



## SULAWE Description of the module

<b>Code.</b> Code 1	<b>Module name</b> Sustainable Livestock Production
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### 1. Module learning objectives

#### ***Qualification objectives and overall module objectives for all sub-topics***

*What knowledge, skills, and competences do you need to acquire disciplinarily and interdisciplinarily?*

Formation of general and special competences, knowledge, skills and abilities of higher education students in sustainable production and processing of livestock products:

- information and communication technologies skills;
- ability to search, process and analyse information obtained from various sources;
- ability to develop, organise and implement measures to improve animal productivity;
- the ability to practically manage work or educational processes in the production and processing of animal products that are complex, unpredictable and require new strategic approaches;
- the ability to develop and implement scientific and applied projects in the field of technologies for the production and processing of livestock products and veterinary medicine with related interdisciplinary areas, taking into account technical, economic, social, legal and environmental aspects;
- ability to apply modern methods and tools for research in veterinary medicine and technology of production and processing of livestock products;
- to conduct research and innovation activities in order to obtain new knowledge and create new technologies and products in the field of animal husbandry in broader multidisciplinary contexts;
- build and research models of technological processes for the production and processing of livestock products, assess their feasibility and determine the limits of their application;
- be able to identify factors that affect the achievement of production goals, analyse and compare alternatives, assess risks and consequences.

#### **Summary**

Sustainable animal husbandry is a relevant and important discipline in the formation of highly qualified specialists in the field of animal husbandry. The module considers the concept of using available resources in the production of livestock products based on the validity of technological solutions from the standpoint of resource conservation, animal welfare and the integrity of the ecological system of the surrounding areas of production facilities. The knowledge and skills acquired will allow the specialist to use sustainable livestock production technologies in practice and analyse the cause and effect of their implementation in production.

What professional, methodological, practical and interdisciplinary content will be included?

The technological foundations of sustainable livestock production will allow higher education students to gain knowledge of the assessment of the physiological state of animals in industrial use. The criteria and methodology of sustainable development considered in this module will allow to form a scale for assessing the sustainability of animal husbandry in practice. The knowledge gained will allow you to form a theoretical basis and acquire practical skills in keeping, feeding and breeding animals and develop a strategy for managing production processes based on best resource-saving practices.

#### **Forms of teaching / learning (synopsis)**

e.g. problematic lecture, interactive lecture, binary lecture, lecture-consultation, seminar (with an exercise), laboratory work, project, excursion, workshop, master class, workshop (for creative people), etc.

Problem lecture, interactive, inverted lecture and binary lecture, as well as in the form of practical work. Case study method (situational task, analysis of a specific situation). Workshops and recitations on selected issues of the sustainable livestock concept.

