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D 5.2. DEVELOPMENT OF RESEARCH LABS

WP5 - DEVELOPMENT OF INFRASTRUCTURES



Co-funded by the
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Deliverable 5.2. Development of research labs

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Approved on behalf of STEPS

Name

Partner

STEPS Management Team

Position

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EXECUTIVE SUMMARY

Research Laboratories in the partner countries HEIs have been developed with new equipment that will support the development and increase in quality and relevance of courses. Equipment and software are purchased and installed. EU partners were actively involved, mainly for mentoring purposes. Faculty-technical staff will prepare experiments/simulations and laboratory training material based on the installed equipment. Software training will be conducted by professionals outside University of Bihać (natural person-contract based). Two types of laboratories developed in partner countries HEIs are „Food Quality Control Lab“ and „Food Production Systems Management Lab“.

1 GUIDELINES

- Briefly describe the equipment included in the laboratory and explain the relationship between developed laboratories and MSc STEPS program Courses,
- Briefly describe the development of two types of laboratories at your University,
- Be sure to attach a photo of the developed laboratories,
- **Please provide all documents related to the development of two types of laboratories (scanned PDF file). You should send the same or similar documents depending on your internal procedures, with translation of the document title. Supporting documents for development of laboratories (example of UNBI documents): [GUIDE FOR SUBMISSION OF ALL DOCUMENTS](#)**
 - ✓ Documents (e.g. Request) for adopting the decision on establishment of laboratory/IT cabinet for Food production systems management within the STEPS Project (*original documents and English version*),
 - ✓ Documents (e.g. Request) for adopting the decision on modernization and strengthening of capacities of Laboratory of PARTNER COUNTRIES HEIs in the domain related to Grocery quality control within the STEPS project) (*original documents and English version*),
 - ✓ Documents (e.g. DECISION) on establishment of “**Food Production Systems Management Lab**” within the framework of STEPS Project,
 - ✓ Documents (e.g. DECISION) on establishment of “**Food Quality Control Lab**”; within the framework of STEPS Project,
 - ✓ Documents (e.g. Certificates) about Installation Training/Education/small-scale demonstrations provided by suppliers (legal representatives of equipment manufacturers).
- All the documents related to the development of two types laboratories have to be included in report.
- All equipment pieces in the developed laboratories procured by the the Erasmus+ CBHE funds must bear an Erasmus+ sticker
- All equipment pieces in the developed laboratories must be properly registered in the inventory of the institution concerned.

Please refer the

- ✓ **Development of the „Food Quality Control Lab“ and the „Food Production Systems Management Lab / ICT-centar“ within the project „MSc in Sustainable Food Production Systems/STEPS“** justification for equipment specification modification, detailed argumentation and specification for equipment procurement: <https://btf.unbi.ba/wp-content/uploads/2019/12/Detailed-Justification-specification-and-argumentation-for-purchasing-equipment-STEPS-2019.pdf>
- ✓ **Guidelines for the Use of the Grant-for grants awarded in 2017 under Call EAC/A03/2016 p. 25, 3.2.6.1 Equipment:** [Capacity Building in the Field of Higher Education 2017 \(europa.eu\)](https://ec.europa.eu/europa.eu/capacity-building-in-the-field-of-higher-education-2017)

2 INTRODUCTION

2.1 Aims and objectives of STEPS project

The main objective of the project is the implementation of a modern MSc programme on “Sustainable food production systems”, compliant with the Bologna convention. Food culture and sociology, agriculture and rural development, food engineering, quality and safety, environmental footprints, economics, management and governance will be combined in a flexible and modular educational programme, designed and developed in the light of the European initiative for the transition to circular economy.

Partner countries HEIs will be supported in order to help them provide an education aligned to the needs of the labour market and society. Laboratories will be equipped with experimental devices, computers and software. Scientific staff of the HEIs involved in the consortium will have the opportunity to enrich their scientific background and be familiarized with modern educational methodologies and ICT tools, in order to practice student-based approaches, and teaching based on learning outcomes.

2.2 Purpose of Development of research labs

Research laboratories have been developed in all partner countries in order to build the capacity of HEIs in terms of advanced software licenses and experimental devices. The equipment will be used to improve the quality of teaching and the level of knowledge delivered, but it will also increase the potential of the scientific staff so that they are able to prepare and publish research articles in international scientific journals and conferences. These types of laboratories in the partner countries will also offer the opportunity to organise joint programmes with industrial partners or small and medium private sector companies, and national bodies involved in decision-making and the development of policies.

Two types of laboratories that have been developed in partner countries HEIs are:

- **Food Quality Control Lab**; it will offer the advantage to experimentally specify the quality of agricultural products, by utilization of mass spectrometry, in particular after small-scale treatment and/or small-scale processing.
- **Food Production Systems Management Lab**; it will offer to students the opportunity to design and analyse processes, supply chains and evaluate the performance of production systems, in terms of energy consumption, environmental impact and recoup.

3 DEVELOPMENT OF RESEARCH LABS IN PARTNER COUNTRIES HEIs

The specifications of the experimental devices of the Food Quality Control Lab were supervised by **AUT**, **UNBI** and **UNSA**. Scientific staff of **USAMVB** and **ReadLab** were actively involved in the task as advisors. Regarding the Food Production Systems Management Lab, **UET**, **UHZ**, **UC** and **UNSA** were responsible for evaluating the corresponding specifications, while scientific staff of **CULS** and **TEISTE** and **ReadLab** were also involved in the tasks, mainly, as advisors.

After the purchase and installation, small-scale demonstrations have been provided by suppliers, so that the scientific and technical staffs become familiar with the operation of the devices and could prepare experiments/simulations and develop the training material of the planned activities (*task 5.3*).


Considering the educational content of the STEPS programme in particular, each of the experiments and simulations and training material should include learning outcomes on an experiment/simulation level, a detailed description of the experiment/simulation, guidance and a description of the steps towards the successful implementation of the activity. UNBI was responsible for collecting all necessary documentation and submitting it to the coordinator to make it available to the EACEA.

4 DEVELOPMENT OF RESEARCH LABS IN ALBANIA


4.1 Development of research labs at Agricultural University of Tirana (AUT - P1)

4.1.1. Food Quality Control Lab Equipment



Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory - Food Quality Control Lab
Equipment piece	pH meter Benchtop (including electrode for solid samples)
Specification	<p>pH benchtop meter with pH combination electrode.</p> <p>Precise measurements</p> <p>Reproducible measured results due to the active automatic function with independent detection of stable measuring values. An adjustable calibration timer assists in an increased improvement of the accuracy.</p> <p>User friendly keyboard with large, easy to read LCD display</p> <p>measuring range pH -2 ... 16. -2000 ... 2000 mV.</p> <p>temperature: -10 ... 100 °C. ISE 0 ... 30000 ppm</p> <p>pH resolution 0,1 / 0,01 / 0,001</p> <p>pH accuracy $\pm 0,1$ / $\pm 0,01$ / $\pm 0,005$</p> <p>pH calibration 1 to 3 points</p> <p>mV resolution 0,1 / 1</p> <p>mV accuracy ± 1 / $\pm 0,3$</p> <p>Display Graphic LCD Display. 128 x 64 pixel, backlid</p> <p>storage 4000</p> <p>channels 1</p> <p>protection IP 40</p> <p>interface USB</p> <p>Power supply external power supply 5 V DC of 100 - 240 V. 50/60 Hz. power input: 5 Watt</p> <p>pH combination electrode: Plastic shaft, hole-junction, Referid® electrolyte, Ag/AgCl-reference system, spear membrane, A-glass, plug head, length 65/25 mm, 12/5 mm Ø, -5...+80 °C, 2...13 pH.</p> <p>Puncture knife for puncture electrode for pH measurement semi-solid and solid foods such as meat, sausage and cheese.</p>
Quantity	1

Cost	1.800 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> - <i>Fundamentals of sustainable agri-food systems;</i> - <i>Agricultural and food industry waste management;</i> - <i>Advanced food science and technology;</i> - <i>Quality System Development, Management and Shelf Life Assessment of Food</i> - <i>Quality and Sustainability of Animal-source Food Production</i> - <i>Traceability systems of food products</i> - <i>Innovative product development</i> - <i>Innovative practices of harvesting and post harvesting</i> - <i>Ecological sustainability for Fish Management and Conservation</i> - <i>Environmental Chemistry towards Food Processing</i> - <i>Profesional Practice</i> - <i>Master Thesis</i> <p>To be used for measuring of pH of liquid and solid food and feed, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6218 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	


Partner No	P1
Name (University)	Agricultural University of Tirana (AUT)
Country	Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Kjeldahl system fornitrogen and protein analysis including digestion 8 places and scrubber unit
Specification	<p>Semi-automated system for Kjeldahl and other nitrogen based chemical analysis for Protein and Nitrogen testing in: raw materials and finished products in food, feed and agriculture. Safe and semi-automated distillation, addition of alkali and the time interval for distillation can be pre-programmed for consistent results independent of operator. High accuracy bellow pump for reagent. Safe operation with feature for safe distillation of samples that form salt cakes. Safety features including safety door, plus level pins and overpressure sensors for the steam generator.</p> <p>Power supply: 200-240 V 50 – 60 Hz. Water consumption:2 l/min at water temp of 30°C (During distillation only): 1 l/min at water temp of 15°C:</p> <p>Power consumption:1900 W.</p> <p>Ambient temperature: Max 40°C.</p> <p>Ambient humidity: Max. 80% relative.</p> <p>Drain: For cooling water only.</p> <p>Officially approved (AOAC, EPA, DIN, ISO) for simplified validation. Kjeldahl tablets 1 box. Digestion system: Digestion system based on a digestion unit and tube rack, allowing digestion for safe and flexible Kjeldahl analysis. Sample types. Raw materials and finished products in food, feed, agriculture and related matrices. Water and wastewater and a wide range of industrial compounds. Parameters: Kjeldahl digestions, chemical oxygen demand and other reflux chemistries, trace metal analysis by AAS or ICP instruments. Built in, user definable, time and temperature controller and display. Digestion unit should be insulated to minimize heat transfer to the surroundings and allow fast, even heating and saving energy. Audible alarms for ready, cycle over or errors. Accessories: Exhaust manifold, 250 ml tubes x 8 pcs, Kjeltabs 1x1000 tablets. Performance data: Temperature range: Ambient - 440°C. Temperature setting repeatability: 1°C. Temperature readout: Digital. Heater indication: LED. Heater warning: Text in display. Over temperature protection: Yes. Temperature stability at 100°C: ± 2°C. Temperature stability at 400°C: ± 1°C. Heating time 20 to 400°C at 230 V: ~35 min. Time setting per step: 1 - 999 min. Tubes / batch: 8. Typical sample capacity: Tube size: 250 ml. Sample size solids: up to 5 g. Sample size liquids: up to 15 ml. Tube size: 100 ml . Sample size solids: up to 1 g. Sample size liquids: up to 3 ml. Scrubber unit for safe fume removal: Scrubber Unit as a self-contained unaffected by water supply issues allowing to safely remove acid fumes, moist during digestion moist by connecting the exhaust manifold to scrubber unit. Acid vapours are first condensed and diluted in a large acid trap and then passing through a second smaller acid trap which protects the vacuum pump. The cleaned air is then vented via a tubing outlet. In the interest of GLP and H&S this venting tube should be directed into a fume cupboard. Power supply: 220-240 V, 50Hz. Power consumption: 50 W. 4 x Burettes straight, burette clamps for 2 burettes steel x 2 pcs, including stand and rod x 2 pcs and 1 Schilling burette amber Plastic. Installation and training should be included in the price.</p>

Quantity	1
Cost	14.000 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> - <i>Fundamentals of sustainable agri-food systems;</i> - <i>Agricultural and food industry waste management;</i> - <i>Advanced food science and technology;</i> - <i>Quality System Development, Management and Shelf Life Assessment of Food</i> - <i>Quality and Sustainability of Animal-source Food Production</i> - <i>Traceability systems of food products</i> - <i>Innovative product development</i> - <i>Innovative practices of harvesting and post harvesting</i> - <i>Ecological sustainability for Fish Management and Conservation</i> - <i>Environmental Chemistry towards Food Processing</i> - <i>Profesional Practice</i> - <i>Master Thesis</i> <p>To be used for measuring of N (protein) of food and feed, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6219 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	


Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	ELISA system
Specification	<p>Elisa reader for microtitre plates absorbance reading as well as kinetic reading. Range of wavelengths 365 – 1050 nm Measuring range 0,000 – 4,000 OD Precision 0,000 – 2,000 OD \leq 1.0% or 0,002 OD 2,000 – 4,000 OD \leq 1.5% Accuracy 0,000 – 2,000 OD CV \leq 1.0% or 0,002 OD 2,000 – 4,000 OD CV \leq 1.5% Bandwidth FWHM 10 nm Optical parameters 12 channels + reference channel Light source LED Plate movement Axis Y Plates Standard 96-well microtiter plates Control External PC (not included) Communication interface USB Reading speed for one filter 10 s Power supply 120-230V, 50-60 Hz Power consumption 30 W max Aflatoxin B1 complete Elisa kit, Variable volume single channel pipettes: 0.1-10 ul 10-100 ul 100-1000 ul 1-10 ml Pipette tips 1000 each for 10 ul, 100 ul and 1000 ul and 250 pipette tips for 10 ml pipette. D-Lactic Acid (D-Lactate) (Rapid) test kit is suitable for the rapid, specific measurement and analysis of D-lactic acid in wine, beer, juice, milk, cheese, vinegar, meat and other food products. D-Malic Acid assay kit is suitable for the specific measurement and analysis of D-malic acid (D-malate) in beverages and food products.</p>
Quantity	1
Cost	5.900 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Ecological sustainability for Fish Management and Conservation •Professional Practice •Master Thesis <p>To be used for measuring of mycotoxins, D-lactic acid, D-malic acid etc. in wine,</p>

	beer, juice, milk, cheese, vinegar, meat and other food products. and feed, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6220 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	 

