The project

"Development of Higher Education Content Aimed to Support Industries for Sustainable Production of Qualitative Agri-food" (AgroDev)

No 619039-EPP-1-2020-1-LV-EPPKA2-CBHE-JP

EVALUATION REPORT
ON THE RESULTS, QUALITY AND IMPACT OF PILOT TEACHING AND CAPACITY BUILDING MEASURES

2023

CONTEXT

The European Union (EU) Erasmus+ Programme funded project "Development of Higher Education Content Aimed to Support Industries for Sustainable Production of Qualitative Agri-food" (AgroDev), No. 619039-EPP-1-2020-1-LV-EPPKA2-CBHE-JP, have been in implementation in the time period January 2021 - January 2024. Its **primary aim is – to modernise agro-industry related higher education thus promoting implementation and effective management of sustainable agro-food production systems in Kyrgyzstan and Uzbekistan**.

The main aim was achieved by review and modernisation of relevant higher education curriculum in four Central Asia (CA) universities, thus promoting availability of knowledgeable and skilful specialists for agro-food production industry. These universities are:

- In Uzbekistan: **Tashkent State Agrarian University, Samarkand branch of Tashkent State University of Economics**;
- In Kyrgyzstan: **Kyrgyz National Agrarian University, Naryn State University**.

Knowledge, skills and expertise were provided by EU partner universities: **Latvia University of Life Sciences and Technologies (Latvia), University of Agriculture in Krakow (Poland), Linnaeus University (Sweden)**, as well by non-profit organisation **Hilfswerk International (Austria)**, having a long-term work experience in Central Asia, aimed to raise knowledge and skills of agri-business development.

Key stakeholders - non-governmental organisations of both countries were involved in the project in order to ensure needs of the agro-industry enterprises are well addressed and future professionals have capacity to offer adequate and effective solutions. These organisations are:

- In Uzbekistan: **The Centre of Agro-Innovation of the Council of Farmers, Agrobusiness Association of Uzbekistan**;
- In Kyrgyzstan: **Association for the Development of the Agro-Industrial Complex, Association of Dairy Livestock Companies "Kyrgyz Sut"**.

Besides such objectives as: 1. To modernize agro-food production related study programmes and 2. To promote availability of knowledgeable and skilful specialists for agro-food production industry, **the project strived to develop and strengthen capacity of academic staff, to improve study environment and to strengthen links and cooperation among a) involved CA and EU universities and b) among CA universities agro-food production industry. This report includes a summary of all capacity building measures held, results achieved and immediate impact.**

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ABBREVIATIONS USED IN THE REPORT

Abbreviation	*Full name, explanation*
AgroDev	The European Union Erasmus+ Programme funded project "Development of Higher Education Content Aimed to Support Industries for Sustainable Production of Qualitative Agri-food"
CA	Central Asia
EU	European Union
G.A.P.	Good agriculture practice
HACCP	Hazard analyses and critical control points
HWI	Hilfswerk International (Austria)
ISO	International standardisation organisation
KG	Kyrgyzstan
KNAU	Kyrgyz National Agrarian University (Kyrgyzstan)
LBTU	Latvia University of Life Sciences and Technologies (Latvia)
LNU	Linnaeus University (Sweden)
NSU	Naryn State University (Kyrgyzstan)
QAAP	Methodology for the assurance and assessment of quality of modernised higher education study programmes, elaborated within the project
SBTSEU	Samarkand branch of Tashkent State University of Economics (Uzbekistan)
TSAU	Tashkent State Agrarian University (Uzbekistan)
UAK	University of Agriculture in Krakow (Poland)
UZ	Uzbekistan

THE EVALUATION METHODOLOGY APPLIED

In order to acquire evidence on results achieved, immediate impact made with regard to the CA universities and their academic staff capacity, study environment and new cooperation initiatives and their sustainability, various evaluation measures were implemented throughout the project. They are as following:

a) **evaluation of the quality assurance and assessment methodology**, elaborated and adopted in the involved Central Asia universities, practising application of defined evaluation criteria;

b) **evaluation of pilot teaching quality**,

c) **evaluation of quality and impact of academic staff training**, realised through five different activities:

- training in teaching methodologies and pedagogic skills,
- training in modernised study subjects,
- field - farm-based training,
- organisation and provision of master classes,
- organisation of the study visits and follow up measures;

After implementation of all capacity building measures the consortium held a workshop in June 2023 in Kyrgyzstan, aimed to acquire in depth understanding on results and quality of implemented measures, their immediate impact and follow up (sustainability).

The workshop took place through using interactive approaches and the Delphi method, by using a plan jointly prepared by EU partners. The workshop was organised in eight sessions, during which participants were divided into focus groups (4 per session), each having representatives of Central Asia and European universities. Two EU partner moderators were provided for each focus group, one who led the process and the other who recorded the information in writing. Each participant was given the opportunity to express the views and recommendations (both the CA and the EU partners) in the focus groups and in joint sessions. The conclusions and proposals, both at the time of the working groups and in the joint part, were recorded in writing without delay.

Materials used for elaboration of the report are:

· Evaluation of the modernised curricula pilot teaching, done by students and academic staff of the involved CA universities

· Evaluation of academic staff training, done by the involved CA universities academic staff

· Evaluation of study visits, done by the involved CA universities academic staff

· Evaluation of academic staff training and master classes, done by the involved CA universities academic staff and external stakeholders

· Summary of the opinions and recommendations, provided by the joint workshop's participants – EU and CA partners' managerial and academic staff

· Field (farm based) training report

APPROACH TAKEN IN ELABORATION OF THE REPORT

LBTU, the lead partner of the AgroDev project, has elaborated the draft report, by summarising and using information from all evaluation materials and events. Draft of the report was sent to all project partners, who were acquainted with the document and provided their input: added missing details, reviewed texts, amended recommendations and follow up measures, according to their experience in the project. The document was amended by the LBTU and approved by the partners.

1. Pilot teaching of students

Pilot teaching of students was done in the involved Uzbekistan's universities in the autumn semester, and in the involved Kyrgyzstan's universities in the spring semester of the of the study year 2022/2023. Teaching plan was elaborated for each respective university according to the modernised subjects and harmonising teaching periods with the regular study process. EU partner universities academic staff provided teaching in-class and remotely. Proportion between in-class and remote lectures is provided in the table below. Pilot teaching quality evaluation was done after the end of each study course by students and assigned CA partner universities teachers.

CA university, where pilot teaching has been provided	Total number of modernised and taught credits	In-class teaching, % of total modernised and taught credits	Remote teaching, % of total modernised and taught credits	Number of students taught in the modernised curricula	Number of students as planned in the Grant agreement
P2 Naryn State University	25,5	72	28	**24**	**20**
P3 Kyrgyz National Agrarian University	44	92	8	**104**	**100**
P4 Samarkand branch of Tashkent State University of Economics	34,5	100	0	**61+43**	**50**
P5 Tashkent State Agrarian University	17	88	12	**42**	**50**
TOTAL	**121**	**x**	**x**	**231+43**	**220**

Evaluation templates were elaborated for this purpose and filled by the students and academic staff after each respective study course at each respective CA university. Results and impact were evaluated also during the joint workshop, by using interactive approaches and the Delphi method, and a plan jointly prepared by EU partners.

1.1. Quality of teaching and learning tools provided

As it was highlighted by the involved CA universities academic staff and students, integration of the new learning tools and application during the pilot teaching process was very valuable. Students learned how to use different **databases** not known before the project (e.g., Global GAP, Codex Alimentarius, Organic farming, Halal, eAmbrosia), how to analyse the available information, and to apply it while elaboration of study papers, provision of practical works and research. Another significant tool are thematic **audio and video materials** – either found on the internet or created by the academic staff.

Besides the above described, students have mentioned learning to apply **statistical methods** effectively and **develop qualitative presentations** – being very well structured, theory illustrated with cases, best practices, pictures, schemes and drawings, factual information, what helps to understand and acquire knowledge more efficiently. Materials and links provided for practical and independent work led to the increased responsibility to take independent action while studying, as well to work in small teams, which is not usual practice in CA universities. All above described helped to achieve better **learning outcomes: students' deeper understanding of thematic and improved analytical skills.** Availability of the **contemporary study literature** (acquired within the AgroDev project) was also highlighted as a significant tool, ensuring access to the latest knowledge in the field. Creation of learning laboratories have extended possibilities for students to carry out scientific research work in a higher quality and to produce quotable publications on the results obtained. With equipment that meets the requirements of modern technology, students can develop innovative products, thus facilitating cooperation with producers and processors of agricultural products.

1.2. Quality and appropriateness of teaching and assessment methods applied

1.2.1. Teaching process and methods applied

Academic staff has highlighted efficiency of approach when **lectures and practical works are combined**, which helps to understand theory better. When there is no long break between lectures and practical works, it helps students to apply better theoretical knowledge in the practical work, thus helping to strengthen knowledge. **Provision of laboratory works during studies** lead students towards the acquisition and strengthening of the skills necessary for the new specialists. **Practical works in the food processing enterprises and farms** strengthened the student's ability to solve various problems and situations. As a result, employers will receive specialists more familiar with the relevant specificity of the industry, having innovative ideas and being able to work with IT technologies.