### 2. Prerequisites for participation



<p><b>Knowledge, skills, competences</b></p>	<p>What knowledge, skills and competencies are required for successful participation? The mastery of the discipline requires analysis and synthesis of the laws of biological, zootechnical, veterinary, engineering and economic sciences, as well as professional knowledge of animal feeding, housing and breeding, technology of production and processing of livestock products. One should have competencies in biodiversity of the livestock sector.</p>
<p><b>Preparing for the module</b></p>	<p>References, electronic databases and resources, links to multimedia teaching and learning programmes:</p> <p><a href="https://www.bfh.ch/en/research/all-our-consulting-services/rise/">https://www.bfh.ch/en/research/all-our-consulting-services/rise/</a></p> <p>Sarkar, A., Wang, H., Rahman, A., Memon, W. H., &amp; Qian, L. (2022). A bibliometric analysis of sustainable agriculture: based on the Web of Science (WOS) platform. <i>Environmental Science and Pollution Research</i>, 29(26), 38928-38949. <a href="https://doi.org/10.1007/s11356-022-19632-x">https://doi.org/10.1007/s11356-022-19632-x</a></p> <p>Varijakshapanicker, P., Mckune, S., Miller, L., Hendrickx, S., Balehegn, M., Dahl, G. E., &amp; Adesogan, A. T. (2019). Sustainable livestock systems to improve human health, nutrition, and economic status. <i>Animal Frontiers</i>, 9(4), 39-50. <a href="https://doi.org/10.1093/af/vfz041">https://doi.org/10.1093/af/vfz041</a>.</p> <p>Michalk, D. L., Kemp, D. R., Badgery, W. B., Wu, J., Zhang, Y., &amp; Thomassin, P. J. (2019). Sustainability and future food security-A global perspective for livestock production. <i>Land Degradation &amp; Development</i>, 30(5), 561-573. <a href="https://doi.org/10.1002/ldr.3217">https://doi.org/10.1002/ldr.3217</a></p> <p>Turner, I., Heidari, D., Widowski, T., Pelletier, N. (2023). Development of a life cycle impact assessment methodology for animal welfare with an application in the poultry industry. <i>Sustainable Production and Consumption</i>, 40, 30-47. DOI: <a href="https://doi.org/10.1016/j.spc.2023.06.010">https://doi.org/10.1016/j.spc.2023.06.010</a></p> <p>Cammarata, M., Timpanaro, G., Scuderi, A. (2021). Assessing Sustainability of Organic Livestock Farming in Sicily: A Case Study Using the FAO SAFA Framework. <i>Agriculture</i>, 11(3), 274. DOI: <a href="https://doi.org/10.3390/agriculture11030274">https://doi.org/10.3390/agriculture11030274</a></p> <p>Broom, D.M. (2021). A method for assessing sustainability, with beef production as an example. <i>Biological Reviews</i>, 96, 1836-1853. DOI: <a href="https://doi.org/10.1111/brv.12726">https://doi.org/10.1111/brv.12726</a></p> <p>Van-Heurck, M., Alegre, J., Solis, R., Del Castillo, D., Pérez, L., Lavelle, P., Quintero, M. (2020). Measuring the sustainability of smallholder livestock farming in Yurimaguas, Peruvian Amazon. <i>Food and Energy Security</i>, 9, 242. DOI: <a href="https://doi.org/10.1002/fes3.242">https://doi.org/10.1002/fes3.242</a></p> <p>FAO. 2016. Identification of indicators for evaluating of sustainable animal diets, by Freija H. van Holsteijn, Marion de Vries &amp; Harinder P. S. Makkar. FAO Animal Production and Health Working Paper. No. 15. Rome, Italy. URL: <a href="https://www.fao.org/documents/card/en/c/ababb1b9-d990-432d-bc1f-b1af024ba6a7">https://www.fao.org/documents/card/en/c/ababb1b9-d990-432d-bc1f-b1af024ba6a7</a> (<a href="https://www.fao.org/3/i5200e/i5200e.pdf">https://www.fao.org/3/i5200e/i5200e.pdf</a>)</p> <p>Fabián Cruz, J., Mena, Y. and Rodríguez-Estévez, V. (2018). Methodologies for Assessing Sustainability in Farming Systems. <i>Sustainability Assessment and Reporting</i>, 2018, 33-58. DOI: <a href="http://dx.doi.org/10.5772/intechopen.79220">http://dx.doi.org/10.5772/intechopen.79220</a>.</p> <p>Sakharova, M Stryukov and Zolnikov, V. (2019). Methodology for assessing the sustainability of agricultural production, taking into account its economic efficiency. <i>IOP Conference Series: Earth and Environmental Science</i>, 392. DOI: <a href="https://doi.org/10.1088/1755-1315/392/1/012019">https://doi.org/10.1088/1755-1315/392/1/012019</a></p> <p>Gharsallah, O., Gandolfi, C., Facchi, A. (2021). Methodologies for the Sustainability Assessment of Agricultural Production Systems, with a Focus on Rice: A Review. <i>Sustainability</i>, 13, 11123. DOI: <a href="https://doi.org/10.3390/su131911123">https://doi.org/10.3390/su131911123</a></p>



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### 3. Link to the sustainability module

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What aspects of sustainable development (economic, environmental, social) will be considered?

