technopolis |group|

Latvia: Research Assessment Exercise

Panel Report: Agriculture, forestry and veterinary science

technopolis |group|, December 2013

Professor Ken Thomson, chairman
Professor George Coupland
Professor Katri Kärkkäinen
Professor Viktor Nedović
Professor Paul Struik

Table of Contents

Introduction

The Panel was asked to assess 22 institutions in the field of "Agriculture, forestry and veterinary science", which included some institutions in food technology research. Of these, eight were Scientific Institutes (SIs), six were State Scientific Institutes (SSIs), five were higher education institutions (HEIs, all Faculties of the Latvia University of Agriculture, LUA), and three were joint HEI/SIs (agencies of the LUA). In staff size (reported FTE researchers, 2011), they ranged from 0.2 (Latvian Academy of Agricultural and Forestry Sciences) to 47.4 (Latvia State Forest Research Institute "Silava"), with a total of 286 (mean = 13.0).

The Panel met initially in Latvia and discussed all institutions to be assessed within the context of the five prescribed criteria (and based on the Panel's extensive desk-based work prior to the trip to Latvia). Additional questions – some common, some specific – were then sent to institutions, and answers obtained. Members of the Panel visited 14 of these institutions over the period 22-24 October 2013, in various locations around Latvia. The selection of site visits was based on: (i) the size and quality of the institutions based on the data in the self-assessment reports and on bibliometric analysis; and (ii) a balance of institutions by type, discipline and geographical coverage. Most were located entirely in their own premises, with office and experimental facilities, sometimes including nearby land, but several had additional facilities in other locations. The Panel then held a second meeting where institutions were evaluated based on all information obtained, with attention paid to equality of treatment across all institutions, whether or not visited.

Within the above field, research in a large number of scientific areas was assessed, including crop and livestock science and breeding, forestry and wood science, economics, farm and business management, engineering, food technology, and veterinary science. Areas of actual or potential application included farming, rural development, input supply, output processing, food production and consumption, and policy analysis.

After examination of all available evidence, the Panel concluded that three of the 22 institutions (the Latvian Academy of Agricultural and Forestry Sciences, the Latvian Institute of Humic Substances, and the Research Institution Trading Company Vinkoki) lay outside the scope of its evaluation, due to lack of research (no scientific staff of their own, or activities only to develop or test new products, not basic or applied research). The other 19 institutions were scored strictly in accordance with the five sets of criteria prescribed to the Panel, and were then rated overall, based on these scores and on the Panel's general judgement.

1. A_01_Latvia State Institute of Fruit-Growing

Name of the institution	**Latvia State Institute of Fruit-Growing**
Name of university	N/A
Type of institution	State Scientific Institute

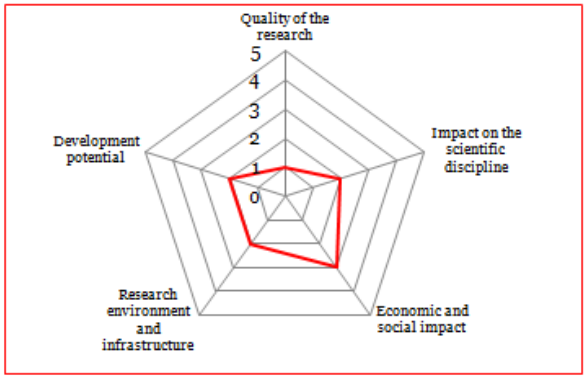
This institution is an independent research institute but with links to universities through PhD research. The research fields are agricultural (fruit-growing) science, breeding and cultivar evaluation, genetics and molecular biology, plant pathology and entomology, orchard management, food science, storage and postharvest management, processing and chemistry. The activities on agricultural science, orchard management, and processing and chemistry are dominant.

The activities are rather diverse and usually very applied in nature. The institution deals with many different crops and with many different issues (whether that is research or not). An example is the work on plant pathology which is undoubtedly very useful for the fruit industry but is spread very thinly, resulting in lack of critical mass to become an international player.

It is a relatively large institute with about 28.5 FTE research staff in 2011 and slightly more than 25 FTE other staff in the same year. Of the research staff 77% is female; this unbalance in gender was also observed in several other institutes, especially in the breeding institutions. Breeding is an important part of the activities and it is claimed that the specific environment in Latvia makes it necessary to have a specific breeding programme. At the moment the main breeding efforts are aimed at apple, sweet cherry, Japanese quince (*Chaenomeles japonica*), raspberry, black currant, plum and pear. The work on Japanese quince has resulted in interesting and innovative developments.

Figure 1 A_01 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	2
Economic and social impact	3
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall Score

The Institute has the potential to become a national player. It has developed a programme which is very diverse in its activities ranging from breeding, cultivar evaluation, some research on food science and agronomy and activities in the field of knowledge transfer and extension. This portfolio creates economic impact but reduces scientific impact.

Quality of Research

The applied research carried out by this Institute is very descriptive. The research focuses on breeding and cultivar evaluation, genetics and molecular biology, plant pathology and entomology, orchard management, storage and postharvest management, processing and chemistry. Many activities are in fact not research at all. Some researchers manage to publish in international refereed journals such as Euphytica, Scientia Horticulturae and European Journal of Plant Pathology, but these journals are usually of moderate quality (impact factors between 1 and 3.5). The publications provided mainly contained descriptions of genetic variation, development of plant diseases, etc. This is rather basic explorative research, not research aimed at understanding. The majority of publications are in journals like Acta Horticulturae (in fact a series of proceedings of the ISHS) and national/regional journals. Research questions tackled are very applied, not aimed at advancement of fundamental insight, and are often mainly relevant for Latvia or its immediate surroundings. This not only applies to the crop research but also to the food science activities. Given the descriptive nature of the research activities, the lack of a clear medium and long-term research strategy and the focus on short-term problems and solutions the institution might not be the best place to train PhD students. The Panel has noted, however, that there is a close cooperation with the Faculty of Agriculture of the Latvian Agricultural University and that PhD students carrying out research at the Institute are travelling frequently to the Faculty of Agriculture for additional training.

Impact on the scientific discipline

This institution plays a role in the development of the scientific discipline in this part of the world, with its unique agro-ecological conditions. In general, however, the research is too descriptive to really make an impact on the international development of the scientific discipline. There is no activity focused on strategic or fundamental research. Moreover, a larger proportion of the research is published in low-impact journals. The Institute has some well-developed international cooperation that has been realised through bilateral cooperation with 27 scientific institutions, experts and enterprises from over 20 different countries all over the world, through COST cooperation, EUREKA, INTERREG, UROSTAR as well as FP7 projects. The role of the Institute in those partnerships, however, is not focused on advancement of science or knowledge but more oriented towards sharing resources. The Institute is an organiser of conferences, workshops, seminars, and field days at national as well as international level, but again these activities are of a very applied nature. The Institute greatly contributed to establishing the technology Transfer Centre in fruit growing. This Centre can play a significant role in the dissemination of knowledge but this also forms a distraction from actually doing innovative research. The Institute intends to become the Baltic-Nordic research centre for fruit growing and development of new, healthy food. Such an ambition would require a different research strategy. The Institute is maintaining and using the largest fruit plant genetic resources collection in Latvia. This is a valuable asset.

Economic and social impact

Fruit-growing seems to be an important agricultural sector in Latvia. Moreover, there is an important processing industry connected to the sector. The Institute certainly plays a role in the development of this agricultural sector and in the processing industry. It also plays an important role in the extension in the sector. Although this might not be the major role to play for the Institute, its economic impact is relevant. Local food production might play its role in social development. There is a long list of the Institute's

activities related to the business sectors, farmers, small and medium enterprises, and processing companies. It presumes the launching of new growing technologies, the transfer of knowledge and technologies available, the assistance in cultivar's choice, the development of new products and recipes, implementation in the production process, organisation of training seminars, field days, advice services, lectures, exhibitions, distribution of the educational materials and so on. At the same time the Institute is organising activities for the general public on the promotion of fruit sciences and food industry by the exhibitions at its own museum, by the organisation of different events in its lilac park, by the maintenance, propagation and distribution of cultivars bred at the Institute, performing the lectures at schools as well as guiding the student's scientific works. The Institute is very visible in the immediate environment.

Research environment and infrastructure

The Institute seems to be relatively well endowed with facilities, at least in comparison with some of the other institutions for agricultural research in Latvia. The Institute has four buildings including laboratory and greenhouse building complex, fruit-storage facility, administration building, hostel apartment and 36.88 ha of land. Equipment and research facilities for molecular biology, plant pathology, genetic resources data bank, experimental processing laboratory, fruit storage cooling and freezing chambers, and equipment for the field trials are currently available the Institute. The already existing facilities and laboratories are in use for 70-90%. This infrastructure should be further improved to realise the ambition of the Institute and to make good use of the international collaboration in place. The Institute has a mid-term (2011-2015) strategic and financial resource planning, including the human resource development strategy (for example the Institute is planning to increase the number of permanent research staff from 54 in 2011 to 63 in 2015) with the overall goal to create new knowledge, develop new products and innovative technologies, and promote Latvian fruit growing and processing to increase competitiveness for sustainable rural development. Detailed planning of scientific activities, possible sources of financing, further development of the material and technical base, development of human resources and scientific potential as well as ethical issues are elaborated. The Panel noticed commitment and enthusiasm, but also that the strategic thinking is less developed and not well embedded in international developments in research and science.

Development potential

The Institute plays some part in international collaboration based on EU programmes. However, this collaboration is mainly the result of active participation in COST activities, a type of programme which finances international collaboration and information exchange but not so much research activities. The staff seems to be highly motivated and very committed. On the other hand, the need to acquire funding results in opportunity seeking and fragmentation of activities. It is important that the Institute develops a strategy to find important partners and to coordinate future activities. Do not jump on every bandwagon that promises money. A considerable portion of the research staff is relatively young. That is an important human potential for strengthening the position and further development. The Institute needs to develop a clear vision and strategy based on opportunities for long-term national and international cooperation, funding acquisition, project's preparation and implementation, publishing of research results, participation in the international conferences, organisation of the national and international scientific events, production of the new cultivars, development of new technologies, patent's applications, providing of technology and knowledge transfer services. Given the physical infrastructure and on the condition of improving the research environment the Institute seems to have some potential for further development.

Conclusions and recommendations

This seems to be a relatively large institution, working for a small, but important and region-specific Latvian agricultural sector with strong ties to the processing industry, the growers and the local community. The Panel therefore recommends that this Institute

will be maintained while at the same time needs to become more research oriented. The Panel also recommends that the institution rethinks its strategies and strengthens its collaboration with the Faculty of Agriculture of the Latvian Agricultural University and the other breeding stations in the country. The Panel is not optimistic about the research environment and human resources available (see above under Quality of research and Impact of the scientific discipline). This Centre can play a significant role in the dissemination of knowledge but this activity also forms a distraction from actually doing innovative research. The Panel suggests to include this Institute in a nation-wide review of breeding centres (see also A_05, A_06 and A_14).

2. A_02_Latvian State Institute of Agrarian Economics

Name of the institution	Latvian State Institute of Agrarian Economics
Name of university	N/A
Type of institution	State Scientific Institute

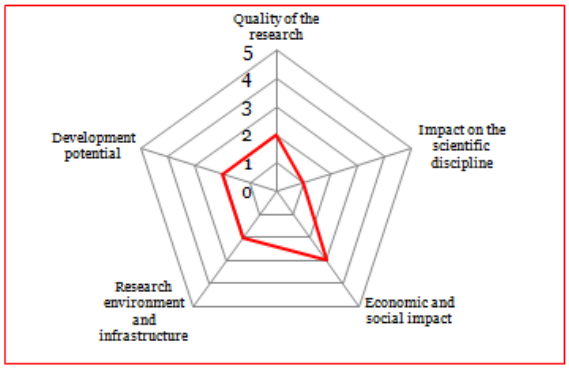
This is a small Institute, located in a Riga office block. Its work includes:

- Agrarian and agri-food economics, particularly the economics of the agricultural sector, farms and enterprises (40%)
- Rural development and evaluation of its factors and aspects (30%)
- Development of rural areas (territories) and economics of rural policy (20%)
- Sustainable development of food chain, its environmental and ecological impact; trends of food consumption; quality management and economics (10%).

The age profile is young (45% between 25 and 35 years of age, though none younger), and over three quarters (76%) of its staff are female. The Institute has been relatively well funded for a socio-economics unit, at almost twice the Panel average for 2006-2011, though Ministry of Agriculture funding (mainly for relatively routine tasks) has risen in recent years. It faces research competition from a number of other institutions in Latvia, e.g. Faculties in the University of Latvia and the Latvia University of Agriculture, and the Baltic Studies Centre.

Figure 2 A_02 - Scores

Criteria	Scores
Quality of the research	2
Impact on the scientific discipline	1
Economic and social impact	3
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall Score

Given the relatively small size of the Institute and its low level of core funding, it is not surprising to find that its scientific quality is limited and its scientific impact is not large. Certain projects appear to have been successful and influential, but not all, and the short-term nature of many of these projects inhibits longer-term development of specific Institute research activity. Nevertheless, the Panel feels that the Institute could have

done better in recent years to build on previous international experience and on current policy developments at both national and EU levels.

Quality of Research

This institution is well embedded in the Latvian research framework, and works in a field highly relevant to the policies of the country and to the EU, which strongly promotes collaboration amongst the large international network of similar institutions across Europe. As a middle-sized unit, it is not large enough to be able to focus on many agrarian economic issues, or to build substantial teams, e.g. of model builders. It appears to have chosen to focus on analysis of farm production and rural development/growth, partly based on its data collection duties (FADN) and projects (RDP MTE). The Institute has tried to be internationally oriented, but has not fully succeeded, with limited foreign collaboration (e.g. an FP7 project now ended, and the recent loss of a key modeller). Moreover, the number of citations per paper is higher than in other institutions. Overall, the quality of the output is below what is possible, given the field and the exposure to the international scientific community. There is scope for improvement here, certainly given the level of the work being done.

Impact on the scientific discipline

The Institute has a rather low number of outputs per researcher (9.0 compared to the Panel A average of 12.7, according to the Data Analysis Report), and many publications are in conference proceedings or in lower-quality journals. However, these publications have a relatively high rate of citations (2, cf. 1.5), and a low rate of non-citations (50%, cf. 67%). Only four non-Latvian co-author countries are claimed for its publications; this is low for a discipline with strong and clear international dimensions, and for an Institute which has had a substantial FP7 project. The impact of the Institute's work is reduced by the focus on short-term projects, which is not surprising given the problems in obtaining long-term funding for large projects. However, this does inhibit the development of the scientific discipline which requires projects with a longer time horizon and large data sets.

Economic and social impact

The Institute collects and provides useful data (but this is hardly "research") and carries out analyses which may not be very deep but are essential background information for understanding the economic and social development of rural Latvia. It appears to put substantial effort into communicating its work to rural audiences and readerships, and claims important contribution in terms of a livestock transportation cost model. It appears to have rather limited memberships of national and international scientific and policy bodies in which it might be expected to play a more active role.

Research environment and infrastructure

There are major problems in support funding, e.g. for international travel and publications data, and some loss in morale is no doubt due to this. The staff are predominantly female (16, compared to 6 males), which (as elsewhere) may be a sign of low salaries and uncertain prospects. The PhD students appeared to have to undertake their thesis work during evening hours etc., and to have no strong sense of joint direction. The SWOT analysis exposes a number of weaknesses and threats to the Institute. There is not enough staff at PhD level and the facilities (although less critical in this field than in many other fields) are not up to standard, e.g. no subscription to international scientific publication databases. The main worry is the apparent need to focus on short-term projects, which creates great difficulties in the middle and long terms.

Development potential

Along with the University of Latvia, the Institute is a partner in the ERDF-funded State Priority Research Centre "Socio-economic and Management of Society", which will result in a partial renovation of the Institute facilities. Otherwise, and to some extent, the future of the Institute depends on policy developments, e.g. government interest in

and spending on rural development, food systems, and rural diversification. There is an urgent need for the Institute to (re-)enter international networks. The declared "strategy" of the Institute may be over-dependent on "mathematical modelling", which requires a high level of specialised expertise, and is highly vulnerable to staff loss, and as well as requiring substantial software development, data updating, etc. International publications and funding are rightly identified as necessary for development; this should be pursued with energy, e.g. by contacting previous partners with suggestions for joint publications, specific Latvian contributions, etc. Some (younger?) staff is registered for PhD degrees, but progress is unclear as yet.

Conclusions and recommendations

The Panel concludes that this Institute is too small to constitute a viable research institution capable of tackling a sufficient proportion of the huge range of potential economic issues facing Latvia's agriculture and rural areas. It has a core of essential data collection work, which could form the basis for interesting analytical work, but to do so it needs stronger links with conceptual thinkers inside and outside Latvia. In terms of international links, cooperation with JRC IPTS looks important: the Institute has been selected by JRC IPTS as a local Latvian partner for various analyses at the national level, and a major researcher currently in Seville may be attracted back.

The Panel therefore recommend stronger and more explicit links – possibly involving full merger – with the Faculty of Economics at the Latvia University of Agriculture, which would probably find the Institute's office in Riga a useful base, closer to governmental activity than Jelgava. An alternative, building on the current State Research Centre partnership, would be a form of incorporation with the University of Latvia; this might generate competition between the two universities, but this exists already in the area of rural economics.

By the nature of its economic work, the Institute staff could easily develop interdisciplinary research (as to some extent it already has done). To do so, clear definition of the issue to be investigated (e.g. a practical and cost-effective policy intervention to address a specific problem in production, trade or diversification) is essential, and the initiative should probably come from a non-economic institution or from the government (e.g. the Ministry of Agriculture).

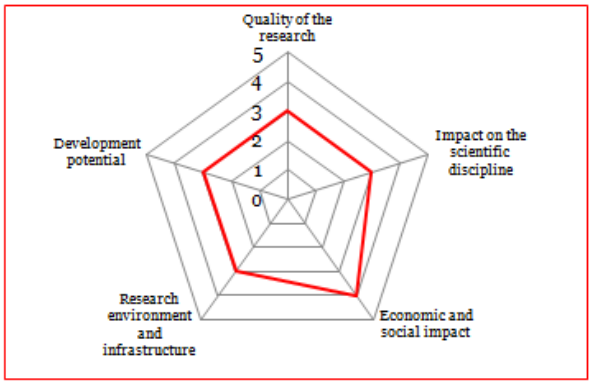
3. A_03_Latvian State Forest Research Institute "Silava"

Name of the institution	Latvian State Forest Research Institute "Silava"
Name of university	N/A
Type of institution	State Scientific Institute

"Silava" is a governmental research Institute founded in 1946, conducting research and national duties in forestry. It is a large research unit with over 50 academic researchers. The functions delegated by the state to Silava include: 1) centre of forest genetic resources; 2) forest statistical inventory; and 3) forest environmental monitoring. It also offers laboratory services for paying customers. In research and knowledge transfer "Silava" concentrates on four themes: forest cultivation, forest ecology and forest products, and game and fauna management. Thus, research in Silava concentrates on the beginning of the value chain in forestry (increase of forest capital value). Other research units in forestry: Forestry Faculty of Latvia University of Agriculture, Institute of Wood Chemistry, and Forest and Wood Products Research and Development Institute MEKA are specialised in teaching or end products of forest based sector. As research institute, Silava does not officially provide higher education. However, most PhD students in forestry are conducting doctoral work in Silava's projects and thus are supervised by Silava researchers. The age structure of Institute is young with many PhD students and recent doctors working in the Institute, and gender ratio is very balanced (41:59 female:male).

Figure 3 A_03 - Scores

Criteria	Scores
Quality of the research	3
Impact on the scientific discipline	3
Economic and social impact	4
Research environment and infrastructure	3
Development potential	3
OVERALL SCORE	**3**



Overall Score

"Silava" is conducting its research and national duties in an important field of the Latvian economy. It has a young age structure, has shown ability to publish in internationally recognised journals, and has good collaborative contacts in some fields. This makes the development potential of "Silava" high. If the exchange of ideas and researchers rises between "Silava" and international research institutes, "Silava" has the potential to become an important international player in the field of forest research.

Quality of Research

The research activities of "Silava" cover many disciplines such as: molecular genetics, afforestation, growth and yield studies, entomology, pathology, soil sciences, and natural regeneration of forests, tree breeding and forest genetics. The research strategy of institute stresses studies supporting forest growth (e.g., silviculture, tree breeding), forest health, and forest regeneration. The funding situation of the Institute is relatively good, and the budget has been increased considerably during the last ten years. From the total budget, about 11% is allocated to functions delegated to the Institute by the state, 13% being direct state funding for research, and about 75% being tenders' funding. The major customer is Latvian State Forests.

"Silava" has a rather good publication record, with an increasing number of SCOPUS-level articles per year. Some of the articles, especially in the field of forest pathology, are published in the best forestry journals, e.g. Canadian Journal of Forest Research, Tree Genetics and Genomes and Forestry. However, much is still published in national journals in the Latvian language which is regrettable when many of the research questions have international relevance. SCOPUS-level articles written by "Silava" researchers are also quite well cited, suggesting that their quality is good and that their themes are interesting.

Impact on the scientific discipline

The scientific impact of "Silava" is relatively good. The institution has a stable position in the scientific community, both nationally and internationally.

The staff of "Silava" produce internationally recognised articles. Furthermore, international collaboration in producing papers is common, and joint articles are published between "Silava" researchers and scientists from nearly 30 countries, including Baltic and Scandinavian countries, Germany, Netherlands, Spain, United Kingdom and France. The researchers are members of editorial boards of Latvian and Baltic journals in forestry.