Explaining the topics by using the case study method has been valued as a very efficient approach. Case study presentations helped to widen the view on diversity of approaches possibly to be taken, as well provided examples on how to combine different approaches in order to find the most efficient solutions that are vitally significant for the agro-industry enterprises. Highly valued is also **knowledge on the latest trends in the food sector,** where novel products are produced based on consumers' demand and factors being significant to increase food produce attractiveness, regional or global competitiveness.

Use of the contemporary teaching and learning tools have demonstrated possibilities on how to ensure equal learning opportunities for all students, independently of their location and factors affecting ability to take part in studies. This is especially significant for Uzbekistan's and Kyrgyzstan's students, often living in the remote areas, or having family issues, limiting their possibilities to follow full-time studies, e.g. young women being on maternity leave.

In line with other methods, some teachers have marked **interaction between the academic staff and students** as a very innovative method, where students have possibility and are invited to comment on lecture materials, provide feedback on thematic and methods used, and to debate. Debates were mentioned as excellent method by the students, too. The method helps to develop communication skills and skills to work in a team, which is the required capacity to be attractive in the labour market.

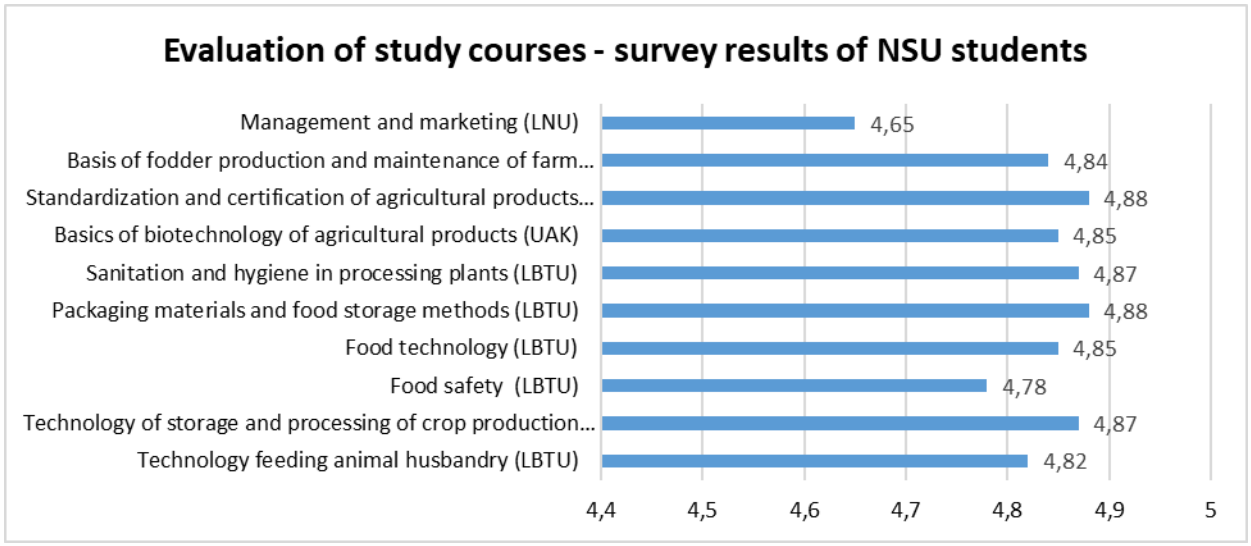
1.2.2. Assessment methods

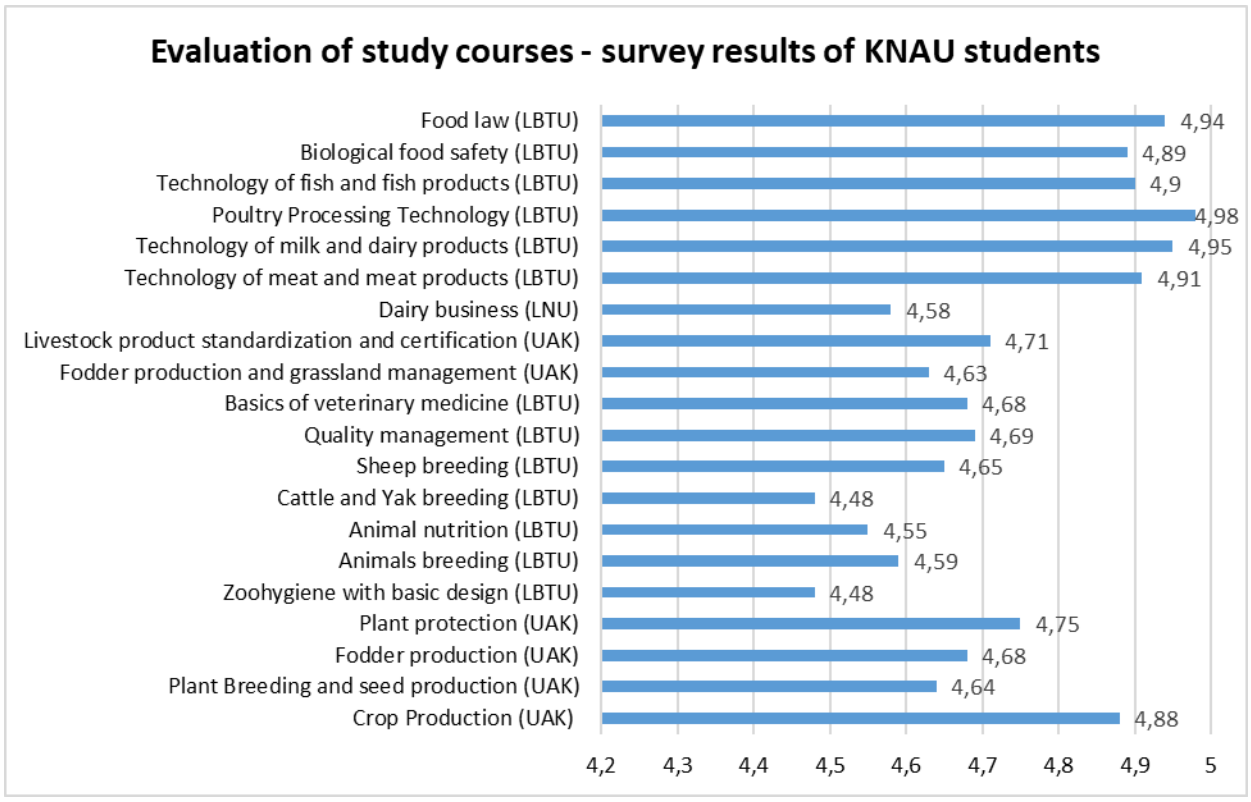
In line with the pilot teaching, academic staff and students taught assessed provided new contents topicality and relevance and teaching process quality. CA academic staff highlighted the relevance of the evaluation tools adopted specifically for different study courses and study levels. For example, for the bachelor level students more appropriate is examination with quizzes and open questions, as well elaboration of solutions for solving problems, but for the master level students more appropriate is analysis of situation and/or data from experiments, and presentation of findings and conclusions to the other students.

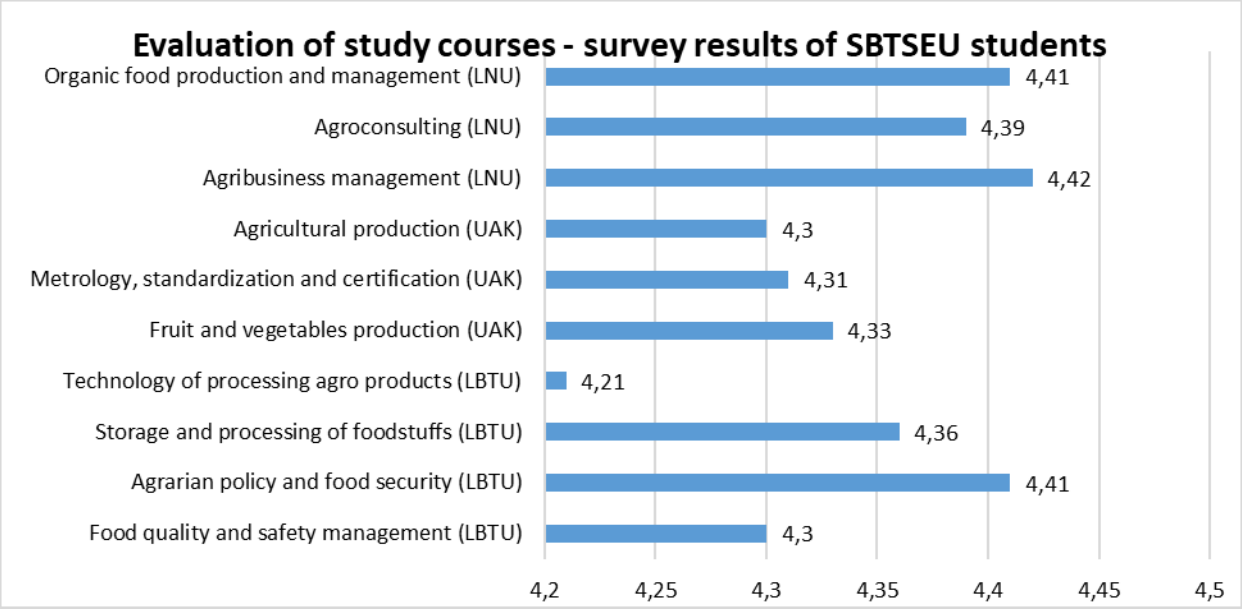
Evaluation of modernised courses contents and teaching process was done by using methodology and templates elaborated specifically for the project needs. It is rather challenging to introduce assessment methods in Central Asia universities when students assess performance of the teachers as well peer review of methods applied by colleagues, as this to some extent breaks cultural boundaries. There is no tradition in the CA countries when younger people evaluate activities of older ones or younger colleagues assess performance of older ones. However, the project achieved some progress, especially from the side of the students who emphasised in the evaluation such values as good communication of teachers with students, respect demonstrated by academic staff towards the students, and paying equal attention to all students.