The discipline covers the development of the livestock industry as a key element of sustainable development of mankind. Animal husbandry is a branch of agriculture that provides food for people and is a key tool in the fight against hunger. The main aspects of sustainable development to be considered are:

1. *Economic aspects* - methodology for calculating sustainable development criteria, digitalisation of production sustainability, economic efficiency and forecasting the consequences of production decisions.
2. *Environmental aspects* - methodology for using resource-saving techniques in feeding, caring for and keeping animals based on the principles of their welfare. Management of production by-products, the impact of livestock production activities on adjacent areas (soil, water, air).
3. *Social aspects* - managing the impact of the livestock industry on local communities. Ensuring the development of industrial infrastructure and jobs. Motivation to obtain education in order to conduct production in the livestock sector. Promoting the principles of sustainable livestock development in society.

### 4. Exam performance (prerequisites for awarding credits)

Type and duration (min)	Share %.
Exam (90 min): practical work	NUBiP: Academic work 70 % of the time Attestation of 30 %. PSAU: 80\20 LNUVMB50\50 V. Dahl EUNU60\40



## 5. Organisation.

<p><b>Responsible for the module</b>  <b>NUBiP:</b>  <i>PhD Hryshchenko Nataliia</i>  <i>PhD Zlamaniuk Liudmyla</i>  <b>PSAU:</b>  <i>PhD Larysa Kuzmenko</i>  <i>Prof. Dr Shostia Anatolia</i>  <b>LNUVMB:</b>  <i>PhD Petro Bodnar</i>  <i>Prof. PhD Yuriy Kropyvka</i>  <i>V. Dahl EUNU</i>  <i>PhD Liudmyla Parkhomenko</i>  <i>PhD Tetiana Stryzhak</i></p>		
<p><b>Module type</b>  <b>Type of the module</b>  <b>PSAU and LNUVMB: + Dal compulsory basic</b>  <b>NUBiP: elective</b></p>	<p><b>Regular cycle</b>            Annually</p>	<p><b>Duration.</b>            1 semester</p>
<p><b>Requirements for applicants</b>            204: Bachelor's degree            211: completed secondary education</p>	<p><b>ECTS points</b>            4 ECTS</p>	<p><b>Attendance during semester</b>            4 hours per week</p>
<p><b>Load</b>            4 ECTS x 30 hours = 120 hours - <b>total workload, with the following distribution</b></p>		
<p><b>Presence/Contacts</b>            40-60 hrs. / 33-50%</p>	<p><b>Preparation/ follow up/ self-study</b>            80-60 hrs. / 67-50%</p>	<p><b>Tasks/Group work</b>            0-20 hrs. / 0-17%</p>

## 6. Design of the module Sustainable livestock production

<b>Sub-topics</b>	
Code 1.1.	Title of subtopic 1 Concepts of sustainable development, sustainable agricultural production and sustainable livestock management
Code 1.2	Title of subtopic 2 Impacts of livestock production, health and welfare on biodiversity, environment, climate change and antimicrobial resistance
Code 1.3	Title of subtopic 3 Innovative and sustainable technologies in animal husbandry
Code 1.4	Title of subtopic 4 Sustainability assessment and sustainability criteria for livestock products
Code 1.5	Title of subtopic 5 Livestock products, raw materials and end products



