Curriculum assessment and training guide

WP2-Competence Framework Development.

Innovative digital tools applied to sustainable Meat Science and Technology Higher Education:
a link between industry and academia

WP2. Meat Sci. and Technology Training in HE: competence framework development

WP2 is focused on achieving OBJECTIVE 1. Competence framework for Meat Science and Technology training in European Higher Education organizations

The aim of this WP is to evaluate the competences (knowledge and skills) developed in Meat Science and Technology in the Food Science/FSTechnology of the European Higher Education organizations of the countries participating. This analysis is carried out by identifying the courses in this HE studies offered by the academic partners which include contents and skills in meat science and technology. Also, online questionnaires have been designed to be sent to the target groups (students, professors and professionals of the meat sector) and to be disseminated by the partners. These questionnaires included a list of possible topics that would be of interest to develop in the training material, but it was also possible to suggest new topics of interest.

A1. CURRICULUM ASSESSMENT

This activity had the aim of assessing the currently offered Food Science/Technology curricula and define the modules/topics related to Innovative Meat Science to be developed as training material. All the curricula have been thoroughly discussed and compared to identify differences, strong and weak points. The assessment led to the present technical report to map an evidence-based evaluation of the study programs in relation to MST that are currently running in the participating universities.

In order to know the curricula offered by the university partners in Food Science (FS)/Food Sci. and Technology (FST) or related studies and the degree of teaching in meat science (MS)/innovative meat science (IMS) (IMS should be those topics considered at an advanced level, in contents, competences, and in the use innovative teaching tools) each partner completed the following information: country, name of the degree/bachelor, 3/4 years, main courses including milk and meat products contents and innovative meat science topics (name, credits ECTS, compulsory/elective), other courses (estimation of the ECTS), MS topics included in the curricula with a estimation of the degree of development (scale form 1, minor to 3, major).

RESULTS

The degrees (BSc) on FS/FST or related, offered by the five universities participating in the project, and a quantification of the degree of development of DS/IMS topics are shown in Table 1.

Around 4,4 % of the total ECTS of these studies include contents related to meat science, of which about 11,5 % are considered innovative meat science contents.

Table 1. Results of the assessment of studies on Food Science and Technology (or related) at Bachelor level offered by the Universities participating in the project, and credits dedicated to Meat Science (MS) (including innovative meat science IMS)

UNIVERSITY/CENTER	ULE	ULE	UNIPR	UNIPR	UNIPR	UNIPR	UTH	UTH	UTH	UTH	UWM	UWM	UWM	UWM	IPB
Country	Spain	Spain	Italy	Italy	Italy	Italy	Greece	Greece	Greece	Greece	Poland	Poland	Poland	Poland	Portugal
Degree	Food Science and Technology	Agronomy engineering degree-food industry orientation	Food Science and Technology	Gastronomy science	Livestock science and animal production technologies	Food System Sustainability and Management	Animal Science	Food Science	Veterinary Medicine	Nutrition and Dietetics	Food Technology and Human Nutrition	Food production bioengineering	Animal Science (Quality Management Systems for Food Products of Animal Origin)	Gastronomy-Culinary Art	Food Engineering
Years (ECTS)	4 (240)	4 (240)	3 (180)	3 (180)	3 (180)	3 (180)	5 (300)	5 (300)	5 (300)	5 (300)	3,5 (210)	3,5 (210)	3,5 (210)	3,5 (210)	3 (180)
ECTS on MS (IMS)	5,1 (0)	0,75 (0)	1,5 (0,5)	8 (0)	4 (2)	1,5 (0,5)	15 (3)	10 (3)	8 (1,6)	10 (2)	50 (5)	4 (0)	3,5 (0)	6 (0)	12 (5)
%MS (%IMS)	2,12 (0)	0,31 (0)	0,83 (33,3)	4,44 (0)	1,66 (50)	0,83 (33,3)	5 (20)	4,16 (30)	2,6 (20)	3,33 (20)	23,8 (10)	1,9 (0)	1,9 (0)	2,85 (0)	6,66 (41,6)

ULE, University of Leon (Spain); UNIPR, University of Parma (Italy); UWM, University of Warmia-Mazuri (Poland), UTH, University of Thessaly (Greece), IPB (Polytechnic Institute of Bragança)

Considering only bachelor's degrees, there are some differences among the universities in the depth of knowledge, credits and competences dedicated to meat science (annex 1): credits dedicated to meat science are from 0,75 in the course of Agronomy engineering at ULE to 50 in food technology and human nutrition course at UWM. In this latter, a lot of elective courses including meat science are offered. In most compulsory courses including meat science, this is not the only topic of the course (as for example in courses such as food microbiology or food chemistry).