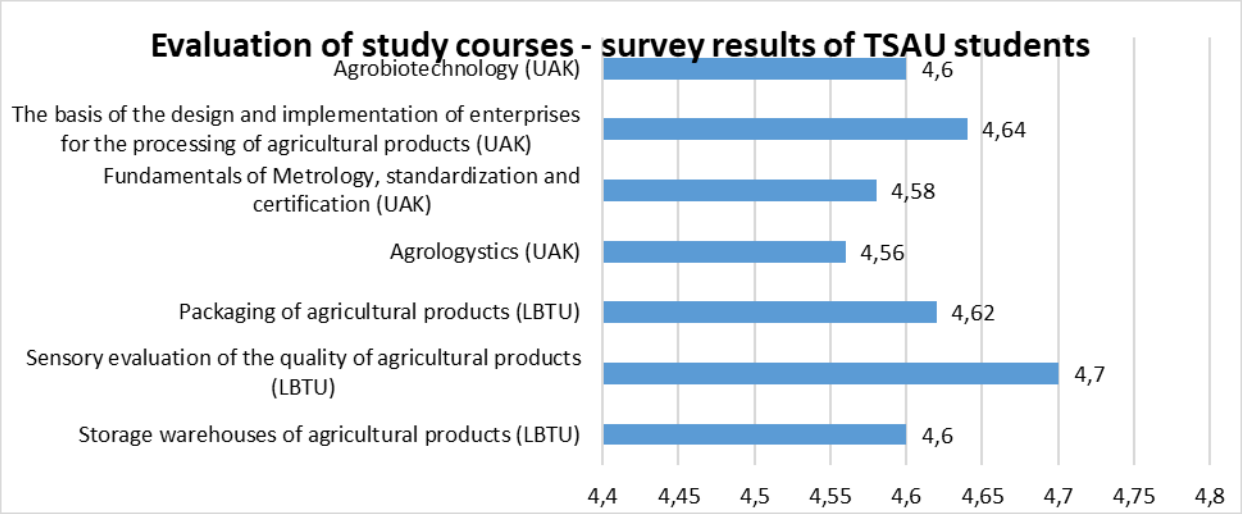
In order to assess the attractiveness, relevance and quality of the lessons, conducted by the EU teachers, and the teaching methods used, student questionnaires were carried out at each of the CA universities for each modernised subject. The evaluation was carried out on a 5-point scale, where 1 is very bad and 5 are excellent. In the survey students were asked: whether the content of the course was explained by the teaching staff in understandable terms, about used teaching methods, whether teaching staff led the course with interest, encouraging student participation, whether the teaching staff provided feedback (explanation, analysis) on the results of the learning.

Evaluation of students have been summarized after provision of studies at each respective CA university. As it is seen, students have highly appreciated the performance of EU teachers. The average student rating in P2 NSU is 4,82, in P3 KNAU - 4,72, in P4 SBTSEU - 4,34, but in P5 TSAU - 4,61. Students have highlighted qualitative aspects such as: a) the professionalism of EU lecturers, b) the modern teaching methods used in the process of pilot training and c) the knowledge provided on the latest developments in agribusiness related sectors. Summary of students' feedback per each CA university is provided below.









1.3. Relevance of new knowledge to the agroindustry needs

According to the feedback, received from the agro-industry stakeholders during national seminars and individual meetings, they appreciate as the most necessary knowledge on the Global G.A.P., certification process, geo indications, new methods for detecting food quality and prolonging shelf life of food. They also highlighted knowledge on implementation of food chain traceability systems, based on international food safety standards such as ISO 22000. Access to international experience has been mentioned as very significant. In the opinion of agro-industry stakeholders, new knowledge helps to develop quality and competitiveness of the food products and thus stimulate export of the products. With the new knowledge graduates will be able to analyse and effectively solve existing production challenges, and to provide advice to the producers. Leadership qualities and critical thinking skills have been mentioned as "must be" in order to be able to work in every step of the food production chain.

During the national seminar, held in Kyrgyzstan on April 6, 2023, entrepreneurs, invited by the Naryn State University, noted the need to open the laboratory on the basis of universities, where entrepreneurs and farmers can cooperate academically and to do analyses of their products. The provision of the training on quality control of agricultural products on the village level was also noted as one of the significant points. Stakeholders invited to the seminar by KNAU, emphasized the need for the trained auditors, being able to guide companies and clusters through the Global G.A.P. certification processes and management of the standard when implemented.

1.4. Main findings and recommendations

1.4.1. Challenges faced

Some challenges were identified during the piloting process. Lack or low level of English knowledge, especially terminology in the thematic area, limited ability of students to catch the context and nature of the courses. Uzbekistan's young people often know only the Uzbek language. In Kyrgyzstan most of the students speak Russian as well, besides their mother tongue. Thanks to EU partners' academic staff capacity to deliver part of the courses in Russian and participation of CA academic staff in lectures, the challenge was reduced to some extent. Improvement of language knowledge requires appropriate actions from the side of the involved universities.

In some cases students mentioned lack of basic knowledge and skills (Mathematics, Chemistry, computer skills, etc.) needed to understand the thematic and to carry the tasks (practical works, laboratory works).

Another factor limiting students' ability to follow the study courses is rather long lectures in one theme, which is caused by limited time resources within the project. It was suggested to distribute time among different teachers, combining lectures with laboratory and practical works within the same day. This approach will be adopted after the project, when modernised courses will be implemented on a regular basis (study regime as usual).

Challenging was provision of study courses remotely (on-line). It requires students' discipline and capacity to concentrate attention, and these skills should be developed long before the studies at a university (at secondary school period at the latest).

1.4.2. Recommendations for follow-up activities

A range of recommendations are provided by the academic staff and students at the involved CA universities after the pilot teaching as well during the joint workshop. They are reviewed by relevant study units of each involved CA university and follow up measures are planned. Some of the measures are already in implementation.

Recommendations are as following:

- To increase proportion of practical and laboratory works
- To include in curricula methods and approaches promoting development of students' entrepreneurship capacity (start-ups, innovations)
- To move to the student-centred learning (SCL-Student-Centred Learning)
- To develop collaboration with food producers aimed to link education and industry better – to organise excursions, practical works and practice in the enterprises, develop dual training
- To choose bachelor paper thesis topics relevant to the needs of the food industry
- To integrate in the study programmes new subjects: eco-tourism, ecological food production etc.
- To involve in the study process food producers as guest lecturers
- To involve food producers in evaluation of the study programs relevance and quality
- To continue upgrading study resources acquire paper edition books, journals, create free and qualitative access to electronic resources
- To adopt students' evaluation of study courses and programmes in general as a regular practice: relevance and quality of teaching/learning materials, teaching methods used, availability of relevant resources (laboratories, practice opportunities etc.)
- To stimulate students to develop agro-industry related start-ups and participate in different competitions presenting their business ideas

- To organize language courses for newly matriculated students to increase their ability to study in international environment and to follow the latest knowledge (scientific databases, journals, web resources)
- To apply to national Ministries of Education request to increase emphasis to the natural sciences-based subjects and to promote increase of independent learning skills

2. Academic staff capacity building in teaching methods and pedagogic skills

Academic staff training in teaching methods was done by Linnaeus University teachers in the time period October 2021 – April 2022, using distance teaching with a follow-up visit to each CA university. 48 teachers at the involved CA universities were trained in learning, adoption and use of contemporary teaching methodologies and pedagogic skills. Number per involved CA university is provided below.

P2 NSU	**P3 KNAU**	**P4 SBTSEU**	**P5 TSAU**	**Total**
10	12	14	12	**48**

2.1. Integration and application of new teaching methods in the study process

All involved CA universities have adopted several new teaching methods. Most actively it has been done in the Samarkand branch of Tashkent State University of Economics. Other CA universities have adopted a few of them. Number of trained teachers, who have implemented acquired teaching methods is as following:

Teaching methods/teaching tools (4 methods mentioned the most often as those learned and adopted)	Number of teachers, who have applied acquired listed teaching methods, per involved CA university				Total
	P2 NSU	P3 KNAU	P4 SBTSEU	P5 TSAU	
Experiential learning	10	12	12	8	42
Case studies	5	14	16	12	47
Distance learning	10	12	12	10	44
Texts, audio, and video materials	10	12	16	8	46
Total	**35**	**50**	**56**	**38**	**179**

The focus on knowledge and skills to produce and deliver classes and lectures in distance learning format was highly appreciated, and based on acquired knowledge, CA academic staff have elaborated teaching tools – texts, audio, and video materials. The application of distance teaching also broadens availability of the experts and worldwide knowledge (invite as lecturers' entrepreneurs, foreign academic staff etc.), which can be applied in case of double diploma studies and provides opportunities to study to persons with limited possibilities to take part in full time studies (young mothers, students with disability etc.). Distance learning is very effective in specific courses where the participation of lecturers from foreign partner universities is crucial and discussions of students with diverse experiences and visions is needed to explain and demonstrate possibilities and various solutions and options.