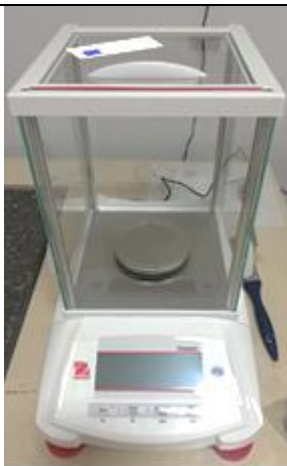
Partner No	P1
Name (University)	Agricultural University of Tirana (AUT)
Country	Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Vortex mixer
Specification	<p>Offers touch and continuous orbital mixing for variety of applications. Provides efficient mixing with infinitely adjustable electronic speed control from 0 to 3000 rpm.</p> <p>Operation time can be set and controlled electronically between 1 second to 100 minutes. User friendly large LED displays enable easy setting and reading of speed and time.</p> <p>Guarantees perfect mixing of a 50 ml tube in 5 seconds with 6 mm diameter orbital movement.</p> <p>Unique counter-balance system creates maximum vortex power while minimizing the noise and excessive vibration.</p> <p>Aluminium cast base avoids moving and slip</p> <p>resistant silicone feet pads minimize the vibration</p> <p>Reliable and extremely quiet motor guarantees an even distributed efficient mixing for all speeds ranges.</p> <p>Head is easily removable and replaceable with optional adapters that offer multiple use with different tube diameters.</p> <p>speed & time display LED</p> <p>speed range (rpm) 0 - 3000.03.001</p> <p>run time continuous / touch operation</p> <p>mixing motion orbital</p> <p>orbital diameter (mm) 5</p> <p>voltage (V) 220</p> <p>frequency (Hz) 50/60</p> <p>power (W) 20</p> <p>protection class IP 21</p>
Quantity	1
Cost	240,00 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Agricultural and food industry waste management; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Innovative practices of harvesting and post harvesting •Ecological sustainability for Fish Management and Conservation •Environmental Chemistry towards Food Processing •Profesional Practice •Master Thesis

	For continuous orbital mixing for variety of applications for food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6221 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	


Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Centrifuge general purpose 8x15 ml tubes
Specification	<p>Centrifuge for fast separation of serum, plasma, urea, blood samples and other routine applications in medical, research and chemical laboratories.</p> <p>Explosion proof and marked as CE, cTUVus, and FCC.</p> <p>MCA test according to IEC/EN61010-2-10.</p> <p>Brushless DC motor accelerates the rotor to the set speed with low vibration and also with a quiet operation less than 56 dB noise level.</p> <p>User friendly large LCD display enables easy setting and reading of the functional parameters.</p> <p>Both RPM and RCF can be set and displayed. The parameters can be modified after the set speed is reached.</p> <p>Starts and reaches a maximum speed of 4.500 rpm with max 2.490 RCF in seconds. Speed can be set with an accuracy of +/- 20 rpm.</p> <p>Metal casing with low gravity, provides stable and reliable running at maximum speed. Timer can be set from 30 seconds to 99 minutes or continuous running.</p> <p>Timer starts once the target speed is reached for more accurate operation time.</p> <p>Short spin function is used for quick spins by pressing and holding the "pulse" key.</p> <p>Multi voltage design guarantees stable running and high accuracy of speed.</p> <p>Featured with a dual door interlock system for twice safety.</p> <p>Electronic brake immediately stops when lid opens for user safety.</p> <p>Lid is released automatically when the rotor stops.</p> <p>The unique design guarantees stable running and high accuracy of the speed. High strength rotor and excellent balance technology guarantees a quiet and stable operation.</p> <p>Delivered complete with a 8 cavity angled rotor and suitable adaptors to be used with 15 ml conical tubes and all kinds of blood collection tubes.</p> <p>maximum speed (rpm) 4500</p> <p>maximum RCF (xg) 2490</p> <p>speed accuracy (rpm) ± 20</p> <p>acceleration / braking time (sec) 20 s 20 s</p> <p>speed control (rpm) increment of 100</p> <p>RCF control (xg) increment of 100</p> <p>noise level (dB) < 56</p> <p>run time 30 sec. - 99 min. or continuous</p> <p>Voltage 220</p> <p>Frequency 50 Hz</p> <p>safety devices door interlock, over - speed detection automatic internal diagnosis</p> <p>additional features sound alert function, speed / RCF switch short time run function</p>
Quantity	1

Cost	850,00 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Agricultural and food industry waste management; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Innovative practices of harvesting and post harvesting •Ecological sustainability for Fish Management and Conservation •Environmental Chemistry towards Food Processing •Profesional Practice •Master Thesis <p>Centrifuge for fast separation of samples and other routine applications in food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6222 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	


Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Analytical Balance
Specification	<p>Maximum Capacity 220 g Readability 0.0001 g Pan Size 90 mm Internal Calibration InCal™ - Semi Automatic Draftshield Included Communication RS232; USB Display 2-Line LCD with Backlight In-use cover Included Minimum Weight (USP, 0.1%, typical) 200 mg Pan Construction Stainless Steel Power AC Adapter (Included) Stabilization Time 3 s Tare Range To capacity by subtraction Units of Measurement Carat; Custom; Grain; Gram; Hong Kong Tael; Kilogram; Mesghal; Milligram; Momme; Newton; Ounce; Ounce Troy; Pennyweight; Pound; Singapore Tael; Taiwan Tael; Tical; Tola non-condensing; operability guaranteed between 5°C and 40°C)</p>
Quantity	2
Cost	2.600,00 EUR (1,300 EUR per unit) (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Agricultural and food industry waste management; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Innovative practices of harvesting and post harvesting •Ecological sustainability for Fish Management and Conservation •Environmental Chemistry towards Food Processing •Profesional Practice •Master Thesis

	To measure the weight of samples in food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed, etc	
Tendering procedure (purchased/not purchased)	Finished	
Inventory number	6223 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019	
Attach a photo for each Equipment piece if the equipment is purchased.		

Partner No	P1
Name (University)	Agricultural University of Tirana (AUT)
Country	Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	ABBE refractometer
Specification	Manual ABBE Refractometer for: Refractive index (nD) & Concentration of sucrose [%Brix] MEASUREMENT RANGE nD 1.3000–1.7200 0–95 %Brix READING ACCURACY nD ± 0.0002 ± 0.1 %Brix RESOLUTION nD 0.0005 0.25 %Brix MEASUREMENT PRISM Optical glass LIGHT SOURCE LED; WAVELENGTH 589 nm TEMPERATURE MEASUREMENT Digital thermometer; TEMPERATURE MEASUREMENT RANGE 0–99 °C; TEMP. MEASUREMENT ACCURACY ± 0.5 °C TEMP. MEASUREMENT RESOLUTION 0.1 °C; FURTHER SPECIFICATIONS METHODS Adjustable scale; CONTROL Reading via eyepiece; Thermostat connections available

Quantity	1
Cost	1.400 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Innovative practices of harvesting and post harvesting •Profesional Practice •Master Thesis <p>To measure measure the refractive index and concntration of sucrose of samples in food, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6224 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Hotplate Magnetic Stirrer
Specification	<p>Maintenance free brushless DC motor with low noise level offers a stirring volume up to 3 lt with a smooth start and quick stop.</p> <p>Ceramic coated stainless steel top plate guarantees perfect chemical resistance especially against strong acids. Also provides impact resistant, easily cleanable, scratch proof surface with excellent heat distribution.</p> <p>Integrated design of the heater and the top plate provides excellent heat transfer rate and quick heat up capability.</p> <p>ABS housing protects all mechanical and electronic components from aggressive effects and guarantees safety with a long life time.</p> <p>Electronic speed control from 100 to 1500 rpm provides a gentle revolution and precise stirring speed.</p> <p>PID temperature technology enables excellent heating control from ambient temperature to 280°C.</p> <p>Offers integrated temperature control (+/- 0,2°C accuracy) with external PT1000 temperature sensor and support rod.</p> <p>Overheat protection circuit turns off the heater if the top plate temperature reaches 320°C for any reason.</p> <p>Hot surface warning display indicates any residual heat even if switched off. LCD display will show "HOT" if hotplate temperature is over 50°C.</p> <p>Large LCD panel for simultaneous display for set & actual temperature and set & actual speed.</p> <p>Supplied complete with PT1000 temperature sensor, support rod and fixing clamp.</p> <p>motor type: DC motor</p> <p>top plate material: ceramic coated stainless steel</p> <p>top plate dimensions (mm): Ø135</p> <p>voltage (V): 100 - 240</p> <p>power (W): 515</p> <p>frequency (Hz): 50 / 60</p> <p>max. stirring capacity (L): 3</p> <p>speed range (rpm): 100 - 1500</p> <p>speed & temp. display: LED</p> <p>heating output (W) 500</p> <p>heating range (°C) room temp. - 280</p> <p>heating accuracy (°C) $\pm 1 < 100$; $\pm 1 \% > 100$</p> <p>safety temperature (°C) 320</p> <p>heating warning (°C) 50</p> <p>external temp. sensor PT 1000</p>
Quantity	1


Cost	300,00 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Agricultural and food industry waste management; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Innovative practices of harvesting and post harvesting •Ecological sustainability for Fish Management and Conservation •Environmental Chemistry towards Food Processing •Profesional Practice •Master Thesis <p>To heat and steer of samples in food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6225 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Soxhlet single place complete extraxion unit
Specification	Complete single extraction unit for 100 ml extraction consisting of: base frame, heating device, bracket, tube and glass apparatus (reaction flask, extractor, Dimroth condenser for extraction). Infinitely variable heating control. After the extraction cycle, the extractors with tap conduct the solvent directly into the dispensing bottle. Includes extraction thimble and boiling chips in a sample pack Voltage/Frequency 230 VAC/ 50/60 Hz Power consumption 450 W
Quantity	1
Cost	780,00 EUR (vithout VAT)
Purpose linked to the Course to be delivered	For courses: <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Profesional Practice •Master Thesis To extract crude fat of samples in food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed, etc.
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6226 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019


<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	
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Partner No Name (University) Country	P1 Agricultural University of Tirana (AUT) Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Water activity meter
Specification	<p>Handheld instrument for measurement of water activity including professional software.</p> <p>Measurement range: -10...+60 °C; 0 - 1 aw; 0 - 100% RH $\pm 0,1$ K; 0,008 aw; $\pm 0,8\%$ RH</p> <p>Water activity set, consists of: Handheld instrument Measurement probe Sample holder Disposable sample container (10 pc.) Humidity standard 5% RH Humidity standard 10% RH Humidity standard 35% RH Humidity standard 50% RH Humidity standard 80% RH ABS case</p> <p>Software: Viewing of measured values/Monitoring</p>

	<p>Display of measured values on the monitor for one & more instruments</p> <p>Monitor display of measured values consolidated into groups</p> <p>Archiving of data</p> <p>Automatic saving of the measured data (monitoring)</p> <p>Simultaneous management of the log settings for instruments in a group</p> <p>Display of the measured values</p> <p>Numeric and graphic display</p> <p>Graphic comparisons and overlay functions</p> <p>Customer-specific room layout</p> <p>Analysis and calculation tool</p> <p>Psychrometric calculations</p> <p>Statistics</p> <p>Printing/Reports</p> <p>Automatic generation of adjustment, calibration and configuration reports</p> <p>Printout as table or graph</p> <p>Users and passwords</p> <p>Password protection</p> <p>User names and rights free definable</p> <p>Alarms</p> <p>Visual display of active alarms</p> <p>Alarm via email, SMS, relay, report printout</p> <p>Flexible programming of alarm evaluation, pre- and main alarm, own alarm evaluation possible for every instrument</p> <p>Electronic record, electronic signature, audit trail</p> <p>Logging of all HW4 user events & automatic generation of reports</p> <p>Verifiability of manipulations guaranteed at all times</p>
Quantity	1
Cost	5.100 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Profesional Practice •Master Thesis <p>For measurement of water activity including professional software in food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>

Tendering procedure (purchased/not purchased)	Finished
Inventory number	6227 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P1
Name (University)	Agricultural University of Tirana (AUT)
Country	Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Advanced Moisture Analyzer
Specification	<p>Advanced Moisture analyzer with halogen light. Maximum Capacity 120 g Readability Moisture Content 1 mg/0.01% . Pan Size 3.5 in (90 mm). In-use cover Included . Moisture Range 0 % – 100 % Operating Range (Temp.) 10 °C – 40 °C Power 220 v, 60 Hz Sample Size 0.5 g – 120 g Shut-Off Criteria Manual; Timed; Automatic - Preset Weight Loss/Time; Custom - User Set Weight Loss/Time; Custom-User Set Moisture% Loss/Time Temperature Range 40 °C – 230 °C Test Library 100 Units of Measurement Gram; %MC; %RG; %DC Working Environment 50°F – 104°F, 85%RH, non-condensing (10°C – 40°C, 85%RH, non-condensing) Applications: Percent Moisture Determination, Percent Moisture Regain Determination, Percent Solid Determination, Weighing Display 4.3" TFT color touchscreen display Operation Power cord (included) Communication RS 232 with GLP/GMP data output, USB Host and USB Device (included). Construction: Metal base, ABS top housing, halogen heat source, stainless steel pan support, stainless steel pan handler, in-use cover</p>

Quantity	1
Cost	2.800 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <ul style="list-style-type: none"> •Fundamentals of sustainable agri-food systems; •Agricultural and food industry waste management; •Advanced food science and technology; •Quality System Development, Management and Shelf Life Assessment of Food •Quality and Sustainability of Animal-source Food Production •Traceability systems of food products •Innovative product development •Innovative practices of harvesting and post harvesting •Ecological sustainability for Fish Management and Conservation •Environmental Chemistry towards Food Processing •Profesional Practice •Master Thesis <p>For percent moisture determination, percent moisture regain determination, percent solid determination, weighing in food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6228 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P1
Name (University)	Agricultural University of Tirana (AUT)
Country	Albania
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Color meter
Specification	High quality portable colorimeter, illuminating/viewing geometry: 8d. Color measurements: CIEL*a*b*C*h* CIEL*a*b* CIEXYZ CIERGB, CIEL*u*v* CIEL*C*h Yellowness & Whiteness Color Fastness. Measuring aperture: 8mm/4mm. Detector: Silicon photoelectric diode. Error: $\leq 0.40\Delta E^*ab$. White/Black Calibration : Automatic/Manual. Rechargeable lithium-ion battery. 3.7VDC@3200mA. Operating temperature/humidity - range 10~40°C°Relative humidity 0~85%. Powders measuring cell & Liquids/creams/powders measuring cell. Miniature thermal printer
Quantity	1
Cost	3.500 EUR (without VAT)
Purpose linked to the Course to be delivered	<p>For courses:</p> <p>Fundamentals of sustainable agri-food systems; Advanced food science and technology; Quality System Development, Management and Shelf Life Assessment of Food; Quality and Sustainability of Animal-source Food Production; Traceability systems of food products; Innovative product development; Innovative practices of harvesting and post harvesting; Ecological sustainability for Fish Management and Conservation; Profesional Practice; Master Thesis</p> <p>For Color measurements (CIEL*a*b*C*h* CIEL*a*b* CIEXYZ CIERGB, CIEL*u*v* CIEL*C*h Yellowness & Whiteness Color Fastness) in liquid and solid food and feed products, also to be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc</p>
Tendering procedure (purchased/not purchased)	Finished
Inventory number	6229 Entrance sheet no. 42, dt. 26/11/2019, Sales tax invoice 5468, dt. 26/11/2019
Attach a photo for each Equipment piece if the equipment is purchased.	 