### 6.1.1 Description of subtopics

<b>Code.</b> Code 1.1	<b>Subtopic title</b> <b>Concepts of sustainable development, sustainable agricultural production and sustainable livestock management</b>			
<b>6.1.2. Creating subtopics</b>				
<b>Learning outcomes</b> After completing the subtopic, graduate students acquire competencies in the concept of sustainable development, which includes three components: economic, environmental and social. Course participants acquire the ability to analyse the development of sustainable agricultural production as a basis for sustainable development of rural areas and the region as a whole. They have systematic knowledge of the causes of the projected global problems of sustainable development of mankind (food security, global warming, depletion of critical resources).				
<b>Contents.</b> - Concepts of sustainable development and sustainable agricultural production - Sustainable management in agricultural and livestock production - Prerequisites and factors for the formation of the concept of sustainable development, strategy for its further development - The role of stakeholders (producers, consumers, government, global organisations) in promoting sustainable agricultural development in the world - Social perception of sustainable livestock development in the context of consumers and producers - Animal welfare in the context of sustainable livestock development				
<b>Forms of teaching/learning</b> Problematic lecture, interactive dialogue, binary lecture, lecture-consultation, practical work				
<b>Teaching/learning methods</b> lecture, discussion, exercise, training of a study group, case analysis, business game, role play, group work, presentations, project work				
<b>Literature/training materials</b>  Sarkar, A., Wang, H., Rahman, A., Memon, W. H., & Qian, L. (2022). A bibliometric analysis of sustainable agriculture: based on the Web of Science (WOS) platform. <i>Environmental Science and Pollution Research</i> , 29(26), 38928-38949. <a href="https://doi.org/10.1007/s11356-022-19632-x">https://doi.org/10.1007/s11356-022-19632-x</a>  Varijakshapanicker, P., Mckune, S., Miller, L., Hendrickx, S., Balehegn, M., Dahl, G. E., & Adesogan, A. T. (2019). Sustainable livestock systems to improve human health, nutrition, and economic status. <i>Animal Frontiers</i> , 9(4), 39-50. <a href="https://doi.org/10.1093/af/vfz041">https://doi.org/10.1093/af/vfz041</a> .  Michalk, D. L., Kemp, D. R., Badgery, W. B., Wu, J., Zhang, Y., & Thomassin, P. J. (2019). Sustainability and future food security-A global perspective for livestock production. <i>Land Degradation &amp; Development</i> , 30(5), 561-573. <a href="https://doi.org/10.1002/ldr.3217">https://doi.org/10.1002/ldr.3217</a>  Turner, I., Heidari, D., Widowski, T., Pelletier, N. (2023). Development of a life cycle impact assessment methodology for animal welfare with an application in the poultry industry. <i>Sustainable Production and Consumption</i> , 40, 30-47. DOI: <a href="https://doi.org/10.1016/j.spc.2023.06.010">https://doi.org/10.1016/j.spc.2023.06.010</a>				
<b>Other</b> tutorials, online parts, practical visits, invited experts and more <b>Farm visits, guest lecturers</b>				
<b>6.1.3. Organisation of the sub-topic</b>				
<b>ECTS points</b> e.g. 0.8	<b>Semester Week Hours</b>	<b>Grouping/ no</b>	<b>Recommended academic semester</b> e.g. 2	<b>Language.</b> Ukrainian
<b>Load</b> For example, 0.8 ECTS points x 30 hours = 24 hours, with the following distribution				
<b>Lectures</b> 4 hours / 16.5 per cent	<b>Practical Tasks/Group work</b> 4 hours / 16.5 per cent		<b>Preparation/ follow up/ self-study</b> 16 hours / 66 %	