Preparation and provision of video lectures (taught by Linnaeus University) have been marked as a method having the highest interest among CA academic staff. There was a range of existing experience of the use of the Moodle system in different CA universities, from none to those with some previous experience to those with none.

2.2. Main findings and recommendations

2.2.1. Challenges faced

Some challenges with regard to the introduction of new teaching methods were identified during the project. As with the students, some teachers have limited English knowledge to fully understand to full extent the context and meaning of the training provided by the Swedish partner, to carry set homework, participate in discussions, as well to use tools and software applicable for creation of materials and provision of distance learning. This was mitigated where one of the LNU staff was able to travel to each of the CA university partners after the training period and hold face-to-face workshops based on issues that staff at each institution expressed an interest in following up on. These included distance learning, experiential pedagogy and media production for teachers.

Another challenge is limited motivation or opportunity for teachers to introduce contemporary teaching methods in their practice because it also requires change of contents, development of new materials and templates, and more time for proactive interaction with the students. Even where evaluation of the peer teacher's performance has been introduced at a university, cultural traditions limit expression of true opinion on their performance, especially if the colleague to be evaluated is older and more respectable.

The third issue is limited availability of equipment and software at the involved CA universities for creation of contemporary teaching materials and lack of time or resources for professionals to be able to technically support teachers in the creation process. The challenge needs to be solved at the administration level by assigning appropriate resources.

2.2.2. Recommendations for follow-up activities

A range of recommendations are provided by the involved CA and EU's universities academic staff after the training, as well during the joint workshop. Some of the measures are already in the implementation.

Recommendations are as following:

- To encourage adoption and use of interactive teaching methods by organising mutual support and coaching within each respective university and possibly between CA universities academic staff. In order to make positive change, to find possibilities to reward teachers financially or through promotion for using more engaging teaching methods.
- To increase specific weight of digitally provided classes, especially those where understanding the contents require international experience, e.g., case studies of other countries, provided by students at the partner universities
- To improve the quality and attractiveness of the teaching/learning materials in all disciplines of the modernised curricula by using digital tools
- To organise annual internal monitoring (within a university) of how the academic staff adopts new teaching methods. Bilateral assessment (teacher-teacher) on teaching methods used have to be promoted, even though there are cultural tradition restraints currently
- To ensure joint development and sharing of new materials among involved academic staff and among partner universities (within own country)
- To introduce regular internal training sessions on the application of new teaching methods, tools and pedagogic approaches

3. Academic staff capacity building in study courses subjects

Academic staff training in study subjects was done by teachers at the involved EU partner universities in the time period September 2022 – May 2023. 78 teachers at the involved CA universities were trained. Number per each CA university involved is provided in the table below.

P2 NSU	P3 KNAU	P4 SBTSEU	P5 TSAU	**Total**
15	15	19	20	**69**

The thematic of academic staff training in CA universities is as following:

P2 NSU:

- Student field projects: Teaching and practical experience
- Ice cream quality evaluation methods
- Quality evaluation of dairy products
- Principles of microbiological testing in food hygiene
- Microbiological analyses for assessment of food safety

P3 KNAU:

- The use of case studies in higher education teaching
- Student field project: Teaching and practical experience
- Ultrasound examination of cow
- Metabolic disease diagnostics
- Parasitology methods
- Food legislation – Codex Alimentarius, Food legislation database
- Biological food safety
- Technology of milk and dairy products. Practical production of curd and testing of curd quality indices

P4 SBTSEU:

- Teaching Geo-indications with a case study assignment
- Food security. Agrarian policy
- Products expiration data
- Storage and processing of foodstuffs
- Global G.A.P.
- Metrology, standardisation and certification
- HACCP and TACCP quality management system

P5 TSAU:

- Food shelf-life. Legislation. Healthy claims
- Food shelf-life (new technologies for food shelf-life prolonging). Emerging technologies (irradiation). Emerging technologies (membrane technologies)
- The importance of international standards in ensuring the safety of agricultural and food products
- Prospects for the implementation of the Global G.A.P standard
- Implementation of the Global G.A.P. standard on farms
- Standard requirements for the implementation of the Global G.A.P. standard

3.1. Novelty of the new thematic knowledge

Possibility to modernise study programs, using European partner universities' experience, has been highly appreciated by the involved CA universities. Many subjects were partly or totally innovative for the partners. Those mentioned as the most innovative are Geo indication (provided by UAK), Zero waste

production (UAK, LBTU), Quality systems in food chain (LBTU), Laboratory works organisation principle, starting with problem and actuality, developing aim and solutions (LBTU), Waste free recycling (UAK - waste processing for obtaining plastic, LBTU - dairy products production). Searching solutions by viewing particular challenges from several disciplines perspective and combining knowledge of several fields of science was also mentioned as an innovative approach.

Innovative was also teaching methodology applied in thematic related subjects. Novelty for CA universities was a) illustration of theory with practice-based examples, b) on-line classes, methods and tools used for their provision, c) application of interactive methods, such as seminars, d) methods used for provision of laboratory and practical works (individually, group works, discussions, re –training). All above described helped to absorb new thematic related knowledge.

3.2. Impact of application of new knowledge on the study quality

While answering the question - how new knowledge has impacted teaching quality and results, CA universities academic staff mentioned several fields of knowledge and skills. Such as:

a) **innovative subjects,** described in previous chapters,

b) i**nterdisciplinarity** - searching solutions by viewing at particular challenges from different disciplines perspective and combining knowledge of several fields of science, linking subjects, and integration of one subject to another one,

c) **skills to apply and demonstrate in practice theoretical methods**,

d) **capacity and knowledge to analyse regulatory/legislative documents**, to explain their meaning and impact on real life situations, e.g. ISO standards.

There are some **immediate results** of the training: **improved quality of contents of lectures and more effective methods used to deliver the theme, improved quality of laboratory and practical works, which leads to better knowledge and skills of students, and promotes creation of knowledge helping to solve the problems encountered in enterprises**. Better organization of laboratory and practical work ensures efficient and effective use of both student learning time and resources. Increased level of knowledge in the thematic and skills to deliver it efficiently will let to continue to improve teaching process in the long term.

3.3. Main findings and recommendations

3.3.1. Challenges faced

Some teachers have limited English knowledge to understand to full extent the context and meaning of the training in the thematic provided, participate in discussions, as well to use new knowledge for creation of new and modernisation of the existing teaching and learning materials.

Though the equipment was acquired within the project, some CA teachers highlighted limited knowledge and skills to work with acquired equipment and to carry laboratory works independently. Limited funding for reagent provision was also mentioned as a challenge (for example, standard fixonals).

Due to full time employment and tight regular lectures schedule of CA teachers, it was challenging to find common time slots for joint training. Therefore, not all teachers for whom it would be useful to take part, were available.

3.3.2. Recommendations for follow-up activities

Range of recommendations are provided by the involved CA and EU's universities academic staff after the training, as well during the joint workshop. Some of the measures are already in the implementation. Recommendations are as follows:

- To organise short term (7-15 days) and medium term (1-3 months) mobilities of the CA academic staff at EU partner universities in thematic fields
- To develop and provide joint EU and CA universities scientific events, PhD works and publications in the covered thematic fields
- To organise internal measures aimed to improve knowledge and skills of the academic staff to work with acquired equipment and to carry laboratory works independently
- To encourage adoption and use of new contents by organizing mutual support and coaching within each respective university and possibly among CA universities academic staff. In order to make positive change, to find the possibility to stimulate teachers financially
- To organise annual internal monitoring (within a university) of how the academic staff adopts new contents. Bilateral assessment (teacher-teacher) on teaching methods used have to be promoted, even though there are cultural tradition restraints currently
- To deepen cooperation within the framework of the university-science-food production-public sector, in order to understand better stakeholders needs and interests, and update the capacities needed to respond to these needs and interests

4. Master classes

Master classes – open lectures discussions, involving internal and external stakeholders, is a new form of teaching and communication the higher education to the society, adopted at the involved CA universities while implementation of the project. Master classes were led jointly by EU and CA academic staff. 274 stakeholders took part in the total, where 54 were external out of the total number. Number of the participants per each involved CA university and per groups of stakeholders is provided in the table below.