4.1.2. Development of “Food Quality Control Lab”

In line with the activities and obligations within the STEPS project and WP5, particularly the activity 5.2 Development of research labs, the Faculty of Biotechnology and Food at the Agricultural University of Tirana timely initiated procedural and technical (training, small-scale demonstrations) activities for the development of two types of laboratories “Food Quality Control Lab”, and “Food Production Systems Management Lab”. These activities on one hand directly support the implementation of Master of Sciences on “Sustainable Food Production Systems” in terms of provision of laboratory-infrastructure preconditions/procurement of laboratory-instrumental equipment, but also to support other second and third cycle study programs at Faculty of Biotechnology and food, at Agricultural University of Tirana. On the other hand, laboratories will provide an opportunity to increase the potential for scientific research, which will result in the publication of scientific papers in national and international scientific journals and conferences. Also, they may have a positive impact in enhancement of the collaboration with Food Business Operators, SMEs, Food Laboratories and Food Control Authority and other national bodies that AUT has, and may in creation of an Open science network in Albania. “Food Quality Control Lab” will offer the advantage of experimentally determination the quality of agricultural products. Considering the fact that the Food Quality Control Lab is already established at Food Research Centre, at FBF, AUT STEPS team, led by Prof. Renata Kongoli, followed internal procedures to establish the new equipment in that laboratory, reinforcing its infrastructure.

AUT - Food Quality Control Lab Photos:



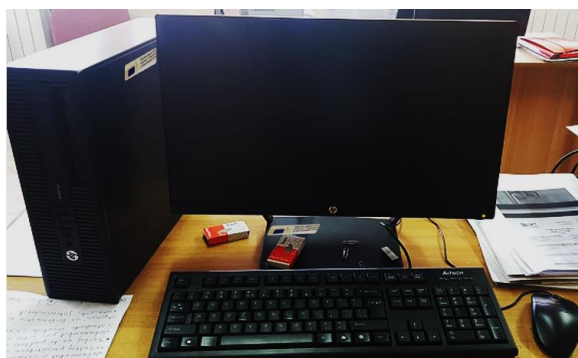


Regarding the post-installation activities, the FBF, AUT STEPS team together with the suppliers organized the necessary training and demonstrations (in the link of G Drive in annex may be found the certificates of the trained staff), so that the scientific and technical staff gets acquainted with the functioning of the new devices and gain the necessary skills for conducting experiments/simulations and developing training materials (Activity 5.3).



4.1.3 Development of laboratory/IT cabinet for “Food Production Systems Management Lab”

Besides the Food Quality Control laboratory capacities in the framework of Erasmus+ Project “MSc in Sustainable Food Production Systems/STEPS”, AUT STEPS team led by Prof. Renata Kongoli, in compliance with this project and the need for ICT infrastructural capacities, followed all procedures for establishment of new ICT equipment at Faculty of Biotechnology and FOOD, AUT. Considering the fact that ICT Center is already established in frame of another Erasmus + CBHE project (NETCHEM 2016-2020), will also support the “Food Production Systems Management” for the implementation of the MSc on “Sustainable Food Production Systems”, and other study programs of second and third cycle.



Through the implemented and completed public procurement procedures, all the equipment pieces were purchased for the ICT laboratory. Faculty of Biotechnology and Food completed the process of obtaining a license for advanced software tools SimaPro Software for Food Production Systems Management Laboratory/ICT Center. Obtained Licenses of advanced software tools [SimaPro Software](#) will be used for analysing processes and supply chain scenarios, in terms of supply chain management, energy consumption and environmental impact, and the evaluation of feasibility of basic and alternative scenarios.

Training for teaching – scientific staff members and development of software-based exercises and projects as part of the curriculum of the second cycle for Sustainable Food Production Systems is currently conducted. Food Production Systems Management Laboratory will offer the opportunity for students to design software-based exercises and projects (*Activity 5.3*), and analyse processes and supply chains and evaluate the performance of production systems, with the aim of ultimate utilization of the purchased equipment and further improvement of the level of knowledge and relevance of a variety of courses.

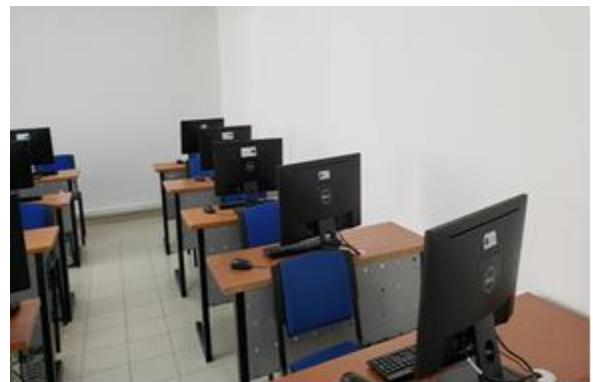
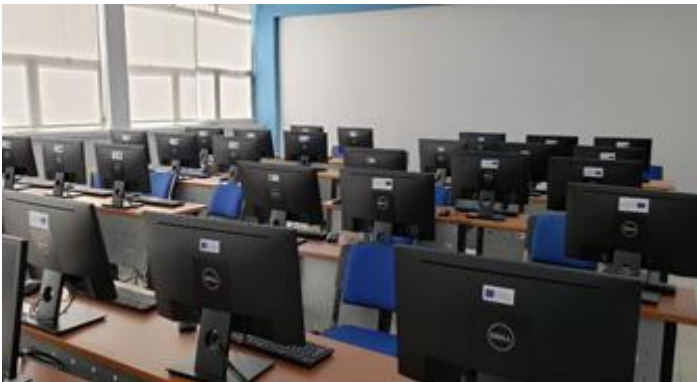
4.2 Development of research labs at European University of Tirana (EUT- P2)

4.2.1. Food Production Systems Management Lab

In the framework of Erasmus+ Project “Msc in Sustainable Food Production Systems/STEPS”, the European University of Tirana was obliged to establish the ICT Center for the “Food Production Systems Management” for the support of the implementation of the second study cycle on Sustainable Food Production Systems, and other study programs within the 1st and 2nd study cycle.

Through the implemented and completed public procurement procedures, all the equipment pieces (computers, software) were purchased for the ICT laboratory. Food Production Systems Management Laboratory will offer the opportunity for students to design and analyse processes and supply chains and evaluate the performance of production systems, in terms of energy consumption, environmental impact and recoup. This type of laboratory will provide enhanced knowledge related to the second group of courses, i.e. food production systems management. ICT lab in terms of "Food Production Systems Management Lab" will be used to design software-based exercises and projects (Activity 5.3), with the aim of ultimate utilization of the purchased equipment and further improvement of the level of knowledge and relevance of a variety of courses.

EUT - Food Production Systems Management Lab Photos:



5 DEVELOPMENT OF RESEARCH LABS IN KOSOVO

5.1 Development of research labs at University of Haxhi Zeka (UHZ - P3)

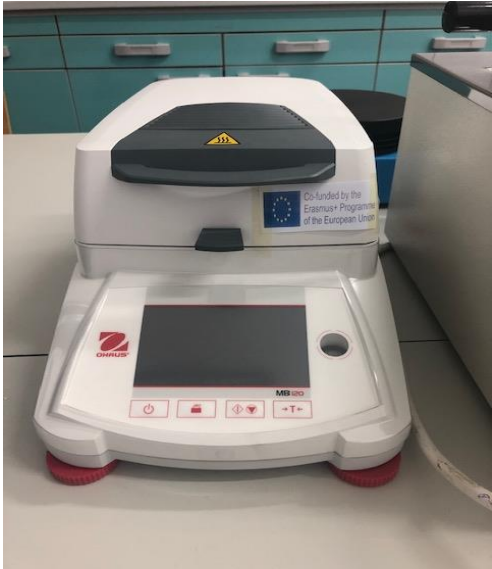
5.1.1 Food Quality Control Lab Equipment

Partner No Name (University) Country	P3 University of Haxhi Zeka (UHZ) Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Colorimeter for liquids and solids
Specification	High quality portable colorimeter, illuminating/viewing geometry: 8d Color measurements: CIEL*a*b*C*h* CIEL*a*b* CIEXYZ CIERGB, CIEL*u*v* CIEL*C*h Yellowness & Whiteness Color Fastness Measuring aperture: 8mm/4mm Detector: Silicon photoelectric diode. Error: $\leq 0.40\Delta E^*ab$, White/Black Calibration :Automatic/Manual, Rechargeable lithium-ion battery, 3.7VDC@3200mA, Operating temperature/humidity, range 10~40°C relative humidity 0~85%, Powders measuring cell & Liquids/creams/powders measuring cell
Quantity	1
Cost	3.800,00 EUR
Purpose linked to the Course to be delivered	Related to the following courses: <ol style="list-style-type: none"> 1. Sustainable technology of fruit and vegetable processing products 2. Sustainable technology of wine, beer and spirits 3. Innovative practices of harvesting and post harvesting 4. Advanced food science and technology Color measurement of samples whether solid such as vegetables or liquid samples as well. at the II cycle of studies (MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises and preparation of student training materials, development of experiments, analysis and quality control of agricultural products.
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 3102242

<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	 
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Partner No Name (University) Country	P3 University of Haxhi Zeka (UHZ) Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Moisture analyzer
Specification	<p>Advanced Moisture analyzer, Measurement of the moisture content from 0.005 % to 100 %, Weighing capacity of 100 g with 0.1-mg weight resolution, Automatic endpoint searching/automatic programming to determine the best possible parameters at the touch of a key, Fast heating of a sample by choice of ceramic heating element, a halogen lamp or a CQR-coiled quartz radiator, all of which are infrared heaters, Readability 0.1 mg, 0.001 %, Weighing capacity 100 g, Depth 453 mm, Height 156 mm, Width 350 mm, Number of measuring programs 30, Recommended moisture range 0.005 – 99.995%, Heating Source Ceramic heating, gentle and smooth, Data Interface RS232C unidirectional, Weighing pan diameter \varnothing 90 mm, Accuracy of the weighing system 0.1 mg, Max. weighing capacity 100 g</p> <p>Password Protection - Yes, Display Mode for Results % moisture- % dry weight (solids), % RATIO, g residue, g/kg residue, mg weight loss, calculated value (measured value \times factor), Max. weighing capacity 100 g, Repeatability, typical Starting at an initial sample weight of approx. 1 g: \pm 0.1% starting at an initial sample weight of approx. 5 g: \pm 0.02%, Readability 1 mg, 0.01% 0.1 mg, 0.001% Typical sample quantity 5 – 15 g, Reading display % moisture content (optionally available with conversion factor) % dry weight RATIO value mg weight loss g residue g/kg residue g/l residue, Temperature range and settings 30°C–180°C, stand-by temperature selectable from 30–100°C in increments of 1 degree</p> <p>Sample heating Infrared heating using a round ceramic heating element</p> <p>Heating programs Standard, quick, gentle and phase drying</p> <p>Shutoff criteria:</p>


	<ul style="list-style-type: none"> – Fully automatic – SPRM mode (optimization to a reference system) – Semi-automatic (1–50 mg/5–300 sec.) – Semi-automatic (0.1-5.0%/5–300 sec.) – Timer setting (3+ 0.1–999 min.) – Timer setting + fully/semi-automatic (2+ 0.1–999 min. + automatic) – Manual <p>Access to sample chamber Motorized cover</p> <p>Measuring program 30 programs saved in a non-volatile memory (freely selectable parameters)</p> <p>Data storage Result statistics for the last 9999 measurements/program</p> <p>Operator guidance features Menu-driven, alphanumeric dialogue text (5 languages selectable)</p> <p>Parameter data entry – Optimized text entry via soft keys</p> <ul style="list-style-type: none"> – Numeric entry via keypad <p>Report printout – Printout using the optional, internal printer</p> <ul style="list-style-type: none"> – Configurable GLP-report for measuring results, calibration adjustment
Quantity	1
Cost	6.500,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> 1.Environmental Chemistry towards Food Processing 2.Fundamentals of sustainable food production systems 3.Innovative practices of harvesting and post harvesting 4.Advanced food science and technology <p>For measuring of moisture % on different samples such as food and processed food. Advanced Moisture analyzer. Measurement of the moisture content from 0.005 % to 100 %. moisture analysis and offer a wide range of reliable and easy to use moisture analyzers suiting the needs of quality control, production and in-process control of many industries. at the II cycle of studies (MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food.</p>
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. B935190505

