Lithuanian legal acts and the international research front.

The sizes of the smallest research fields were considered at the lower end of the critical mass of researchers needed for a productive and creative research environment. The small sizes were also not helped by focusing on student training or a clear plan for how to alleviate the conditions. It is recommended that further strategic development of the UoAs explicitly consider how small research fields/areas benefit and effectively integrate within the larger UoA.

The large size of some UoAs/research fields also created expectations that a proportion of the researchers operates at the international research front. Examples of excellence could be seen from the submitted data. On the other hand, the proportion of researchers/groups that reach the highest score “top international players” and with “R&D activities are of the highest international standard” is still limited. It is not expected or realistic that all R&D activities within an institution uniformly aspire to such standard. It was nevertheless not fully clear how the leadership of the UoAs identifies outstanding talent, merit, and achievements and build consciously on these indicators to foster excellence. It is recommended that the UoAs consider how merit-based recognition systems can ensure the full growth potential of researchers/groups/areas operating at the international forefront. This requires careful crafting and balancing incentives between broader institutional development and specific excellence goals.

Overall, the level of and quality of published studies were considered very good. Many of the papers were published in journals that are in the Q1 quartile. A clear positive publication trend was evident. This trend is expected to continue. Awareness of predatory journals or journals with questioned peer-review processes was evident from the discussions at site visits. On the other hand, many high-level publications were only co-authored, and it is recommended that the UoAs continue to work on how to increase scientific leadership and visibility. More attention may be given the important lead role of the principal investigator driving research efforts, bridging research networks, and securing competitive funding.

It is also noted that several funding agencies/evaluations now place increased focus on the quality of a few and recent publications, rather than looking at the number of publications. It is recommended that the UoAs take this observation into account when considering how to measure output from research activities. I.e. in some settings, it is more important to have a few but solid publications that firmly move the research front, rather than encouraging many publications reporting minor findings.

All UoAs listed a high number of conference attendances/presentations. It is suggested that UoAs clearly distinguish conference contributions that result from invited (partly/fully sponsored), from those resulting from self-sponsored attendance.

Most UoAs also contributed to arrange various conferences and meetings. It is recommended that activities related to such events with wide international attendance is given more attention by the institutions at this stage, as such events may be one of the most efficient ways to build and maintain scientific networks. Networks that are needed to reach/stay at the research front, share infrastructure, and develop competitive applications.

Several National awards and distinctions were awarded to researchers, as well as PhD students. It is however hard to evaluate the merit behind such awards for foreign evaluators. The number of awards available and their traditions may also vary behind institutions as well as nations. It is suggested that institutions place more emphasis on international awards/recognition.

Overall, the quality of R&D activities was considered very good at the international level.

- **Knowledge transfer:** socio-economic impact of research activities

Overall, the level of interaction with economic entities, decision makers, and society is very good. Activities are mainly focused on disseminating and sharing knowledge. There is clear demand for scientific expertise outside the institutions. Members of the various UoAs contribute to ministerial developments (Agriculture, Environment, Education, Science and Sport), and provide direct consultancies to the public, economic entities, and national authorities. These consultancies confirm the valued competence of the UoAs within their fields.

The opportunities for evaluation of the socio-economic impact varied between UoAs. Some Units listed ongoing research/projects activities for which impact it yet to be realized whereas others focused on completed projects and their realized impact. The latter is considered the relevant approach. Of course, realized impact can be considered in the short- and long-term perspective, and an in-depth exploration of the UoAs impact was not possible within the scope of the assessment. It is nevertheless clear that all UoAs are important developers of knowledge and providers of expertise that is appreciated and used within their region/nationally. Only few examples were provided for direct utility abroad.

On the other hand, many scientists take part in various European expert/professional working groups in different areas. These expert driven activities are very important for maintaining networks with scientists from different countries. They may also facilitate development of joint EU projects. It is recommended that such professional activities are continued and further supported.