Target groups reached	**Number of participants per partner and in total**				
	P2 NSU	**P3 KNAU**	**P4 SBTSEU**	**P5 TSAU**	**Total**
Number of master classes realised in each particular CA university	**5**	**7**	**7**	**6**	**25**
Total number of participants, inter alias:	**62**	**87**	**55**	**70**	**274**
Academic staff	15	47	14	12	88
Students	33	16	31	52	132
Food production entrepreneurs, inter alias farmers	11	7	6	4	28
Representatives of public authorities	3	17	4	2	26

4.1. Thematic, its selection and relevance to the interests of stakeholders

Master classes were organised in the chosen thematic, raising the highest interest of Uzbekistan's and Kyrgyzstan's partners and their stakeholders. This thematic is as following:

- Geo-indications: Concept, international experiences, and opportunities in Uzbekistan and Kyrgyzstan
- Plant safety
- Student field project: Teaching and practical experience
- Risk assessment methods
- Food safety
- Agrarian policy
- Storage and processing of foodstuffs
- Defining risk factors and their assessment in primary production - requirements of standardised
- Diagnostic possibilities by using ultrasound device in farm animals
- Animal nutrition. Feed evaluation systems
- Global G.A.P. as example of quality management in agricultural production
- Global GAP
- Standardised systems in plant and animal production - environmental aspects and approach to product safety
- Meat sensory evaluation
- Products expiration date
- Food self-life (new technologies for food shelf-life prolonging)
- Emerging technologies (irradiation).
- Emerging technologies (membrane technologies)
- Food shelf-life.
- Legislation.
- Healthy claims and nutrition claims
- Cow husbandry. Sheep husbandry
- Assisted reproduction technologies (ART) in farm animals. Multiple ovulation and embryo transfer (MOET), ovum pick up and in vitro fertilisation in farm animals

Thematic interests of internal stakeholders - academic staff and students - were identified by holding academic staff internal meetings. Interests of external stakeholders were assessed during national level seminars (such events were organised twice in each involved CA country) and by taking different approaches in each particular CA university. P2 NSU held a plenary discussion during the second part of the National seminar with the participation of stakeholders and NSU staff. P3 KNAU and P5 TSAU used a direct contact method (individual meetings of entrepreneurs and academic staff). P4 SBTSEU elaborated and distributed a questionnaire to the food processors.

Positive feedback from stakeholders, who participated in the master classes, was obtained. As especially significant and useful master classes were rated on the topics of a) new product development (provided by LBTU), b) agricultural enterprise certification system (UAK) and c) regulatory aspects (UAK), and c) Geo-indication: concept, international experiences, and opportunities (UAK, HWI). Format of the event – open discussion was characterised as novel and up to date format, unusual in Central Asia. Participants emphasised the significance of the provision of specific examples for demonstration of challenges, solutions, and results, because it helps to understand and choose possible pathways in own situations.

4.2. Main findings and recommendations

4.2.1. Challenges faced

Involved universities highlighted rather low interest of farmers on activities involving diverse groups of stakeholders, because a) they have no previous experience to participate in such a type of activities, b) are sceptical on cooperation with universities, c) have limited interest to devote time for discussions, when they do not earn anything, even if the participation can provide some benefits for them. The same partly can be applied to the public authorities. Constraint was also the level of understanding and expectations of different stakeholders – the academic staff looks at the topic more from a theoretical perspective, but entrepreneurs expect immediate practical solutions. Some stakeholders highlighted the need to prepare better for the master class thematically, in order to be able to go in depth discussions.

4.2.2. Recommendations for follow-up activities

- Master class format is a good tool to promote multi-stakeholder dialogue in topics being on the agenda of the involved parties and to ensure students access to the practice-based knowledge and skills, therefore have to be included as a teaching method. Scientific institutes, stakeholders and governmental officials have to take part in order to be able to create solutions for agriculture industry (science + production+ education)
- Master classes have to be used for informing external stakeholders about new trends and best practices in the field, as well as to get information on problems, which possibly can be solved with the assistance of knowledge created and provided by the universities
- Master classes should be announced very timely together with the distributed materials, including best practices and examples, which would help the participants to prepare better in order to be able to go in depth discussions and provide competence-based feedback
- Master classes should be supplemented with panel discussions of competent, experienced participants, and therefore they should be extended in time when needed
- Some master classes should be provided in the farms and food processing enterprises, therefore allowing to demonstrate application of knowledge in practice
- Master classes should be conducted strictly in a narrow specialty using theoretically based practical skills (feedback provided by AGROMIR LLC)
- Strong representation of the governmental officials would be very beneficial

5. Study visits

There were five study visits organised within the project, for the involved CA universities academic staff. Participants of Kyrgyzstan's and Uzbekistan's higher education institutions were preselected based on their involvement in the curricula modernisation, piloting, and foreseen further implementation.

Month, year	Venue of the study visit (university and country)	P2 NSU	P3 KNAU	P4 SBTSEU	P5 TSAU	TOTAL
June 2022	Linnaeus University (Sweden)	6	6	6	6	**24**
June 2022	Latvia University of Life Sciences and Technologies (Latvia)	6	6	6	6	**24**
September 2022	University of Agriculture in Krakow (Poland)	6	6	6	6	**24**
April 2023	Latvia University of Life Sciences and Technologies (Latvia)	6	6	6	5	**23**
April 2023	University of Agriculture in Krakow (Poland)	6	6	6	6	**24**

During the study visits EU partners demonstrated to the CA academic staff different aspects of academic activities: how the considered thematic is integrated into curricula of the EU HEIs, studies and research are integrated, research results are included in the teaching content, sustainability aspects are integrated into the curricula. When visiting external stakeholders' teachers were acquainted on cooperation forms among higher education institutions and agri-business sector, how work is being done with businesses to ensure that the business environment considers and respects sustainable aspects taking responsibility towards the environment and society, and what innovation and digital solutions are applied.

5.1. Impact of the study visits on the capacity of the CA academic staff and universities

The study visits helped to increase CA universities academic staff capacity in various ways. Measures mentioned in the reports, prepared after the study visits, and highlighted during the joint workshop (hold in June 2023) are:

- Participation in the lectures at the EU universities
- Visiting food production and processing enterprises
- Participation in laboratory works at the EU universities
- Working in the EU partners' libraries
- Visiting the EU partners' study and research laboratories, carrying research
- Visiting governmental institutions responsible for food production and processing supervision, monitoring and database maintaining
- Visiting other research laboratories in the visited countries, e.g., the Institute of Horticulture
- Visiting national bodies responsible for food legislation development and implementation
- Meeting food producers' cooperatives and clusters

Main benefits obtained from the above listed activities are a) new knowledge and better understanding how different food production and processing processes are organised, controlled, and evaluated, b) increased capacity to carry research, c) joint initiatives with EU partners for cooperation in the development of novel food products, d) cooperation among CA and EU partners and among CA partners

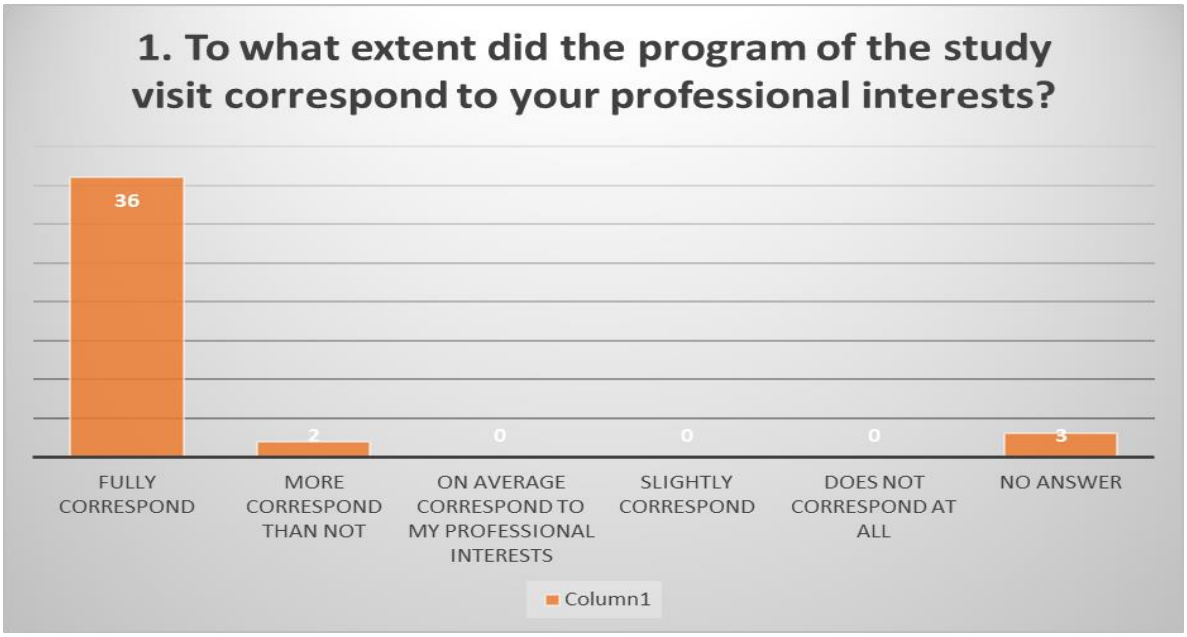
for conducting joint research and writing international scientific publications. Increased teaching potential in the field of food safety has been mentioned as especially significant.

The experiences gained will be used for a) development of new curricula and/or study courses, especially in fields of agricultural food innovation, food safety, sustainable production chains, quality management in agricultural production, development and management of plant and animal origin based food production systems, food shelf-life extension, and other, b) development of effective regional and international networks and cooperation mechanisms, where universities, governmental institutions farmers, food processors are equally and fairly represented.

All of the above described has direct general impact on the increase of the capacity of the involved CA universities because more capable teachers will be able to deliver such higher education, which attracts students, and which is respected and appreciated by the economic sectors for which professionals are prepared.