Silava seems to be an internationally wanted partner and collaborator, especially in the field of forest pathology. Thus, it has lively international collaboration in several fields of research, e.g. forest pathology and molecular genetics. Visits abroad, and especially visits to the unit, are frequent, suggesting that the Institute has unique scientific know-how that is internationally valuable. The Institute has participated in several international projects, e.g. the Forest Soil C Sink Nordic network, the PelBalNet pellet net Baltic Sea, and has been a partner in several EU projects (e.g. one FP4 project, four FP6 projects/networks, and one FP7 project,) and it participates in the SNS network (PATHCAR) and Life+ programmes (FUTMON).

Economic and social impact

"Silava" has several important functions delegated to it by the Latvian State, including forest inventory, elaboration of report of carbon dioxide removals and emissions from the land use, land use change and forestry sector (LULUCF) with respect to climate change, monitoring and conserving genetic resources of forest trees, and forest environment monitoring. Furthermore, large part of research activities is on contract research, both in producing information and solutions to Latvian State Forests or market-oriented research in the fields important for forestry and forest industry. These studies consist of 73 customised research and development projects ordered by Latvian and foreign businesses with total funding over 6 million LVL in the period 2006-2012. International collaboration includes several projects on bioenergy, and increasing efficiency in sorting timber.

In addition to its national importance, "Silava" also collaborates with foreign companies, for example, the Finnish Forest Research Centre Tapio and the Swedish Energy Agency. Members of the staff have memberships of various boards (e.g., Board of Latvian State Forests, science advisory board of Latvian State Forests, forest advisory board of Ministry of Agriculture). Thus, "Silava" actively takes part in discussions on the forest policy of Latvia.

"Silava" has efficient means for distribution of information to end users, whether electronically, via printed articles for general audience and forest professionals, or presentations and meetings for interested audience.

Research environment and infrastructure

"Silava" is a large scientific unit with a healthy age structure and an even gender ratio. The number of PhD students is very high, with over 25 PhD students working presently at the Institute. "Silava" is the major institute supervising doctoral studies in forestry in its research projects although the degrees are officially supervised by the universities. In some fields, for example forest pathology, doctoral studies often include long research visits and studies abroad. However, most students stay in the Institute and receive their degrees from Latvian universities. Thus, important exchanges of expertise via foreign studies (degrees) and recruitment of researchers that have worked in foreign institutes for longer periods (doctoral degree, post doc) are still rare in "Silava".

Development potential

In addition to PhD students, a large proportion of researchers are young, having obtained their doctoral degree very recently. Therefore, the age group 25-35 is the largest (49 researchers) and the number of researchers in the oldest age group (over 55) is modest (17 researchers). The Institute has a very small administrative staff, most emphasis being put to research.

In addition to researchers, "Silava" has a reasonably sized technical staff (45) to help in laboratories and with field work.

"Silava" has six well equipped laboratories in molecular genetics, forest phytopathology, forest products processing, forest environment, silviculture and forest resources. The laboratories seem to be efficiently used (utilisation over 90% of capacity in many laboratories), and the efficiency is being improved by client orders. Silava has recently invested considerably in laboratory equipment.

Thus, "Silava" has a young age structure, good facilities and good international contacts, making its developmental potential considerable.

Conclusions and recommendations

The Panel was impressed by the scope and dynamism of this Institute's activities, especially its engagement with the forestry sector and its agencies, with its utilisation of recent EU funding for modernising its facilities, and its efforts to keep in international contact. It is addressing current and future issues, and has a substantial academic component to its activities in the form of doctoral students and post-doctoral researchers.

In the Panel's opinion, it could develop further its international reputation by fostering foreign contacts, and aiming for more influential roles in international collaborations (e.g., as a coordinator in EU projects). Publication strategy should be changed from national journals to international ones (and instead of Baltic forestry, should aim for internationally more visible journals). National journals (e.g., Mezzinatne) can be excellent means to inform end users on scientific findings in native languages and style suitable for general audience. Silava should also focus on issues of regional (i.e./e.g. Baltic/Scandinavian/Central European) interest, particularly where it has comparative advantages in terms of data, expertise or interest. In present day world where climate is changing together with forestry and forestry markets (e.g., free seedling markets within EU), sharing expertise (and e.g., long term field experiments) between countries becomes increasingly important.

4. A_04_Institute of Food Safety, Animal Health and Environment "BIOR"

Name of the institution	**Institute of Food Safety, Animal Health and Environment "BIOR"**
Name of university	N/A
Type of institution	State Scientific Institute

The Institute of Food Safety, Animal Health and Environment "BIOR" is the largest research Institute in the area of veterinary medicine, public health, food safety, and fisheries in Latvia, providing an advanced laboratory facilities and equipment for research purposes.

The Institute carries out research on the chemical and microbial safety of foods of animal and plant origin, animal infectious diseases, zoonoses, antimicrobial resistance, fisheries and biological resources in aquatic environments. Besides its research activities, "BIOR" is a National Reference Laboratory involved in national and international monitoring and surveillance programs. Historically, the Institute was founded back in the 1930s, including national veterinary and food reference laboratories. Alongside these functions, the Institute has occasionally been involved in research activities throughout this time. Since 2006, Institute has been officially registered as a Scientific Institute in the national register of scientific institutions of Latvia, and part of Food and Veterinary Service as National Diagnostic Centre. Thus, the data for research activities and output was provided from year 2007. In 2010, the Institute of Food Safety, Animal Health and Environment was founded after the decision of the Latvian Cabinet of Ministers Nr. 714 (19.10.2009) to merge the National Diagnostic Centre and Latvian Fish Resources Agency during a reorganisation of Latvian state agencies in 2009. The history of Latvian Fish Resources Agency and research activities started back in the 1920s as a hydrobiology laboratory of the Department of Fishery and Fish Culture of Ministry of Agriculture. Today, the Institute has a staff around 400 persons, including a research staff of 49 persons with different workloads in the research.

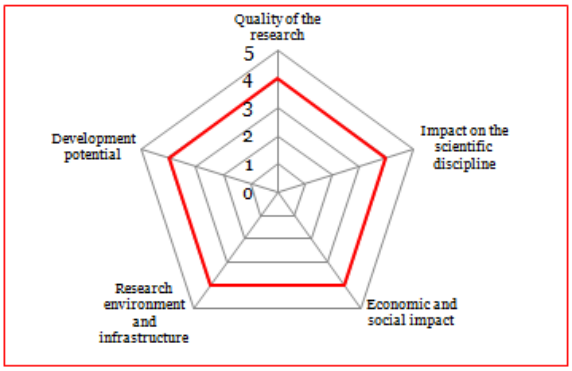
The Institute has defined long-term research plans in its strategy document "Operational and Development Strategy 2010-2012". One of the priorities of the Institute is to carry out national and international research collaboration, and to develop interdisciplinary and internationally competitive research.

Overall 73% of employed researches are younger than 55; 31% are younger than 35, and 27% are over 55. The male:female ratio is 47:53.

Over the period 2006-2011, funding came from the public/state budget (55.5%), from international projects (28.2%), from contract research (15.7%), and from the ESF/ERAF (only 0.6%). The funding rate per researcher, 307,000 LVL per researcher for the period 2006-2011, is the 3rd highest in the group of 22 evaluated institutions.

Figure 4 A_04 - Scores

Criteria	Scores
Quality of the research	4
Impact on the scientific discipline	4
Economic and social impact	4
Research environment and infrastructure	4
Development potential	4
OVERALL SCORE	**4**



Overall Score

"BIOR" is carrying out research of international significance and quality. This performance is a consequence of scientists that are qualified to compete internationally in several research fields; numerous of original articles published in high-level scientific journals, an excellent research infrastructure environment, good management with clear and achievable vision and strategy, broad international cooperation, and a high number of enrolled PhD students.

Quality of Research

"BIOR"'s main research areas are veterinary medicine, analytical chemistry, microbiology, marine biology, inner waters and aquaculture, and nutrition. It recently became the national centre of excellence in the area of food safety, animal infectious diseases and risk assessment (NLRC). Besides, "BIOR" hosts the European Food Safety Authority (EFSA) National Focal Point with the aim of establishing more coordinated and more comprehensive collaboration with EFSA and to maintain and develop scientific excellence in the fields of "BIOR" competence (food safety, quality and technologies, animal health, infectious diseases and epidemiology, environmental safety, fisheries and fish resources and aquaculture) at national and international level.

The quality of the research by different groups is proved by numerous scientific publications, published mostly in international peer-review scientific journals with high impact factor (up to 9.737). In 2011 and 2012 the number of the publications in high-impact journals has increased (for example, the number of Thomson Reuters ISI Web of Science publications was doubled from 2010 to 2012). The relevance of research is increased by well-developed cooperation with national and institutions abroad. The groups seem to be strong and internationally well-acknowledged, as shown by many international collaborations.

The Institute is a strong international player. Research by the Institute possesses a very good standard of quality in terms of originality and importance. Work at this level can arouse serious interest in the international academic community, and the international publishers or journals with the most rigorous standards of publication could publish work of this level.

Impact on the scientific discipline

The number of the original articles published in both, SCOPUS journals as well as Thomson Reuters ISI Web of Science journals for the period 2006-2012 is high (82 and 75, respectively). Majority of them were published in the highly ranked journals. The citation index of these articles is also high. .

In the period 2006-2011, 43 publications were published with international co-authors (the highest number among the Panel A institutions; the Panel A average is 7.3). The number of co-author countries is also very high: 22 – the Panel A average is 7.

The number of the PhD students from different Latvian universities enrolled at the Institute and researchers with a PhD in 2011 and 2012 was as follows: 15 PhD students and 13 PhDs in 2011, and 18 PhD students and 17 PhDs in 2012. All PhD students are included in the research under the supervision or assistance of senior research staff at BIOR, but they are also included in the routine work. This occurrence could cause delay in the accomplishment of their PhD thesis.

The cooperation with large number of foreign universities, institutes, companies and laboratories has a positive influence on developing the many disciplines which exist in "BIOR". Its researchers are very active in FP6 (6 projects) and FP7 (4 projects), LIFE, BONUS, other EC projects, the EEA and Norwegian programme and projects, Baltic Sea Region Programme. "BIOR" is the organiser of several national and international conferences, workshops and seminars. The number of trained young researchers (doctoral and post-doctoral students) at BIOR's facilities is significant. Some of "BIOR"'s researchers participated in the mid- and long-term research activities in laboratories abroad. As a result, common research projects have been realized and joint publications published. All this suggests that the Institute is internationally well recognised.

The Institute is a strong international player. "BIOR" is internationally recognised in its discipline and is highly regarded as a partner in international research projects and networks.

Economic and social impact

"BIOR" has a positive economic and social impact due to its long experiences working with the food and fishery industries as well as with governmental organizations (Food and Veterinary Service and Ministry of Agriculture, particularly in the area of epidemiology of animal infectious diseases and zoonoses, providing in that way scientific knowledge for risk managers in the area of food safety, animal and public health) for the benefit of citizens. The Institute operates as the National Reference Laboratory in European food safety and veterinary surveillance networks where in collaboration it provides scientific expertise and advice. From 2013, "BIOR" became the European Food Safety Authority (EFSA) National Focal Point with the aim of establishing more coordinated and more comprehensive collaboration with EFSA and to maintain and develop scientific excellence in the fields of "BIOR" competence.

It has also established strong national and international contacts in environmental monitoring. It thus has major significance for society. Besides the Ministry of Agriculture, "BIOR" is cooperating with several national stakeholders, such as the Ministries of Education and Science, of Health, and of Environmental Protection and Regional Development, Food products quality cluster, agriculture and food industry. The number of industry-funded research projects is increasing from year to year: in 2011 – two industry funded projects, in 2012 – 6 of that kind, and in the first 9 months of 2013 – 5.

The research of the Institute is very important for society. The Institute's interaction with non-academics (i.e. business, policy-makers, and the public) stands out in terms of their extensive and dynamic nature.

Research environment and infrastructure

Laboratory facilities, physical infrastructure, research and analytical equipment (for example in the fields of food chemical analysis and molecular biology) are up-to-date, and provide very good environment for "BIOR" researchers, PhD students and post-docs. The Institute has a specialised library for fisheries which is an internationally recognised unit. "BIOR" is also the National Reference Laboratory in the areas of veterinary medicine and food safety. It has the collection of the most important microbial isolates of veterinary and public health importance, in this way providing

great research material for epidemiological studies. The Institute also has a wide range of equipment for research in the areas of fisheries and aquaculture.

The Institute has a clear strategy: to reach the level of 100 researchers, to establish the process of continuous preparation of research applications (through a small office that is already established), to publish more than 50 ISI WoS publications annually, to develop interdisciplinary projects (veterinary medicine, food safety, agriculture, fisheries and aquaculture), to foster strong cooperation with universities, international staff mobility, to strengthen international cooperation, and to further develop its infrastructure.

In that sense the Institute is a strong international player: it is able to provide an internationally comparable excellent research environment to high-level international research in the given discipline.

Development potential

The Institute has very good scientists that are capable to compete internationally, and can support high-quality research in addition to its non-academic aims and duties. Research facilities are outstanding, scientific units big enough and new research articles and proposals written actively. It is a very viable and strong institution. The potential of Master and PhD students is high, but, in the future, "BIOR" should increase the number of full-time researchers and leading researchers. Also, international research mobility should be further improved and the number of visiting researchers increased.

The Institute is able to maintain itself as a recognised and respected player in the international scientific community within the given scientific discipline. It is expected that over the next 5-10 years it will achieve an excellent level of scientific quality and influence and will become a highly regarded partner in international collaboration projects and networks.

Conclusions and recommendations

The Institute is carrying out research of international significance and quality and should be able to keep that level in the future. The research environment and infrastructure is very good. The potential for collaboration with other institutions and for interdisciplinary research is high. The strategy for further development is well designed and looks achievable. The Panel recommends more active and important roles in the future Horizon 2020 project consortia, such as project or/and WP coordination.

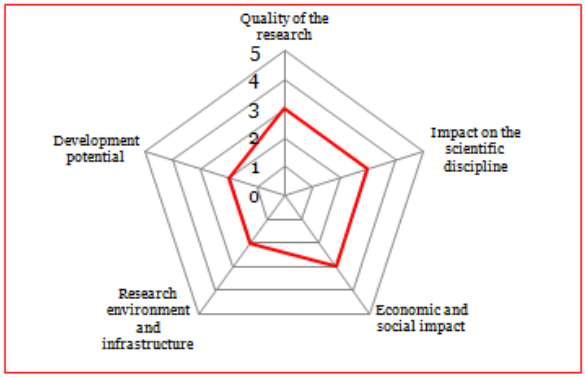
5. A_05_State Priekuli Plant Breeding Institute

Name of the institution	State Priekuli Plant Breeding Institute
Name of university	N/A
Type of institution	State Scientific Institute

The State Priekuli Plant Breeding Institute is an independent institution founded a century ago. It has collaborative and educational links to the Latvia University of Agriculture (Faculty of Agriculture and Faculty of Food Technology) and the University of Latvia (Faculty of Biology). In addition, there are collaborative research projects with related breeding institutes such as the State Stende Cereal Breeding Institute. The Priekuli Institute carries out research on plant breeding across a wide range of species including potato, rye and barley, and has extensive field space for these activities. The laboratory-based research is carried out in one large building that is undergoing refurbishment. The scientific staff comprises 16 individuals at all levels (6 leading researchers, 6 researchers including 4 PhD students, and 4 technicians). The total staff in full-time equivalents is estimated at 50. The Institute is in a rather isolated location far from its collaborating universities, but has regional importance within north Latvia.

Figure 5 A_05 - Scores

Criteria	Scores
Quality of the research	3
Impact on the scientific discipline	3
Economic and social impact	3
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**3**



Overall Score

The Institute carries out very good work on the national level over a wide range of plant breeding topics. There are some international links. The staff is committed and skilled. The infrastructure is extensive but requires investment; nevertheless, it touches many of the bases for what is required to study plant breeding. The scale of the Institute is small although nationally competitive and funding limits the impact they can have to the national level, where they have a strong impact. The Institute is rather isolated with inadequate informatics links. There is a powerful argument for rationalising plant breeding nationally, but this site would be an appropriate one on which to concentrate future development. The overall score reflects their strong showing at the national level, the breadth of technologies the employ and their international links.

Quality of Research

The Institute performs research across a wide range of agricultural topics related to plants, including research on breeding for organic farming, biotechnology and molecular biology for potato and barley, production of compounds required for human health such as vitamins and amino acids, and development of genotypes and cropping systems for their production, as well as environmentally friendly farming systems based on growing technologies, plant protection, weed management and soil maintenance. The breeding programme has incorporated some use of molecular markers for marker assisted breeding of resistance genes as well as for association genetics, which is an encouraging development.

Of the five research outputs submitted, two were published in national journals and three in international journals. One paper arose from an international collaboration with a Portuguese group. Over 10 Scopus publications were listed, several with international authors. Therefore, the Institute has some international recognition and collaborations. Nevertheless, the rate of citations per publication was only slightly over 1. Other outputs in edited journals and proceedings brought the total refereed output to around 50. The papers produced are competent, but not particularly innovative. A lot of the work remains descriptive, not aimed at developing new insight or understanding. The focus on the specifics of breeding for organic agriculture is an interesting niche, but should be maintained as a small proportion of the total activity of the Institute, reflecting its importance in agricultural production. The Institute has an international grant from ESF and some funds from EU. Encouragingly, the Institute takes part in EU consortia, e.g. EUROLEGUME and ERA-NET CORE . The institute appears to have a large income above core budget, although a large fraction of that is for infrastructure. The staff is competent and highly motivated. International collaborations, high research income and utilisation of modern methods such as molecular mapping of breeding material distinguishes the Institute from other breeding institutes assessed and tips this score to a 3. The Institute fits the description of a strong national player with some international recognition.

Impact on the scientific discipline

The institution publishes satisfactorily in a national context but in absolute terms produces a low number of publications and research outputs overall. The interest in organic agriculture might provide an international profile. The citation rate is low, indicating that impact on the discipline by this measure is not extensive. The Institute breeds recognised new varieties that might be of national significance, providing a practical and commercial impact. Furthermore, the Institute makes a national impact by taking part in international grant consortia funded by the EU and ERA-CAPS, bringing international funding into the Latvian research system. However, in total it does not have extensive educational impact, with only four PhD students in the reporting period, but it provides these individuals with an intensive education. There is little evidence of radical innovation within the discipline or of making scientific breakthroughs. The methodologies used in the Institute are adequate and aimed at internationally recognised standards.

Overall, although the Institute does a good job in the circumstances, the impact of their research on international plant breeding as a science is limited. The Institute is a strong national player where it does have an impact, and it has some international recognition.

Economic and social impact

The output of the Institute in terms of new cultivars specifically bred for the local conditions is impressive and certainly contributes to the development of agriculture in Latvia and its immediate surroundings. In this respect, there is a long-lasting impact from their work that deserves credit. This impact would be further enhanced if the Institute is successful in translating some of its focus on breeding for organic farming to develop cultivars that are specifically suitable for that type of agro-ecological conditions. Breeding for organic farming is still rare throughout the world, so there is potential for a unique contribution here. The institution does some consultancy and has several

connections with companies, but at a relatively low and almost exclusively national level. Interactions with companies focus on organic farming and crop production. The Institute raises funds through EU programmes that have had a considerable national impact in boosting employment and opportunities for young scientists, for example 300,000 EUR through the EUROLEGUME programme. Thus the Institute carries out important research and has a satisfactory level of interaction with non-academics.

Research environment and infrastructure

The Institute has impressive infrastructure for growing crops and performing field experiments. These include 255 hectares of arable land of which 13.8 hectares has been certified for organic use. In addition, the Institute has a glasshouse complex as well as the laboratory equipment for analysing and storage of DNA markers. Notably, there is a tissue culture laboratory, which further enables the Institute to provide a range of methods relevant for breeding. The laboratory building is relatively large with sufficient laboratory and office space, which, although somewhat out of date, is being refurbished. Thus the institution has the infrastructure required for breeding target crops. The number of research personnel is low by international standards, approximately 12 scientists (including 4 PhD students) and 4 research assistants. This is competitive nationally. The research language is English, increasing the opportunity of links with international institutions. The research environment would be greatly enhanced by improved access to scientific literature online, which was very slow and limited in range.

Overall the Institute is a satisfactory national player.

Development potential

This Institute has potential for future development. It has the arable land required for breeding, an extensive lab/office building and an infrastructure that supports breeding research in additional ways through tissue culture and DNA markers. There is a broad scientific strategy as well as a focus on distinctive niches such as organic farming. Nevertheless, to develop further, the institution requires investment and an increase in scale, particularly employing young scientists with international experience in modern methods. Despite this point, the current group is committed, flexible and determined to improve providing a strong basis on which to develop the institute. Certainly the Institute has the potential to become a strong national player and eventually with appropriate investment and direction to become an international player.

Conclusions and recommendations

The Priekuli Institute is a national centre for plant breeding and performs very well in this context. The Institute collaborates extensively with other Latvian institutes working in similar areas within a National Research Centre that includes the State Stende Cereals Breeding Institute, the Faculty of Agriculture at the Agricultural University and the University of Latvia Faculty of Biology. Overall there appear to be too many plant breeding institutes across the country, all of which are too small to create a modern research environment or much international impact. There may be a case for maintaining the breeding facilities at these sites to provide diverse environments for crop testing, but rationalising the staff and research facilities onto fewer sites. A detailed review of such possibilities could be carried out (separately from this assessment) involving at least this institute, State Stende Cereals Breeding Institute, some of the field sites available to the Faculty of Agriculture at the Agricultural University, the Agricultural Science Centre of Latgale and the Institute of Fruit-Growing.