<b>Code.</b> Code 1.2					<b>Subtopic title</b> <b>Impacts of livestock production, health and welfare on biodiversity, environment, climate change and antimicrobial resistance</b>				
<b>6.2.2. Creating subtopics</b>									
<b>The Learning outcomes</b> After completing this subtopic, higher education learners acquire competencies in the cause-and-effect chain of livestock management affecting public health and the environment. Course participants develop the ability to analyze the sustainability of livestock management in relation to welfare, biodiversity, and biosecurity. They possess systematic knowledge about the use of antimicrobial agents and methods to prevent their usage.									
<b>Contents.</b> - Impact of livestock development on environmental biodiversity and climate change -Impact of livestock development on human health -Calculating the impact of livestock production on air quality and water resources -The impact of the quality of livestock products on the consumer -Hazardous emissions from various livestock industries; -Animal welfare as an aspect of animal health in industrial production; -Climate change over the period of industrial agricultural production; -Occupational diseases of employees of livestock enterprises; -Biosafety in the production of livestock products.									
<b>Forms of teaching/learning</b> problematic lecture, interactive lecture, binary lecture, lecture-consultation, practical work									
<b>Teaching/learning methods</b> lecture, discussion, exercise, training of a study group, case study analysis, business game, role play, group work, presentations, project work									
<b>Literature/training materials</b> Cammarata, M., Timpanaro, G., Scuderi, A. (2021). Assessing Sustainability of Organic Livestock Farming in Sicily: A Case Study Using the FAO SAFA Framework. <i>Agriculture</i> , 11(3), 274. DOI: <a href="https://doi.org/10.3390/agriculture11030274">https://doi.org/10.3390/agriculture11030274</a> Broom, D.M. (2021). A method for assessing sustainability, with beef production as an example. <i>Biological Reviews</i> , 96, 1836-1853. DOI: <a href="https://doi.org/10.1111/brv.12726">https://doi.org/10.1111/brv.12726</a> Van-Heurck, M., Alegre, J., Solis, R., Del Castillo, D., Pérez, L., Lavelle, P., Quintero, M. (2020). Measuring the sustainability of smallholder livestock farming in Yurimaguas, Peruvian Amazon. <i>Food and Energy Security</i> , 9, 242. DOI: <a href="https://doi.org/10.1002/fes3.242">https://doi.org/10.1002/fes3.242</a> FAO. 2016. Identification of indicators for evaluating of sustainable animal diets, by Freija H. van Holsteijn, Marion de Vries & Harinder P. S. Makkar. FAO Animal Production and Health Working Paper. No. 15. Rome, Italy. URL: <a href="https://www.fao.org/documents/card/en/c/ababb1b9-d990-432d-bc1f-b1af024ba6a7">https://www.fao.org/documents/card/en/c/ababb1b9-d990-432d-bc1f-b1af024ba6a7</a> ( <a href="https://www.fao.org/3/i5200e/i5200e.pdf">https://www.fao.org/3/i5200e/i5200e.pdf</a> ) Fabián Cruz, J., Mena, Y. and Rodríguez-Estévez, V. (2018). Methodologies for Assessing Sustainability in Farming Systems. <i>Sustainability Assessment and Reporting</i> , 2018, 33-58. DOI: <a href="http://dx.doi.org/10.5772/intechopen.79220">http://dx.doi.org/10.5772/intechopen.79220</a> .									
<b>Other</b> tutorials, online parts, practical visits, invited experts, etc. <b>Farm visits, guest lecturers</b>									
<b>6.2.3. Organisation of the sub-topic</b>									
<b>ECTS points</b> e.g. 0.8		<b>Semester Week Hours</b>		<b>Grouping/ no</b>		<b>Recommended academic semester</b> e.g. 2		<b>Language.</b> Ukrainian	
<b>Load</b> For example, 0.8 ECTS points x 30 hours = 24 hours, with the following distribution									
<b>Lectures</b> 4 hours / 16.5 per cent			<b>Practical Tasks/Group work</b> 4 hours / 16.5 per cent				<b>Preparation/ follow up/ self-study</b> 16 hours / 66 %		