<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	
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Partner No Name (University) Country	P3 University of Haxhi Zeka (UHZ) Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Multifunctional hand operator for vacuum systems including vacuum pump
Specification	<p>Controlled aspiration of liquids from standard laboratory containers such as cuvettes, test tubes, microtitre plates, Petri dishes, roller bottles, etc. Disposal of biological or chemical waste liquids. Filtration of liquids (media) with the aid of filter systems. Compact, user friendly design. Automatic level monitoring prevents the bottle from overflowing. Two hydrophobic filters, one inside and one outside the pump intake, protect the device and its electronics from moisture. With rotary knob for automatic vacuum control (300 to 600 mbar). Chemically resistant quick couplings (PVDF) for tubing connection. Includes hand operator and 40 mm stainless steel adapter. All parts that come into contact with liquid such as the bottle, lid, tubes, connectors and the hand operator are autoclavable. user friendly dual use; Supplied system includes one 4 litre PP bottle (3 litre glass bottle with lid and barbed tubing connections PVDF (quick couplings with Comfort Plus models), fill level sensor, one tubing set with filter, power supply unit, one hand operator and a 40 mm single-channel, stainless steel adapter. Noise rating <50 dB (A). Specifications Aspiration rate of liquids 17 ml/s (aspiration pipette). Vacuum range -300 – 600 mbar. Flow rate 8 l/min. Vacuum pump supplied with the system</p>
Quantity	1
Cost	2.500,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses: <i>Quality System Development, Management and Shelf Life Assessment of Food; Agricultural and food industry waste management; Environmental Chemistry towards Food Processing; Nutrition</i></p> <p>At the II cycle of studies (MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises.</p>

Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 4022421
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P3
Name (University)	University of Haxhi Zeka (UHZ)
Country	Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Elisa reader
Specification	<p>Optical system 12 measurement channels, 1 reference channel and gradient tunable filter, Wavelength range 400 to 700 nm using gradient tunable wavelength filter, Wavelength range 400 to 700 nm using gradient filter Bandwidth @ 50 % transmission 10 +/- 2 nm; Measurement range 340 to 399 nm 0 to 3.0 OD; 400 to 750 nm 0 to 4.0 OD; Measurement time Single wavelength 6 seconds; Dual wavelength 8 seconds; Kinetic repeat time 5 seconds; Accuracy 0.0 to 2.0 OD/492 nm < (1.0 % + 0.010 OD)** 2.0 to 3.0 OD/492 nm < (1.5 % + 0.010 OD)**; Linearity 340 to 399 nm 0.0 to 2.0 OD: <2 %, R2 >= 0.999 400 to 750 nm 0.0 to 2.0 OD: <1 %, R2 >= 0.999 2.0 to 3.0 OD: <1.5 %, R2 >= 0.999; Precision 0.0 to 2.0 OD/492 nm < (0.5 % + 0.005 OD)** 2.0 to 3.0 OD/492 nm < (1.0 % + 0.005 OD)**</p> <p>Resolution 0.001 OD; Interface RS-232C (remote control)/parallel Shaking Linear shaking in 4 different modes; Physical data Width 28.5 cm Depth 34.0 cm, Height 14.5 cm; Specification tunable wavelength option Wavelength range 400 to 700 nm using gradient ; Accuracy 0.0 to 2.0 OD/492 nm < (1.5 % + 0.010 OD)**; Linearity 0.0 to 2.5 OD/492 nm <2 %, R2 >= 0.999 Precision 0.0 to 2.5 OD/492 nm < (1 % + 0.005 OD)**</p> <p>Specification temperature control Temp. range RT to 42 °C (resolution 0.1 °C) Temp. Accuracy Typical +/-0.2 °C (max. +/-0.5 °C). Delivery includes: Instrument with gradient tunable filter</p>

Quantity	1
Cost	7.000,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> <i>1.Sustainable technology of fruit and vegetable processing products</i> <i>2.Sustainable Use of the plant protection products</i> <i>3.Environmental Chemistry towards Food Processing</i> <i>4.Sustainable technology of wine, beer and spirits</i> <p>Instrument for qualitative screening of different parameters for food pathogens, fruit and vegetables chemical parameters such as grape for citric acid, tartaric acid in wine etc. Open platform that accepts different Elisa kits from different manufacturers. Optical system 12 measurement channels, 1 reference channel and gradient tunable filter Wavelength range 400 to 700 nm using gradient tunable wavelength filter. MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises and preparation of student training materials.</p>
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 5206-0138
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P3
Name (University)	University of Haxhi Zeka (UHZ)
Country	Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Multiple-position hot plate stirrer with 4 positions
Specification	Multiple-position hot plate stirrer with four separately controlled stirring plates coated with aluminium alloy which provides uniform heat distribution. No. of stirring positions 4 Max. stirring capacity H ₂ O (l) 4x15 , Speed range (min-1) 50 – 1500, Temperature range (°C) 370 , Heat output (W) 2550, Plate dimensions (mm) Ø 155, Heated area (mm) 4x Ø155
Quantity	1
Cost	1.800,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> 1. <i>Environmental Chemistry towards Food Processing</i> 2. <i>Nutrition</i> 3. <i>Agricultural and food industry waste management</i> 4. <i>Traceability systems of food products</i> <p>Multiple-position hot plate stirrer with four separately controlled stirring plates coated with aluminium alloy which provides uniform heat distribution. Sample preparation, solution preparation etc by heating and magnetic stirring. MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises and preparation of student training materials.</p>
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 130419

<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	
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Partner No Name (University) Country	P3 University of Haxhi Zeka (UHZ) Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Water activity analyzer for food
Specification	<p>Water activity meter</p> <p>Sensor Types</p> <ol style="list-style-type: none"> Chilled-mirror dewpoint. Infrared temperature. <p>Accuracy ± 0.003 aw</p> <p>Range 0.10 to 0.95 aw</p> <p>Moisture Content Precision 0.02%</p> <p>Agreement to Moisture</p> <p>Content Reference Method $\pm 0.1\%$ to $\pm 0.5\%$</p> <p>Sample Dish Capacity 7 ml recommended (15 ml full)</p> <p>Resolution Moisture: $\pm 0.01\%$ mc</p> <p>Water Activity: ± 0.0001 aw</p> <p>Measurement Speed Less than 5 minutes.</p> <p>Lcd display with backlighting</p> <p>Results Displayed Percent moisture and water activity.</p> <p>Temperature Control 15 to 50°C ($\pm 0.2^\circ\text{C}$)</p> <p>Temperature Stability User-selectable range, internal thermoelectric controlled.</p> <p>Test Result Memory 10,000 readings</p> <p>includes water activity, moisture content, temperature, time, date, operator, and sensor used</p> <p>Alphanumeric; Programmable to display product name, lot, or product ID number.</p> <p>Operating Environment 4 to 50°C 0 to 90% Relative Humidity non-condensing.</p> <p>Universal Power 220 V AC, 50/60 Hz</p>

	<p>Less than 0.4 amps. Data Interface RS232A compatible, 8-data bit ASCII code, 9600 baud, no parity, 1 stop bit, cable included. Case Material Machined aluminum frame; injection molded plastic cover. Certifications CE; AOAC Approved Method for Measurement of Water Activity</p>
Quantity	1
Cost	8.500,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> 1. <i>Fundamentals of sustainable food production systems</i> 2. <i>Advanced food science and technology</i> 3. <i>Sustainable technology of fruit and vegetable processing products</i> 4. <i>Sustainable technology of bakery products</i> 5. <i>Consumer science and sustainable consumption</i> <p>For testing of different food samples for water activity content Both moisture content and water activity—the ratio of the water vapor pressure of a substance such as food to the water vapor pressure of pure water under the same conditions—are important in formulating products for safety and stability. Moisture content is, simply, how much water is in a product. It influences the physical properties of a substance, including weight, density, viscosity, conductivity, and others. It is generally determined by weight loss upon drying. Water activity, aW, is a measure of how much of that water is free, i.e., unbound, and thus available to microorganisms to use for growth. It is therefore important with regard to food safety. MSc in Sustainable Food Production Systems / STEPS, it will be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products.</p>
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 0061897707

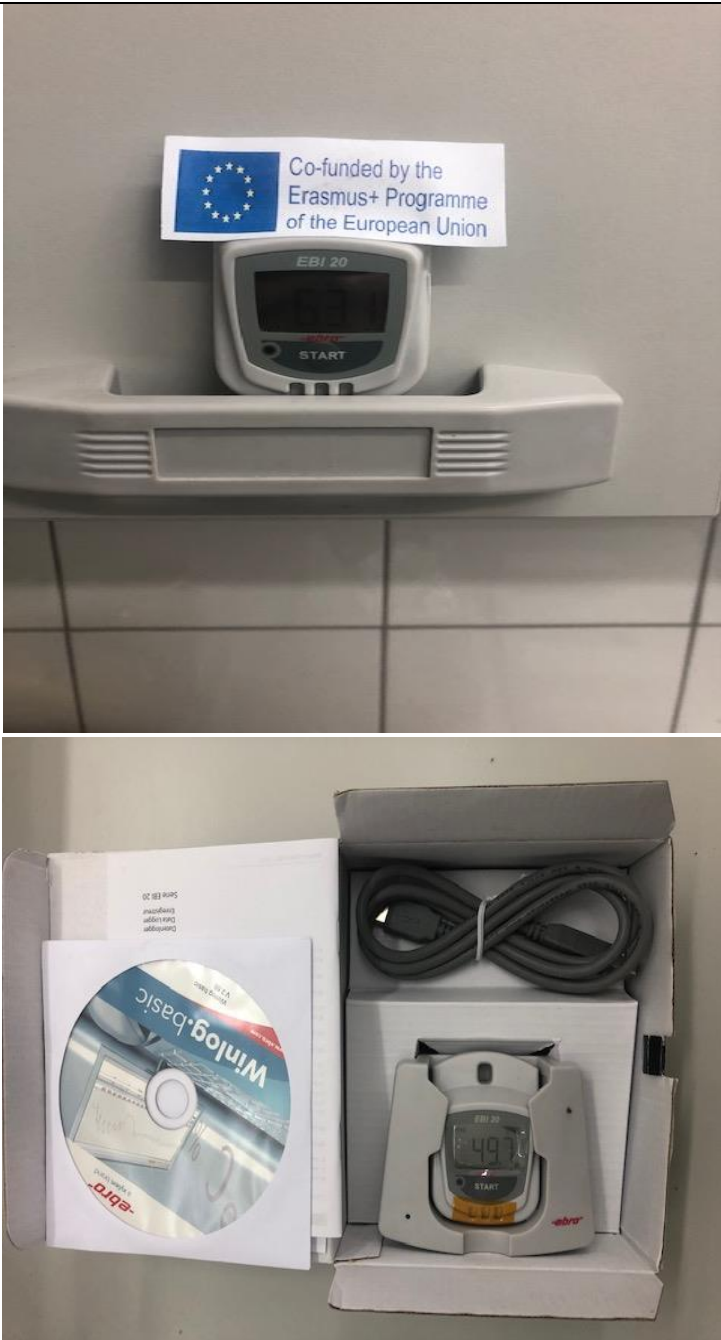
Attach a photo for each Equipment piece if the equipment is purchased.




Partner No	P3
Name (University)	University of Haxhi Zeka (UHZ)
Country	Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Infrared Thermometer with splash proof housing
Specification	Measurement range -60 °C ... +550 °C. Accuracy ± 2 °C + 0,05 °C per °C below 0 °C (at -60 °C ... 0 °C) ± 2 °C (at 0 °C ... +15 °C) $\pm 1,5$ °C (at +15 °C ... +35 °C) ± 2 °C, Resolution 0.1 °C (-9.9 °C ... +199.9 °C). 1 °C for the remaining measurement range
Quantity	5
Cost	5 x 120 = 600,00 EUR

Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> 1. <i>Advanced Food Science and Technology,</i> 2. <i>Innovative practices of harvesting and post harvesting ,</i> 3. <i>Sustainable technology of fruit and vegetable processing products ,</i> 4. <i>Total quality management in the agri-food sector</i> <p>For non-contact measuring of temperature. Infrared thermometers are mainly used to measure temperature of a surface without making any contact. During infrared measurement (IR measurement), surface temperatures are measured without contact and also at a distance. IR measurement is ideal for moving or conductive parts. Noncontact temperature measurement is the preferred technique for small, moving, or inaccessible objects; dynamic processes that require fast response. At the II cycle of studies (MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises and preparation of student training materials.</p>
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 72104572, 72104581, 72104999, 72104986, 72104577
<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	