The State Priekuli Institute has features that suggest it could act as a nucleation point for national breeding efforts after a review of the type proposed above. It has good field facilities, a large if outdated building, international contacts, and a broad scientific strategy. Successful development of the research programmes of the Institute requires improved funding and an expansion of the scientific staff. Core funding of the Institute has fallen to less than 10% of the budget, which is not viable in the medium term. The

Institute depends on international external grants, which are competitive and cannot be depended on to fund core services. Plant breeding research is a long-term effort that requires long-lasting financial commitment. It is not an activity that can be put on hold for some time without tremendous damage. Despite these difficulties, the scientists are motivated and an asset to the Institute.

The Institute has made encouraging strategic moves into organic farming and use of molecular markers for methods such as marker-assisted breeding and association genetics that bode well for the future. Nevertheless, employment of new staff with international training in these and other modern methods would provide the institute with a further impetus and improve the overall quality of research.

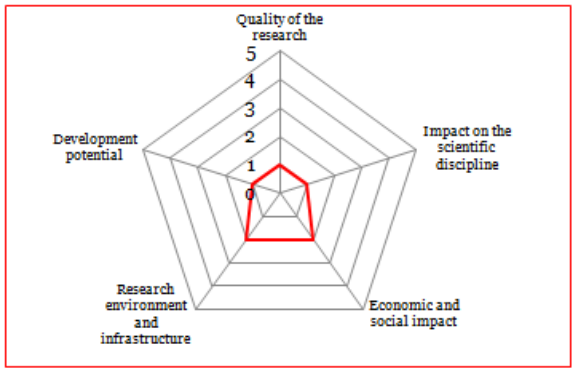
6. A_06_State Stende Cereals Breeding Institute

Name of the institution	State Stende Cereals Breeding Institute
Name of university	N/A
Type of institution	State Scientific Institute

The State Stende Cereal Breeding Institute was founded as a plant breeding station in 1922. It focuses on breeding of cereals (such as wheat, barley and oats) and crop growing technologies. It is not affiliated to a University but linked to the Ministry of Agriculture. It owns the 3.4 hectares of land on which the 10 buildings are located. The remaining 200 hectares at the disposal of the Institute are state-owned agricultural land. The institute is organised into three departments: the Breeding Department, the Agroecological Research Department and the Seed Multiplication Department. In addition, there are several support units such as Mechanisation and Administration. The total number of employees in 2012 was 46, of whom 15 were research personnel. Currently the Institute hosts 3 PhD students registered at the Latvia University of Agriculture in Jelgava. The Institute has close collaborations with other plant breeding institutes in Latvia such as the State Priekuli Plant Breeding Institute. Its current status as a Plant Breeding Institute was acquired in 2006.

Figure 6 A_06 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	2
Research environment and infrastructure	2
Development potential	1
OVERALL SCORE	**1**



Overall Score

The State Stende Cereal Breeding Institute provides a nationally significant site for cereal breeding and phenotyping of plant varieties. The field sites and related infrastructure are important but the laboratory facilities are poor and will likely remain so even after the current refurbishment. The work carried out is mainly empirical breeding and does not have a strong research component.

Increasingly the research carried out is falling behind the international standard, which relies on molecular analysis of breeding material to assess allelic variation and exploit marker-assisted breeding. The staff are committed and are very good breeders, but in terms of research and international expectations for breeding research are fighting against a rising tide.

Quality of Research

The Institute has a clear focus on breeding of cereals, particularly wheat, barley and oats. In addition to breeding new varieties, it aims at the protection of genetic material and the development of optimal methods for growing particular varieties. The Institute has a well-focused research strategy but this is in an internationally competitive area. In general, the research output is very agronomic, applied and of mainly local importance. It provides important locations for field testing, for example of certain cereal diseases. The personnel of the Institute are skilled at phenotypic breeding of new varieties. This is an important task, but does not have a high research component aimed at scientific understanding; rather, it relies on practical, empirical genetic crossing and segregation of phenotypes. Much of the work of the Institute is directed to these practical goals. The Institute does not actively use more modern methods such as DNA markers or marker-assisted breeding. It has employed doubled haploid tissue culture methods. All reported publications were submitted to national or Lithuanian journals, or were book reviews. Over 10 papers were in Scopus, with a citation average of just over 1. A very high proportion of papers are not cited. The Institute has very little international collaboration. However, it collaborates well nationally, notably with the Priekuli Plant Breeding Institute, the Faculty of Agriculture at the Latvia University of Agriculture and the Faculty of Biology at the University of Latvia. In such collaborations, the State Stende Institute provides valuable material and phenotypic scoring of material. A low proportion of total budget was non-state. Overall, State Stende appeared a poor national player in terms of research quality.

Impact on the scientific discipline

The impact on the discipline is low when measured by publications. The numbers of publications and citations of these publications are very low. Many publications are not cited. Several of the better publications are collaborative, with the Institute providing material or phenotyping data. The Institute does take part in international consortia, but many of these appear not to result in documented output in terms of publications. Impact in terms of education is also low, with only 3 PhD students listed in the report period. The small scale of the Institute with total research personnel of 15 makes it very difficult for it to have an international impact. Overall, in terms of research impact, this Institute appeared a poor national player.

Economic and social impact

As expected from the scientific activities of the Institute, it does have a social and economic impact in breeding new varieties for use in Latvia. Two of their varieties were included in the list of “Achievements of Latvian Science” compiled by the Latvian Academy of Sciences in 2009 and 2011. They carry out maintenance breeding of 15 varieties of wheat and oats, providing a service to Latvian agriculture. In addition, the Institute does some consultancy and has a few connections with non-academics, but these are very few and at a low level. It operates in these capacities at an exclusively national level. The breeding of new varieties and contact with farmers placed the impact of the institute as a 2.

Research environment and infrastructure

The Institute has very good infrastructure for field testing and harvesting plants. This infrastructure includes 200 hectares of arable land at its disposal, as well as new or well-maintained machinery for planting, harvesting and threshing plants. The office and laboratory building has recently been invested in. However this is small, and even after current investments are completed will not provide high-quality, modern laboratory space because of insufficient funds.

The scientific strategy of the Institute is still very much based on empirical breeding. The scientific personnel perform well at this level, and based on their submission appear committed as well as hard working, but their empirical breeding approach precludes use of modern methods that are becoming standard elsewhere. There was no indication that modern methods such as marker-assisted breeding or molecular assessment of the

alleles present in their material had impacted on the work or future strategy of the Institute. With international institutes routinely organising their research programmes based on genomic sequence data of barley or wheat, this will be an increasing disadvantage and will distance the Institute from the international state of the art. The scientific language of the Institute appeared to be almost exclusively Latvian, making international contact or involvement in international scientific discourse more difficult. The field infrastructure and facilities for breeding place Stende as a satisfactory national player overall.

Development potential

The Institute has a strong base in empirical breeding and nationally important facilities for growing cereal plants and phenotypically assessing them. Its scientists have long and successful experience in these areas and are strongly committed to the Institute. However, the laboratory buildings and office space are small, which limits future development. The refurbishment of laboratories is also incomplete, and will require further investment to reach a standard where they can make a significant impact. The scientific strategy of the Institute is narrow and is based around more empirical breeding and phenotyping. The proposed trajectory will lead to the Institute operating further and further below the internationally expected standard. A radical change in investment, infrastructure and scientific strategy is required for the Institute to establish itself internationally. Similarly, an expansion in staff, particularly well-trained individuals aware of modern developments, would be necessary. Generally the field sites are important, and the experience of phenotyping significant, but the future of the Institute might best involve fusion with another institution to create research mass. After such a fusion, the field sites at Stende might be important, but the laboratory facilities could be provided at the other site and staff could be concentrated there. Overall, very limited scope for developing research quality and reputation was detected without a radical change in funding, scientific strategy and research programmes.

Conclusions and recommendations

The State Stende Institute is successful in breeding new varieties of important crops such as wheat and barley. The Institute collaborates extensively with other Latvian institutions working in similar areas within a National Research Centre that includes the Priekuli Breeding Institute, Faculty of Agriculture at the Agricultural University and the University of Latvia Faculty of Biology. Overall, there appears to be too many plant breeding institutes across the country, all of which are too small to create a modern research environment or much international impact. There might be a case for maintaining the breeding facilities at these sites to provide diverse environments for crop testing, but rationalising the staff and research facilities onto fewer sites. A detailed review of such possibilities could be carried out separately from this assessment involving at least this Institute, the Priekuli Institute, some of the field sites available to the Faculty of Agriculture at the Agricultural University, Agricultural Science Centre of Latgale and the Institute of Fruit Growing. The State Stende Institute has features that might appear weak in such a review. These include the laboratory facilities, the narrowness of the scientific strategy and the lack of modern methodologies being used. There might be an argument for continuing to use the field facilities at Stende but concentrating the laboratory facilities and personnel on another site.

Such decisions as those outlined in the previous paragraph should be made quickly. If work continues in its present form at Stende, then the Institute requires additional investment in laboratory facilities and an increase in its core operational budget, which has fallen below the levels required to run the Institute efficiently and made it over-reliant on unpredictable grant or similar income.

7. A_07_Faculty of Agriculture

Name of the institution	**Faculty of Agriculture**
Name of university	Latvia University of Agriculture
Type of institution	HEI

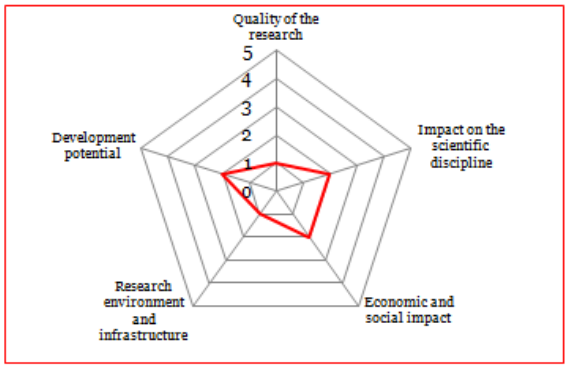
The institution is a large faculty of the agricultural university of Latvia and has a central position in the research activities on agriculture. It is one of the largest research institutions in agricultural sciences of the country and has a large number of PhD students, many of them working in cooperation with other institutions. As such the faculty is entirely focused on teaching and research in the field of agriculture. It has a broad mandate and also has assigned itself a research mission that is very broad too. The Panel makes the observation that apparently the philosophy is that the mandate for teaching is extremely broad and that this teaching assignment can only be carried out properly if it is supported by an equally wide range of research activities. Such a strategy results in a lack of research focus and consequently a a difficult position in the international scientific arena. The Panel realizes that the diverse interests of the students and the diversity of PhD studies could be an argument for a wider scope and that apparently this is a view shared by the vast majority of permanent staff and PhD students, but the Panel would like the Institution to reconsider this approach.

The institution is characterised by a strong and dominant leadership which appears to be accepted as authoritative and inspirational. The faculty has a large number of PhD students who seem to be relatively happy with the research environment, the support provided by the faculty staff and the lines of research offered. There is a gender imbalance, but it is less strong in the Faculty than observed for some other institutions and especially the plant breeding stations, where the dominance of female researchers was larger.

The main research topics include: renewable energy (energy crops), agricultural engineering (both for arable crops and dairy), and forestry, environmental impact of agriculture and food sciences. This list underlines the wide diversity of activities, but in fact the impression during the site visit was that the area covered was even wider than this as it also included aspects such as horse breeding, evaluation of feeding value of roughages and forage quality, etc.

Figure 7 A_07 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	2
Economic and social impact	2
Research environment and infrastructure	1
Development potential	2
OVERALL SCORE	**2**



Overall Score

The lack of a clear strategy and a clear focus in the research programme, combined with a relatively old physical infrastructure are major worries. The presence of many PhD students and a motivated staff are assets. It is obvious that the Faculty has a central role to play but it could do a much better job if it would restructure its research portfolio.

Quality of Research

Most publications are in the B or C category in terms of quality. Relatively few are in the A category. The publication lists contain many papers in national journals, proceedings or in Acta Horticulturae (which in fact is also a series of proceedings of the ISHS). Nevertheless, the number of citations of these papers is – on average – higher than for other institutions.

The size of the group would allow interaction, collaboration and should make the institution a desired partner for collaboration, both nationally and internationally. For international collaboration, there was not enough proof of such a situation.

Topics of PhD thesis research were also often very much oriented towards dose-response research or rather descriptive in nature. It is a pity that these opportunities for risky but challenging research are not used.

In general, for a University the research programme is very applied and descriptive. A lot of the research activities could still be qualified as dose-response research or explorative activities. There were even many activities that could not be classified as research, for example, the routine analysis of feeding value provided to extramural clientele.

The research programme of the faculty lacks focus and scientific analytical depth. The philosophy that they need to teach a wide diversity of topics and therefore need research programmes across the same wide range of topics is considered to be a major factor limiting the quality of the research.

Impact on the scientific discipline

Given the rather traditional approach in research the impact on the development of the discipline is smaller than what is possible given the specific role of the institution. It is recommended to take more risks and to become more daring in research and especially in the topics of PhD research. There is also a need to acquire more international funding and establish a more internationally oriented research programme. The faculty needs a much more focused research programme investing in a restricted number of signature programmes to be able to create impact and to become an international player. With the current fragmentation of the attention and the lack of critical mass it will be difficult to create visibility in the international arena.

Given the fact that the faculty has an impressive PhD training programme with a large number of PhD students, the faculty does have considerable impact on the scientific discipline at the national level. However, the research strategy does not allow the Faculty to become a player in the international research arena and certainly does not enable the Faculty staff to have an international impact on the development of the scientific discipline.

Economic and social impact

The role of research at a University Faculty is always double: creating knowledge and training future researchers and other academically trained professionals. Both objectives would be better achieved with a bit more daring approach in research. By creating that, the impact on society might become slightly smaller on the short-term but certainly larger on the long run.

Nevertheless, the Faculty of Agriculture is undoubtedly an important academic institution educating students in agronomy and animal science. Research directions are important for the Latvian agricultural sector. Part of the research is directly focused on the needs of branch development. The faculty also seems to have invested considerably in good contacts with end users of information in the agricultural sector. These activities have created economic and social impact but also have reduced focus on the core business of the Faculty.

The Head of the Faculty acts as mentor and official professor for PhD students at many external institutions (e.g., A01, A05, and A06). The Head deserves credit for that and through this role the Faculty has an economic and social impact across the country.

The Panel has the impression that for a long-lasting impact more innovation is required. New people should bring new life to the Faculty and should help to create focus and depth.

Research environment and infrastructure

The Faculty runs many field sites. Some rationalisation in collaboration with research partners (such as A01, A05 and A06) could increase efficiency of resource use.

In general the facilities and physical infrastructure are not up to the standard of a modern university. A lot of the labs and facilities are rather old fashioned in set-up and in equipment. The Faculty buildings are not easily converted into an efficient research and training centre.

The research environment would be greatly enhanced by improved access to scientific literature online, which was very slow and limited in range.

The Institution should also widen its horizon in international travelling and collaboration.

Within Latvia, however, the institution is well embedded and has a strong network of collaboration. It is obvious that it plays the role of desired / preferred partner in agricultural research in Latvia, but that is not enough to create the proper research environment.

Baltic (BOVA) and Nordic (NOVA) networks are important part of the infrastructure both for teaching and for research.

Development potential

Working at a university always provides the benefit of working with young, enthusiastic and dynamic people who challenge their professors on a continuous basis. The developmental potential of a Faculty is, therefore, almost by definition, considerable. Making use of each opportunity is a must and the self-assessment clearly indicates that the motivation, ambition and capacity to do so are present within the faculty. The large PhD programme is also an asset that can be very important to realise the ambition.

The Faculty has potential to become an international player. For instance, BOVA and NOVA give not only international courses for students, but also very likely increase

research collaboration. Increased collaboration – bringing in more international funding – is needed to develop institution further and to improve the scientific level of the faculty to even higher level.

When the Faculty will manage to attract young people who have been exposed to international scientific community and learned how to focus a research programme the faculty can most likely make use of its central position to become an important national player with some promise to develop into an attractive regional partner. However, bringing in new blood is essential.

Conclusions and recommendations

The Faculty of Agriculture has the potential to play a central role in education and research on Latvian agriculture. It should also develop the ambition to become an international player. That will only be possible if the research strategy of the Faculty is reconsidered, if more focus in the research programme will be developed and if new scientists with an international exposure will contribute to the necessary change. There is also a need to create a better physical research environment and to improve the international orientation of the team. The Panel also recommends rationalisation of the field sites in collaboration with partner institutions in Latvia.

The research environment would be greatly enhanced by improved access to scientific literature online, which was very slow and limited in range.

8. A_08_Faculty of Economics and Social Development

Name of the institution	Faculty of Economics and Social Development
Name of university	Latvia University of Agriculture
Type of institution	HEI

The Faculty of Economics and Social Development is being assessed as the Faculty of Economics (as regards its situation up to 2012, before integration with rural sociology and social aspects of regional development). It is the largest (22.5% of all students) of nine in the Latvia University of Agriculture (LUA), and is located within the main LUA campus area in Jelgava. It operates degree programmes in five areas, including MSc courses, and its resources include the LUA research farm and centres. It organises an annual conference "Economic Science for Rural Development".

The following scientific priorities are set out in the Faculty's Strategy for 2010-2016: development possibilities for the national economy; human resources: social capital in developing rural regions; regional development; business environment development; economic processes in rural areas: cooperation; identification and management of risks in agriculture and forestry; development of the forms of business entities; quality and increase in competitiveness; improvement of Latvia's tax system to ensure economic growth and social justice.

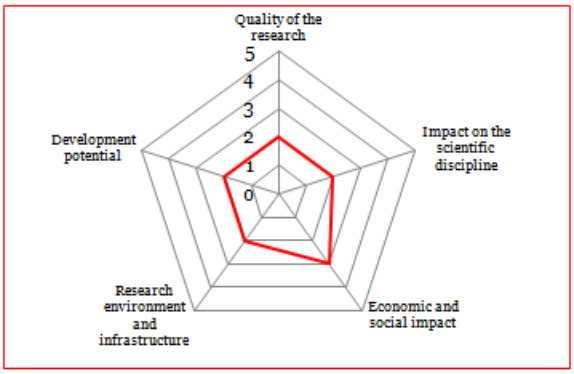
Although a different list of ten "blocks" of "topics researched" was also provided to the Panel, including (amongst other items listed above) training, energy, EU funding, public health and consumption, and forestry economics. The Faculty does not appear to be organised in terms of research groups, but rather undertakes most research on an ad hoc project basis, and the "implementation of scientific research is aimed at preparing new doctors of economics". The scope is very broad - perhaps matching the Faculty's teaching responsibilities – and includes the agri-food sector, rural development, rural territories/policy, sustainability, and food.

The Faculty has about 33 FTE academic personnel (professors, lecturers, etc.), a figure considerably below the level in 2006-2007 (about 60 FTEs) but stable since 2009-2010 in overall terms though some categories have varied considerably over the years, and (as more generally), it may not always be clear what proportion of the time of a professor or lecturer should be allocated to "research". However, the number of doctoral students included in the 33 FTE figure is quite high, e.g. 22 in 2011, and 19 in 2010 and 2012, though numbers may be currently decreasing as ESF funding ends. The staff profiles supplied indicate that the research personnel are predominately female (81%) and generally young (about a third in each of the age cohorts 25-25 and 35-45).

The funding level reported for 2006-2011 appears adequate for an economic research institution, at 117,000 LVL per researcher, but about 40% of this was received from ESF/ERDF during 2010-12. A number of EU FP projects have been undertaken during the assessment period, but many of these have now been completed (peak funding 17,000 LVL in 2009; average about 7,000 LVL during 2006-2012), with little sign of continuing or increasing international research funding

Figure 8 A_08 - Scores

Criteria	Scores
Quality of the research	2
Impact on the scientific discipline	2
Economic and social impact	3
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall Score

The Faculty is carrying out research of national and regional significance, but not much of international interest or quality. This performance appears to derive from (i) its very broad range of scientific effort, with no clear focus on two or three core areas, (ii) its perhaps excessive attention to national publications (largely of a scientific rather than non-academic nature) and (iii) low and uncertain funding.

Quality of Research

The Faculty's research predominantly addresses national and regional issues, and about two-thirds of the work belongs to the fields of regional economics, agricultural economics and business management. The five papers supplied as evidence (all conference proceedings) cover renewable energy (2 papers, on risk assessment and dynamic modelling for on-farm biogas, respectively), dairy trends, electric transport costs and power engineering mathematics; these topics.

The "brief description" above suggests that the Faculty is unable or unwilling (perhaps because of funding uncertainties, or staff interests and expertise) to pursue a focussed research strategy, but is responding to ad hoc demands across a wide range of topics.

It is of particular concern that no visits over a month long are reported for any of the years 2006-2012, although a few visiting lectures are cited and 0.2 "visiting professor" FTEs for 2012.

This suggests a rather "local" and "scattergun" approach to scientific research, with little to show in terms of international quality.

Impact on the scientific discipline

The rate of "self-reported outputs" (publications) is very high, at 635 in total 2006-2011, or 60.5 per researcher (about five times the Panel average), but many of these papers appear to be short and/or low-ranking in scientific terms. Only a few of these papers were recorded by SCOPUS, and only 3 had international co-authors, from only 2 countries. The list of "best publications" for 2012 continued this pattern.

The annual plans of the Faculty envisage a number of publications for each Department. Many of these are purposefully prepared for proceedings of the Annual International Scientific Conference "Economic Science for Rural Development", and are indexed in the relevant research and scientific databases. Accordingly, the institution occupies a stable position in the international scientific community and may be considered as a relevant national research centre.

Its production of doctoral theses may also be considered as a positive contribution to the scientific discipline, but again it is difficult to perceive much of a fully international character in this area.