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<b>Code.</b> Code 1.3	<b>Subtopic title</b> <b>Innovative and sustainable technologies in livestock production</b>			
<b>6.3.2. Creating subtopics</b>				
<b>Learning outcomes</b> After completing the subtopic, higher education students acquire knowledge of innovative, industrial and resource-saving technologies for the production of livestock products. Students of the course acquire knowledge of tools to reduce by-products of animal husbandry, economical use of available resources (water, feed, electricity, etc.). They have systematic knowledge of livestock genetic resources, organisation of production activities based on the principles of sustainable production and sustainable development.				
<b>Contents.</b> - Innovative and industrial technologies in animal husbandry -Resource-saving technologies in animal husbandry as a concept of sustainable development -Sustainable production of livestock products in industrial technology -Causes and consequences of production intensification -Intensive use of animals in terms of economics and bioethics -Waste management in livestock production -Sustainability of genetic resources -The logic of interaction between sustainable livestock production and industrial technology.				
<b>Forms of teaching/learning</b> problem lecture, interactive lecture, binary lecture, lecture-consultation, practical work				
<b>Teaching/learning methods</b> lecture, discussion, exercise, training of a study group, case analysis, business game, role play, group work, presentations, project work				
Literature/training materials Noor Uddin, G., Abdul Hannan, A., Hosain, Z., Al-Amin, Hossain, M., Shariful Islam, S., Mizanur Rahman, M., Aktar, M., Debnath, M., Kumar Dey, A., Dhali, C. (2019). A Review on Quality and Safety of Animal Source Foods. Quality Control Laboratory for Livestock Inputs and its Food Products, Department of Livestock Services, Bangladesh, Dhaka. December, 2019. URL: <a href="https://www.researchgate.net/publication/353739076_Quality_and_Safety">https://www.researchgate.net/publication/353739076_Quality_and_Safety</a> . Van Wagenberg, C.P.A., Y. de Haas, H. Hogeveen, M.M. van Krimpen, M.P.M. Meuwissen, C.E. van Middelaar, T.B. Rodenburg (2016). Sustainability of livestock production systems; Comparing conventional and organic livestock husbandry. Wageningen, Wageningen University & Research, Report 2016-035. 124 pp.; 15 fig.; 5 tab.; 222 ref. URL: <a href="https://edepot.wur.nl/374992">https://edepot.wur.nl/374992</a> (10.11.2023) Capper, J.L. (2017). Looking forward to a sustainable future - how do livestock productivity, health, efficiency and consumer perceptions interact? Cattle Practice, 25(3), 179-193. URL: <a href="https://www.researchgate.net/publication/320930327_Looking_forward_to_a_sustainable_future_how_do_livestock_productivity_health_efficiency_and_consumer_perceptions_interact">https://www.researchgate.net/publication/320930327_Looking_forward_to_a_sustainable_future_how_do_livestock_productivity_health_efficiency_and_consumer_perceptions_interact</a> (10.11.2023) Eldesouky, A., Mesias, F.J., Escribano, M. (2020). Consumer Assessment of Sustainability Traits in Meat Production. A Choice Experiment Study in Spain. Sustainability, 12, 4093. DOI: <a href="https://doi.org/10.3390/su12104093">https://doi.org/10.3390/su12104093</a> Our Land and Water (2021). Consumers' willingness to pay for sustainability and other attributes. Research findings brief prepared by Our Land and Water (Toitū te Whenua, Toiora te Wai) National Science Challenge, New Zealand, 8p. URL: <a href="https://ourlandandwater.nz/wp-content/uploads/2021/05/OLWResearchFindingsBrief_Consumers-WTP.pdf">https://ourlandandwater.nz/wp-content/uploads/2021/05/OLWResearchFindingsBrief_Consumers-WTP.pdf</a> (10.11.2023) Hamid, E., Bilali, Callenius, C., Strassner, C., Probst, L. (2019). Food and nutrition security and sustainability transitions in food systems. Food Energy Secur, 8, e00154. DOI: <a href="https://doi.org/10.1002/fes3.154">https://doi.org/10.1002/fes3.154</a>				
<b>Other</b> tutorials, online parts, practical visits, invited experts and more				
<b>Farm visits, guest lecturers</b>				
<b>6.3.3. Organisation of the sub-topic</b>				
<b>ECTS points</b> e.g. 1	<b>Semester</b> <b>Week</b> <b>Hours</b>	<b>Grouping/</b> <b>no</b>	<b>Recommended academic</b> <b>semester</b> e.g. 2	<b>Language.</b> <b>Ukrainian</b>
<b>Load</b> <b>For example, 1 ECTS point x 30 hours = 30 hours, with the following distribution</b>				
<b>Lectures</b> <b>6 hours / 20% of</b> <b>the time</b>	<b>Practical Tasks/Group work</b> <b>6 hours / 20% of the time</b>		<b>Preparation/ follow up/ self-study</b> <b>18 hours / 60 %</b>	