Partner No Name (University) Country	P3 University of Haxhi Zeka (UHZ) Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Temperature / Humidity Data Logger, interface and software
Specification	<p>Temp/Humidity logger consisting of: Logger, Interface and Software, With a memory capacity of 40,000 measurements data loggers are suitable for the continuous documentation and monitoring of temperature and humidity.</p> <p>Applications: • Transport monitoring • Storage monitoring • Process monitoring</p> <ul style="list-style-type: none"> • Excellent price/performance ratio • Automatic recording of temperature data • No network connection required • Programming and evaluation with PC • LED alarm • Min/max values on display • Factory calibration certificate <p>Measuring range -30 °C...+70 °C Accuracy Humidity: ±3 % (at 10...90% rel. humidity) Temperature: ±0.5 °C (-20 °C to +40 °C) ±0.8 °C for the remaining measuring range Resolution 0,1 °C 0,1% rF Operating Temperature -30 °C...+60 °C Memory 40.000 measurement value Sensor NTC Sample Rate 1min...24h IP Rating IP 52 Battery 3V Lithium (CR2450), exchangeable by user Battery lifetime approx. 1 year Dimensions 69 x 48 x 22 mm</p>
Quantity	10
Cost	10 X 200 = 2.000,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> 1. Innovative practices of harvesting and post harvesting 2. Agricultural and food industry waste management 3. Quality and Sustainability of Plant-source Food Production 4. Traceability systems of food products <p>Data logging and monitoring of temperature and humidity The TempIT software also automatically calculates dew point from the measured temperature and relative humidity readings. TempIT is used to configure the majority of our data logging products. This is ideal as you may start data logging using the low cost button data loggers but wish to upgrade at a later date. This is all possible without having to learn another software package.</p> <p>The temperature\humidity datalogger interface is connected to the PC</p>

	measurements data loggers are suitable for the continuous documentation and monitoring of temperature and humidity at the II cycle of studies MSc in Sustainable Food Production Systems / STEPS, it will be used in the development of laboratory exercises and preparation of student training materials.
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 62277275, 62277283, 62277274, 62277296, 62277292, 62277280, 62277279, 62277302, 62277330, 62250635.
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P3
Name (University)	University of Haxhi Zeka (UHZ)
Country	Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Vacuum meter
Specification	Measuring range 0-2000 mbar Accuracy Measuring precision of the electronics at 20 °C ambient temperature: ± 0.4 % of measured range. Resolution 1 mbar 0.1 kPa 0.01psi 1 torr
Quantity	2
Cost	2 X 800 = 1.600,00 EUR
Purpose linked to the Course to be delivered	<p>Related to the following courses:</p> <ol style="list-style-type: none"> 1.Sustainable Ecology for Fish Management and Conservation 2.Sustainable technology of dairy products 3.Sustainable technology of fruit and vegetable processing products 4.Sustainable technology of wine, beer and spirits <p>The Vacuum Gauge is a robust and compact device to measure pressure. One field of use of the Vacuum Gauge is, for example, the checking of the input/output of liquefied gas. Thanks to the large display of the Vacuum Gauge, you can see the current measuring value, maximum, minimum and mean value at the same time. At the II cycle of studies , it will be used in the development of laboratory exercises and preparation of student materials, development of experiments, increasing potential for scientific research in the field of food production, etc.</p>
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	20-shv01-001-116 nr. 15280483, 15280479.
Attach a photo for each Equipment piece if the equipment is purchased.	

5.1.2 Development of “Food Quality Control Lab” and Development of laboratory/IT cabinet for “Food Production Systems Management Lab”

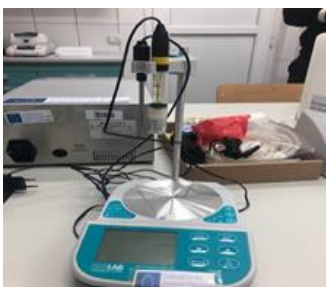
In line with the activities and obligations within the STEPS project and WP5, particularly the activity 5.2 Development of research labs, the Faculty of Agribusiness University of Haxhi Zeka in Peja, timely initiated procedural and technical (training, small-scale demonstrations) activities for the development of two types of laboratories “**Food Quality Control Lab**”, and “**Food Production Systems Management Lab**”. These activities on one hand directly support the implementation of Master of Sciences on “Sustainable Food Production Systems” in terms of provision of laboratory-infrastructure preconditions/procurement of laboratory-instrumental equipment, but also to support other second and third cycle study programs at Faculty of Agribusiness University of Haxhi Zeka in Peja.

On the other hand, laboratories will provide an opportunity to increase the potential for scientific research, which will result in the publication of scientific papers in national and international scientific journals and conferences. Also, they may have a positive impact in enhancement of the collaboration with Food Business Operators, SMEs, Food Laboratories and Food Control Authority and other national bodies that UHZ has, and may in creation of an Open science network in Kosovo.

Food Quality Control Lab” will offer the advantage of experimentally determination the quality of agricultural products. Considering the fact that the Food Quality Control Lab is already established at Food Research Centre, at FAG, UHZ STEPS team, led by Prof. Nexhdet Shala, followed internal procedures to establish the new equipment in that laboratory, reinforcing its infrastructure.

Food Quality Control Lab Photos at UHZ






Food Production Systems Management Lab Photos at UHZ:




5.2 Development of research labs at Universum College (UC - P4)

5.2.1 Food Quality Control Lab Equipment

Partner No Name (University) Country	P4 Universum College Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Analytical Instrument - Automated Titrators
Specification	<p>Application Type Potentiometric Burette 20mL , Number of Titration Methods: 3, USB-P25 printer; Pump; Temperature sensor, Parallel Titration: No, Acid/Base; Redox; Precipitation, PC Software (Optional), Sensor EG11-BNC sensor pH aqueous, Supported Stirrer Motors, User Interface iTitrate.</p> <p>SST - System suitability test which demonstrates whether the measurement system: pH / ion or conductometer and electrode, suitable for planned measurement or testing, is substantially aligned with ISO17025: 2005; 5.5.2 and 5.5.5. Certified standards consistent with CSRM and NIST.</p>
Quantity	1
Cost	5,490.00 EUR
Purpose linked to the Course to be delivered	Mainly „Analytical Instrument - Automated Titrators” will be used for a solution - a so called titrant or standard solution – where during use will be added to sample to be analyzed. The titrant contains a known concentration of a chemical which reacts with the substance to be determined.
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	00216
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P4
Name (University)	Universum College
Country	Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Laboratory mill - Instrument for grinding and homogenizing foods and feeds
Specification	Technical Data: Process type: batch, Operating principle: cutting/impact, Motor rating input: 300 W, Motor rating output: 240 W, Speed max: 25000 rpm, Speed deviation: 500 \pm rpm, Circumferential speed max.: 73 m/s, Useable volume max.: 50 ml, Feed hardness max.: 5 Mohs, Feed grain size max.: 6 mm, Material beater/cutter: stainless steel, Material milling chamber: stainless steel, , Milling chamber can be cooled with water, Mill feed can be cooled in milling chamber with dry ice, Permissible ambient temperature: 5 - 40 °C, Permissible relative humidity: cca 80 %, Protection class according to DIN EN 60529: IP 41, Voltage: 220 - 240 V Frequency: 50/60 Hz, Power input: 300 W.
Quantity	1
Cost	3,550.00 EUR
Purpose linked to the Course to be delivered	Laboratory mill will be used in laboratory environments as part of practical work from the teaching process. Samples will be prepared especially with this equipment. This device will help students homogenize the samples and achieve consistency and accuracy in testing.
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	00214
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P4
Name (University)	Universum College
Country	Kosovo
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	VORTEX - laboratory orbital shaker
Specification	<p>Vortex shaker suitable for short-time operation Possibility for different applications - interchangeable attachments and inserts.</p> <p>Orbital diameter: 4 mm. Infinitely adjustable speed range: 500 - 2.500 rpm</p> <p>Type of movement: orbital, Shaker diameter: 4 mm, Motor rating input: 58 W, Motor rating output: 10 W, Permissible ON time: 100 %, Speed min (adjustable): 500 rpm, Speed range: 0 - 2500 rpm, Operating mode: continuous operation. Working with microtiter plates - number of microtiter plates: 1, Permissible ambient temperature: 5 - 40 °C, Permissible relative humidity: cca 80 %, Protection class according to DIN EN 60529: IP 21, Voltage: 200 - 240 / 115 / 100 V, Frequency: 50/60 Hz, Power input: 60 W</p>
Quantity	1
Cost	450.00 EUR
Purpose linked to the Course to be delivered	The mini vortex mixer is a laboratory instrument which conforms to the international safety regulations for laboratory instruments. In genral the mini vortex mixer is designed for shaking test tubes.
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	00215
Attach a photo for each Equipment piece if the equipment is purchased.	

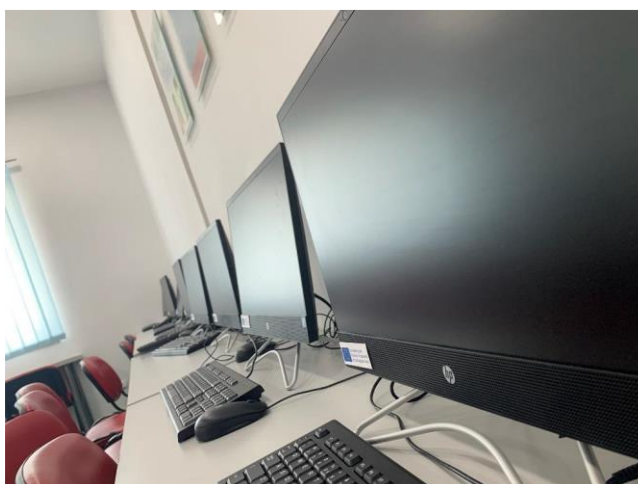
5.2.2 Development of laboratory/IT cabinet for “Food Production Systems Management Lab”

In line with the activities and obligations within the STEPS project and activity 5.2 *Development of research labs of WP5*, Universum College has conducted the necessary activities for the development of an ICT cabinet as part of “Food Production Systems Management Lab”. The Msc program to be implemented in UC the management and entrepreneurial part of the master program will be implemented, the laboratory will serve two purposes: a) facilitating the learning and teaching process within the program and b) conducting research by the students and the staff in order to increase students' understanding of the field and its concepts, as well as for the purpose of publishing papers in the field of sustainable food production systems, as defined by the project. The lab is equipped with 50 all in one computers, 6 laptops, and 18 desktops. All the computers are equipped with statistical packages, Stata and SPSS which are dedicated for enabling students and staff to conduct scientific research in the field of Food Production Systems management. The list of the lab equipment can be found [here](#). More specifically, they will be used to facilitate researching and analysing market demands, supply chains, performance of production systems, and promotion of sustainable food production systems, as well as other related factors. All the equipment pieces for the ICT laboratory were purchased through public procurement procedures. The call was initially promoted through [traditional media/newspaper](#) in September 2019, but it wasn't successful. Subsequently, another call was published through [online](#) portal and online newspaper ([e-print of newspaper advertisement](#)). Through standard assessment procedures, all the offers were assessed and the most suitable company was selected. The assessment report for the offers can be found [here](#).

The accompanying documents related to the development procedure are as follows:

- List of equipment purchased ([here](#))
- Public advertisement for Equipment Supply Request ([online portal](#), [online newspaper](#), [physical newspaper](#))
- Selection report on equipment procurement ([here](#))
- The technical and financial offer of the selected company ([here](#))
- Contract with the selected provider of equipment ([here](#))
- Payment for the purchased equipment ([here](#))

Food Production Systems Management Lab Photos at UC:





5.2.3 Development of “Food Quality Control Lab”

The main aim of food control laboratory is to provide valuable information about the composition of food. The quality of that information will be evaluated by whether it is of appropriate standard, is available on time and is produced at an acceptable cost. So the purpose of food analysis is to confirm the safety and quality of food. This procedure will be provided by laboratories with high standards. Namely during the official control of food, at the food producers, the analysis must be performed by an accredited laboratory. Students will have the opportunity to develop the knowledge gained during theoretical lectures into practice through laboratories provided for them.

Food Quality Control Lab Photos at UC




6 DEVELOPMENT OF RESEARCH LABS IN BOSNIA AND HERZEGOVINA


6.1 Development of research labs at University of Bihać (UNBI - P5)

6.1.1 Food Quality Control Lab Equipment


Partner No Name (University) Country	P5 University of Bihać (UNBI) Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Kjeldahl Distillation Solutions for Food and Feed – Automatic distillation unit
Specification	<p>Automatic thinning, adding alkali, distillation and discharge pipes allow easy use. Variable steam generator increases application area to other volatile components. Official and accurate procedures (ISO, AOAC, EPA, DIN) simplify validation. Safe method for safe pipe distillation. Built-in security systems for user protection. Self-regulating cooling water regulation saves water and reduces costs. Automatic ignition of pumps for correct dispensing of reagents. Plastic-resistant aluminum holes and tube discharge bushes allow long life span. Addition of solution to the receiver solution. Automatic security doors. External titration (Mettler, Metrohm, Schott, etc.). Modularly upgradable to the analyzer and sampling system from multiple locations. Examples of official methods: EN ISO 5983-2 (AOAC 2001: 11) applicable to protein / nitrogen in raw materials, cereals, poultry, oil seeds, food for domestic use pets and fish. This standard is also a reference method for the determination of nitrogen / protein: Indirect spectroscopic determination (NIR / NIT), Combustion Method Dumas (ISO 16634).</p> <p>ISO 20483 determination of the proportion of nitrogen in cereals, and derived products</p> <p>ISO 8968-2 (IDF / FIL 20-2) Determination of the content of liquid milk nitrogen, complete or defatted, by the digestion principle</p> <p>ISO 8968-3 (IDF / FIL 20-3) determination of nitrogen content of liquid, whole or skimmed milk, semi-micro method</p> <p>ISO 8968-4 (IDF / FIL 20-4) Determination of non-protein content of liquid milk nitrogen, complete or defatted.</p> <p>ISO 937 (AOAC 981.10) Meat and meat products - Determination of nitrogen content (Reference method)</p> <p>Included items with the appliance: 1 pcs, 10000897, Stainless steel tube grip, 1 pcs, 10000090, digestion tube 250 ml, 1 pcs, 10000734, digestion tube 100 ml, 1 pcs, 60027131, power cord Schuko-C19, 1 pcs, 15220002, dosage flask 250 ml, 4 pcs, 15640178, fuse 12A 250V 6.3x32mm (3AB), 1 pcs, 60022390, the rest of the pipe, 6 m, 15820011, tubes reinforced with alkali, 8 pcs, 15820051, Pipe clamp, 1 pcs, 15820066, water pipe 3/4 "1/2", 194150500 * ACR AMONIUM SULPHATE 99.9995% 50 GR, KJELTABS TABLETE CU 3.5 / 1000, SR 210.</p> <p>Scrubber: This semi-automatic, variable scrubber is used in the digestion phase for the neutralization of corrosive fumes. The diameter fills through a string before the entrance into the condenser. Digester 2508 Auto rack: Digester 2508 Auto Rack 230V, Automatic Digestion 8-seater Excavation Unit. EM 2508 Exhaust Unit for Digester 2508 / DT208 250 and 400 ml tubes EM 2508 Exhaust Unit</p>

Quantity	1
Cost	17.774,55 EUR
Purpose linked to the Course to be delivered	<p>Kjeldahl Distillation Solutions for Food and Feed - Automatic Distillation Unit will be used for determining protein in plant and animal products (cereals, milk, meat) and will be an integral part of the subject matter (curriculum development) at the II cycle of studies (MSc in Sustainable Food Production Systems / STEPS), it will be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin, animal feed, quality control of animal feed,etc.</p> <p>linked to the Course:</p> <ul style="list-style-type: none"> •Sustainable Technology of Dairy Products •Sustainable Technology of Meat Products •Animal Food Technology Science •Advanced Food Science and Technology
Tendering procedure (purchased/not purchased)	Purchased
Inventory number	30001727
Attach a photo for each Equipment piece if the equipment is purchased.	