Economic and social impact

The Faculty has strong collaboration and involvement with public and policy-maker sectors within Latvia, and its annual rural development conference at Jelgava indicates considerable effort to disseminate its research to a wider audience. However, there was little evidence of close involvement with business and social stakeholders.

Its staff possess a number of memberships of national bodies and editorial boards, and its staff and students have received a satisfactory number of awards, though few of these appear to be of outstanding quality.

The research of the institution is very important for society. During the observed period relevant for evaluation, the institution was engaged in a number of projects relevant for development of national economy and society. The given list of scientific projects unambiguously confirms importance of the evaluated institution both at the national and regional level.

Research environment and infrastructure

The Faculty reports satisfactory numbers of PhD completed (33 in 2006-2011), and therefore clearly provides an attractive environment for doctoral studies. However, during the Panel's visit, it was struck by the process of PhD approval, which appeared unnecessarily complex (though commendably involving an international assessor) and its long duration; these aspects drew some criticism from current students.

The Panel is aware that changing (i.e. simplifying, accelerating) the process of PhD approval – and perhaps shortening the time allowed for completion – may involve changes in regulations at University or even state level.

Most of the candidates on doctoral studies with theses defended during observed period are employed in the national higher education institutions. They were involved, as well as MSc students, in the different national projects governed by the institution. Therefore, the institution shows a strong capability to provide a research environment comparable with globally recognised academic institutions in the discipline (the institution was engaged in the cross-border cooperation projects, as well as in the joint research activities with the EU institutions). However, there is no evidence on visits abroad as well as visits to the unit during the observed period.

Development potential

The lack of study programmes carried out in foreign languages means little chance to attract international students. However, over the next 5 years, it is planned to engage in the following main fields: (1) New scientists will be prepared in both master and doctoral study programs, including foreign students studying in English; (2) Research project proposals will be prepared and submitted to various contests both in Latvia and abroad; (3) Possibilities for further and closer cooperation with scientists of other sciences will be sought to establish various interdisciplinary researcher groups; (4) Cooperation with other scientific institutions in Latvia and abroad will be increased and developed; (5) Research results will be regularly presented at international scientific conferences and published in anonymously peer-reviewed international scientific publications both in Latvia and abroad. It is also planned (2012) to extend work into bioeconomics.

All these are highly commendable intentions, but their feasibility must remain in doubt while staff are heavily involved in teaching and other duties, and while funding for core research remains low and uncertain.

Conclusions and recommendations

The Faculty is substantial in size, and should provide major national leadership in conceptualising and analysing agricultural and rural development in Latvia. However, as

with other LUA Faculties, there is a clear tension – in terms of time and focus – with teaching duties, and some obstacles in terms of the process of University and Academy approval of doctoral theses.

There appears to be a need to specialise and differentiate, e.g. with sister faculties in other Baltic countries and/or in collaboration with similar institutions in other EU countries. Every effort should be made to contact and join ongoing FP7 and future Horizon 2020 research studies, with a clear aim of providing Latvian leadership in terms of Workpackages and/or regional (e.g. North-East Europe) expertise.

The institution's visibility at the international level should be based on a strong orientation to publish articles in peer-reviewed scientific journals. The importance of multi-week international visits (in either direction) should be addressed. Attention should be paid to the staff structure and the engagement of older professors in the teaching and researching process (high share of professors under 65). Effort should be put into both the selection of new teaching material (research concepts, methods and models) and the process of staff promotion.

9. A_09_Faculty of Food Technology

Name of the institution	Faculty of Food Technology
Name of university	Latvia University of Agriculture
Type of institution	HEI

The Faculty of Food Technology is one of 8 faculties of the Latvia University of Agriculture. The main activities of the Faculty of Food Technology are: to provide the education in the field of food science, food technology, and catering and hotel management; to promote and perform research in the field of food science; to disseminate knowledge to general public, but also to the consumers and the industry in the form of technology transfer. Main research activities are related to the following topics:

- Development of new products from the raw materials of plants and animal origin, their production technologies and nutrition;
- The study of biologically active compounds
- The food safety and risk assessment and management
- The application of new processing technologies and new packaging materials and technologies in food production
- The research on wood properties and possibilities for its modification

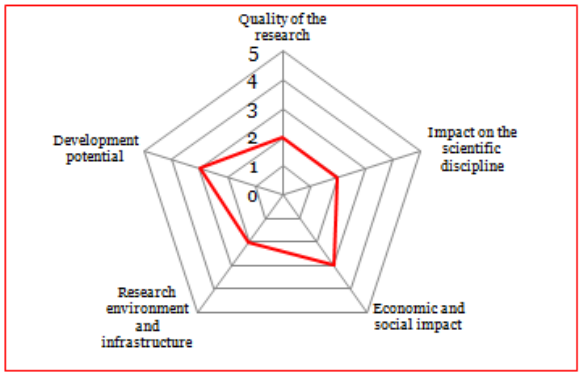
FFT has 43.1 FTE in total. The size of the academic and research staff in 2013 is 30,9 FTE. The research is performed by six research groups: Food chemistry research group – 9.0 FTE (10 persons); Bakery products research group – 4.6 FTE (5 persons); Nutritionist' research group – 4.5 FTE (7 persons); Novel food processes and packaging techniques and materials research group – 2.8 FTE (4 persons); Plant and animal origin raw materials, their product's technology development group – 8.4 FTE (10 persons); Food quality and sensory evaluation research group – 6.2 FTE (7 persons).

Distribution of the Faculty of Food Technology researchers by age groups and gender: 63.2% of employed researches are younger than 55 (50% are younger than -45), and 36.8% are over 55. The female:male ratio is 84:16.

In the period 2006-2011 the funding was provided from the following sources: public/state budget (35.1%), the international projects (17.5%), the contract research (8.8%), and the largest part from the ESF/ERAF funding (38.6%). The funding rate per researcher, 111,000 LVL per researcher for the period 2006-2011, was very low, much less than panel average (Panel average is 194,000 LVL).

Figure 9 A_09 - Scores

Criteria	Scores
Quality of the research	2
Impact on the scientific discipline	2
Economic and social impact	3
Research environment and infrastructure	2
Development potential	3
OVERALL SCORE	**3**



Overall Score

The Faculty carries out good research on the national level across a wide range of food topics. There are some international links, particularly in the frame of BOVA and NOVA university networks, student's exchange and student's training. In addition to that, the Faculty recently become a partner in the FP7 EUROLEGUME project (2014-2017). The staff is committed and skilled. The research infrastructure environment is good particularly in the several newly established laboratories. The potential in the PhD students, in several cases very enthusiastic ones, is high. The cooperation with the food industry is established, several products created by the Faculty's researchers are already on the national market. The Centre of Technology and Knowledge Transfer, that is University unit firmly linked with the Faculty's transfer of technology activities, is trying to play important role in that respect.

Quality of Research

The Faculty of Food Technology performs research across the following areas of food science and technology: development of the new food products from the raw materials of plant and animal origin and their production technologies (such as special breads, cheddar cheese snacks, hydrolysed oat flakes for the preparation of new juice drinks), then food safety and risk assessment, nutrition and biologically active compounds, the study on application of new processing technologies and new packaging materials and technologies in food production. The research fields are strictly connected with the new equipment purchased and new laboratories built in the last period. The research is dominantly of applied nature. The results (2006-2011) were published mainly in the conference proceedings and scientific journals with low Impact Factor (IF), with some exceptions (Food Chemistry, J. of A. Oil Chemists' Society). This is improved in the last few years with more published works in stronger journals. Some findings are protected by the patents, mainly Latvian, with few European ones. It seems that patenting culture exists at the Faculty.

The Faculty of Food Technology is big enough scientific unit to be viable. The size of the group allows interaction and collaboration on both levels, national and international.

In spite of the fact that the Faculty has some international collaboration and international funding, it is at the moment satisfactory national player considering the quality of the research. The international academic community deems the significance of the research by the Faculty of Food Technology to be acceptable. Nationally recognized publishers or journals, and sporadically international as well, could publish work of this level.

Impact on the scientific discipline

Number of the original articles published in SCOPUS journals for the period 2006-2012 is 72. In another analysis that is covering the same period, the total number of the published original articles with certain IF in the ISI Web of Science journals was 20. 4 articles out of 20 were published in the top level journals – inside the first 30% in its one scientific discipline. 4 of them are cited more than 5 times. The average citation index is 0.86.

In the period 2006-2011, 3 publications were published with international co-authors (the Panel A average is 7.3). The number of co-author's countries was 3 – the Panel A average is 7.

The number of the PhD students enrolled at the Faculty of Food Technology in 2011 and 2012 was as follows: 7 PhD students in 2011, and 6 PhD students in 2012. All PhD students are included in research. The PhD students seem to be rather satisfied with the research environment, the support provided by the faculty staff and the fields of research offered.

Faculty is nationally important, but has so far rather limited international collaboration. However, recent international projects may improve the situation. The Faculty performs at the international level through the following programmes: ERASMUS, BOVA and NOVA university's net, network "Food studies in Europe", but also through FP6, FP7 (EUROLEGUME), Eureka projects and COST actions. There are some bilateral and mobility cooperation mainly with the Nordic countries. Some of Faculty's researchers participated in the mid- and long-term research activities in laboratories abroad.

Overall the Faculty occupies a stable position in the national scientific community. The position of the faculty within the international scientific community is still developing. It still has to compete for its status as a recognised member of the discipline at international level.

Economic and social impact

The Faculty of Food Technology, as an important academic institution, has by definition an essential social impact educating students in food science and food technology. The role of research at the Faculty is to create the knowledge, to train the students and, by knowledge, innovative ideas and technology transfer schemes, to give the support and further develop the Latvian food industry, giving an economic impact. In that respect the University has established the network of research centers that are promoting transfer of technologies in rural areas of Latvia. In addition to that the university created Technology and knowledge transfer center in 2005 to stimulate the transfer from the research units of the University to the business sector. It is nowadays the main channel by which the University interact with public as well as private partners. During the last years, numerous agreements and contracts with the food processing companies have been signed. Several food and cosmetic products developed at the Faculty have been recently launched and today are present on the national market: fruit cubs in cooperation with "Biograph organic sweets" Ltd.; vegetable purees "Rudolfs" for children – in cooperation with "LatEcoFood" Ltd.; cereal mixes "Musli Graci" – in cooperation with "Felici" Ltd.; ready-to-eat products - in cooperation with "Matss" Ltd.; processed potato products – in cooperation with "Paplate Nr. 1" Ltd. And "Nassi" Ltd.; flower water – in cooperation with "Dabba" Ltd. Natural cosmetics. The Faculty become lately the partner in the "The cluster of food production" (2013-2014) project as well.

Overall, education provided as well as research performed by the Faculty are important for the society. The Faculty's interaction with non-academics (manly industry/business/end users) are at the level of nationally recognized academic institutions. Number of patents obtained is high, suggesting that Faculty might be even more important player in the future.

Research environment and infrastructure

Research (and training) facilities and research (and training) infrastructure are rather good in the recently created and equipped laboratories: scientific laboratory of chemistry of natural substances, packaging material property testing laboratory, laboratory of food processes, laboratory of bread technology, laboratory of milk and meat product analysis, laboratory of food product analysis, microbiology research laboratory and laboratory of sensory evaluation. That research environment is new and in some extent/several cases comparable with internationally recognised academic institutions in its discipline. Still, there is a lack of space for the purchased sophisticated analytical instruments and, in some cases, processing equipment is based in the same laboratory with analytical one. Some of the laboratories are equipped and used for the student's exercises and trainings and not for the research itself.

The long-term strategic and financial resource planning, including the human resource development strategy is still missing.

Overall the Faculty is satisfactory national player. The Faculty's research environment is in several cases up to the standard of a modern university, but in general still developing to achieve a level that is expected in the international scientific community of a respected institution in the given discipline.

Development potential

The faculty is only higher education institution in Latvia in the field of food science and technology. Based on that fact and the enrolment of enthusiastic and dynamic master and PhD students in research, the developmental potential of the Faculty is significant. Increased number of master and PhD students during the last years should have a positive impact towards the development of well qualified and skilled academic and research faculty staff in the future, strengthening the position of the faculty at the national level and improving at the international one. The international mobility of the PhD students, not only through BOVA and NOVA programmes, is visible. Influence of those students, exposed to the internal scientific community, to further development of Faculty's potentials through international collaboration is crucial.

The new and improved research infrastructure should provide high quality and competitive research not only at national level, but also in the international research and development arena.

Overall, the Faculty may become more important international player if international collaboration in education and research continues to increase.

According to the present situation and its potentials, the Faculty will be able to strengthen its position in the international scientific community in the coming years as a convincing actor and a trustworthy partner within international collaboration networks.

Conclusions and recommendations

The Faculty is carrying out applied research of national significance and quality. The international cooperation is well developed in the sense of the students exchange and training. Research cooperation on the international level is still in the early stage of development. The research environment and infrastructure in newly established laboratories is good. The potential for collaboration with other institutions and for interdisciplinary research exists. The strategy for further development is not clear, but Faculty has potential for this, particularly in the enthusiastic and dynamic PhD students. We recommend the strengthening of the cooperation at national level, particularly with BIOR and Latvia State Institute of Fruit-Growing, and at the same time to put more emphases and to be proactive in creating of international (not only in education and curricula development, but also research) networks and preparing of project proposals.

A_10_Forest Faculty

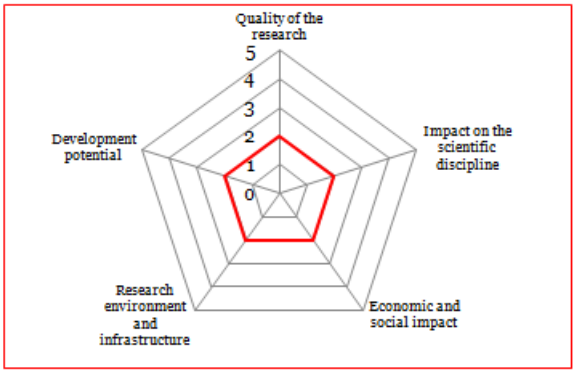
Name of the institution	Forest Faculty
Name of university	Latvia University of Agriculture
Type of institution	HEI

The Forest Faculty of the Latvia University of Agriculture has a long history in providing higher education in forestry. The total size of academic staff in forest faculty is 40, however, most of the time being allocated to teaching instead of research. The number of academic staff in research in the faculty is 15, with 7 professors/associate professors. Gender balance is relatively good at the faculty. Presently, the Forest Faculty has three departments: the Department of Silviculture, the Department of Forest Utilisation, and the Department of Wood Processing. The Faculty teaches basic studies in forest science, forest engineering, and wood processing, and arranges doctoral studies on wooden materials and technologies and forest science. The number of students in basic studies is 565, and in PhD studies 31. While number of PhD students is relatively high, it must be noted that most of these students conduct thesis work elsewhere, for example, in "Silava".

The research activities of the Faculty are evenly distributed between the themes "Forestry Science", "Forest Ecology and Silviculture", "Materials Science" and "Forest exploitation". Much of the research is conducted in collaboration with other institutes, e.g. Latvian State Forest Research Institute "Silava" and Forest and Wood Products Scientific Research Centre "Meka". Research funding of the faculty comes from special projects from Ministry of Agriculture, contracts from e.g., State Forests of Latvia or Latvian Council of Science.

Figure 10 A_10 - Scores

Criteria	Scores
Quality of the research	2
Impact on the scientific discipline	2
Economic and social impact	2
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall Score

The Forest Faculty has a clear and unique role in Latvian research field. Despite of importance of forestry in Latvia, forest faculty has only modest national funding, and its international role is minor due to publication policy and limited international contacts.

Quality of Research

The research activities of the Faculty are evenly distributed between the themes "Forestry Science", "Forest Ecology and Silviculture", "Materials Science" and "Forest exploitation". Much of the research is conducted in collaboration with other institutes, e.g. Latvian State Forest Research Institute "Silava" and Forest and Wood Products Scientific Research Centre "Meka". Forest Faculty has its own role in these studies, e.g. in collaboration with "Silava" the Faculty has a role in developing IT and mathematical methodology (e.g. methods and analysis of remote sensing in forest inventory).

The number of publications produced by Faculty members is relatively high. However, most papers are published in national journals or in proceedings of scientific conferences and only few are published in SCOPUS-level journals (e.g. Forest Ecology and Management). The publications chosen for the institution's best publications are mainly monographs, many in Latvian, suggesting that the research conducted is local, with limited international collaboration. Contributions, for example, on the Latvian forest ecosystem are valuable as such, but would be more important contributions if published in English in international journals.

The Faculty has some state budget funding and grants from the Latvian Council of Science. ESF funding has been an important means of financing PhD studies. The Faculty has also some ERDF projects and contract research.

Impact on the scientific discipline

The Faculty has presently many MSc students and 13 PhD students, with 1-6 completed doctoral degrees per year. Most PhD students conduct their thesis work in research units: Latvian State Forest Research Institute "Silava" or Forest and Wood Products Research Centre "Meka", and are thus mainly supervised by staff of these institutions.

Research conducted in the Faculty is mainly published in national journals, but to some degree also in SCOPUS-level journals, and these papers have been relatively well cited, thus suggesting impact of the research on the scientific discipline.

Faculty members have many national duties and awards. However, international activities are less visible. International projects are very few, and funding limited. Some collaboration producing scientific articles exists, but mostly the level of collaboration has been described as "exchange of scientific statements" or ERASMUS cooperation agreements. There are no framework projects listed in SAR delivered by Faculty, or networks except for participation in COST actions. Foreign visits are lacking, both visits to the faculty from foreign universities or research units and from the faculty abroad for research visits, not only for attending meetings. Furthermore, it seems that the Faculty is not utilising the international networks (BOVA, NOVA) that are available for students in the Latvia University of Agriculture (PhD students would benefit from this, especially).

Economic and social impact

The Faculty is the only institution officially providing higher education in forest sciences, and therefore has clear impact on the Latvian society. However, other forestry institutes, e.g., Silava, participate heavily in doctoral training (supervising doctoral thesis) .

The staff of the Faculty has some board memberships in socially important bodies (e.g. Council of Forest Certification and Forest Advisory Council, Ministry of Agriculture).

Together with some other partners, the Faculty has established in 2004 the Forest and Wood Products Research and Development Institute "Meka". This institution does developmental work and applied research, and has private funding (contracts). It is evaluated separately, but most of the senior staff in "Meka" have also positions in Forest Faculty and some of its PhD students will have their degree at the Latvian University of Agriculture. Although "Meka" is the avenue through which most collaboration with companies is being conducted, the Forest Faculty has also some direct collaboration with companies in fields other than wood processing.

The Forest Faculty has expertise in mathematical analyses and software development, and has produced several useful software packages for practical forestry. For instance, the Ozolins Algorithm assesses wood felling sites for State Forests of Latvia, Mezverte performs a similar function for private forests, Meza eksperts software is a decision-making tool for management of private forests, and MAPIS is a web application of an information system for planning forest management. These are valuable for Latvian forestry, but developing these systems would have benefitted from closer contacts with countries which have already developed and are presently using such systems.

Research environment and infrastructure

The Faculty has reasonable infrastructure for conducting studies. In the department of wood processing, most empirical work is conducted in the facilities of "Meka" (located in close proximity) that can be used by researchers of the Faculty. With the help of EU structural funds, a forest ecological laboratory has been built and other facilities improved. Tight interaction makes it possible to use "Silava"'s research infrastructure in collaborative studies.

The Forest Faculty could be internationally more active; presently, it is too isolated from the international scientific community. The tradition of publishing in own university journals, together with few and infrequent international contacts, makes the Faculty internationally not as well-known as it should be. Research themes in forestry are as international as forestry itself is nowadays. More viable international contacts, together with more international publishing profile, would make the Forest Faculty a more attractive partner for EU projects and other international coalitions.

The age structure of forest faculty is skewed towards older age classes, and new recruits would be needed to develop the Faculty further. The number of students in forestry has been rather high, but there is a threat that is will decline. In particular, the number of doctoral students may decrease when EU structural funding comes to end.

Development potential

The Forest Faculty has, for obvious reasons (teaching), a highly diversified research profile, representing the whole forestry chain from forest ecology to wood processing. The research spread of the unit is conducted with a small number of staff, thus making larger-scale research efforts and building viable research groups possible only with stable and ample outside funding.

However, the Faculty is well-placed to exploit contacts with Latvian industry and forest owners. To become a more serious international player, it would need more international contacts, collaboration resulting in scientific publications in internationally recognised journals

Conclusions and recommendations

Forest Faculty has presently less international and national impact than is could have – and should have, considering the importance of forestry in Latvian economy. Research efforts are allocated to may fields. Concentration on fewer themes with strong research teams would be more effective way to reach depth and quality in research. Furthermore, tighter collaboration with "Silava" and "Meka" could bring research opportunities.

The age structure of the Faculty demands new recruitment, and if this done wisely, the Forest Faculty could have good development potential in the future. Forest and forestry has an important role in the EU, and the demands of the bioeconomy will bring new calls for such research themes. The Forest Faculty could be internationally more active; presently, it is too isolated from the international scientific community. According to SAR, the faculty has not been very active in utilising international networks Latvian University of Agriculture has in teaching (e.g., NOVA, BOVA), that would help students to have international contacts during their studies. Furthermore, the tradition of publishing in own university journals, together with few and infrequent international contacts, makes the Faculty internationally not as well-known as it should be However, increasing international collaboration, both in teaching and in research, would improve

its research quality, increase its contribution to the discipline, help the Faculty to have more impact on the society and economy, and help to attract more funding.