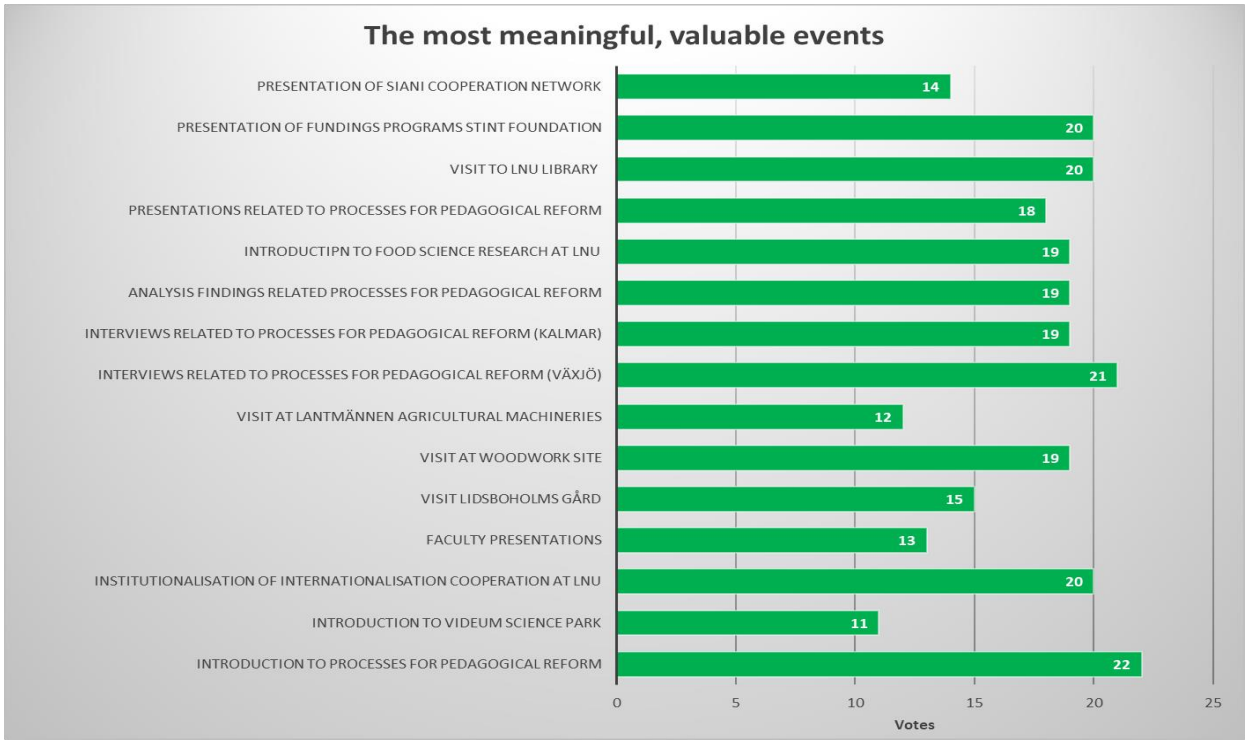
After each first round **study visit, held in June and September 2022**, participants evaluated the impact of the particle experience gained visiting institutions and participating in planned events. **All visits to Latvia, Sweden and Poland fully corresponded with participants' professional interests and needs. Summary is provided in the following figures.**

Overall evaluation of the study visits to Sweden, Poland and Latvia



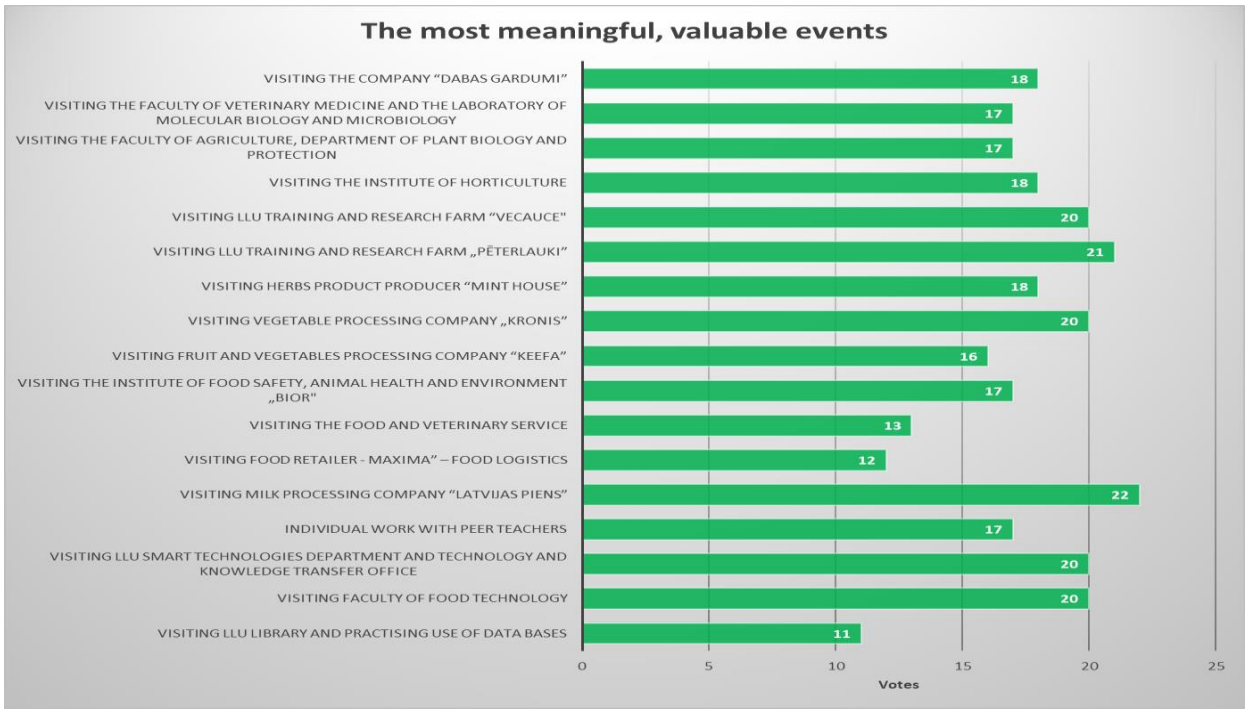
During **study visit to Sweden**, participants appreciated the opportunity to improve their knowledge and skills to implement pedagogical reform in their universities. Important experience for future research work was gained during the visit to Videum Science Park and the International Partnership for Higher Education governance at LNU. The participants also found the visits to rural enterprises (Lantmännen agricultural machinery; site of VIDA forest work; Lidsboholms gård) important. Overall, the study visit to Sweden was very highly rated by participants.

Evaluation of the study visit to Sweden in June 2022



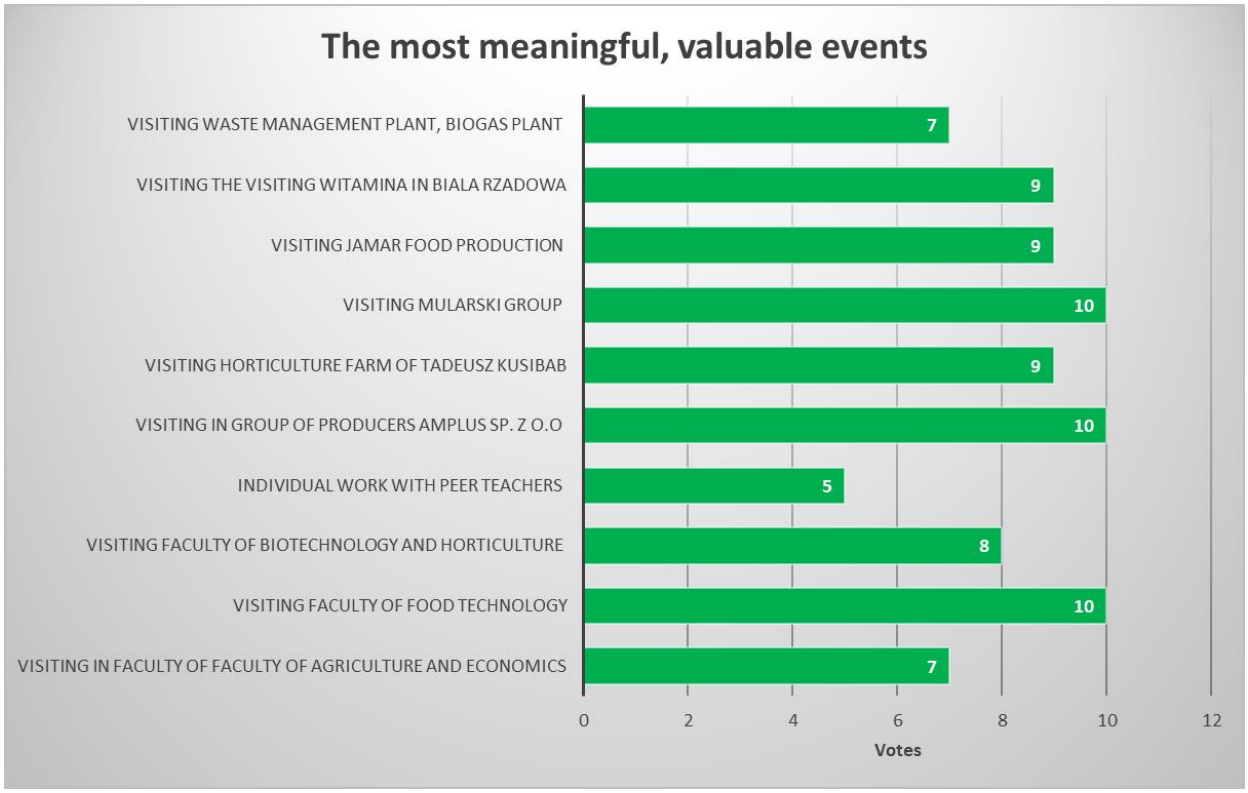
Participants have rated their **first visit to Latvia** very highly. The most important experience was gained by visiting LBTU structural units: the library, where participants had the opportunity to work with various databases; the Faculties of Food Technology, Veterinary Medicine and Agriculture; the Smart Technologies Department and Technology and Knowledge Transfer Office., where participants gained experience in establishing cooperation between the university and the manufacturer in their countries. The participants highlighted the visits to LBTU training and research farms „Pēterlauki" and "Vecauce" and production enterprises ("Latvijas Piens", "Keefa" and "Kronis") as useful for them. The participants stressed that the knowledge and experience gained during the visit could be further used in their scientific and pedagogical work.