Partner No	P5
Name (University)	University of Bihać (UNBI)
Country	Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Analytical Instrument - Automated Titrators LL-Unitrode WOC/pH electrode
Specification	Application Type Potentiometric. Burette 20mL ,Number of Titration Methods: 3, USB-P25 printer; Pump; Temperature sensor, Parallel Titration: No, Acid/Base; Redox; Precipitation, PC Software (Optional), Sensor EG11-BNC sensor pH aqueous, Supported Stirrer Motors, User Interface iTitrate. SST - System suitability test which demonstrates whether the measurement system: pH / ion or conductometer and electrode, suitable for planned measurement or testing, is substantially aligned with ISO17025: 2005; 5.5.2 and 5.5.5. The test must be performed by an authorized person with the issuance of a calibration certificate. Certified standards consistent with CSRM and NIST.
Quantity	1
Cost	7.663,29 EUR
Purpose linked to the Course to be delivered	<p>The device will be used to detect peroxide, iodine number, acid level (acid level in milk and dairy products - determination of milk freshness, acid level in oils in oils), salt detection (NaCl, nitrite in meat and meat products), but also will be used directly in the development of laboratory exercises and preparation of materials for student training, development of experiments, upgrading of existing level and improvement of knowledge quality, increase of potential for scientific research in the field of food production, quality control of food (food products), quality control of agricultural products, herbal raw materials, animal feed, quality control of animal feed, etc. The device will be an integral part of the subject (MSc in Sustainable Food Production Systems / STEPS) curriculum. Automated Titrators has the ability to automatically connect to Kjeldahl Distillation Unit - external titration.</p> <p>linked to the Course:</p> <ul style="list-style-type: none"> •Agricultural and Food Industry Waste Management •Harvesting and Post-Harvesting Technologies •Advanced Food Science and Technology •Sustainable Technology of Dairy Products •Sustainable Technology of Meat Products •Animal Food Technology Science
Tendering procedure (purchased/not purchased)	Purchased


Inventory number	30001728; 30001729
Attach a photo for each Equipment piece if the equipment is purchased.	


Partner No Name (University) Country	P5 University of Bihać (UNBI) Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Color measurement instrument - portable colorimeters for measuring reflected colour and colour difference in a wide range data processor
Specification	<p>Handheld, portable measurement instrument designed to evaluate the color of objects, particularly with texture, uneven surface conditions, or a lot of color variation. Compatible with an optional data processor to print results on-site or software to record measurements and provide a more comprehensive color analysis. It is necessary that the device can accurately identifies color characteristics in objects, determine color differences between objects, and provides pass/fail assessments to immediately determine if the sample meets the defined standard (for color inspections of food, quality control, quality assurance, and R&D fields).</p> <p><i>Specifications:</i> Calibration Plate, Wrist Strap, Data Processor, Protection cap, Cable (Head - DP), Color measurement instrument - Meter Head, AC-Adapter.</p> <p>Optional equipment: CABLE Color Data Software - software to record measurements and provide a more comprehensive color analysis for color quality control.</p>



Quantity	1
Cost	1.427,40 EUR
Purpose linked to the Course to be delivered	<p>The color measurement instrument will be used directly in the development of laboratory exercises and preparation of materials for student training, development of experiment, increase of existing level of knowledge and improvement of knowledge quality, increase of potential for scientific research in the field of food production, quality control of food products, quality control of agricultural products , herbal raw material, animal feed, quality control of fodder.</p> <p>linked to the Course:</p> <ul style="list-style-type: none"> •Advanced Food Science and Technology •Harvesting and Post-Harvesting Technologies •Sustainable Technology of Dairy Products •Sustainable Technology of Meat Products •Animal Food Technology Science
Tendering procedure (purchased/not purchased)	purchased
Inventory number	30001732
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P5
Name (University)	University of Bihać (UNBI)
Country	Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Laboratory mill - Instrument for grinding and homogenizing foods and feeds
Specification	<p>The redesigned batch mill grinds hard, brittle, soft and fibrous materials for volumes up to 50 ml. Because samples may be embrittled directly in the grinding chamber; tough, oily and aqueous samples can also be grinded. The development of the mill placed particular emphasis on safety. The mill will only start when the lid is closed and can only be opened at standstill. A quick stop feature further increases the safety of the user. Test results of the new A 10 basic are comparable with the ones of the previous model A 10, due to the same grinding chamber, cutter geometrics and speed.</p> <p>Specifications:</p> <p>Digital timer, Counter: Display of grinding time, Interval function, Brushless motor for long service life and low noise level, Integrated cooling connections, Error code display, Simple handling with keypads, Easily exchangeable beater/cutter for a variety of applications, Grinding chamber reduction for small sample sizes and stainless steel cutter, Bayonet lock for lid to enable simple and safe locking.</p> <p>Technical Data: Process type: batch, Operating principle: cutting/impact, Motor rating input: 300 W, Motor rating output: 240 W, Speed max: 25000 rpm, Speed deviation: 500 ±rpm, Circumferential speed max.: 73 m/s, Useable volume max.: 50 ml, Feed hardness max.: 5 Mohs, Feed grain size max.: 6 mm, Material beater/cutter: stainless steel, Material milling chamber: stainless steel, Milling chamber can be cooled with water, Mill feed can be cooled in milling chamber with dry ice, Permissible ambient temperature: 5-40 °C, Permissible relative humidity: cca 80 %, Protection class according to DIN EN 60529: IP 41, Voltage: 220 - 240 V Frequency: 50/60 Hz, Power input: 300 W.</p>
Quantity	1
Cost	1.775,90 EUR

Purpose linked to the Course to be delivered	<p>Laboratory mill will serve to prepare samples (grinding, milling and homogenizing samples of agricultural/food products of animal and cereal crops - application examples: hard, firm, fragile, soft, fibrous, oil and water samples). The prepared samples will be used in the further process for analyzes and determination of quality parameters of agricultural/food products (determination of fat - fatty acids, proteins - mineral amino acids, vitamins, fibers, carbohydrates, pesticides, toxins, heavy metals, etc.).</p> <p>This equipment will be an integral part of the MSc in Sustainable Food Production Systems (STEPS) for the purpose of developing laboratory exercises and preparation of student training materials, developing experiments, improving the existing level of knowledge in the field of analysis and quality control of food (nutritional products), analysis and control of agricultural products, herbal raw material, animal feed, quality control of animal feed, land analysis, water analysis, etc.</p> <p>linked to the Course:</p> <ul style="list-style-type: none"> • <i>Advanced Food Science and Technology</i> • <i>Harvesting and Post-Harvesting Technologies</i> • <i>Sustainable Technology of Dairy Products</i> • <i>Sustainable Technology of Meat Products</i> • <i>Animal Food Technology Science</i>
Tendering procedure (purchased/not purchased)	purchased
Inventory number	30001733
<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	

Partner No	P5
Name (University)	University of Bihać (UNBI)
Country	Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	Moisture Analyzer
Specification	Repeatability (sd) with 2g Sample 0.15 %, Repeatability (sd) with 10g Sample 0.05 %, Readability 0.01 %MC, Storage 1 Method: 1 Result, Drying Temperature: 50 °C – 160 °C, Drying Programs Standard: Rapid, Recommended Moisture Range: 1.0 - 100 %MC, Result Handling Progress Indicator, Switch-off criteria Timed: 1 Automatic (SOC 3), Test & Adjust Temperature (100/160): Weight, Temperature Increments: 1 °C, Display Mode: %MC; %DC; %AM; %AD; g, Maximum Capacity cca 50 g
Quantity	1
Cost	1.389,83 EUR
Purpose linked to the Course to be delivered	<p>The device will be an integral part of the subject (MSc in Sustainable Food Production Systems/STEPS) and will be used in the development of laboratory exercises and preparation of materials for student training, experiment development, raising existing levels and improving the quality of knowledge, increasing the potential for scientific research in the field of food production, quality control of food, quality control of agricultural products, herbicide raw material, animal origin, quality control of animal feed, etc. Linked to the Course:</p> <ul style="list-style-type: none"> • <i>Advanced Food Science and Technology,</i> • <i>Harvesting and Post-Harvesting Technologies,</i> • <i>Sustainable Technology of Dairy Products,</i> • <i>Sustainable Technology of Meat Products,</i> • <i>Animal Food Technology Science</i>
Tendering procedure (purchased/not purchased)	purchased
Inventory number	30001730
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P5
Name (University)	University of Bihać (UNBI)
Country	Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	pH measuring device - pH portable Food kit
Specification	pH/mV F2-Food Kit with puncture pH sensor and carrying case. SST - System suitability test which demonstrates whether the measurement system is: pH / ion or conductor and electrode, suitable for planned measurement or testing, content compliant with ISO17025: 2005; 5.5.2 and 5.5.5.
Quantity	1
Cost	621,88 EUR
Purpose linked to the Course to be delivered	The device will be an integral part of the subject (MSc in Sustainable Food Production Systems / STEPS) and will be used in the development of laboratory exercises and preparation of materials for student training, experiment development, raising existing levels and improving the quality of knowledge, increasing the potential for scientific research in the field of food production, quality control of food (food products), control of agricultural products, raw material of raw materials, raw material of animal origin, quality control of animal feed etc. The device will be an integral part of the subject matter (curriculum) on II MSc in Sustainable Food Production Systems (STEPS). Linked to the Course: <i>Advanced Food Science and Technology, Harvesting and Post-Harvesting Technologies, Sustainable Technology of Dairy Products, Sustainable Technology of Meat Products, Animal Food Technology Science</i>
Tendering procedure (purchased/not purchased)	purchased
Inventory number	30001731
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No	P5
Name (University)	University of Bihać (UNBI)
Country	Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	VORTEX - laboratory orbital shaker
Specification	Shaking movement: orbital. Orbital diameter: 4 mm. Infinitely adjustable speed range: 500 - 2.500 rpm. Type of movement: orbital, Shaker diameter: 4 mm, Motor rating input: 58 W, Motor rating output: 10 W, Permissible ON time: 100 %, Speed min (adjustable): 500 rpm, Speed range: 0 - 2500 rpm, Operating mode: continuous operation. Working with microtiter plates - number of microtiter plates: 1, Permissible ambient temperature: 5 - 40 °C, Permissible relative humidity: cca 80 %, Protection class according to DIN EN 60529: IP 21, Voltage: 200 - 240 / 115 / 100 V, Frequency: 50/60 Hz, Power input: 60 W.
Quantity	1
Cost	333,48 EUR
Purpose linked to the Course to be delivered	The device will be an integral part of the MSc in Sustainable Food Production Systems/STEPS and will be used for the development of laboratory exercises and preparation of training materials student development, development of experiments, improvement of the existing level of knowledge in the area of quality control of food (food products), control of agricultural products, raw material of raw materials, animal feed, quality control of animal feed, soil analysis, water analysis, etc. Linked to the Course: <ul style="list-style-type: none"> • <i>Advanced Food Science and Technology,</i> • <i>Harvesting and Post-Harvesting Technologies,</i> • <i>Sustainable Technology of Dairy Products,</i> • <i>Sustainable Technology of Meat Products,</i> • <i>Animal Food Technology Science</i>
Tendering procedure (purchased/not purchased)	purchased
Inventory number	30001734
Attach a photo for each Equipment piece if the equipment is purchased.	 

6.1.2 Development of “Food Quality Control Lab”

In line with the activities and obligations within the STEPS project and WP5, particularly the activity 5.2 *Development of research labs*, the Biotechnical Faculty of the University of Bihać timely initiated procedural and technical (*training, small-scale demonstrations*) activities for the development of two types of laboratories, “[Food Quality Control Lab](#)” and “[Food Production Systems Management Lab](#)”. These activities on one hand directly support the foreseen start and implementation of the second study cycle on [Sustainable Food Production Systems](#) in terms of provision of laboratory-infrastructure preconditions/procurement of laboratory-instrumental equipment, but also the implementation of other study programs at the Biotechnical Faculty of the University of Bihać. On the other hand, laboratories will provide an opportunity to increase the potential for scientific research, which will result in the publication of scientific papers in national scientific journals, international scientific journals and conferences. Also, they will offer the possibility of organizing joint programs with industrial partners or small and medium-sized private sector companies and national bodies involved in decision-making and policy making but also to become part of Open science network society.

“[Food Quality Control Lab](#)” will offer the advantage of experimentally specifying the quality of agricultural products, by means of mass spectrometry, in particular after small-scale treatment and/or small-scale processing. Considering the fact that the Food Quality Control Lab is already established at the Biotechnical Faculty, UNBI STEPS team, led by the Assistant Professor Emir Mujić, submitted a request to the Scientific-Teaching Council of the Biotechnical Faculty for passing the **Decision on “Modernization and strengthening of capacities of the Laboratory at the Biotechnical faculty in the area of Grocery quality control”**.