10. A_11_Faculty of Veterinary Medicine

Name of the institution	Faculty of Veterinary Medicine
Name of university	Latvia University of Agriculture
Type of institution	HEI

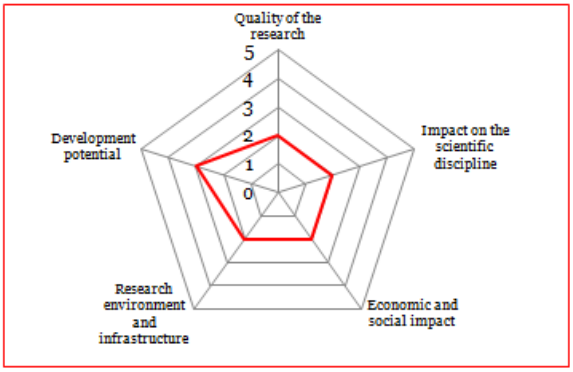
The Faculty of Veterinary Medicine in the Latvia University of Agriculture provides higher education in veterinary medicine. The number of academic personnel in 2012 was 16,5 and academic research personnel 16. Faculty has also 24 technical personnel. Sex ratio among researchers is rather equal, only among youngest group (PhD students?), females are over-represented (5:1). The Faculty teaches basic studies in veterinary medicine, and gives post graduate education in the discipline. The number of students in basic studies remained unclear, but number of PhD students is 16-19 with 2-3 doctoral degree completed per year. Faculty is divided into four sections: preclinical institute, clinical institute, institute of food and environmental hygiene, and veterinary hospital. Recently, Facilities have been improved and new veterinary hospital built with EU funding. In addition to education, faculty provides also professional services and conducts research.

The Faculty has several research directions, all supporting veterinary medicine: morpho-functional studies in ontogenesis and disease pathogenesis, epidemiology and prevention of infectious diseases, zoonoses, food hygiene and safety assessment, development and validation of novel diagnostic and treatment methods, wildlife ecology and conservation, herd health management and reproduction of productive animals. All research directions were described as equally important, and study themes were various and research groups focussing on one theme small (sometimes only one student working in a project).

Faculty is producing quite many articles per year, but big proportion of those is published in national journals (e.g., university series). Funding of the faculty is rather modest, compared with the other faculties in the same university, consist of governmental core funding, research funding from Latvian Council of Science, contracts funding (mainly from Ministry of Agriculture), and ESF and ERDF-funding. However, international funding and private funding are missing.

Figure 11 A_11 - Scores

Criteria	Scores
Quality of the research	2
Impact on the scientific discipline	2
Economic and social impact	2
Research environment and infrastructure	2
Development potential	3
OVERALL SCORE	**2**



Overall Score

Within Latvia, the Faculty of Veterinary Medicine has a clear and unique role in its research field. It has some international recognition, but with increased collaboration and partnerships in international projects it could become more serious player in the research field of veterinary medicine.

Quality of Research

The Faculty has research teams in six areas: Morpho-functional studies in ontogenesis and disease pathogenesis, Epidemiology and prevention of infectious diseases, zoonoses, Food hygiene and safety assessment, Development and validation of novel diagnostic and treatment methods, Wildlife ecology and conservation, and Herd health management and reproduction of productive animals. 97% of the studies are in the field of veterinary medicine, and 3% in zoology. The number of academic staff in the Faculty is 17, with 7 professors/associate professors. The Faculty has collaborative research projects with biologists in other faculties, Riga Technical University, Riga Stradins University, Institute of Food Safety, Animal Health and Environment "BIOR", and Research Institute of Biotechnology and Veterinary Medicine "SIGRA".

The number of publications produced by Faculty members is relatively high. Although most papers are published in national journals or in proceedings of scientific conferences, there are several in SCOPUS-level journals (e.g., some with rather high impact factors, e.g., Molecular Ecology).

The Faculty of Veterinary Medicine has some state budget funding and grants from the Latvian Council of Science. ESF funding has been an important means to finance PhD studies. The Faculty has also some ERDF projects and contract research. However, international funding (Framework projects etc.) is lacking.

Impact on the scientific discipline

The Faculty of Veterinary Medicine has undergraduate students and presently 13 PhD students with 1-6 completed doctoral degrees per year. Doctoral students conduct their thesis work either in the Faculty, supervised by Faculty members, or in other institutes (e.g., BIOR), which supervises the practical part of thesis work (sometimes participating in degree approval).

Research conducted in the Faculty of Veterinary Medicine is mainly published in national journals, but to some degree also in SCOPUS-level journals. Among the faculties of the Latvia University of Agriculture, it has the best publication record (most SCOPUS-level papers per researcher). The citation record of the Faculty is also good, suggesting impact of the research on the scientific discipline. The Faculty has a rather large number of joint publications with collaborators from countries such as Germany, USA, Russian Federation, United Kingdom, and Baltic and Scandinavian countries.

Current research projects, e.g. cell therapy for type 1 diabetes, a novel approach for targeted treatment of insulin dependency in dogs, might increase the impact of the Faculty in the future.

Faculty members have many national duties and awards. International contacts are also active, as shown by co-authored scientific articles and research visits (e.g., to Finland, USA and UK). However, international funding is missing.

The Faculty seems to utilise actively the international networks (BOVA, NOVA) that are available for students in the Latvia University of Agriculture.

Economic and social impact

The Faculty of Veterinary Medicine in the Latvia University of Agriculture is the only institution providing higher education in veterinary medicine, and thus has obvious importance to the Latvian society.

The staff of the Faculty has some board memberships in nationally important bodies. However, there are no editorships or other international duties.

The Faculty is using the LLU Technology and Knowledge Transfer Centre in contacting private and public partners. LLU has also signed agreements with various enterprises for research projects in veterinary medicine. However, private funding is very minor, and contract research is conducted only together the Ministry of Agriculture, not with companies.

The Faculty has increasing number of (domestic?) patents, suggesting increasing economic and social importance. Collaborative projects with "BIOR" (e.g., one on type 1 diabetes) may bring in new patents and have increased economic and social impact.

ERDF funding was received to improve veterinary hospital. The modern and well-equipped hospital is facilitating collaboration, e.g. with Riga Stradins University (medicine) and Swiss universities.

Research environment and infrastructure

The Faculty has a reasonable infrastructure for conducting studies. EU funding has been received to improve laboratory facilities and purchase new research equipment. The Faculty has good capacity to conduct preclinical studies on anatomy, morphofunction and histology. Furthermore, the clinical unit has good facilities. Close collaboration with other research institutes (e.g. "BIOR") enables analyses not feasible at the Faculty. The veterinary hospital is an excellent facility to conduct clinical research on veterinary medicine.

Faculty of Veterinary Medicine has some international contacts, although it could be internationally more active. Including BOVA-NOVE networks, and other international collaboration, the Faculty has connections with enterprises working in the fields of Medicines, Food Safety, and veterinary education.

All faculties in the Latvia University of Agriculture have a tendency to publish at least part of research in own university journals that may not be wise for PhD students that need to compete in international level for post doc positions. The research themes of the Faculty seem to be topical enough to attract more international collaboration.

The age structure of the faculty is quite even, and the gender ratio is healthy (50:50).

Development potential

The Faculty of Veterinary Medicine is conducting research in highly diverse themes, due to the fact that Faculty members are experts in different fields of veterinary medicine. The Faculty does not wish to prioritise any of the six research directions (Morpho-functional studies in ontogenesis and disease pathogenesis, Epidemiology and prevention of infectious diseases, zoonoses, Food hygiene and safety assessment, Development and validation of novel diagnostic and treatment methods, Wildlife ecology and conservation, and Herd health management and reproduction of productive animals), but sees them all equally important. Some of the research themes studied in the Faculty seem highly interesting, and, if pilot studies are promising, may attract more funding in the future.

Developing research in any of these themes further calls for collaboration, both national and international. Collaboration can be increased also within the University at the departmental level (sharing equipment and other facilities etc.). More intense collaboration with "BIOR" can be highly beneficial for the Faculty.

The Faculty has some international collaboration, and many students seem to be actively seeking for possibilities to study abroad during their PhD programme. The Faculty seems to have realised that recruiting personnel that have studied/worked abroad in good research teams would be an excellent way to increase international collaboration and improve impact and quality of research. Hopefully, the trend will continue in the future.

To become an even more serious international player, e.g. an institute leading EU projects etc., the Faculty of Veterinary Medicine would need more international

contacts, collaboration resulting in scientific publications in internationally recognised journals, and a strategy to seek international (framework) funding more eagerly.

Conclusions and recommendations

The Faculty of Veterinary Medicine is conducting research in highly diverse themes. The Faculty should prioritise some viable themes where research were conducted in larger coalitions, and with strong national and international contacts. National collaboration with suitable institutes, e.g., BIOR and medical research teams, should be increased.

Some students in the faculty have been using networking available in Latvian University of Agriculture (as shown by SAR), but these networks should be used even more. Furthermore, students should be encouraged to publish only in international, peer-reviewed journals.

Faculty has good facilities, e.g., veterinary hospital, that could be utilised to increase private funding and get more international contacts in research. To become an even more serious international player, the Faculty of Veterinary Medicine would need more viable international contacts, collaboration resulting in scientific publications in internationally recognised journals, and a strategy to seek international (framework) funding more eagerly.

11. A_12_Research Institute of Agricultural Machinery

Name of the institution	Research Institute of Agricultural Machinery
Name of university	Latvia University of Agriculture
Type of institution	HEI /SI

The strategic goal of the Research Institute of Agricultural Machinery is to create a research centre of national and international importance for the technologies of renewable energy resources and field crop cultivation.

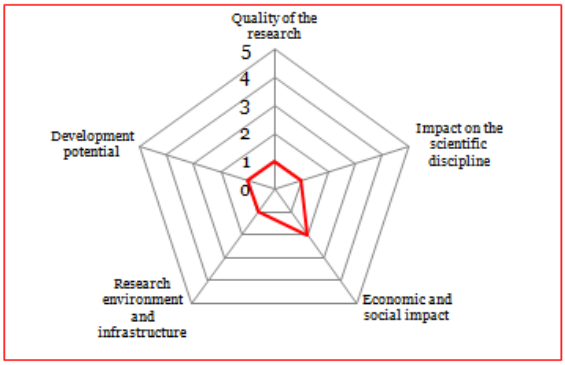
The Institute has some unique characteristics within Latvia; its main scientific competitors are the Certification Centre for Agricultural Machinery and the Technical Faculty of the Latvia University of Agriculture (neither assessed by this Panel).

Research is sub-divided more or less equally between Renewable Energy (30%), Agricultural Machinery (30%), and Bioethanol (40%), although the five "best" ; the first and third of these areas represent close attention to recent policy pressures.

The Institute reported 11 researcher FTEs (apparently mostly male), and a funding rate per researcher, at 119,000 LVL per researcher for the period 2006-2011, which is rather low for an applied-science research unit..

Figure 12 A_12 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	2
Research environment and infrastructure	1
Development potential	1
OVERALL SCORE	**1**



Overall Score

Overall, this Institute is struggling with low levels of funding – state, contract and commercial – and a number of other disadvantages, including aging staff and poor facilities. It is clearly striving to survive, but both current and potential performance is disappointing.

Quality of Research

The Institute performs in many research areas: the use of renewable energy, the transformation of solar energy into electric and thermal energy, heat recuperation in piggeries, utilisation of biomass for the production of biogas and electric energy, bioethanol dehydration technology, then investigation in terramechanics, agricultural

technological processes and machines, mathematical modelling, ecological conformity of machines, economy of energy resources in field crop cultivation, possibilities and efficiency of "precision agriculture", harvesting and storage technologies for grains, potato biological growing technologies, growing and harvesting technologies for berries, soil preparation technologies, optimal tractor aggregates and so on.

The research related to the transformation of solar energy into electric and thermal energy as well as bioethanol dehydration technology appears rather isolated/closed, without data exchange with international workers in the same research field.

However, perhaps because of this breadth, the quality of research cannot be said to be "international", and indeed its research "contains new scientific discoveries only sporadically".

It should be added that senior Institute personnel work also at the university.

Impact on the scientific discipline

The rate of outputs (publications) for the period 2006-2011 is satisfactory at 18 per researcher (Panel average 13) but these outputs are mostly in conference proceedings and special issues of Agronomic Research (a largely 3-country Baltic journal), and there is only one co-author country (Poland). Moreover, the rate of self-citation, at 79%, is very high (Panel average 23%).

The Institute has few postgraduates; this is a major negative feature.

The Institute cooperates with scientific institutions nationally as well as in foreign countries (mostly Nordic and Baltic, particularly Poland and Ukraine) in both research and educational fields. It organises some national as well as international seminars and conferences. Its leading researchers are included in different national committees and scientific advisory boards, mainly at the governmental, Academy and university level. These may have a positive influence on the development of the Institute's scientific disciplines, but evidence to this effect was not obvious to the Panel.

In summary, the Institute seems "predominantly geared towards the national scientific community".

Economic and social impact

There is cooperation in place with the local Stopini Municipality, with enterprises in the local region and beyond, and with farms. For example, the machines for growing and gathering cranberries, the machines and appliances for gathering flax, the improved design the soil tillage machine the algorithms for optimum fleet of machines for different farming conditions are already in use by several different companies. The technology of bioethanol dehydration has been developed with the aim of a 70% reduction of energy use in production. The Institute is the main scientific partner of the Ulbroka Pool of Sciences and Technologies, a kind of technology park, where 30 SMEs are said collaborate with the Institute. Despite this, the level of active cooperation with surrounding companies appears rather low. Important findings have been protected by Latvian and international patents, and the patenting culture seems well developed.

Despite these initiatives, and patents, the economic and social impact of the Institute's research appears limited, without much input from industrial partners/end users. Staff memberships of non-academic committees and organisations appear limited, and only one prize is recorded, for 2007.

In summary, the Institute produces "important research but a low level of interaction with non-academics".

Research environment and infrastructure

The age profile of the Institute's staff is heavily weighted towards the upper end, with 50% over 55 years of age, and few in the 35-55 cohorts.

Nearly half (45%) of the Institute's funding over the period 2006-2011 was state-sourced but this has fallen significantly (by two thirds) since 2008. The gap has been partly filled by EU funding ESF and ERDF in 2010-12 but this cannot continue indefinitely.

The Institute declares that it is only place in Latvia which has the unique facilities for the investigations of solar energy, bioethanol dehydration and physico-mechanical properties of soil. A computerised tribometric stand has been developed for the studies of the frictional resistance of materials.

However, the research equipment is neither new nor at a "sufficient level". However, the ratio of the PhD students included in research to the overall number of research staff is very law. There is also a problem with "considerable average age of the scientists".

Development potential

The strategic goal is clear, to become an internationally recognised research and training centre for the Master and PhD students in various research fields. The research focus of the Institute is commendably oriented to "new" problems such as renewable energy; this should constitute a platform for successful funding applications.

However, it seems that there are many obstacles to the achievement of such a reality. There is no significant direct participation in the realization of the EU-financed projects, and the Institute is not widely recognised as a potential partner for such projects. Being located rather far away from the University (and outside Riga), there is a problem of physical access, and this may affect the attraction of students to do develop MSc or PhD thesis at the Institute. The salaries are rather low, another obstacle to attracting talented young researchers.

In summary, the Panel concluded that "the institution has to work hard to establish itself as internationally notable in its discipline within the foreseeable future".

Conclusions and recommendations

The Institute is a small one, and has rightly focussed on a few lines of research, most of which are in innovative fields such as solar energy. However, it cannot be escaped that the Institute has inadequate equipment and staff to carry out much high-quality research. It should be considered whether attempts to carry out research in these areas, which are under intense study in many other countries, is a good use of public funds and scientific expertise in Latvia, especially if distributed amongst a number of institutions.

The Panel does not see a viable future for this Institute as an internationally significant research institution, and suggests that it be closed or merged, with relevant staff and equipment transferred to LUA at Jelgava or another location where they can be effectively used. If this recommendation is not followed, major revision of research strategy and improved contacts are needed.

12. A_13_Research Institute of Biotechnology and Veterinary Medicine „Sigra"

Name of the institution	Research Institute of Biotechnology and Veterinary Medicine „Sigra"
Name of university	Agency of Latvia University of Agriculture
Type of institution	HEI/SI

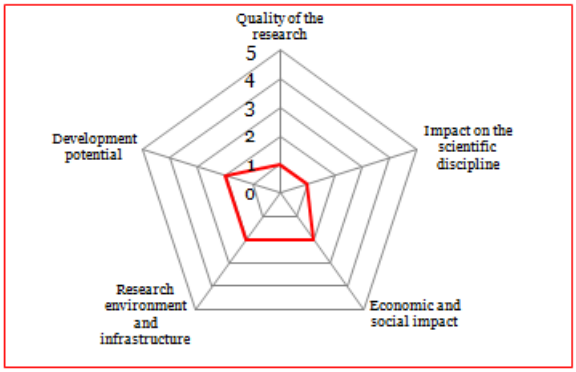
"Sigra" is one of the three agencies of the Latvia University of Agriculture. It performs research across: agricultural science (40%), food science (30 %), and veterinary medicine (30%). It is active in national as well as international research projects. The cooperation with scientific institutions at the national level is well developed.

Most of the researchers in this agency are older than 55 years (55 %), however, in the recent year the number of researchers who are 36-45 years old doubled (from 15% to 36 %). More than 2/3 of the FFT researchers are female.

In the period 2006-2011 the funding was coming predominantly from the public/state budget (62.1%), private sector (only around 0.7%), 14.5% from the ESF/ERAF funding, 20.9% from the international projects, and 1.8% from the other sources. The funding rate per researcher, 273,000 LVL per researcher for the period 2006-2011, is rather high in comparison with the majority of the evaluated institutions.

Figure 13 A_13 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	2
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall Score

"Sigra" has well equipped laboratories, developed international networks, and may play important role at the national level and in some extend at international as well. However, the long-term strategic and financial resource planning, including the human resource development strategy is missing. From the other side the Institute has "high average number of ageing scientists" and problem to attract young talented scientists to develop the career in its own environment. Collaboration (national with faculties and BIOR, international), exchange of the researchers, visits of international experts are essential for a unit of this size.

Quality of Research

The institute "Sigra" performs across the wide range of research fields: metabolic processes in animal body, production of safe, quality and healthy animal products, production of innovative poultry products with new feed ingredients, development of new feed components for the pig-breading industry, milk chemistry, dynamics of formation of active substances during cheese maturation process, cheese quality and functionality, use of modern immunohistochemical methods for diagnosing infectious animal diseases. There is also some market oriented research towards the farmers. The quantity of the published research results is huge, but the majority of it is published in the national and international conference and university/faculty proceedings and national journals. There are several original papers published in international scientific journals with low Impact Factors. Some findings are protected by patents.

Overall the Institute is a Poor National Player. Research by the Institute contains new scientific discoveries only sporadically. The profile of the research by the Institute is expressly national, i.e. the Institute is not involved in international debates of the scientific community. It focuses on introducing international research trends in Latvia.

Impact on the scientific discipline

The impact on the discipline is low when measured by publications. The numbers of publications and citations of these publications are low. The Institute does take part in international consortia, but many of these appear not to result in documented output in terms of publications. There are only two publications with international co-authors in the period 2006-2011, from only one foreign country (Lithuania). Impact in terms of education is also low, with only 3 PhD thesis finalised in period 2006-2011. The small scale of the institute with total research personnel of 11.5 FTE makes it very difficult to have an international impact.

The Institute researchers are involved in national, as well international projects (1 FP6 and 1 FP7). The cooperation with foreign institutions has been realised mainly through FP projects. If this is excluded, the cooperation till 2012 exists only with few counties (UK, Czech Republic, and Estonia). In 2012 it is expanded to the institutions from Italy, Spain, Lithuania, and Germany. There is no recorded participation in COST and EUREKA projects. There is no exchange of the researchers with the foreign institutions. The institute organises numerous national as well international conferences and workshops. There are a lot of contacts with the companies but mainly on the service basis, not real cooperation.

Overall, "Sigra" appeared a Poor National Player. The publishing strategy and scientific impact of the institution are predominantly geared towards the national scientific community in terms of research impact.

Economic and social impact

In the period of 2006-2011, four projects were implemented in the companies. In 2012 the cooperation continues with one farm. There is no creation of spin-off companies. The Institute is doing a lot of services for the enterprises and farms related to chemical and microbiological analysis, consultations, recommendations. With some of them cooperation is realised in the framework of the market-oriented and international research projects.

"Sigra" has many contacts with national and international industry has but only very limited proportion of contract funding.

Overall research of the institution is important for society. The research activities of the institution are characterised by a low level of interaction with non-academics (i.e. business, policy-makers, and the public).

Research environment and infrastructure

The Institute has rather strong international networking as shown by projects FP7 BALTFOODQUAL and FP6 SAFEFOODNET. International funding has been rather

large compared to the size of the Institute. For example, FP7 RegPot project (BALTFOODQUAL) brought 1.1m EUR (in total) to develop the RTD potential, quality of the research, human capacity, and to upgrade the Institute into so called "centre of excellence" for further successful cooperation at European level. However the research environment would benefit from more national interaction with other institutes (e.g. "BIOR") as well.

Nowadays, there are several well equipped laboratories, such as laboratory for feed preparations, laboratory of microbiology, and laboratory of biochemistry. It looks like rather good research environment comparable with the environment of similar institutions worldwide. Material base is good. However, there is no the long-term strategic and financial resource planning, including the human resource development strategy, as well as the goal orientation of the research. The research focus and goal is missing.

Development potential

Contrary to the statement from the SAR that the institute "Sigra" is today one of the leading research institutes in the Baltic region and only research institute in Latvia which is covering different fields of veterinary medicine, biology, agriculture, food science, …, in the present circumstances the Institute's development potential is rather low. It is obvious from the fact that the number of enrolled PhD students in 2011 and 1012 is zero. From the other side the Institute has "high average number of ageing scientists" and problem to attract young talented scientists to develop the career in its own environment.