The many links with business confirms the role of the UoA in the larger innovation ecosystem. On the other hand, the conscious development and strategic positioning of the UoAs with the ecosystem is yet to be fully developed. Further work to position and strengthening the UoAs contributions to the innovation ecosystem in its region is recommended. This includes developing relevant interactions/interfaces with other actors in the system that identifies needs, bridge competences, develop and test, intellectual protection, and can scale, finance and market innovations.

- **Infrastructure, funding, management, human resources (including career development and human resource management)**

Overall, the panel was impressed with the available research infrastructure. Several buildings were in being renovated. Access to research infrastructure was generally not considered to be a limiting factor. Available physical space also suggests there is capacity to host more researchers, e.g., guest students and researchers from abroad. A continued focus on developing the research infrastructure is recommended. This to ensure competitiveness and to attract motivated talent and to increase internationalisation. The potential for more shared use of infrastructure across UoAs and institutions locally, regionally, and internationally seems not yet fully realized. The same assessment can be given the limited use of the location of the institutions within innovation zones, etc.

Many of the UoA partake in projects externally funded by international sources. Several of them with large budgets. This allows for contributing to the research front as part of strong networks. It is recommended that the UoAs continue to support such activities, and gradually develop the administrative and research support to apply and lead international projects. This will, over time, support further development of scientific leadership.

The long-term development of R&D in Lithuania will depend on how young and motivated extraordinary talent is identified and developed. Although there are institutional differences, the balance between employment categories was perceived to be skewed towards chief and senior researchers. It is important that the next generation of researchers are familiar with the international research front and are part of productive international networks. It is therefore recommended that each UoA develop clear strategies for merit-based recruitment of career-minded and outstanding talent. In this context, the UoAs are commended for their important partaking in training PhDs. With few exceptions, the UoAs contributed in a major way to such training. In most cases, training efforts were also gradually shifting to wider European style. e.g., publication based thesis written in English language. It is recommended that such efforts are continued, to facilitate international exchange of PhDs and Postdocs. Moreover, to instigate early a publication culture targeting well-recognized international journals and audiences.

In most cases, the completion time of the PhD degree was within expectations. The interview with PhD students indicated that they were more than satisfied with infrastructure, supervisors, opportunities to go abroad, as well as the scientific learning environment.

No issues with gender/equal opportunities were identified.

The data and information provided for the assessment did not emphasize a focus on management and leadership. For further institutional developments, these aspects may be given more weight. This include both how the organisational structure of the UoAs is built and effectively maintained, and how leadership in the scientific field is developed and maintained.

- **Recommendations for the covered research fields/for the national science system**

Overall, the UoAs were considered to operate at the international level, with variations as expected for large Institutions. The self-assessment and site visits demonstrated motivation and dedication to further build and strengthen the positive trend of institutional development. Increasing recognition and internationalisation is seen. Societal impact is evident from the demand for expertise. As exemplified/outlined above, various areas can be developed further; for instance, the level of internationalisation, talent development, structures for

project idea developments, and the role of the UoAs in the larger innovation ecosystem. The on-site conversations made it clear that the institutional leadership and researchers were aware of the opportunities about how to develop their institutions further. Generally, most UoAs have the potential to achieve a very good rating, and it is hoped that more research fields can achieve an excellent rating within the next 5 years. It may nevertheless, in the long term, be more important how institutional policies are developed that ensure recruitment and further development of the most talented, motivated, and driven researchers that will form the next generation of research. Research that is firmly established at the international research front and that provides strong support to the Lithuanian innovation ecosystem.

**RCL: Consideration of changes to the data package provided to the panel:**

- Less emphasis/space given awards that are not international.
  - PhDs training data should include statistics on completion rate and completion time.
  - The list of best reports delivered at conferences abroad may be reduced to only include those invited. A short summary of other types of attendances can be provided.
  - More emphasis on conferences arranged/co-arranged, as it will be an important arena for international networking (at home).
  - The Societal impact description should only list/explain completed projects, not ongoing (with incomplete results).
  - Separate clearly project participation versus overall project leadership (and work package leader) in listed projects.
  - SWOT analysis should be provided per UoA, not at the institutional level.
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