Evaluation of the 1st study visit to Latvia in June 2022



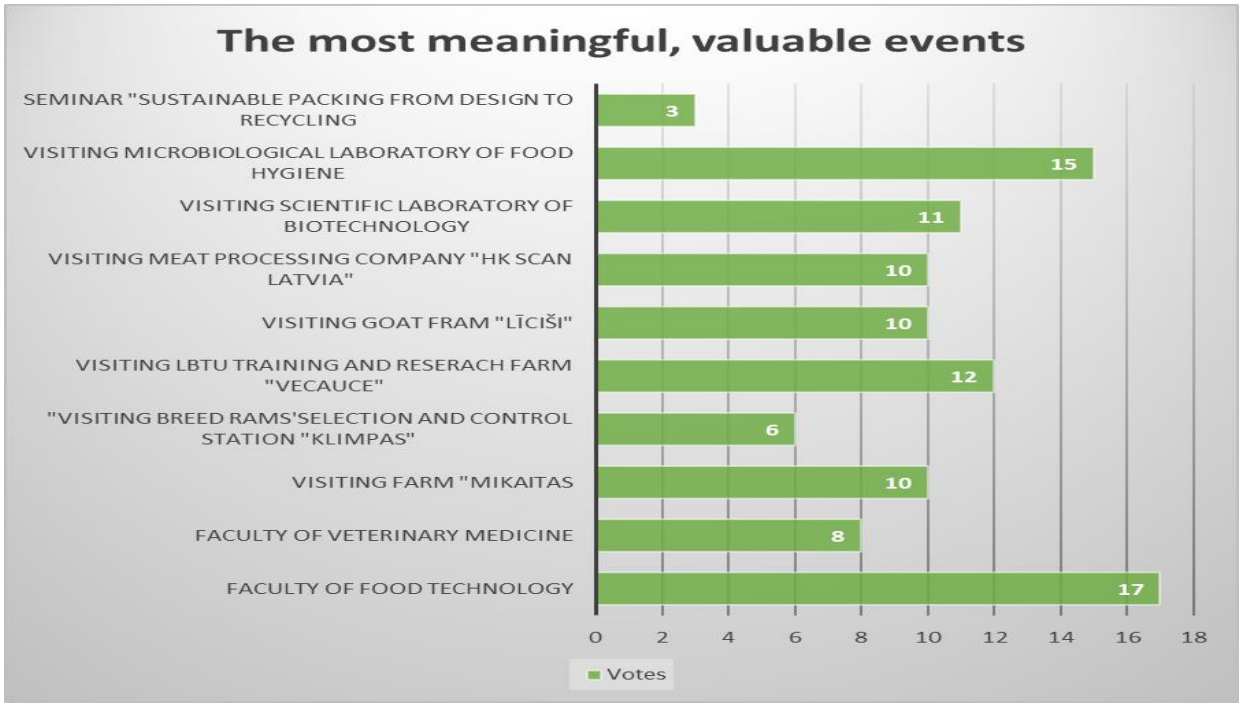
Participants have similarly evaluated their **first visit to Poland**. Participants highlighted the faculties (Agriculture and Economics, Food Technology, Biotechnology and Horticulture) visits as very useful for their pedagogical and scientific work. Participants as important and useful for their future work also mentioned visits to companies: Group of producers Amplus sp. Z.o.o., Horticulture Farm of Tadeusz Kusibab, in Mularski Group, Jamar food production plant:

Evaluation of the 1st study visit to Poland in September 2022



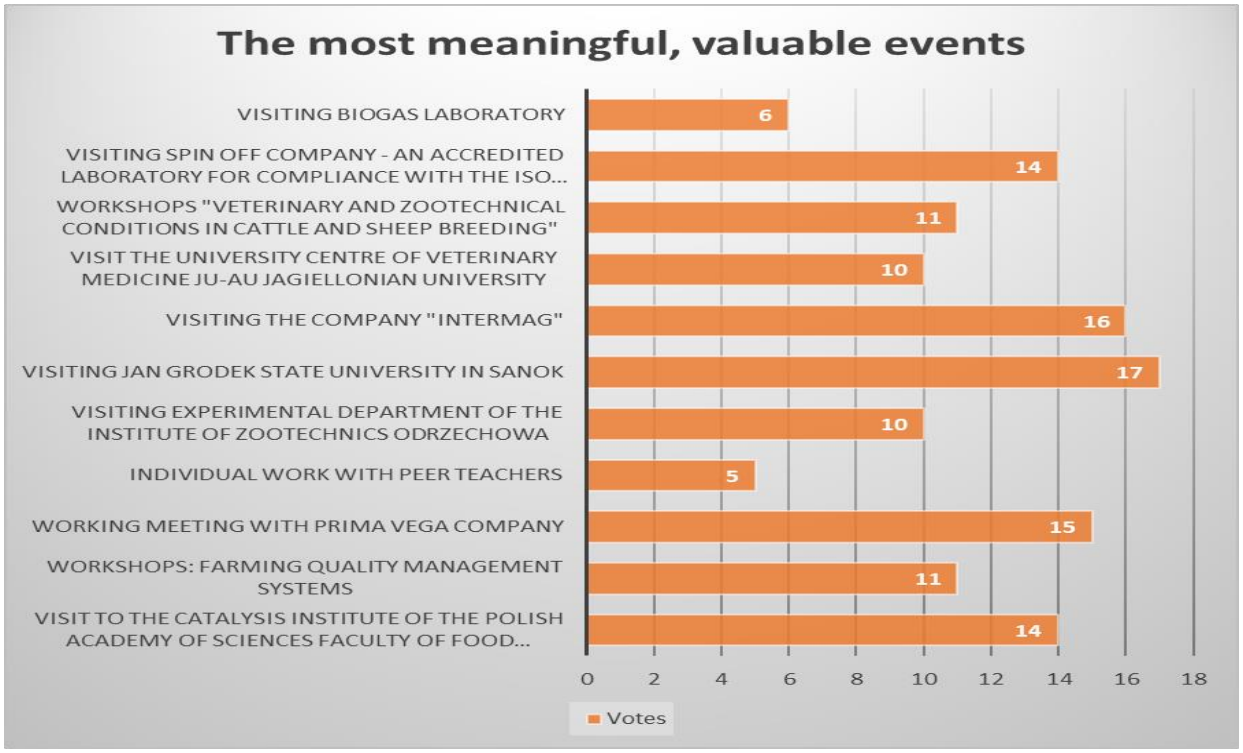
Participants were asked to evaluate the visited institutions after **the second study visits, held in April 2023**. **In Latvia the most meaningful experience** was gained in LBTU Faculty of Food Technologies and Microbiological laboratory of food hygiene, as well as LBTU training and research farm "Vecauce", although all visits were important at least for some people. Participants believe that the most valuable part of the visits was practical examples, to observe theory in practice and linkage with scientific research in home universities.

Evaluation of the 2nd study visit to Latvia in April 2023



The Poland visit showed similar results. All visited institutions were emphasised in the questionnaire. It was very important for participants to get acquainted with innovative and modern technologies, some of participants outlined that visited institutions were related to their work at university.

Evaluation of the 2nd study visit to Poland in April 2023



In both visits participants have learned new things. After the Latvia study visit one third of participants have learned sensory evaluation methods and making ice-cream - selection and calculation of ingredients whereas in Poland new for participants were gene banks of goats and surgical equipment for animals.

5.2. Main findings and recommendations

5.2.1. Challenges faced

Some teachers have limited English knowledge to understand to full extent activities, where contents were explained in English. Where possible Russian was used, and interpretation was provided at sites where English was used by hosts.

Due to full time employment and tight regular lectures schedule of EU and CA teachers, it was challenging to find common time slots for provision of the joint study visits.

5.2.2. Recommendations for follow-up activities

- For future study visits placements in food processing companies and farms would be recommended
- Individual approach, focusing on a certain issue, thus reducing the number of people in the group and extending the time for questions-answers is recommended.
- To strengthen EU and CA universities collaboration: develop and implement joint projects, organise mobilities for the academic staff and for students, carry joint research, and elaborate publications.