The Institute failed in several FP7 applications in the last few years.

The strategy for the forthcoming period looks like a broad list of wishes. In the period of 2009-2020 the Institute is planning to involve young researchers, students, master and doctoral students in implementation of national, international and market oriented projects, and so on, but the way how it will be managed is not presented.

Overall "Sigra" can become an important national player when research is being conducted in more ambitious manner (high quality publications in international collaborative projects) and/or more emphasis is being put to R&D collaboration. Collaboration is essential for a unit of this size (national with faculties and BIOR, international). The institution is capable of remaining a visible local player in its area of research, which from time to time can be expected to contribute to the activities of the international scientific community.

Conclusions and recommendations

"Sigra" is rather small, but well equipped, research unit. It performs research in many different areas and has some international connections. However the strategic planning, the research focus, and the human capacity development are missing. This means that there is a room for huge improvement and potential for consolidation of research institutions in order to reach critical mass in particular research fields. Therefore, the Panel recommends merging "Sigra" (which is aiming to cover all different disciplines without real strategy, focusing, human capacity and financial means) with "Bior" (which is producing very good science in several fields and has very well developed international collaboration).

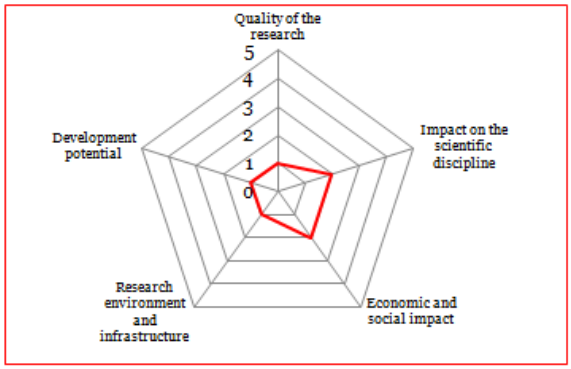
13. A_14_Research Institute of Agriculture

Name of the institution	Research Institute of Agriculture
Name of university	Agency of Latvia University of Agriculture
Type of institution	HEI / SI

This is a small research unit that focuses on crop production. It describes its research activities as biology/biotechnology, heat and power energetics, forestry ecology and silviculture, and environmental science or engineering. The Institute carries out an intensive breeding programme of grasses (e.g., through interspecific hybridisation) and forage legumes (e.g., through polyploidisation). The Institution also carries out the DUS (distinction, uniformity and stability) and VCU (value for cultivation and use) testing. The Institution is rather small with 12 researchers and 3 assistants. Given this limited number of research staff, the activities are rather diverse. Among the "leading researchers" there is a gender balance (three female, four male). "Researchers" and "assistants", however, are all female.

Figure 14 A_14 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	2
Economic and social impact	2
Research environment and infrastructure	1
Development potential	1
OVERALL SCORE	**1**



Overall Score

Given the low scores for quality of the research, research environment and infrastructure, and development potential, it seems wise to save the valuable parts of the research programme and bring them under the umbrella of another institution.

Quality of Research

The Institute focuses on breeding perennial grasses for forage, development of management models for their cultivation, crop rotation and fertilisation. The Institute also tests cultivar performance for other institutions or companies under contract. The institute has some interesting and original approaches in its research programme. For example, the energy analyses based on the long-term field experiments were certainly interesting, also in an international perspective.

However, very little research work is published in international high-quality journals. All submitted papers are in national or low profile journals. Scopus number of publications relatively low with also very few citations per publication.

Much of the work is also linked to variety comparisons or dose-response trials, very relevant and useful work but not the type of work that will create international standing or trigger international exposure and collaboration. Much of the internationally published work is also written in Russian, a language read by very few outside Russia or Eastern Europe and, therefore, not much cited. Even the PhD work is related to dose-response type of research.

Relatively high number of PhD students, with at least one completed each year.

Funding base is small; and funding per researcher among the lowest. Based on low publication rate, low impact of publications and low funding the score is 1.

Impact on the scientific discipline

Impact measured by Scopus publications and citations is very low, as described above.

Beyond publications the Institute has evaluated a large number of cultivars for other institutions. The Institute has only a small number of international exchanges. However, the Panel could not find any evidence of ambition to change discipline beyond developing new varieties for use in Latvia.

Nevertheless, some approaches are rather special and unique (for example, long-term experiments are becoming a rarity nowadays) and, therefore, have the potential to be important for the development of the scientific discipline; other elements are simply traditional, or even old-fashioned. The latter are not superfluous or poor in quality; they simply contribute more to filling in the gaps or the details and are not exploring new territory.

The balance of the assessments above is that despite the low quality of the research, the impact on the scientific discipline of certain parts might still be present to some extent.

Economic and social impact

Although the Panel is not very positive about the quality of the output of the entire programme and about the impact of parts of the research programme it is convinced that certain elements of the on-going programme and especially the part on grass breeding, have significant value. It would be a shame if the grass breeding programme would be stopped as it has potential and is unique in the world, where grassland science for agricultural production is not often well developed at research institutes and grass breeding is mainly a commercial activity.

Moreover, the Institute has performed field tests for a large number of government organisations and companies. The number of PhD students is also relatively high indicating that the Institute has an important contribution to teaching. Aiming to improve forage grasses for use in Latvia with reduced fertiliser use could be of high strategic value.

However, given the small budget and the purely national scope, the impact is probably relatively small.

Research environment and infrastructure

The Institute has extensive areas of field sites for cultivar testing. In addition, it has laboratories for carrying out analytical tests, but the amount of equipment and the complexity of the tests carried out are not described. The laboratories are described as outdated and not matching their present requirements.

So, although the human resources seem to be reasonable, the self-assessment provides some insight in an infrastructure which is no longer suitable to carry out high quality research. This is a major threat. The SWOT analysis also gave a more pessimistic picture of the current situation than observed in other institutions. This suggests that there is less resilience in the Institute or suggests that is has been hit harder by budget cuts than some of the other institutions.

The laboratory base is, therefore, likely to be that of a poor national player, although the field sites might be of higher significance. Based on outdated facilities the Panel rates the research environment and infrastructure as 1.

Development potential

The Institute works in a narrow research area of breeding and testing perennial grasses. No molecular analysis is described and laboratory base is poor. Publication record is poor with little international recognition based on citations. Also the funding base is low.

It seems that a major investment in this institution is needed to save it from becoming obsolete or redundant. The work being done certainly justifies continuation of parts of the programme. It might be the best solution to save parts of the programme by incorporating them usefully into other institutes.

Conclusions and recommendations

The quality of the research, the research environment and infrastructure and the development potential all received low scores from the reviewers. Given the fact that there is some national scientific, economic and social impact of the research it is advised to maintain the most promising and unique parts of the research programme (such as the grass breeding or the long-term experiments that might have international value if properly analysed) However, the Panel also recommends to include this Institution in a process of rationalisation of the breeding research and activities in Latvia and to include it in a rationalisation process to improve the efficiency of research sites, together with other institutions (i.e. A_01, A_05, A_06, and A_07).

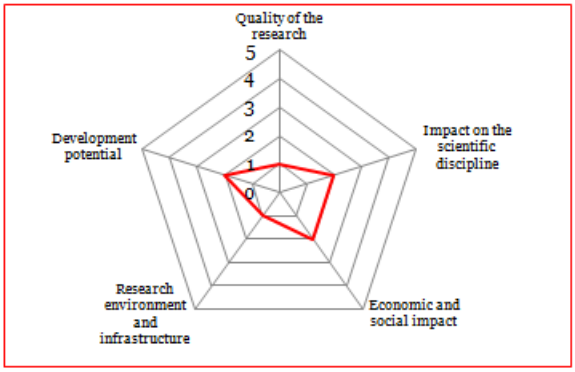
14. A_15_Agriculture Science Centre of Latgale

Name of the institution	Agriculture Science Centre of Latgale
Name of university	N/A
Type of institution	SI

The Agriculture Science Centre of Latgale is a private research centre and limited company. It is located in eastern Latvia, where it appears to have a regional importance in the agricultural sector. The Centre carries out applied studies to improve field crop cultivation with a focus on agrotechnical issues as well as maintenance of genetic resources, particularly of hemp and oil flax but there is also some work on cereals. The laboratory building including the equipment is owned by the Centre, whereas the offices, the space and facilities for agricultural machinery and facilities for storing and drying samples of field tests are rented under long-term arrangements. Similarly, 30 hectares of agricultural land are rented for field testing under a long-term lease. At present, there are 16 employees at the centre, including 14 researchers of whom 6 have doctoral degrees. The organisation has collaborations to carry out field testing with large multinational breeding and chemical companies. In addition they have established several national collaborations, particularly with Universities including the Biology and Chemistry faculties of the University of Latvia and with Riga Technical University. Nevertheless, levels of external funding are low, and the organisation had a very low level of funding per researcher.

Figure 15 A_15 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	2
Economic and social impact	2
Research environment and infrastructure	1
Development potential	2
OVERALL SCORE	**2**



Overall Score

The Centre is a private company with a small funding base and a reliance on rented facilities. Nevertheless, they have a unique subject area in fibre crops, established links with large multinational companies and good societal connections in their region of Latvia. Generally their activities are directed to practical agronomic goals that could be profitable rather than research. Nevertheless, the final score is largely based on their societal and economic significance as well as their research focus on a unique area.

Quality of Research

The research of the Centre aims to improve technologies for cultivating field crops with a large focus on hemp, flax and fibre crops. This work is relevant to industry, and significant in the context of the international research community, occupying a specialised niche where the Centre can be competitive and can engage in international collaborations. The Centre also works on cereals such as winter wheat and barley. It performs tests to measure productivity of various crops under different field conditions.

This is a small institution with hardly any output in international journals of high quality. The scientific output is very descriptive. All submitted papers appear to be meeting reports, national journals or internal documents. The number of Scopus publications is very low, well below 10 over the period 2006-2011, and there is an average of only approximately 1 citation per publication. The funding base of the Centre was also very low, among the lowest of all institutions assessed. Very little external funding had been obtained, and notably no international funding. The Centre had the lowest funding rate per researcher of all institutions assessed. The score given is based on low publication rate, low impact of publications and low funding. Overall, based on research quality, the Centre was assessed to be a poor national player.

Impact on the scientific discipline

The work of the Centre is too descriptive and applied to be of high importance for the development of the scientific discipline. Impact measured by Scopus publications and citations is very low, as described above. The Centre hosts annual visits by foreign visitors such as scientists, selection experts and other groups to examine the test fields and methods as well as the technologies of research. Such visits have a national impact on the discipline. One paper with international (French) co-authors indicates some international reputation, as does the co-operation with international companies (see below). However, no evidence of ambition to advance the discipline was found beyond developing new varieties for use in Latvia. The Centre works in a rather narrow area of research in fibre crops, although this provides a distinctive aspect. Overall, the institution was assessed as a satisfactory national player with some international connections.

Economic and social impact

The Centre performs field tests for government organisations and companies. The educational contribution is low, as there have been only approximately 3 PhD students during the period; however apprenticeships at a lower level are also provided. The Centre aims to improve hemp and fibre crops, which seems a narrow area of commercial impact, but there is also some cereal work. The Centre has a very small budget based almost entirely on state funding. It also has a range of cooperation partners including internationally recognised industry leaders, such as Baltic Agro (Kemira), BASF, Swalof Weibul, Syngenta, Bayer, Monsanto, Yara, Timac Agro, which suggests some commercial potential. Considerable improvements in the development of practical agriculture in the Eastern part of Latvia may be due at least in part to the activities of the Centre. Thus the Centre is well embedded in societal and cultural environment which is conducive to the uptake of results from its research activities. The Institute thus has a good level of interaction with external institutions.

Research environment and infrastructure

The Centre has field sites of 30 ha and occupies laboratory and office space. Much of the facilities are rented on long-term leases. No detailed description of laboratory facilities are given, but statements are made concerning a requirement for modernisation, suggesting that the space available is not optimal. The Centre is a limited company, so that the research strategy is based on practical production of products and contracts available. Financial pressures and doubts over the long-term financial viability of Centre will restrict research opportunities. In terms of research environment and compared to other larger institutes, the Centre is a poor national player.

Development potential

Based on the relatively narrow area of expertise, very small output in Scopus publications, small funding base relying almost entirely on core funding, and limited infrastructure based on rental agreements, the potential for the Centre to develop into an internationally competitive organisation is limited. Nevertheless, there is a better recent tradition in scientific research on the agronomy and physiology of fibre crops in Eastern Europe than in Western Europe, and this may provide a unique opportunity for development. There is a link with the EU programme "MultiHemp" which is a sequel to several earlier EU programmes on hemp. If properly linked to the international developments in fibre crops and if the institution can make use of the benefit of standing in a long tradition of good research, there is potential for development. Based on these positive considerations a score of 2 was given.

Conclusions and recommendations

The Centre is a private company, and therefore its research activities will be determined by the financial opportunities and funds available. Nevertheless, as for other breeding research organisations in Latvia, there may be opportunities for rationalisation with other institutes such as Stende and Priekuli, which also work with cereals. Further work to reduce overlap in scientific strategy as well as facilities available on each site might help each institute to prosper. Improved interactions among these institutes should also allow more efficient dissemination of new technologies and increased uptake of emerging opportunities such as genome information and exploitation of molecular markers, which do not appear to be currently used by the centre.

15. A_16_Forest and Wood Products Scientific Research Centre

Name of the institution	Forest and Wood Products Scientific Research Centre
Name of university	Forest and Wood Products Scientific Research Institute Ltd. (MEKA)
Type of institution	SI

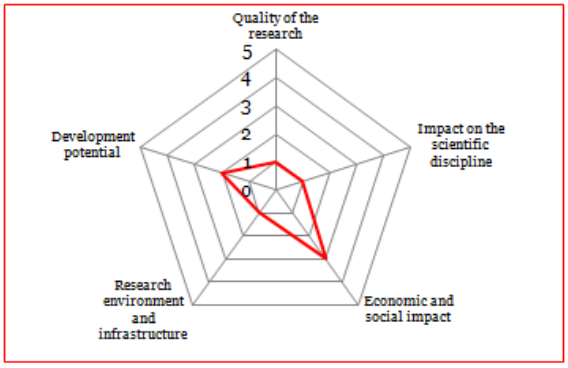
Forest and Wood Products Scientific Research Centre is part of Forest and Wood Products Scientific Research Institute Ltd. (MEKA) which is private research institution established in 2004 by Latvian Forest Industry, JSC "Latvian State Forests", and Latvia University of Agriculture.

The Centre is providing different kind of services in the field of testing and product development as its major activity (some of the testing apparatus are unique not only in Latvia, but also in the Baltic region). Testing Laboratory is accredited and notified body. In some extent the Centre is performing research and professional education as well. The research is oriented towards practical applications, and it is strongly connected with the abovementioned services.

The Centre has 13 researchers in total (5 lead researchers and 8 researchers) that are divided in 6 research groups – means the groups are rather small ones: Fire resistance, reaction to fire (2 lead researchers), Physical and mechanical properties (1 lead researcher and 1 researcher), Furniture and surface properties (1 researcher), Solid biofuels (2 researchers), Forest economy and sustainability (1 lead researcher and 2 researcher), Forest and wood products sustainability (1 lead researcher and 2 researcher). More than 50% of the research staff are 25-35 years old, but still 30% of the staff is older than 55. The funding is coming predominantly from the private sector (around 63% for the period 2006-2012), while 35% from the ESF/ERAF funding, 1.4% from the international projects, and only 0.6% from the public/state budget funding. The funding rate per researcher, 289,000 LVL per researcher for the period 2006-2011, is rather high in comparison with the majority of the evaluated institutions.

Figure 16 A_16 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	3
Research environment and infrastructure	1
Development potential	2
OVERALL SCORE	**1**



Overall Score

The Centre is too small, too focussed on material testing and other services and not able to conduct more strategic research. It is important for the society, performing a lot for and with end users but does not have enough capacity to develop impact on the field. Impact comes from the contract research. Equipment is good but for testing, not research. However, it has the potential to become strong national player with some international recognition.

Quality of Research

The main characteristics of the Centre are: small number of researchers, small number of articles, small number of monographs and books, very intensive cooperation with enterprises focused on testing of wood and wood based products, limited funds for research outside the contract research. They perform applied research closely connected with the services they offer to the companies. The major research fields are wood material and product properties, wood material properties improvement by modification (thermal treatment, densification), glued joints and laminations for structures and components, influence of temperature on glued joints and strength properties, light weight cellular wood material application for structural purposes, new product development, studies of wood material fire behaviour, improvement of wood material fire safety, fire safety of different material combinations and constructions, quality parameters of solid biomass products and influencing factors, of energy wood flows, wood biomass availability assessment, modelling and monitoring of the economic situation within the sector.

They publish mostly in the national journals and conference proceedings, with a few exceptions.

They are predominantly doing services/testing for the companies. The research is related to the practical applications. The quality of the preformed research is not internationally recognised.

Impact on the scientific discipline

Number of total research outputs for the period 2006-2011 is low as well as the number of the research outputs per researcher for the same period. Number of the original articles published in anonymously refereed scientific journals cited in SCOPUS base is only 3 for the period 2006-2011, and number of articles in the refereed scientific edited journals and conference proceedings only 9 for the same period. The rate of outputs (publications) per researcher for the mentioned period is extremely low (only 0.4 in the case of SCOPUS outputs – average for Panel A is 2 SCOUPS outputs per researcher). This element is not improved in 2012. Concerning the international co-authorship, there is only one publication of that kind, and only one co-author country (Finland).

The Centre has only few PhD students. The time frame for the completion of the PhD thesis is rather long. These are some of the major negative features.

The Centre has rather small role in the research community, and it is included dominantly in the realisation of national research and development (mostly development) projects. The international network extends to several countries (France, Lithuania, Germany, Poland, Spain and Sweden).

Economic and social impact

The Centre has been established with the aim to implement education, research, and industry integration and thereby to facilitate the development of forest sector in order to become the most competitive and dynamic, knowledge-based branch in Latvia, as well as competently and responsibly deal with the issues of wood and timber products development, and improvement of informal vocational education. The basic idea was that this integration model provides support for the industry to develop innovative products and technologies.

The Centre has high economic and social impact. It strongly cooperates with the industry/end users through many different projects. The major fields of competence in that respect are mechanical and physical properties of wood-based materials and wood based products, then reaction to fire performance of wood-based materials, furniture and surface quality, and solid biofuel quality. The Institute is doing a lot of development and evaluation studies, such as development of integrated system of environmental and forestry economic accounts in Latvia, development of new and improved synthetic and natural materials by chemical engineering methods and technologists, evaluation of the impact of vehicle combinations for round wood transportation on road infrastructure, development of innovative self-supporting panels and construction elements made of cellular wood-based materials, and so on. These development studies potentially may have the high economic impact as well.

In addition to that the Centre is organising the training and support in the area of professional education.

Research environment and infrastructure

The Centre is small, totally dependent on contract funding and has only limited international collaboration. It declares that its research strategy for the coming years is designed to provide greater visibility, while promoting international cooperation. Also to extend the scope if the research activities and to buy research equipment as well as to renew the existing technical capacity. However, there is no clear financial resource planning to facilitate it, including the human resource development strategy.

The existing laboratories for mechanical testing of wood based materials and products, material reaction to fire testing, glued laminated material development sector, hydrothermal processing sector, furniture testing sector and surface finishes testing sector are equipped very well (some of the equipment units are unique in the region), but their basic purpose is provide the testing, characterisation and in some extent development studies to the end users, and not research itself.

Development potential

Presently the institution is a bit too small, too concentrated on material testing, deferent services providing and development work, and not able to conduct more strategic studies. Good international contacts together with suitable international funding and recruitment of internationally potential researchers could make the Centre more successful also internationally.

The Centre has the ambitious plans for the further development: to become one of the most effective forest and wood sector competence centre's in the Baltics where competent and motivated employees offer services of product research, development and testing, and professional training, to take a part in Wood Wisdom Era Net project, in the COST Actions, and also to participate as a partner in the coming Horizon 2020 programme.

From the other side some building reconstruction for the future research and other Centre’s activities is already in place.

To conclude: in this respect the Institute has a potential to become a strong national player. The Centre is capable of being (or remaining) a visible local player in its area of research, which from time to time can be expected to contribute to the activities of the international scientific community.

Conclusions and recommendations

The Centre is a small one and mainly focussed on service providing to the end users. Infrastructure environment does not seem to be related to research, but to testing and other services for the industry partners. To be able to develop the impact on the field it is necessary to implement its research strategy, to further improve the human resources, to involve competent and motivated employees capable to perform research and development in addition to testing, to include more PhD students in the research issues,

and develop the international contacts and collaboration. From the other side, as Centre has broad experience in offering and performing different services and testing for end users, it may be desirable partner in forthcoming Horizon 2020, which is focused in many aspects on innovation, application and knowledge transfer to the industry partners. The Panel recommends more networking and research activities at the international level, through different international programmes (COST, EUREKA, Horizon 2020).

16. A_17_Latvian Academy of Agricultural and Forestry Sciences

Name of the institution	Latvian Academy of Agricultural and Forestry Sciences
Name of university	N/A
Type of institution	Scientific Institution

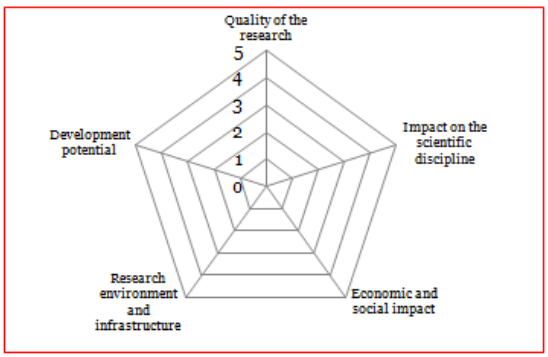
The Latvian Academy of Agricultural and Forestry Sciences (LAAFS) is a non-governmental voluntary non-profit organisation bringing together scientists (115 full members at 1 October 2011) from the fields of agriculture, veterinary medicine, food science, engineering sciences, forestry and wood science. All members work principally in other institutions; the Academy itself employs only a part-time scientific secretary, who has nevertheless herself produced some (respectable) scientific papers, in the field of labour economics.