After the submission of the request, the Scientific-Teaching Council of the Biotechnical Faculty on its 5th (fifth) online session passed the **“Decision on Modernization and strengthening of capacities of the Laboratory at the Biotechnical faculty in the area of Grocery quality control within the STEPS project”** ([attached documents](#)). Regarding the post-installation activities, the Biotechnical Faculty of the University of Bihać together with the suppliers organized the necessary training and small-scale demonstrations ([Training of scientific and technical staff within the STEPS project](#)), so that the scientific and technical staff gets acquainted with the functioning of the devices and gain the necessary skills for conducting experiments/simulations and developing training materials (*Activity 5.3*). Considering the educational content of the MSc in Sustainable Food Production Systems/STEPS programme in particular, each of the laboratory exercises, experiments and training materials are included in the curricula and learning outcomes (*WP2 - STEPS structure and courses design*).

UNBI Food Quality Control Lab Photos:



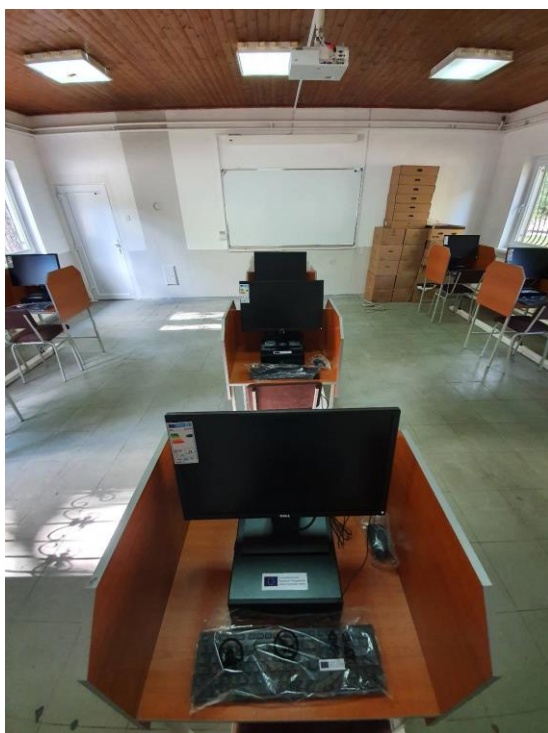
6.1.3 Development of laboratory/IT cabinet for “Food Production Systems Management Lab”

Besides the Food Quality Control laboratory capacities in the framework of Erasmus+ Project “Msc in Sustainable Food Production Systems/STEPS”, the Biotechnical Faculty of the University of Bihać was obliged to establish the ICT Center for the “[Food Production Systems Management](#)” for the support of the implementation of the second study cycle on [Sustainable Food Production Systems](#), and other study programs within the 1st and 2nd study cycle.

Through the implemented and completed public procurement procedures, all the equipment pieces (computers, software) were purchased for the ICT laboratory. Food Production Systems Management Laboratory will offer the opportunity for students to design and analyse processes and supply chains and evaluate the performance of production systems, in terms of energy consumption, environmental impact and recoup. This type of laboratory will provide enhanced knowledge related to the second group of courses, i.e. food production systems management. ICT lab in terms of "Food Production Systems Management Lab" will be used to design software-based exercises and projects (*Activity 5.3*), with the aim of ultimate utilization of the purchased equipment and further improvement of the level of knowledge and relevance of a variety of courses.

In compliance with the above described purpose and need for ICT infrastructural capacities, UNBI STEPS team leader, Assistant Professor Emir Mujić submitted a request to the Scientific-Teaching Council of the Biotechnical Faculty to pass **Decision on Establishment of laboratory/IT cabinet for Food production systems management** within the framework of STEPS project. After the submission of the request, the Scientific-Teaching Council of the Biotechnical Faculty on its 5th (fifth) online session, held on May 20, 2020, passed the **Decision** ([attached documents](#)). Biotechnical Faculty completed the process of obtaining a license for advanced software tools SimaPro Software for Food Production Systems Management Laboratory/ICT Center. Training for teaching – scientific staff members and development of software-based exercises and projects as part of the curriculum of the second cycle for Sustainable Food Production Systems is currently conducted.


Obtained Licenses ([SimaPro Faculty license](#)) of advanced software tools [SimaPro Software](#) will be used for analysing processes and supply chain scenarios, in terms of supply chain management, energy consumption and environmental impact, and the evaluation of feasibility of basic and alternative scenarios. Considering the educational content of the MSc in Sustainable Food Production Systems/STEPS programme in particular, each of the software-based exercises and projects, experiments and training materials are included in the curricula and learning outcomes (WP2- STEPS structure and courses design).

UNBI Food Production Systems Management Lab Photos:


6.2 Development of research labs at University of Sarajevo (UNSA - P6)

6.2.1 Food Quality Control Lab Equipment


Partner No Name (University) Country	P6 University of Sarajevo (UNSA) Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	AUTOMATIC AUTOCLAVES AES-50 with Wire basket CV-28
Specification	<p>Vertical autoclave - volume 50 liters. Electronic temperature display (microprocessor) with adjustable sterilization operating temperatures and parameter programming capabilities sterilization. Main characteristics:</p> <ul style="list-style-type: none"> A minimum of 10 sterilization programs, of which 4 predefined Operating temp. 100-134 C° Volume min 50L of usable space Timer function with audible alarm per expiration of the sterilization time Insulating cover for high protection temperature. Security mechanism that disables opening the lid if the chamber is under by pressing. Safety valve that disables exceeding the maximum pressure limit. Safety pressure switch that switches off the power supply heater in case of pressure overrun. Open door sensor: does not allow run any program if you cover not closed properly <p>The autoclave must meet the following standards: 2014/35/UE Low Voltage, 2014/30/UE Electromagnetic Compatibility, 2014/68/UE Pressure Equipment EN-61010-1, EN-61010-2-040, EN-61326, AD 2000 Merkblatt and RS- 232 Port.</p> <p>External autoclave dimensions: 505 +/- 5 x 580 +/- 5 x 1290 +/- 5 mm</p> <p>The delivery of the autoclave with deliver the appropriate wire basket</p> <p>Warranty: minimum 12 months</p> <p>Equipment installation and user training services (approx. 10 users)</p>
Quantity	1
Cost	6.033 EUR (11.800 BAM) (without VAT)
Purpose linked to the Course to be delivered	<p>Universal equipment, especially in laboratories of microbiological or wider microbiological character. It enables sterilization of equipment and instruments, but the procurement within the realization of the STEPS master study program is done primarily due to the application of this device in the cultivation of beneficial and analysis of food spoilage microorganisms (cultivation of microorganisms on nutrient media). It is planned to use the device in the implementation of practical laboratory exercises in a number of courses such as: Sustainable Wine production (cultivation of yeast cultures), Sustainable Technology of Milk and Dairy Products (cultivation of bacterial cultures with application in dairy) and Sustainable technology of Meat Products).</p>


	<p>The device is also usable in the preparation of all final - master thesisthat include the cultivation of microbiological cultures or microbiological analysis.</p> <p>Linked to the courses:</p> <ul style="list-style-type: none"> • <i>Sustainable Technology of Fruit and Vegetable Products</i> • <i>Sustainable Technology of Dairy Products</i> • <i>Sustainable Technology of Meat Products</i> • <i>Sustainable Wine Production</i> • <i>Sustainable Technology of Cereal Food</i>
Tendering procedure (purchased/not purchased)	Finished (purchased)
Inventory number	<p>Inventory number: 3718</p> <p>Invoice No: 20-301-000292 (14/02/2020), Contract No: 0101-10265-8-3/19</p>
<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	

Partner No Name (University) Country	P6 University of Sarajevo Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	ELISA kit for detection of total aflatoxins
Specification	<p>ELISA kit for residue detection – main characteristics: Kit content: EIA / ELISA reading device Training to work with ELISA plate reader + installation 2 Optional EIA / ELISA diagnostic kit (Aflatoxins B1, B2, G1 and G2) ELISA plate 96 with the possibility of separation into 8 X 12 elements, measurability at 450 nm on an ELISA reader Cross reactivity: Aflatoxin B1 100%, Aflatoxin B2 112%, Aflatoxin G1 69%, Aflatoxin G2 15%, Aflatoxin M1 16% LOD ppt: baby food 0.016; brown rice 0.2; unprocessed cereals 0.3; processed cereals 0.2; red pepper 1.0; liver 0.05; tissue 0.025; fodder 0.4; nut products 0.2 Set contains: diluent (20 ml, 4 times concentrated), rinse aid (30 ml, 20 times concentrated), substrate (12 ml ready to use), stop solution (15 ml ready to use), conjugate (100 times concentrated), antibody (100 times concentrated), zero standard (2 ml ready to use) and other ready to use standards ELISA kit for zearalenone detection: - ELISA plate 96 with the possibility of separation into 8 X 12 elements, measurability at 450 nm on an ELISA reader Zearalenone (F2-mycotoxin) 100%, α-Zearalenol 75%, β-Zearalenol 30%, Zearanol (α-zearalanol) 150%, Taleranol (β-zearalanol) 60%, Zearalanone 190%. All other steroids tested <0.01%. LOD ppb: cereals 12.5, milk 0.625, milk powder: 0.5, serum: 1.25 Set contains: diluent (20 ml, 4 times concentrated), rinse aid (30 ml, 20 times concentrated), substrate (12 ml ready to use), stop solution (15 ml ready to use), conjugate (100 times concentrated), antibody (100 times concentrated), zero standard (2 ml ready to use) and other ready to use standards Warranty: minimum 12 months Equipment installation and training service users (approx. 10 users)</p>
Quantity	1
Cost	6.386 EUR (12.490 BAM) (without VAT)



Purpose linked to the Course to be delivered	<p>The Elisa kit will be used for measuring of total aflatoxins in different kind of food like milk, dairy products, meat and meay products, wine, beer, juice and other food products and feed, also it will be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products), analysis and quality control of agricultural products, raw material of plant origin and quality control of animal feed.</p> <p>Linked to the courses:</p> <ul style="list-style-type: none"> • <i>Sustainable Land Management</i> • <i>Advances in Food Science and Technology</i> • <i>Waste and Recycling Technologies in Agriculture</i> • <i>Harvesting and Post-harvesting Technology in Agriculture</i> • <i>Low Input Agriculture</i> • <i>Sustainable Technology of Fruit and Vegetable Products</i> • <i>Sustainable Technology of Meat Products</i> • <i>Sustainable Technology of Cereal Food</i>
Tendering procedure (purchased/not purchased)	Finished (purchased)
Inventory number	Inventory number: 3656 The bill from 16/03/2020; Contract No: 0101-10265-10-1/19
<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	

Partner No Name (University) Country	P6 University of Sarajevo Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	SPECTROPHOTOMETER with electronic single channel pipet
Specification	<p><i>Spectrophotometer</i> UV / VIS spectrophotometer with a wavelength range of 190 - 1100 nm - "dual beam" spectrophotometer with split-beam (SBT) technology Wavelength accuracy (+/-) 1 nm Wavelength reproducibility (+/-) 0.5 nm Xenon lamp source (PTR) Permeability <3 nm (PTR) xenon lamp reading technology Instrument Performance Verification Plant (IPV) Cuvette holder 8 channel for quartz cuvettes 10x10mm, 2 ml</p> <p><i>Electronic single channel pipette</i> Channels 1 Maximum volume 20 µL Technology type: LiteTouch System LTS Autoclavable pipette tip Password settings protection, alarms for protocols and services for the application of standard operating procedures and GLP / GMP compliance Volume range: 2 µL - 20 µL Increment (electric) 0.02 µL Accuracy ± 7.5% / 0.15 µL; 1.5% / 0.15 µL; 1% / 0.2 µL Accuracy ± 2 µL: 2% / 0.04 µL; 10 µL: 0.5% / 0.05 µL; 20 µL: 0.3% / 0.06 µL Pipette tips: LTS maximum volume 20 µL, in a box 96 pcs, sterile, BioClean - 100% Warranty: minimum 12 months Equipment installation and training service users (approx. 10 users)</p>
Quantity	1
Cost	6.596 EUR (12.900 BAM) (without VAT)

Purpose linked to the Course to be delivered	<p>Widely applicable laboratory instrument usable for a range of food quality control analyzes based on analyzes of optical densities, absorption spectra and induced color reactions. Intended for demonstrative and practical classes in the courses of the STEPS study program. Of particular interest may be in the preparation of master theses in the field of food quality control and functional foods in e.g. analysis of antioxidant properties of existing or new food products.</p> <p>Linked to the courses:</p> <ul style="list-style-type: none"> • <i>Advances in Food Science and Technology</i> • <i>Sustainable Technology of Fruit and Vegetable Products</i> • <i>Sustainable Technology of Meat Products</i> • <i>Sustainable Technology of Dairy Products</i> • <i>Sustainable Wine Production</i>
Tendering procedure (purchased/not purchased)	<p>The procedure is in the final stage</p> <p>Adequate e-pipette tips are not supplied</p>
Inventory number	<p>Inventory number: 3657</p> <p>The bill from: 09/10/2020</p> <p>Contract No: 0101-4402-8-LOT1/2 from 28/05/2020</p>
<p>Attach a photo for each Equipment piece if the equipment is purchased.</p>	

Partner No	P6
Name (University)	University of Sarajevo
Country	Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	PORTABLE NIR IR SPECTROMETER
Specification	Intended for food quality control. Main characteristics: Wavelength range 900-1,700 nm, Optical resolution 10 nm, Groove size 1.69 x 0.025 mm, 1 mm InGaAs detector, Li-ion battery powered by USB or built-in, Standard 1 cm cuvette (the cuvette is not included), 6000: 1 signal to noise ratio, Optical resolution up to a peak of 10 nm, Slot size 25 microns, Lighting module integrated, 24-bit analog-to-digital converter with very low noise, Infrared sensor that measures the ambient temperature and the detector, Bluetooth communication protocol, The required certifications: FCC and CE, Warranty: minimum 12 months, Equipment installation and training service users (approx. 10 users)
Quantity	1
Cost	3.548 EUR (6.940 BAM) (without VAT)
Purpose linked to the Course to be delivered	To be used for the identification of raw materials as a critical step in quality assurance that has a large impact on customer safety as well as speed and cost of production. This portable Near Infrared (NIR) spectrometer has been designed for rapid in-situ analysis. This analyzer is battery powered and autonomous for complete portability. This instrument allows pharmaceutical manufacturers to respond to increased regulatory requirements, improve quality control, reduce production costs and reduce supply chain risks. The instrument will be used in the development of laboratory exercises and preparation of student training materials, development of experiments, raising existing level of knowledge and improving knowledge quality, increasing potential for scientific research in the field of food production, analysis and quality control of food (food products). Linked to the courses: <i>Harvesting and Post-harvesting Technology in Agriculture, Advances Food Science and Technology, Low Input Agriculture, Sustainable Technology of Fruit and Vegetable Products, Sustainable Technology of Cereals Food</i>
Tendering procedure (purchased/not purchased)	Finished (purchased)
Inventory number	Inventory number: 3655 The bill from: 12/08/2020 Contract No: 0101-4402-13-LOT2/20 from 18/06/2020
Attach a photo for each Equipment piece if the equipment is purchased.	