<b>Code.</b> Code 1.4	<b>Subtopic title</b> <b>Concepts of sustainable development, sustainable agricultural production and sustainable livestock management</b>			
<b>6.4.2 Creating subtopics</b>				
<b>Learning outcomes</b> After completing the subtopic, graduate students gain knowledge of the methodology and criteria for assessing sustainable livestock production. Students of the course acquire the ability to analyse the state of sustainability of production at livestock enterprises. They have systematic knowledge of the basics of the quality of of animal-derived food products and ensuring their resilience in meeting consumer needs..				
<b>Contents.</b> - Methodology for assessing sustainable livestock production -Criteria for the sustainability of livestock products -World food security and the role of sustainable agricultural production in it; -The phenomenon of overproduction and shortage of livestock products; -Disposal of livestock products; -Criteria for sustainable livestock production and good agricultural practices; -Distance of livestock production facilities from people's homes; -Animal productivity and animal stress as elements of technology; -The basics of livestock product quality; -Sustainability of livestock products supply to consumers.				
<b>Forms of teaching/learning</b> problematic lecture, lecture-dialogue, binary lecture, lecture-consultation, practical work				
<b>Teaching/learning methods</b> lecture, discussion, exercise, training of a study group, case analysis, business game, role play, group work, presentations, project work				
<b>Literature/training materials</b> RISE <a href="https://www.bfh.ch/en/research/all-our-consulting-services/rise/">https://www.bfh.ch/en/research/all-our-consulting-services/rise/</a> Sarkar, A., Wang, H., Rahman, A., Memon, W. H., & Qian, L. (2022). A bibliometric analysis of sustainable agriculture: based on the Web of Science (WOS) platform. <i>Environmental Science and Pollution Research</i> , 29(26), 38928-38949. <a href="https://doi.org/10.1007/s11356-022-19632-x">https://doi.org/10.1007/s11356-022-19632-x</a> Goglio, P., Trydeman Knudsen, M., van Mierlo, K., Röhrig, N., Fossey, M., Maresca, A., Hashemi, F., Waqas, M.W., Yngvesson, J., Nassy, G., Broekema, R., Moakes, S., Pfeifer, C., Borek, R., Yanez-Ruiz, D., Quevedo Cascante, M., Syp, A., Zylowsky, T., Romero-Huelva, M., Smith, L.G. (2023). Defining common criteria for harmonising life cycle assessments of livestock systems. <i>Cleaner Production Letters</i> , 4, 100035. DOI: <a href="https://doi.org/10.1016/j.clpl.2023.100035">https://doi.org/10.1016/j.clpl.2023.100035</a> Abson, D.J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., von Wehrden, H., Abernethy, P., Ives, C.D., Jager, N.W., Lang, D.J. (2017). Leverage points for sustainability transformation. <i>Ambio</i> , 46, 30-39. DOI: <a href="https://doi.org/10.1007/s13280-016-0800-y">https://doi.org/10.1007/s13280-016-0800-y</a> Belanche, A., Martín-Collado, D., Rose, G., Yáñez-Ruiz, D.R. (2021). A multi-stakeholder participatory study identifies the priorities for the sustainability of the small ruminants farming sector in Europe. <i>Animal</i> , 15, (2), 100131. DOI: <a href="https://doi.org/10.1016/j.animal.2020.100131">https://doi.org/10.1016/j.animal.2020.100131</a> Mehrabi, Z., Gill, M., van Wijk, M., Herrero, M., Ramankutty, N. (2020). Livestock policy for sustainable development (Review). <i>Nature Food</i> , 1, (3), 160-165. DOI: <a href="https://doi.org/10.1038/s43016-020-0042-9">https://doi.org/10.1038/s43016-020-0042-9</a> .				
<b>Other</b> tutorials, online parts, practical visits, invited experts and more <b>Farm visits, guest lecturers</b>				
<b>6.2.3. Organisation of the sub-topic</b>				
<b>ECTS points</b> e.g. 0.8	<b>Semester Week Hours</b>	<b>Grouping/ no</b>	<b>Recommended academic semester e.g. 2</b>	<b>Language.</b> Ukrainian
<b>Load</b> <b>For example, 0.8 ECTS points x 30 hours = 24 hours, with the following distribution</b>				