The work of the Academy is reported as: discussion (50%), research (20%), and publications/conferences (30%). It thus appears to operate more as a scientific society than a research institution. Its duties include arranging scientific meetings, seeking funding for improving education in Latvia, preparing foresight studies, writing proposals for international agencies, and helping ministries in decision-making, and it is a member in several international bodies.

However, the Academy lacks research personnel and funding (except for minor contract projects), and has no research agenda of its own. In the light of the above, the Panel concluded that the LAAFS does not fall into the category of a research-active institution, and declined to provide scores for the five criteria, or overall. However, in view of its position within the agricultural research infrastructure in Latvia, some recommendations are provided in a final section below.

Figure 17 A_17 - Scores

Criteria	Scores
Quality of the research	0
Impact on the scientific discipline	0
Economic and social impact	0
Research environment and infrastructure	0
Development potential	0
OVERALL SCORE	**0**



Conclusions and recommendations

It is recommended that state funding for the LAAFS be confined to its provision of "public goods" which individual research institutions such as University faculties and state research institutes cannot easily supply, e.g. a forum for discussion – at occasional public meetings, or via reports written jointly by a small group of members – of national

issues relating to Agriculture, Forestry, Food, etc. It should not be involved in the approval of doctoral (or other) programmes and degrees, which should be entirely the responsibility of the relevant universities (subject to occasional quality reviews).

The Panel does not understand the need for both LAAFS and the Latvian Academy of Sciences Unit of Agricultural and Forestry Sciences (UAFS), and suggests merger of these two units.

17. A_18_Latvian Institute of Humic Substances

Name of the institution	Latvian Institute of Humic Substances
Name of university	N/A
Type of institution	Scientific Institution

The Latvian Institute of Humic Substances is small, private research unit. The Institute (Ltd) focuses on producing eco-friendly products, mainly fertilizers for a range of purposes such as lawns, fruit trees or crops. The Institute is described as a company established in 2009, and registered as a scientific establishment in 2011.

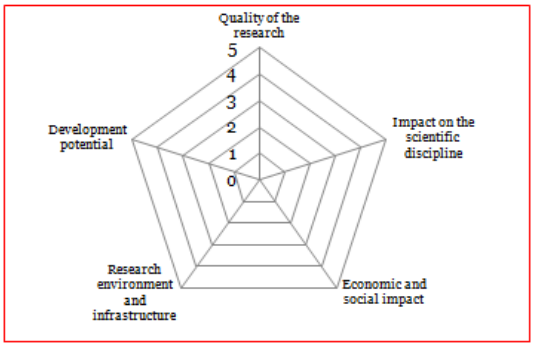
According to SAR 2006-2011, the Institute has no state funding but is totally dependent on contract and private funding. The Institute did not submit any publications, and only four outputs and one Scopus publication were mentioned in documentation; citation records were also very low. Moreover, the Institute does not have any PhD students working in the projects.

The activities described in the SAR do not involve research but rather making products from extractions of living material without clearly outlined hypotheses.

In the light of the above, the Panel concluded that although the Institute of Humic Substances is important for development and production of eco-friendly products, it does not fall into the category of a research-active institution.

Figure 18 A_18 - Scores

Criteria	Scores
Quality of the research	0
Impact on the scientific discipline	0
Economic and social impact	0
Research environment and infrastructure	0
Development potential	0
OVERALL SCORE	0



Conclusions and recommendations

The activities in the institute seem to serve well the needs of the company. Thus, there may not be a need to change the strategy. However, if unit wishes to develop into a research unit conducting solid basic or applied research, institute should be much bigger with many more researchers, more national and international contacts and true collaboration between them. Furthermore, much of the practical research should be conducted in other facilities since laboratory facilities at the institute include mainly very basic equipment.

18. A_19_Latvian Plant Protection Research Centre

Name of the institution	Latvian Plant Protection Research Centre
Name of university	N/A
Type of institution	SI

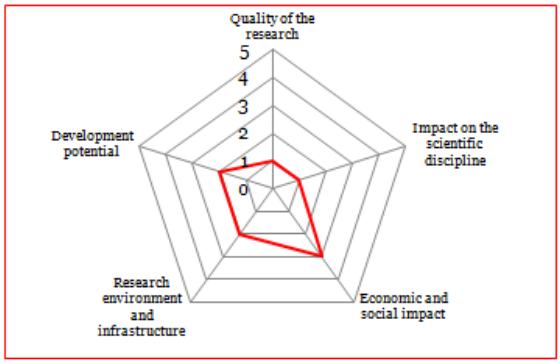
The Latvian Plant Protection Research Centre is an old (over 100 years), private, relatively small research unit. In 2010, there were 15 researchers from which four are doctoral students. The personnel of the Centre consists of rather young researchers, the major age class being 25-35. All researchers are females.

According to the SAR, it concentrates its efforts on plant protection on the prevalence, development and potential noxiousness of organisms harmful to cultivated plants; develops technologies for monitoring and control of the harmful organisms; tests new plant protection technologies in Latvia's conditions and performs research studies on operational efficiency and selectivity of novel active ingredients and their combinations as well as organic plant protection products under agro-climatic conditions of Latvia. It has four research groups on 1) entomology, 2) weed research, 3) field crop pathology and 4) arable crop pathology. According to information obtained from the Centre, it has a close, developmental cooperation with other national scientific institutions specialized on fruits (State Institute of Fruit Growing, Pure Horticultural Research Centre), field crops (State Priekuli Plant Breeding Institute, State Stende Cereals Breeding Institute) and with Latvian University of Agriculture in the field of plant protection. International collaboration is weaker with a few viable contacts.

Latvian Plant Protection Research Centre has funding both from ministries and from private companies, including international groups and resellers trading in chemicals.

Figure 19 A_19 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	3
Research environment and infrastructure	2
Development potential	2
OVERALL SCORE	**2**



Overall Score

The Latvian Plant Protection Research Centre produces important information for its clients and has strong societal and economic importance to the country. However, the scientific community is rather small and isolated, and its research is concentrated in highly applied topics and surveys.

Quality of Research

The Latvian Plant Protection Research Centre studies various harmful organisms of different crop species, e.g. disease resistance of different cereal genotypes, diseases and pest of fruit-bearing plants, eco-friendly plant protection with conifer extracts, and testing new active fungicides and pesticides.

Research is driven by funding sources since contract research is the major source of funding. The major customer is the Ministry of Agriculture and funding is divided into small, highly applied projects instead of projects in basic research. Due to the funding structure, most studies seem to be surveys with local interests. The nature of the research makes the research output in scientific papers relatively low, and number of SCOPUS papers very low (one in 2006-2011, three in 2012). However, applied research needs to meet the same high-quality standards as fundamental research but is more routine in terms of conceptualisation and design of experiments and interpretation of results.

The Centre covers various pests and diseases of large number of crop species which makes it more difficult to focus the research and make more serious scientific contribution to any specific organism or pest-crop plant interaction.

International collaboration is very limited and international funding consist mainly from one ERAnet project (FP7, Core Organic II; Management of pests in organic strawberry and raspberry).

Impact on the scientific discipline

The Centre has a very low number of outputs per researcher (lower than the Panel A average) although funding per researcher is relatively high. Most publications are in conference proceedings or in lower-quality journals.

The Centre lacks international collaboration in producing scientific papers despite the nature of the discipline where collaboration would be highly beneficial (similarity of environment, diseases, pests and crop plants between neighbouring countries). Tighter national and international collaboration would enable deeper studies on specific research themes than the present, somewhat superficial, surveys in various problems, thus improving scientific quality of the research and answering better applied questions of customers (e.g. Latvian Ministry of Agriculture). Its relatively small size, together with large number of topics covered in the institution, also calls for tighter national and international collaboration in any specific theme.

The number of PhDs completed in 2006-2011 is also very low, suggesting that the national impact on the scientific discipline is not very high, either.

Economic and social impact

The Latvian Plant Protection Centre carries out surveys and applied research in the fields of agricultural science, especially crop cultivation and horticulture which are economically important in Latvia. Thus, the research is important for Latvian society and industry, as shown by funding structure (75% of the budget constitutes ERDF funding for research projects and contracts with industry). Highly applied research is accompanied by practical recommendations e.g. on the use of new substances and reduced doses of herbicides in weed control.

Researchers of the Centre are recognised experts in plant protection, as shown by honours awarded to them by the Latvian Ministry of Agriculture. Its long history in research on plant protection has made the Centre a nationally well-known expert unit in its own field and also among end-users (e.g. farmers, other professionals and administrators).

The Centre also plays an important role in public awareness and does so in a stimulating and positive way. In public awareness, the Centre has two main goals: education of society on issues related to plant protection, and training and informing farmers, representatives of agricultural cooperatives, advisors, students on harmful organisms

and their controlling methods in cultivated plantations. Latvian Plant Protection Research Centre is actively producing articles in popular science magazines and newspapers, organises educative field excursions and delivers frequently lectures for general audience.

However, the small size of the Centre, together with its limited international contacts, limits its potential to become a more important player for economic and social impact. New EU procedure for placing on the market of plant protection products foresees the efficiency evaluation of the latter within particular zones would allow more collaboration between countries of same environmental zone, for example in testing new substances.

Research environment and infrastructure

With respect to research environment and infrastructure of the institution, the Latvian Plant Protection Research Centre is a satisfactory national player with very strong dependency on contract funding.

For the type of research that is carried out in the Centre, it seems to be well equipped. It has basic laboratory facilities for crop-pathological and entomological research (microscopes, etc.), plant sample processing laboratory, equipment for field research, and office hardware and software. However, more detailed studies (e.g. molecular identification of pests and pathogens that is common practice other countries and also in Latvia e.g., in forest pathology by other national institutes) is feasible only in collaboration with other research units.

The age structure of the Centre is healthy, with some senior researchers (over 55) and strong proportion of researchers being under 35 years old. The number of PhD students is yet surprisingly small, considering that many among the research staff do not have a doctoral degree. The gender ratio, however, is highly skewed, with only females among research staff.

The Centre is a private research unit in a specialised field (plant protection) of many crop species. In many other countries, such activities are being combined with research on other aspects of crops, e.g. agricultural research institutions. Specialisation and isolation from other institutes studying same crop species (e.g. cereals, berries, fruit trees), together with administrative and physical isolation from universities, make the research unit highly dependent on strong and healthy national and international collaboration that presently is not as strong as it should be.

Development potential

The Centre has been successful in getting funding from ministries and companies, and will probably continue this in the future, too. It could grow internationally more important in the field of testing new substances. Within the EU, collaboration between neighbouring countries is becoming more important in the field of plant protection. This could open new doors for applied research and surveys increasing social and economic impact of the institution. However, that would demand more lively contacts between similar bodies in neighbouring countries and active collaboration between the Centre and international industry.

The Latvian Plant Protection Research Centre lacks basic research in the fields important for plant protection. The Centre sees itself clearly in need of such research since fundamental research facilitates high-quality applied research. However, the present funding structure does not allow more ambitious scientific activities in neither basic nor applied research. More active international collaboration might help the situation. At present, collaboration does exist, but it does not result in scientific papers or ample doctoral degrees but seems merely to be the exchange of information e.g., in the biology of species. The existing ERAnet project and similar ones in the future may be one avenue to seeking increased collaboration and diversifying funding structure to include also long-term funding for basic research.

Conclusions and recommendations

More efforts should be made to connect the Centre nationally and internationally, both to increase its importance as a body producing valuable practical information for end users, and to increase its ability to produce high quality research in international collaboration.
Problems of the centre studies are local, but not so local that collaboration between neighbouring countries with similar environment and crop cultivars would not be useful.

Latvia has many institutes studying agricultural crops. More collaboration is needed to avoid overlapping research and assure integration of information on pests and pathogens into other studies. The impact of the Centre suffers from short-term projects, and long-term funding for large projects would be highly beneficial. More emphasis should be put to seek such funding and improve international collaboration to improve the impact of the Centre on the scientific discipline.

19. A_20_National Botanic Garden

Name of the institution	National Botanic Garden
Name of university	N/A
Type of institution	SI

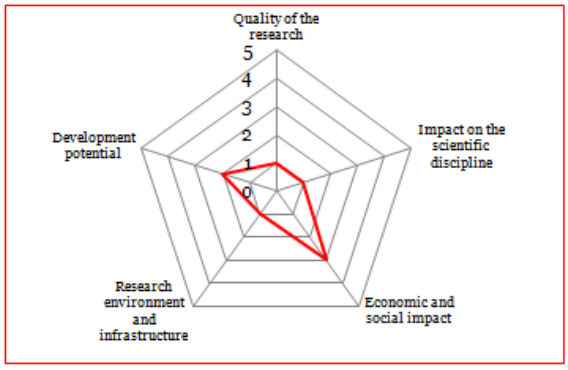
The National Botanic Garden is a private institute, located in Salapils, close to Forest research Institute Silava. It maintains large collections: living plants in field collections, greenhouse or in vitro collections, and a herbarium for research purposes and for exhibition. The Garden has a large garden and arboretum area (129 ha) with 15,000 taxa, being the largest botanical garden in the country.

The scientific staff comprises 16 individuals (5 leading researchers, 7 researchers, 2 Research Assistants, including 2 PhD students). The total staff in full time equivalents is estimated at 86. The age structure of the researchers is skewed with most researchers over 50 yrs. Gender ratio is female-biased.

The Garden is presently rather isolated from universities, with its main emphasis on environmental education and tourism (29 000 visitors/year) and gene conservation activities. International contacts include expeditions, seed exchange, and consulting, but scientific collaboration is limited to few viable contacts.

Figure 20 A_20 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	3
Research environment and infrastructure	1
Development potential	2
OVERALL SCORE	**1**



Overall Score

Overall, the National Botanic Garden is strong in raising public awareness and educating general public. However, its impact in research is limited due to low number of scientific publications in international journals, limited international collaboration in research, and lack of international research funding. NBG should focus its research and seek closer contacts with national universities and international scientific community in order to be a stronger player in science in the future.

Quality of Research

The National Botanic Garden, like comparable international gardens, divides its efforts between the maintenance of various germplasm, education and tourism, and research. While the National Botanic Garden is clearly important in environmental education,

tourism and recreation, its role in research is less clear, and its activities are distributed amongst various fields.

The research profile of the institution includes research and conservation of introduced woody plants and native flora, role of native flora in cultural development of Latvia, taxonomic studies of selected families, stability tests on cultivars, breeding work on introduced American berries, ecological analysis of diversity of orchids, conservation of rare native plants.

Most studies are descriptive, e.g. the performance of non-native plants in Latvia. Research in somatic embryogenesis includes development work on methods for vegetative propagation of endangered plant species of Latvia. Taxonomy and phylogenetics are fields often studied by researchers in botanical gardens, with both morphological and molecular methods. In the National Botanic Garden of Latvia, only a few such studies are conducted in international collaboration.

Although funding per researcher is relatively high, research output is rather limited. Furthermore, international collaboration in research is rather limited. The most important publications by academic personnel are mostly abstracts and papers published in conference proceedings, or papers in national journals (e.g., university series). The number of PhD students is very low, suggesting that interaction and collaboration between the Garden and universities is presently rather weak, making the Garden a rather weak national player.

Impact on the scientific discipline

The scope of research of the Garden is highly diverse, and its impact in any specific area is very limited.

The number of original articles in anonymously refereed scientific journals cited in Web of Science, SCOPUS etc. is very low, only one publication in 2011, and no such publications in 2006-2010. Researchers have publications in other refereed scientific edited journals (mainly Latvian) and conference proceedings, but most efforts are put into writing articles to journals popularising science. The Botanic Garden has also very low records in producing PhDs.

There is research collaboration with some national institutes (University of Latvia, Daugavpils University), producing joint publications. Botanic Garden has foreign contacts in the exchange of materials and in joint expeditions with Baltic universities and some botanic gardens. It also arranged an international conference of the Nordic Arboretum Union in 2009. The National Botanic Garden actively takes part in non-academic collaboration between different international bodies in botanic gardens (e.g. EU botanic gardens, Association of Baltic Botanic Gardens, Organization of the Botanic Gardens of the Baltic Region). However, international collaboration in research is very weak, being only with Kew Royal Botanic Garden (producing so far one ISI-level publication). No international funding (except ERDF infrastructure projects) has been obtained so far. Furthermore, there have not been any significant visits to the unit by foreign researchers, and only one researcher from the institute has been actively seeking international contacts and collaboration in research visits abroad. Thus, the National Botanic Garden has a much stronger impact on public awareness than on the scientific discipline of its area.

Economic and social impact

The National Botanic Garden is a strong national player with respect to economic and social impact. The Garden has extensive interaction with the public. Every year it produces ca. 100 popularising articles, and some books, and it takes part in several radio and TV programmes. The Garden hosts 29,000 visitors per year and arranges workshops and other educational programs for students and general audience.

The Garden has also produced a large number of new cultivars, e.g. large-fruit cranberries and high blueberries to national markets, together with new rose and Gerbera cultivars.

One important activity of the National Botanic Garden is the conservation of endangered species. It collaborates with the Nature Conservation Agency via the participation of NBG experts with expertise in the objectives and development of surveys and species, and with nature conservation plans. Furthermore, NGB both develops gene conservation methods and conducts gene conservation activities in situ and ex situ methods.

The National Botanic Garden is actively taking part in non-academic collaboration between different international bodies in botanic gardens (e.g. EU botanic gardens, Association of Baltic Botanic Gardens, Organization of the Botanic Gardens of the Baltic Region).

While its national impact is very strong, its international social impact could be stronger (e.g. it lacks international funding for gene conservation activities; international projects in the field of botanic gardens etc.).

Research environment and infrastructure

The Garden has excellent plant collections (15,000 taxa) and a large outdoor garden/arboretum (129 ha). The collection is the largest of all gardens in the Baltic states. Internationally important parts of the collection include Allium species (1652 accessions), juno irises (53 taxa, 379 accessions) and other bulbous plant collections. Dendrological collections are also large, e.g. 1,000 taxa of coniferous plants. Nationally and regionally interesting are cultivars of some flowers (chrysanthemum, gerbera and roses) and berries (cranberries, blueberries etc.). Ex situ collections include large number of somatic lines of endangered plants and cultivars stored in cool room. For long-term ex situ conservation, NBG lacks facilities for cryo preservation.

The database NBG augi includes information on accessions, and some other databases constructed by the NGB on woody plants of Latvian parks, monumental trees and noteworthy cultural heritage points.

Plant collections and databases are valuable infrastructure, but their use in research seems to be rather limited except for international collaboration in phylogenetic and taxonomic studies on some species. National contacts with Latvian universities should be closer, with more research collaboration. International contacts in research are very few.

The age structure of researchers in the NBG is biased towards older age groups (over 55 being the largest age group) and the number of PhD students is very low. These facts together make the research environment less dynamic.

Development potential

The Garden has strengths that can be built upon. It has unique collections. It is involved in gene conservation activities where international collaboration should be very feasible (plenty of international bodies and collaborative projects). National and international networking is very important for the future. Presently the NBG lacks viable contacts with scientific community.

There are very few students and few young staff members in the National Botanic Garden. Development will depend upon rejuvenation of the institution.

Conclusions and recommendations

In research, activities should be directed to fewer topics instead of present very diverse efforts.
Some present activities should be cut down or transferred to some other institution. For instance, breeding and developmental work of new cultivars has been a high-priority activity in the past, but now seemingly lacks funding and thus possibilities to test new cultivars. There are many institutes conducting breeding in Latvia that might be able to continue the important work started in the NBG. Furthermore, finding new mutant lines in conifers might not be a top-priority activity, considering that a large number of similar forms has already been found and their stability already tested.

In research and practical activities of gene conservation, priorities and policies should be taken; presently activities include variety of topics from endangered native populations of wild plants to horticultural cultivars and introduced tree plantations. Furthermore, conservation methods should be reassessed and necessary topical methods applied. The NBG is presently investing in the new greenhouse for tropical /subtropical plants and for new herbarium room. However, no plans for developing long-term ex situ conservation facilities (cryo tanks) were mentioned, despite the importance of ex situ conservation in the research/activity agenda of the institute. Maintaining tissue culture in cool room is not a long term solution for ex situ conservation as cryo preservation would be.

NBG is excellent in communicating with general audience, and that should not be neglected in the future, either. In research, publication policy with respect to research should be changed from meeting proceedings and national series to international peer-reviewed journals. Altogether, National Botanic Garden would need much stronger national and international collaboration in research. National collaboration and viable contact with universities could be strengthened e.g., via joint professorship between university and Botanic Garden. Overall, recruiting internationally well-connected, productive researchers is highly important for the NBG for the future.

20. A_21_Pure Horticultural Research Centre

Name of the institution	**Pure Horticultural Research Centre**
Name of university	N/A
Type of institution	SI

This is a small institution entirely focused on horticulture, with a complicated history and structure.