Partner No Name (University) Country	P6 University of Sarajevo Bosnia and Herzegovina
Type of equipment: Laboratory / ICT	Laboratory
Equipment piece	PILOT EQUIPMENT FOR FRUIT PROCESSING
Specification	<p>Pilot equipment for fruit processing consists of: fruit grinding mill, hydropress, overflow vessel with juice pump, flow pasteurizer, manual bottle filler with dispenser and container, bottle sterilizer, stainless steel tanks and plate filter with volumetric pump integrated with filler.</p> <p>Fruit grinding mill Electric drive, minimum motor power is 1.1 kW, knives made of stainless steel AISI 304 or 304 L.</p> <p>Hydropress Squeezing based on water pressure on the pressure membrane volumes minimum 30L and maximum 50L made of stainless steel AISI 304 or 304 L</p> <p>Overflow container with juice pump (from hydropress to pasteurizer) Made of stainless steel AISI 304 or 304 L</p> <p>Flow Pasteurizer Maximum capacity 100l / h; operating temperature maximum 95 ° C, possibility of flow and temperature regulation; power minimum 6kW. Made of AISI 304 or 304 L stainless steel.</p> <p>Manual bottle filler with dispenser and container Made of AISI 304 or 304 L stainless steel with a minimum of one lead and a maximum of two leads.</p> <p>Bottle sterilizer Capacity 200 bottles of 1L, movable for easier manipulation, heater power minimum 4.6 kW. Made of AISI 304 or 304 L stainless steel, with height-adjustable glass packaging holders.</p> <p>Stainless steel tanks (2 pcs) Tank material: Stainless steel AISI 304 or 304 L, wall thickness: 0.8 µm At the bottom of the tank a total drain of ½ " and a tap of ½ "</p> <p>Plate filter with volumetric pump integrated with filler AISI 304 or 304 L stainless steel plate filter with a minimum of 10 plates measuring 20x20 PVC; AISI 304 or 304 L stainless steel volumetric pump adapted to the filter device, filter layers of pore size 0.9µm, which are adapted to the plate filter - 100 pieces. The charger is made of stainless steel AISI 304 or 304 L with four leads; capacity minimum 200 liters / h; weight of plate filter integrated with filler up to a maximum of 50 kg.</p>

Quantity	1
Cost	8.326 EUR (16.284 BAM) (without VAT)
Purpose linked to the Course to be delivered	<p>Within the syllabus of the course "Sustainable Technology of Fruit and Vegetable Products" it is planned a teaching unit that processes juice production as the most common product group from the fruit and vegetable complex on the Bosnia and Herzegovina market. It is more precisely predicted plant production of juices where the student through practical work will categorize waste according to place of origin (9-point scale) and accordingly suggest ways to use it. In the process of juice production, critical points of water and energy consumption will be defined and analyzed possibilities of application of new techniques and technologies for their reduction. The same model can be applied to the courses "Harvesting and Post-harvesting Technology of Agricultural Products", as well as "Sustainable Wine Production" while on the course "Food Packaging Technology" students be able to assess the stability of important nutrients and non - nutritive substances in depending on the packaging material used (type, thickness, color, etc.).</p> <p>Linked to the courses:</p> <ul style="list-style-type: none"> • <i>Sustainable Technology of Fruit and Vegetable Products</i> • <i>Harvesting and Post-harvesting Technology of Agricultural Products</i> • <i>Sustainable Wine Production</i> • <i>Food Packaging technology</i>
Tendering procedure (purchased/not purchased)	Finished (purchased)
Inventory number	Inventory number: 3709, 3710, 3711,3712,3713, 3714,3715,3716, 3717 The bill No 192 020 from:22/12/2020 Contract No: 0101-10406-6/20 from 24/11/2020
Attach a photo for each Equipment piece if the equipment is purchased.	 



6.2.2 Development of "Food Quality Control Lab"

In accordance with the activities and obligations within the WP5 STEPS project in the part related to activities 5.2 Development of research laboratories, the Faculty of Agriculture and Food Sciences, University of Sarajevo initiated the necessary procedure and technical activities (staff training, small demonstrations) related to the development of project defined two types of laboratories, the Food Quality Control Laboratory and the Food Production Systems Management Laboratory. Considering that it was not possible to form a single laboratory defined by the project at the Faculty of Agriculture and Food Science, due to the lack of space, as well as due to the variety and different functionality of the purchased equipment, the purchased instruments and equipment were distributed to a number of existing laboratories. Technical activities related to the installation of equipment directly support the planned start and implementation of the master study program "Sustainable food production systems" in the context of providing laboratory and infrastructural prerequisites. This means the procurement, distribution and installation of laboratory-instrumental equipment, which will serve not only for the teaching activities of the STEPS master study program but also for the implementation of other study programs of the I and II cycle of studies at the Faculty of Agriculture and Food, University of Sarajevo. These laboratories will also provide an opportunity to increase the potential for scientific research, which should result in the publication of scientific papers in domestic and international scientific journals, international conferences and symposia, etc. Equipped laboratories at the Faculty of Agriculture and Food Sciences will also offer the possibility of organizing joint programs and research for the needs of large companies in the agricultural and food sector, but also for the needs of small and medium enterprises from the private sector. Finally, these laboratories will also serve the needs of national bodies (institutions) involved in decision-making, but also to become part of an open scientific network society.

Laboratories for food quality control and other purposes will offer the possibility of various types of research, especially after processing on a small scale. Due to the fact that at the Faculty of Agriculture and Food Sciences has a number of laboratories dealing with food quality control, the UNSA team leader by prof. dr. Sabahudin Bajramović initiated a request to the Dean of the Faculty to make a Decision on modernization and strengthening the capacity of the laboratories of the Faculty of Agriculture and Food Sciences for the realization of teaching activities of the study program "Sustainable Food Production Systems".

After submitting the request, the Dean of the Faculty, by Decision no. 01-1-359-2 / 21 dated 16.2.2021. made a Decision on modernization and strengthening of the capacity of the laboratory of the Faculty of Agriculture and Food Sciences for the realization of teaching activities of the study program "Sustainable food production systems". The equipment purchased, according to this decision, is distributed as follows: (i) Elisa kit for detection of total aflatoxins - Laboratory for Microbiology, (ii) Semi-automatic vertical autoclave - Laboratory for fermentation technology, (iii) Pilot fruit processing equipment - Laboratory for fermentation technology (iv) Spectrophotometer with electronic single channel pipette - Laboratory for Food Technologies and (v) Portable NIR IR spectrometer - Laboratory for fruit growing and viticulture. The installation of the mentioned purchased equipment will enable the planned teaching activities of the study program Sustainable Food Production Systems, as well as other programs related to the field of Food Technologies.

Regarding post-installation activities, the Faculty of Agriculture and Food Sciences, University of Sarajevo, together with suppliers, organized the necessary training and demonstrations (Training of scientific and technical staff within the STEPS project, but others interested), to acquaint scientific and technical staff with the operation of the device and acquired the necessary skills to perform experiments / simulations and develop training materials (activity 5.3).

Taking into account the teaching material (exercises) of the MSc study program "Sustainable Food Production Systems", each laboratory exercise, experiments and training materials are included in the curricula and learning outcomes (WP2 - STEPS structure and course design).

Food Quality Control Lab Photos at UNSA





6.2.3 Development of laboratory/IT cabinet for “Food Production Systems Management Lab”

In addition to laboratory capacities for food quality control within the Erasmus + project "MSc in Sustainable Food Production Systems / STEPS", the Faculty of Agriculture and Food Sciences, University of Sarajevo was obliged to establish an ICT Center for "Food Production Systems Management" to support the implementation of the study program Sustainable food production systems, but also other study programs within the I and II cycle of studies at the Faculty.

For the needs of establishing the ICT center / laboratory, previously purchased IT equipment (desktops, laptops, projector and smart board) within the Erasmus + project LANDS (Next destination Blkans: Agrotourism landscapes development, number 585833-EPP-1-2017-RS-EPPKA2 -CBHE-JP) was used and equipment (desktops, laptops, multifunction printer) procured through the Erasmus + project STEPS. This type of laboratory will provide enhanced knowledge related to the second group of courses, i.e. food production systems management. ICT lab in terms of "Food Production Systems Management Lab" will be used to design software-based exercises and projects (*Activity 5.3*), with the aim of ultimate utilization of the purchased equipment and further improvement of the level of knowledge and relevance of a variety of courses.

In accordance with the above-described purpose and need for ICT infrastructure capacities, the coordinator of the UNSA STEPS project, prof. dr. Sabahudin Bajramović submitted a request to the Dean of the Faculty to make a decision on the establishment of an IT laboratory at the Faculty of Agriculture and Food in Sarajevo for Food production systems management within the Erasmus + STEPS project.

After submitting the request, the Dean of the Faculty, by Decision no. 01-1-358-2 / 21 dated 16.2.2021. made a Decision on the establishment of the IT laboratory of the Faculty through the deployment of purchased equipment within the Erasmus + projects LANDS and STEPS. The purchased equipment will be used for the teaching activities of the study program "Sustainable food production systems", but also other study programs that take place at the Faculty of Agriculture and Food Science, including training of students in the field of agritourism (LANDS).

Within the IT laboratory, instead of the planned Lab VIEW software (no one responded to the public call), the software program ArcGIS Desktop Basic was purchased as well as ArcGIS Academic Departmental Agreement – Small package license (5 licensees) – 3 x 1-Year Term License which includes ArcGIS Desktop Advanced with extensions – 5 licenses, ArcGIS Enterprise Advanced with extensions – 5 licenses and ArcGIS Online User Type Creator – 5 named user licenses. Teaching staff who will work on the modules in which this software package will be used have the necessary knowledge and experience from before, and the first generation of students who will use this software is expected in the second semester of the academic year 2020/2021.

Considering the educational content of the MSc in Sustainable Food Production Systems/STEPS programme in particular, each of the software-based exercises and projects, experiments and training materials are included in the curricula and learning outcomes (WP2- STEPS structure and courses design).

Food Production System Management (IT) Lab Photos at UNSA:

7 DOCUMENTS RELATED TO THE DEVELOPMENT OF TWO TYPES OF LABORATORIES IN PARTNER COUNTRIES HEIs

1. All the documents related to the development of two types of laboratories at the **AUT** can be found on the following link:
<https://drive.google.com/drive/folders/172HxI3ZNdPR1ff1QytyQmrMOQkKPfSWy?usp=sharing>
2. All the documents related to the development of two types of laboratories at the **EUT** can be found on the following link:
https://drive.google.com/drive/folders/1L3LS3yHKJ2otvEdj_njDt7MVploOOsAw?usp=sharing
3. All the documents related to the development of two types of laboratories at the **UNBI** can be found on the following link:
<https://drive.google.com/drive/folders/1uLT2okppWK52zZraZgcJMgM1Q0YmLS?usp=sharing>
4. All the documents related to the development of two types of laboratories at the **UNSA** can be found on the following link:
<https://drive.google.com/drive/folders/15adnNtgk3qj3A4BpSP1pSocITfyd3GBw>
5. All the documents related to the development of two types of laboratories at the **UC** can be found on the following link:
<https://drive.google.com/drive/folders/17CEgURZ8mr5dU5oYzm098gZrCDPYyVGT>
6. All the documents related to the development of two types of laboratories at the **UHZ** can be found on the following link:
https://drive.google.com/drive/folders/1YJ1DsA8clhYlxOw9_D82rj0NmZRZntzx?usp=sharing

8 CONCLUSIONS AND RECOMMENDATIONS

Completion of activities in task 5.1 Development of teaching/learning environment provided conditions for the development of two types of laboratories ("*Food Quality Control Lab*" and "*Food Production Systems Management Lab*"), and for continuing work on the activities 5.2 and 5.3 within WP5. The equipment will be used for the improvement of the quality of teaching and the level of knowledge delivered also improving the potentials of the scientific staff to prepare and publish research articles in international scientific journals and conferences. Capacity building of specific type of laboratories in the partner countries will also offer the opportunity to organize a joint program with industrial partners or small and medium private sector companies, national bodies involved in decision making and policy development.

9 REFERENCES

1. Guidelines for the Use of the Grant-for grants awarded in 2017 under Call EAC/A03/2016 p. 25, 3.2.6.1 Equipment: https://wayback.archive-it.org/12090/20210124190139/https://eacea.ec.europa.eu/sites/eacea-site/files/01guidelines_for_the_special_mobility_strand_version_december_20173rd_call.pdf
2. Development of the „Food Quality Control Lab“ and the „Food Production Systems Management Lab / ICTcenter“ within the project „MSc in Sustainable Food Production Systems / STEPS“ (justification for equipment specification modification detailed argumentation and specification for equipment) (2019). procurement available: <https://btf.unbi.ba/wp-content/uploads/2019/12/Detailed-Justification-specification-and-argumentation-for-purchasing-equipment-STEPS-2019.pdf>