<b>Lectures</b> 4 hours / 16.5 per cent	<b>Practical Tasks/Group work</b> 4 hours / 16.5 per cent	<b>Preparation/ follow up/ self-study</b> 16 hours / 66 %
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<b>Code.</b> Code 1.5	<b>Subtopic title</b> <b>Livestock products, raw materials and end products</b>		
<b>6.4.2 Creating subtopics</b>			
<b>Learning outcomes</b> After completing the subtopic, graduate students acquire knowledge of the regularities of the livestock production chain. The students of the course acquire the ability to analyse the impact of various types of production activities on the final product. They will acquire systematic knowledge of the impact of short-term and long-term stress on meat quality.			
<b>Contents.</b> - Meat biochemistry in relation to animal stress - The livestock production chain "from field to table"  <ol style="list-style-type: none"> <li>1. Standardisation of livestock products;</li> <li>2. Poultry products;</li> <li>3. Dairy and cattle products;</li> <li>4. Pork products;</li> <li>5. Apiculture products;</li> <li>6. Poultry products;</li> <li>7. Aquaculture products.</li> </ol>			
<b>Forms of teaching/learning</b> problematic lecture, interactive lecture, binary lecture, lecture-consultation, practical work			
<b>Teaching/learning methods</b> lecture, discussion, exercise, training of a study group, case analysis, business game, role play, group work, presentations, project work			
<b>Literature/training materials</b> Turner, I., Heidari, D., Widowski, T., Pelletier, N. (2023). Development of a life cycle impact assessment methodology for animal welfare with an application in the poultry industry. Sustainable Production and Consumption, 40, 30-47. DOI: <a href="https://doi.org/10.1016/j.spc.2023.06.010">https://doi.org/10.1016/j.spc.2023.06.010</a> Cammarata, M., Timpanaro, G., Scuderi, A. (2021). Assessing Sustainability of Organic Livestock Farming in Sicily: A Case Study Using the FAO SAFA Framework. Agriculture, 11(3), 274. DOI: <a href="https://doi.org/10.3390/agriculture11030274">https://doi.org/10.3390/agriculture11030274</a> Broom, D.M. (2021). A method for assessing sustainability, with beef production as an example. Biological Reviews, 96, 1836-1853. DOI: <a href="https://doi.org/10.1111/brv.12726">https://doi.org/10.1111/brv.12726</a> Van-Heurck, M., Alegre, J., Solis, R., Del Castillo, D., Pérez, L., Lavelle, P., Quintero, M. (2020). Measuring the sustainability of smallholder livestock farming in Yurimaguas, Peruvian Amazon. Food and Energy Security, 9, 242. DOI: <a href="https://doi.org/10.1002/fes3.242">https://doi.org/10.1002/fes3.242</a>			
<b>Other</b> tutorials, practical visits, invited experts, etc. <b>Farm visits, guest lecturers</b>			
<b>6.2.3. Organisation of the sub-topic</b>			
<b>ECTS points</b> e.g. 0.6	<b>Semester Week Hours</b>	<b>Grouping/ no</b>	<b>Recommended academic semester</b> e.g. 2
<b>Language.</b> Ukrainian			
<b>Load</b> For example, 0.6 ECTS points x 30 hours = 18 hours, with the following distribution			
<b>Lectures</b> 2 hours / 12 %	<b>Practical Tasks/Group work</b> 2 hours / 12 %		<b>Preparation/ follow up/ self-study</b> 14 hours / 76 % of the time



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