Pūre Horticultural Research **Centre** is linked to the Pūre Horticultural Research **Station**. The State Pūre Horticultural Research **Station** (HRS) was subjected to privatization in 1999. It was necessary to establish a legal entity which could privatize the State Pūre HRS. At the end of 1999 Pūre Horticultural Research **Centre** (HRC) Ltd. was established by the researchers and employees of Pūre HR**S** with the aim to privatize Pūre HR**S** and to maintain research activities in Pūre after privatization. The owners of the Pūre HR**C** are 20 individuals and one legal entity "Tukums Association of Horticulture and Bee-keeping". In 2000, Pūre HR**C** Ltd. successfully privatized Pūre HR**S.** At the moment Pūre HRC owns 61.1 % of pure HRS shares. It ensures access to the infrastructure and land resources of Pūre HRS for performing the research activities.

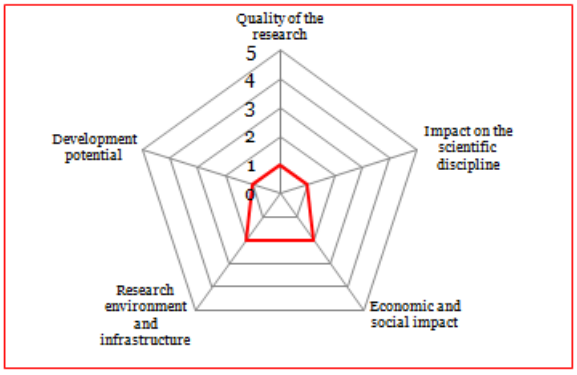
Pūre Horticultural Research Centre has 16 employers, of whom 10 are researchers. The Institution receives technical/manpower support for the maintenance of collections and for research from the Pūre Horticultural Research Station. Given the current economic situation it is not easy to acquire enough workload for the existing staff given the low amounts of national funds for research.

The Pūre Horticultural Research Centre focuses on crop management in open field vegetable production, fruit trees and soft fruits. The research is applied, with a focus on vegetable and fruit growing technologies, postharvest technologies and biotechnology.

Of the researchers, 70% is female.

Figure 21 A_21 - Scores

Criteria	Scores
Quality of the research	1
Impact on the scientific discipline	1
Economic and social impact	2
Research environment and infrastructure	2
Development potential	1
OVERALL SCORE	**1**



Overall Score

It is doubtful whether this private institution has a chance of survival given its limited funding base, small size and low-quality research. There is some economic and social impact but this can never be large given the size of the institution.

Quality of Research

This institution focuses on developing efficient and sustainable methods for growing vegetables, fruit trees and soft fruits. It also pays attention to post-harvest issues such as storage and disease. All submitted papers are meetings proceedings or very low profile technical journals. For example, this institution publishes a lot of its work in Acta Horticulturae, the proceedings of ISHS meetings. The work is very applied, perhaps even too applied. Scopus number of publications is relatively low, with approximately 1 citation per publication. Only 1 PhD student is being mentioned. It appears to be a private institution without core funding from the government, however, eligible to apply for grants. It works closely with the nearby Horticultural Research Station (see brief description). The funding base is therefore small, amongst the smallest of all institutions being reviewed by this Panel. Funding per researcher, however, is about average, because of the low number of researchers. A score of 1 is based on low publication rate, low impact of publications and low funding. The Panel realizes that there are other activities than research and that these should also be taken into account, such as the maintenance of collections. Quality of the research could perhaps e upgraded and other activities could perhaps be maintained by reorganising this institution and providing it a different position in the Latvian research infrastructure.

Impact on the scientific discipline

Impact measured by Scopus publications and citations is very low, as described above. Beyond publications the institution has obtained grants from a number of agencies to sustain the Centre in the absence of core funding. There are a small number of international exchanges, notably with Bonn (Germany) and South Africa. However, no evidence of ambition to change the scientific discipline beyond testing varieties in a semi-commercial way for use in Latvia.

Given the applied nature (dose-response research, root stock comparisons, cultivar comparisons, etc.) the contribution to the development of the scientific discipline is meagre. The role of the institution in maintaining scientific expertise and in maintaining collections might have some relevance.

Economic and social impact

Applied research has in general some economic and social impact. The contribution to economic impact can lie in technology testing and knowledge transfer whereas the social impact can lie in the contribution to creating diversity. The institution considers the role also important given the strong focus on practical and regional issues and problems. The institution does not attract a lot of funding and if that is an important measure for social significance than that is not a positive sign.

The Centre has close collaboration with growers of fruit and vegetables in Latvia with the aim of improving growth and storage of crops. There is also staff involved in teaching and outreach to the general public.

However, the Centre is small and therefore overall the impact is low.

Research environment and infrastructure

The buildings and land are owned by the collaborating Horticultural Research Station. The station provides land, support growth facilities. The Centre has bought some equipment as required to complete projects.

Strong point for the research environment is also the close interaction with growers.

Development potential

The Centre is a small private organisation dependent on grant income, and seems to be a spin out from the Horticultural Research Station. The Centre is small and opportunities for development on this funding model are limited.

The institution has also a negative image of its own potential and chances for survival and improvement. The whole tone in the self-assessment was more negative than for most of the other institutions.

Some activities are relevant though and therefore it is recommended to consider a different business model or organisational structure.

Conclusions and recommendations

Given the small size of this institution, the low quality of its research and its low potential for development, it would be advisable to look for a model in which the activities of this institution and its best staff can be absorbed by another institution on the basis of a financially sound business plan.

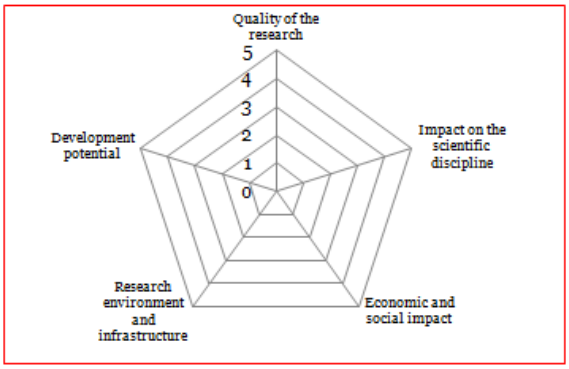
21. A_22_Research Institution Trading Company Vinkoki

Name of the institution	Research Institution Trading Company Vinkoki
Name of university	N/A
Type of institution	SI

The institution is a private organisation focused on breeding of trees and fruits. Particularly breeding of grape, sweet cherry, walnut and Cornelian cherry. The institution is very small with a full time equivalent of approximately 1.0 and has relied entirely on private funding. They have established collaborative agreements in viticulture with Russian, Scandinavian and Belgian organisations. The work of the institution has been conducted by one family over three generations, and largely funded by private capital except for small subsidies in 2 years from the Ministry of Agriculture. No state grants or other forms of funding have been obtained during the review period for research or plant breeding. The organisation appears to face severe difficulties based on their capital running out during 2011 and too few employees holding doctoral degrees to comply with EU definitions of a research organisation. A new greenhouse was built for grape cultivation and has been used since 2010.

Figure 22 A_22 - Scores

Criteria	Scores
Quality of the research	0
Impact on the scientific discipline	0
Economic and social impact	0
Research environment and infrastructure	0
Development potential	0
OVERALL SCORE	**0**



Quality of Research

This institution focuses on practical breeding of new varieties of grape, sweet cherry, walnut and Cornelian cherry for growth in Latvia. No papers were provided and no Scopus publications. While the work is economically and societally important, no scientific publications appear to have been published in 2006-2011. The institution received no funding from state or grants in the funding period, and seems to have been funded exclusively by private family funds. Although the institution aims to breed new varieties, there is no evidence of scientific research in terms of contributing to national or international research literature or scientific exchange. Thus, the focus of the institution is on good practical work to improve cultivars, not on research with scientific goals (publications, degrees). The institution may have a relevant role within the scientific or business community of Latvia as a practical breeding group but it is too small for a viable research unit.

Conclusions and recommendations

The programme of the institution as submitted was considered to be of practical value but not to be research. Also the very small size of the institution prevents contributing to breeding research, and is below the level required to comply with EU regulations. The submission outlines doubts about the future of the institution based on lack of capital and lack of funding from other sources. Some form of integration with the Latvia State Institute of Fruit-Growing might represent a viable future.

22. Summary of the Institutional Assessments

Assessment of research in the field of "Agriculture, forestry and veterinary science" (including food technology) cannot be divorced from the potential utilisation of the scientific findings in the technical and economic aspects of the food, fibre and bio-energy sectors, and more widely, e.g. national economic strategy, and the social life of the countryside. It should also be noted that some areas of research are spatially specific (e.g. local breeds and varieties), while others are highly international in character (e.g. crop genetics, input manufacturing).

A further aspect of "agricultural exceptionalism" is represented by the fact that there is a governmental ministry (the Ministry of Agriculture) dedicated to the sector. This Ministry oversees some research institutions, while other research institutions in the field come under the Ministry of Education and Science, or are independent private companies. While there is no doubt that inter-ministry liaison (including other ministries, e.g. the Ministry of Environmental Protection and Regional Development) takes place, the existence of these different state authorities and their funding streams is liable to create some uncertainty and possibly tension both within and between research institutions, in addition to that existing from generally low funding, institutional mergers, etc.

In most cases, the scoring criteria prescribed for the Panel were prescribed along a spectrum ranging from "national" to "global", using terms such as "strong" and "weak", or "leader" and "player". The scores awarded by the Panel to institutions strictly reflect these criteria, which tend to disadvantage smaller research institutions.

Against these introductory remarks, the Panel concluded that the general level of research quality within its field was disappointingly low in most of the institutions assessed. Of the 22 institutions assessed, one (the Institute of Food Safety, Animal Health and Environment "BIOR") was given an overall score of 4 (out of a maximum of 5), three others (the Latvia State Forest Research Institute "Silava", the LUA Faculty of Food Technology, and the State Priekuli Plant Breeding Institute) an overall score of 3, while nine received a score of 2 and six a score of 1. Three institutions were regarded as not significantly research-active to be assessed. The more highly scored institutions were characterised by dynamic leadership and the productive (often multi-functional) use of resources recently funded by the ERDF or ESF. By contrast, institutions performing more poorly appeared to have no clear or focussed research strategy, no application of modern methodology and/or little access to modern facilities.

There are a number of reasons for this disappointing national performance (see below), but in general there was found to be a strikingly low level of financial support, lack of international contacts and awareness of science, especially beyond the neighbouring Baltic countries, and poor but improving infrastructure. Improvement in these areas will be essential to carrying out modern science of high quality.

Funding

It cannot be escaped that low and uncertain funding for research is fundamental to the disappointing research performance found by the Panel in many institutions. Low state funding may have been inevitable in the recent past (current and future funding was not explored by the Panel), but it has had consequences in terms of staffing (number, age, gender, full/part-time) and facilities. Many institutions were very short of core funding (often about 5% of total funding), and this had led them to depend on project funding

(often short-term) for basic office and research needs as well as salaries. In particular, there has been lack of funds for foreign visits or for foreign visitors to Latvian institutions, and for access to scientific journals and literature databases (e.g. SCOPUS).

During Panel visits, most institutions were asked about their knowledge of, and intentions for, the forthcoming EU Horizon 2020 Framework Programme, the successor to the FP7. Responses varied, but several seemed unaware of this Programme, or badly prepared to make efforts to join a potential consortium, e.g. by proposing specific Latvian scientific expertise (rather than general interest in funding) to a coordinator.

Institutional structure and processes

Many of the 22 institutions assessed were small (mean number of researcher FTEs 14.7, with half below 10 FTEs), and several were found to be attempting research across a wide area, perhaps linked to teaching or advisory responsibilities, or following personal science interests. The role of the Latvia University of Agriculture (and possibly of other Latvian universities, though the Panel did not investigate these in depth) in relation to its own research institutes (agencies) and to other (for example) state scientific institutions was not always clear, but this role did not appear sufficiently close to overcoming the disadvantage of small size and the lack of modern on-site facilities (assuming these to be available in the University). However, in some disciplines such as plant breeding, the mentoring of PhD students in remote institutes by the Faculty of Agriculture played a valued and essential role in their education.

Similarly, the roles of the Latvian Academy of Agriculture and Forestry Sciences (and possibly the Latvian Academy of Science's Unit of Agricultural and Forestry Sciences, again not investigated) in guiding and disseminating the scientific work of the institutions were not always clear.

In both cases (University/ies and Academy/ies), it appeared that these higher-level structures were not playing a very positive role, but were rather imposing unnecessary bureaucracy on the research institutions, especially in the areas of project application (a figure of 8kg of paperwork per project was mentioned) and PhD approval.

Scientific personnel

In some but not all institutions assessed, there appeared to have been recent efforts to appoint younger and more dynamic leadership in the posts of Deans, Directors, Heads of Departments, etc. This is commendable, although it was not always clear whether these appointments were made on mainly scientific grounds or on others such as bureaucratic competence and external recognition. It is recognised that such conflicting tensions exist in any outwardly-sensitive research institution.

Over the institutions which supplied relevant data (in some cases percentages of uncertain totals), the profiles weighted by researcher FTEs were calculated as:

- Age: <25 years: 1%; 25-35 years: 29%; 35-45 years: 23%; 45-55 years: 17%; >55 years: 30%;
- Gender: female 62%; male 38%.

These profiles suggest some weaknesses, such as a high proportion of elderly researchers in some institutions. The relatively high proportion of female researchers may be typical of some biological research, but may also be a sign of low salary levels and uncertain career prospects in other areas.

A high proportion of PhD students appeared to be part-time in this role, due to the need to take up employment or other paid duties while studying. Consequently, such students

were unable to pursue their work in a dedicated fashion. While part-time PhD research can be successful, a higher proportion of funded stipends allowing students (and post-doctoral researchers) to work full-time would be desirable. Such an approach would also ensure that PhD students completed their studies within the European average of 3-4 years, while at present many students require 7 years or longer.

Publication practices

The Panel was struck by the number and volume of local or national publications, such as 'house' journals, conference proceedings and booklets, which were cited in the written evidence or displayed physically during visits. While impressive in terms of output quantity, the staff time and resource costs involved in preparing (e.g. peer review), publishing and perhaps distributing such output must be considerable. At the same time, there was a lack of scientific papers published in fully international (i.e. European or global) journals. Peer-review of local/national publications, where it takes place, is unlikely to be stimulating, especially if these publications derive from a conference programme run by the home institution. These resources would be better allocated to the preparation of fewer papers written in English (or perhaps German, French, Russian, etc.) for high-quality journals. Although acceptance rates for such journals may be low at first, as is common in many countries, the experience of addressing issues raised by journal reviewers, such as relevant literature, possible generalisations and specificities, and alternative methods of analysis, would benefit Latvian researchers, especially younger ones, who mostly appeared to speak good English. Providing researchers with efficient electronic access to a wider range of international journals in their field would also help them select journals to publish in. Several researchers mentioned that they had difficulty in selecting a journal to submit their work to, mainly because they did not have access to and therefore did not read a wide enough range of literature.

The Panel was also struck by the apparently lengthy processes of PhD thesis approval inside and outside the Latvia University of Agriculture; interviews with PhD students suggested that considerable delays and uncertainties at a critical time in their careers. In particular, the apparent requirement to publish in a "house journal" seemed an unwise diversion of effort from more important publication vehicles.

Staff promotion (and perhaps salary levels) should be made partly and explicitly conditional on publication in high-impact scientific journals, in order to provide the necessary incentives. Staff should also be encouraged to foster contact with international experts by personal e-mail, in order to seek guidance on topics, methods, funding prospects, publication routes, etc. Again, while such approaches will not always be successful, due to pressures of time for such experts, some will bear fruit.

22.1 Key strengths, areas of particular interest

In most areas, strength was well towards the applied end of research; this is understandable and even commendable, though it has resulted in some low Panel scores where international excellence and engagement in terms of science – as prescribed by the criteria – could not be detected. The Panel was pleased to see the clear commitment of all institutions and many of their staff to their research and in particular to the needs of Latvia and its agriculture, forestry and food sectors. In what is a difficult period for the nation, it was inspiring to see this level of engagement. Many but perhaps not all staff appear aware of the limitations of their work and/or facilities, but are nevertheless clearly dedicated to their work.

Being a small and relatively homogeneous country, Latvia faces a relatively limited set of specific national problems which can be tackled by scientific research. Some of these (e.g. in forestry, and breeding crop varieties) are being energetically tackled; others can be identified, and should be prioritised over those of lesser interest, especially where much larger institutions in other countries are able to pursue more advanced research on a pan-European or global basis.

Where new facilities have been, or are being, provided by ERDF/ESF or other funding, some if not all of these are being used to maximum effect, e.g. via multi-departmental and multi-institutional arrangements.

Several institutions were obviously strong within national parameters, but the Panel were unable to score these highly under the prescribed criteria. These cases of relative but only national excellence may constitute worthwhile units for longer-term support and maintenance, but without unrealistic expectations of international performance, except perhaps via higher-level sister institutions.

In the area of plant research, some breeding programmes (e.g. for grasses, fruit trees, organic farming) were identified as rather special. It was also pleasing to encounter long-term experimentation in this area, since this is now unusual in Europe.

22.2 Main weaknesses, areas of particular concern

Several weaknesses have been identified above, including lack of funding, structural fragmentation, lack of focus, and excessive bureaucracy. Low (and uncertain) funding is the greatest weakness, and clearly limits scientific effort and enterprise.

A general weakness, found in most though not all assessed institutions, was the excessive spread of research being attempted, coupled with over-ambitious research strategies (or none). In some cases, this tendency to research "thinness" may be explained, but not entirely excused, by the wide range of teaching duties or other non-research (e.g. testing) work undertaken by institutional staff.

In terms of scientific quality, the need is more international engagement with leading scientific centres in non-neighbouring countries such as Germany, France and the United Kingdom, as well as elsewhere such as the United States and (if sufficiently expert colleagues can be found there) Russia or Ukraine. Such contacts should be used to train a new generation of young researchers in the best current methods so that they can become aware of the state of the art and can bring this back to Latvia, or indeed promote higher-quality research elsewhere, e.g. to the east.

In all areas, research was often primarily descriptive, and was seldom presented in terms of hypothesis-testing. At least in the socio-economic area, a greater degree of conceptual thinking would be highly desirable.

Many research staff appeared to have other duties, such as teaching and extension, and were not following full-time research. While some degree of interaction is desirable (especially between University teaching and research), the distractions of other work seemed often to delay and fragment research effort, with adverse consequences for focus and international contact.

Several weaknesses in PhD studies were noted, such as the isolation of some students in institutions distant from their "home" university, and with unclear credit or responsibility on to either side. However, in some disciplines such as plant breeding, the mentoring of PhD students in remote institutes by the Faculty of Agriculture played a valued and essential role in their education. The training of such students seemed

inadequate, in terms of scientific (rather than general, e.g. linguistic) advancement. It appears to be compulsory – in practice if not in regulations – to publish in university journals, rather than encouragement to publish (perhaps with their supervisors) in international journals. The process of thesis and degree approval seems long and (to the students) uncertain. The whole system seems too inbred, with too little involvement both from and with other institutions, within Latvia and abroad. It was notable during our visits that PhD students who had been abroad were generally more forthcoming and responsive than others.

22.3 Conclusions and recommendations

Based on the analysis above, the Panel makes the following recommendations in the field of "Agriculture, forestry and veterinary science", which includes food technology. The Panel is aware that some recommendations may involve change across a wider range than its own area, e.g. across all state funding of science in Latvia, or in university procedures.

1. Small research institutions with low scores should be closed, privatised or where appropriate merged, probably with "BIOR" or with University Faculties (or, better, with Departments or Groups within Faculties, to ensure focus). In the specific area of plant breeding, a review of facilities is required to prevent duplication and dispersal of resources, thereby concentrating expertise to create critical mass in one or two dynamically managed locations.
2. Governmental funding should be increased for core research support (see below) in a few institutions in "Agriculture, forestry and veterinary science" research (including food technology), conditional on clear and focused scientific goals, and on maximum efficiency in the use of modern facilities. Funding agreements should be attempted between the three small Baltic countries – possibly with involvement from elsewhere, such as Nordic or other Central European countries – more specifically, the funding of specialised research institutions across science areas of common interest to all three countries.
3. Institutions should re-consider their Advisory Boards (or similar bodies) to ensure both international representation and attention to key national needs as seen by industry, government and civic society.
4. The roles and structures of the Science Academies should be reduced and simplified, e.g. to public dissemination of scientific thought and findings to non-academic audiences, and to occasional "foresight" exercises for governmental and public purposes. The Academies should not play a large role in internal institutional affairs, except perhaps to assist, by invitation, in occasional institutional reviews.
5. Middle-ranking staff in non-university institutions should generally be given a greater role in the supervision of and promotion committees (for thesis approval) for PhD students.
6. Priority funding should be allocated to enable access to international databases of scientific literature, for both staff and students, especially if individual effort (e.g. acting as a reviewer) is difficult. Potential readers should be actively informed of the increasing number of journals that are now free access.
7. Researcher staff promotion should be made explicitly contingent on publication, whether or not co-authored, in high-impact international scientific journals.
8. A programme of funding, for example, 10 post-doctoral positions for 2 or 3 years in prestigious overseas research institutions should be considered, possibly with joint support from an overseas donor foundation, and with conditions such as regular "home" liaison. While some participants might not return immediately to Latvia, most would do so with highly valuable experience and contacts.

9. The importance of food science and technology should be fully recognised alongside that of science for agriculture itself, for forestry (and wood processing and utilisation) and for veterinary topics.
10. The National Contact Point for EU Horizon 2020 should be tasked with identifying likely future consortia, which could be approached by Latvian institutions, preferably with specific proposals (ideas, case studies, etc.) for their contributions.

technopolis |group| United Kingdom
3 Pavilion Buildings
Brighton BN1 1EE
United Kingdom
T +44 1273 204320
F +44 1273 747299
E info@technopolis-group.com
www.technopolis-group.com