6. Field (farm-based) training of the academic staff

A series of practical training of the CA academic staff on the topic "Food safety of agricultural products based on the GLOBAL G.A.P standard" were held in two universities in Uzbekistan and two in Kyrgyzstan. Training modules provided were prepared according to the Integrated Farm Assurer (IFA) framework version 5.2. 3-day webinars (online activity) and extended 3-days training (farm-based training in planting sector) in Uzbekistan and 6-days training (planting and livestock sectors) in Kyrgyzstan were held. **The total number of participants in webinars was 108 individuals. 68 individuals participated in the training.** In terms of each CA university, the number was as following:

№	Partner university	Thematic, format	Number of participants
1	TSAU & SBTSAU	Webinar: Field (farm based) training on GLOBAL G.A.P. / **general provisions**	45
2	KNAU & NSU	Webinar: Field (farm based) training on GLOBAL G.A.P. / **general provisions**	63
3	TSAU	Training: Field (farm based) training on GLOBAL G.A.P. / **planting sector**	**20**
4	NSU	Training: Field (farm based) training on GLOBAL G.A.P. / **planting sector**	**16**
5	NSU	Training: Field (farm based) training on GLOBAL G.A.P. / **livestock sector**	
6	KNAU	Training: Field (farm based) training on GLOBAL G.A.P. / **planting sector**	**10**
7	KNAU	Training: Field (farm based) training on GLOBAL G.A.P. / **livestock sector**	
8	SBTSEU	Training: Field (farm based) training on GLOBAL G.A.P. / **planting sector**	**22**

Total number of participants of webinars – 108.

Total number of participants of trainings – 68.

6.1. Results and impact of the field training on the capacity of the CA academic staff and universities

According to the feedback, provided by the CA academic staff, the farm based training helped to obtain new and practical knowledge in the field of good agricultural practice approach introduction and maintenance: understand Global GAP standards, requirements to prepare enterprise for the certification, preparatory measures to be implemented, minimization of resources to be used in the process, checklists to be used, risks to be considered, processes to be carried and documentation to be elaborated for proper maintenance of the food enterprise, specificities of standard implementation in the conditions and background of Uzbekistan and Kyrgyzstan and other. Teachers also learned to use online resources for self-study and improvement on knowledge on the GAP and Global G.A.P., e.g. website of the Global G.A.P, system. Acquired knowledge is already in use by the academic staff of some of CA partner universities. E.g. P4 SBTSEU has improved the syllabus of the curriculum "Fundamentals of metrology, standardisation and certification of bioproducts", by including the knowledge on the GAP system.

6.2. Main findings and recommendations

6.2.1. Challenges faced

The time spent in farms on the training was rather short to understand all provided information and experience, because the thematic is new, and teachers demanded detailed explanations, illustrated with practice-based examples.

It was mentioned also that more attention should be paid for identification and highlighting differences of internationally recognised good agricultural practice related requirements and regulatory framework of the involved Central Asia countries, because EU and CA legislation do not comply often. Analysis of differences should be done, and appropriate solutions found in the follow up period. For example, to analyse the differences between Global GAP requirements and national legislation, universities were invited to become members of national working groups under the Ministry of Agriculture and Standardization Agencies, which are currently developing national interpretations on Global GAP. It is the national interpretations on Global GAP that reveal the differences and gaps between the requirements of the standard and legislation.

Methodology of the certification process, to be carried in Central Asia enterprises, has to be reviewed in light of cultural mentality and gender equality issues. Appropriate actions have to be included.

6.2.2. Recommendations for follow-up activities

- To include in the modernised curricula practical works for students
- To organise national, regional, and international seminars on good agricultural practice with participation of universities and farmers
- To carry scientific research about risk factors in G.A.P system in Central Asia countries
- To encourage elaboration of CA farms' environment-based video materials on the good agricultural practice and Global G.A.P.
- To provide in depth analysis of CA and EU and CA countries regulations related to the GAP, identify challenges of CA countries and find realistic and efficient solutions for the GAP implementation and maintenance

7. Application of quality assurance and assessment methodology (QAAP)

The Methodology for the assurance and assessment of quality of modernised higher education study programmes (QAAP) has been elaborated by the project partners with the aim to improve the quality of higher education thus promoting increase of the efficiency and competitiveness of agro-industries and the food processing industry in Kyrgyzstan and Uzbekistan. The QAAP is available here:

The methodology includes a) detailed information on the modernised study programmes at the each involved CA university, b) explanation of knowledge, skills and competencies students should obtain during studies, c) education programme quality assessment criteria, grouped in 3 blocks:

1) criteria for assessment of the modernised programmes scope, contents and relevance,

2) criteria for assessment of the modernised curricula implementation process,

3) criteria for assessment of the results and effects.

7.1. Application of the QAAP and its impact on modernized curricula quality

The methodology has been integrated in the internal quality assurance systems of all involved CA universities. Its application during the project was done by reviewing two first groups of the criteria.

The Quality Assurance and Assessment Methodology at **P2 NSU** was adopted and is coordinated by the Accreditation and Quality Monitoring Unit in coordination with the head of the faculty "Technology of production and processing of agricultural products". During the project implementation NSU assessed the quality of the updated curriculum, the quality of implementation, and immediate results. The assessment highlighted several issues, requiring action. They are: 1) to assess in depth students' learning needs, 2) to continue adoption of the educational materials, 3) to increase number of hours spent for practical works, 4) to acquire additional literature and laboratory equipment.

The modernized curriculum quality assurance and assessment methodology is adopted at the **P3 KNAU**. At the beginning QAAM was presented for discussion at the Academic Council of KNAU, approved and recommended for use by the Department of Quality in assessing the quality of educational programs and disciplines. During the project the project team of KNAU has applied most of these assessment criteria. Assessment findings have helped: 1) to identify challenges and to find their solutions, 2) to improve the relationships strongly with the alumni and stakeholders, 3) to improve assessment process, 4) to identify the future steps in improvement quality of agriculture related education programmes.

The **P4 SBTSEU** project team utilised 24 of the criteria to evaluate the Bachelor study program "Agribusiness and Investment Activities". Quality was assessed with regard to the quality and relevance of new contents, quality of their implementation, the achieved immediate results. The main aspects assessed are: 1) relevance of taught knowledge in alignment with the needs of agro-industry enterprises, 2) relevance and gaps in educational materials, including literature and laboratory equipment, 3) academic, digital, and didactic competencies of the staff involved in the educational process, 4) scope and quality of theoretical and practical knowledge and skills provided, including research skills and critical thinking. The assessment of the quality was carried out by the Quality Control Department. The modernised curriculum changes have been approved by the Department of Green Economy and Sustainable Business, reviewed and endorsed by the Educational and Methodological Committee of the institute, and approved by the Institute's Academic Council.

At the **P5 TSAU** the QAAM was initially studied by the departments of "Education Quality Control" and "Education Quality Control" and discussed at the Academic Council. Modernized curriculum and particular subjects were coordinated by the Department of Accreditation and Quality Control in

agreement with the head of the department of “Preservation and Processing of Agricultural Products” and the Dean of the Faculty of “Preservation and Processing of Agricultural Products”. The main quality and relevance aspects used and found the most significant at the TSAU are: 1) compliance of the taught knowledge and skills with the most important current challenges and problems, 2) regular updating of the teaching materials, 3) regular updating of the curriculum evaluation criteria and further strengthening of evaluation processes, 4) using more hands-on activities during classes.

The QAAM will be used further in all respective CA universities for the assessment of the modernised curricula, as well criteria and indicators will be adopted for assessment of other study programmes.

7.2. Main findings and recommendations

7.2.1. Challenges faced

It is rather challenging to introduce assessment methods in Central Asia universities when students assess performance of the teachers as well peer review of methods applied by colleagues, as this to some extent breaks cultural boundaries. There is no tradition in the partner countries when younger people evaluate activities of older ones or younger colleagues assess performance of older ones.

According to the feedback, provided by the involved CA universities academic staff, the project highlighted lack of assessment tools – qualitative electronic and digital questionnaires at the involved universities - allowing to assess students', especially graduates’, skills, knowledge, and competencies from perspective of the agriculture sector stakeholders. Academic staff needs more knowledge and skills to develop needed tools. Support of quality assurance units is required.

It is rather challenging to involve entrepreneurs in the curricula assessment process. Additional efforts are needed to introduce the approach in practice.

In P2 NSU adoption of the Quality Assurance and Assessment Methodology took more time than expected, because of internal procedures.

7.2.2. Recommendations for follow-up activities

- To introduce systematic assessment of the quality of educational materials for modernized disciplines, including lectures' summaries, seminar and practical session plans, laboratory work, practical assignments for non-auditory and independent student work, assessments, test assignments, recommended literature lists, and other
- While elaboration and improvement of the quality assurance tools, to take into consideration cultural and organizational uniqueness of educational institution and region, and to apply adaptive criteria, aware of the changing needs of the labour market
- To reconsider existing assessment mechanisms in terms of their ability to stimulate real reflection and action on opportunities to improve the entire educational process
- To continue development of fair approach and trust in quality assurance as a management approach, which will have positive impact on overall performance of the faculties, departments and universities
- To strengthen cooperation of universities with enterprises and industry professionals during the entire education process, including assessment of study programmes, conducting internships, laboratory and practical sessions, and participation in certification exams for the specialty, as well as the evaluation of diploma and master's theses and projects
- To elaborate and adopt systematic electronic and digital assessment tools for employers, for assessment of graduates' skills, knowledge, and competencies from perspective of agriculture industry