Courses that include IMS topics:

- **Compulsory**:
  - Food Inspection
  - Methods for evaluating meat and meat products
  - Health-promoting additives in meat products
  - Speciality Seminar
  - Contemporary trends in production of meat products

- **Elective**:
  - Methods for evaluating meat and meat products
  - Health-promoting additives in meat products
  - Speciality Seminar
  - Contemporary trends in production of meat products
  - Unconventional raw materials in gastronomy

The MS topics included currently in the Study Programs of the partners with a major degree of development of the contents/skills (3 in the scale) are (see annex 1):

- Meat-purpose animal production (UTH)

CONCLUSIONS CURRICULUM ASSESSMENT

- There are **some differences among the universities** in the depth of the knowledge, credits and competences dedicated to meat science or innovative meat science.
- Among the universities offering a FS/FST degree, **around 4,1 %** of the total ECTS of the curriculum is focused on meat science of which 28,68 % is considered innovative.
- Innovation in both the contents and the teaching methodologies of the training material to produce in Output 2 could be foreseen (see A4. Curriculum Training Guide).

A2. QUESTIONNAIRES: STUDENTS (ST) AND GRADUATES (G), ACADEMIC STAFF (T) AND MEAT INDUSTRY PROFESSIONALS (MIP)

- After A1 was completed ("curriculum assessment"), three type of online questionnaires (Q) were designed (Microsoft forms). The 3 targets were: students/graduates, academic staff and meat industry professionals. The questionnaires were produced in English and translated to the languages of the partners (Greek, Italian, Polish, Portuguese and Spanish) and disseminated by email to students/graduates/academic staff/meat industry professionals (MIP). After the collection of the data, a statistical analysis was carried out.

QUESTIONNAIRES CONTENTS

- The questionnaires contents were selected as to assess the level of satisfaction of students, graduates, academic staff and meat industry professionals in relation to current Meat Science curricula. Additionally, it was aimed to collect information from the target groups in relation to the needs or lapses they identify in relation to meat science education. Based on their answers, conclusions could be drawn in order to develop a new meat science curriculum.
- More specifically, all questionnaires had a section on personal details such as country, age, sex, profession, etc. The main body of the questionnaires was related to the importance of specific topics in meat science, selected based on the previously concluded curriculum assessment. There was also a free text question for the participants to state other topics of meat science that they consider as necessary to be included in a new dairy science curriculum.
- Full questionnaires in all languages and for all target groups are available at the following links:

- **Professionals**

    - https://forms.office.com/Pages/ResponsePage.aspx?id=xUsGu6i37EG6vte-s_rrHHDQh7fVagBErsAaHOaenbFUOEdCTTVBQlBTU1E2OEM3SFRPOTVNTDJVMy4u

- **Student and recently graduates in food science/related topics**
    - https://forms.office.com/Pages/ResponsePage.aspx?id=xUsGu6i37EG6vte-s_rrHEZEQ9Sr3zxBv-q9OMA4YB5URjRURDVZT1BCT0M0OUJTUTZZSE9EMFhWNS4u

- **Professors**
    - https://forms.office.com/Pages/ResponsePage.aspx?id=xUsGu6i37EG6vte-s_rrHHDQh7fVagBErsAaHOaenbFUQ1ZDNkhBODFMSEQyQlU0NlYyU0dUM0hMUy4u

Questionnaires in the English version are also available in Annex 2. A detailed report of the performed statistical analysis is available in Annex 3.

The number of questionnaires collected is shown in Table 2.

COUNTRY	STUDENTS	PROFESSORS	MEAT SECTOR PROFESSIONALS	TOTAL
ITALY	194	67	18	279
SPAIN	46	28	28	102
GREECE	27	10	14	51
POLAND	53	43	27	123
PORTUGAL	19	8	7	34
OTHER	15	1	2	18
TOTAL	354 58,3%	157 25.86%	96 15,81%	607

A total of **607** questionnaires were collected, with 58,3% being from students/graduates, 25,86% from academic staff and 15,81% from MIP, achieving our goals. See annex 3 for detailed results.

Students

Main descriptive statistics about the panel of students assessed by the questionnaire is reported in Fig. 1.
Most students were females (67%); the majority of students who responded the questionnaire were from Italy, followed by Poland, Spain, Greece and Portugal. The majority of students are food related undergraduate students (59%), are currently attending or have attended a meat science module during their courses, haven´t benefited from an Erasmus fellowship or carried out internships in the meat industry and did not do an internship in the meat sector.
The average age is 24.7 years.

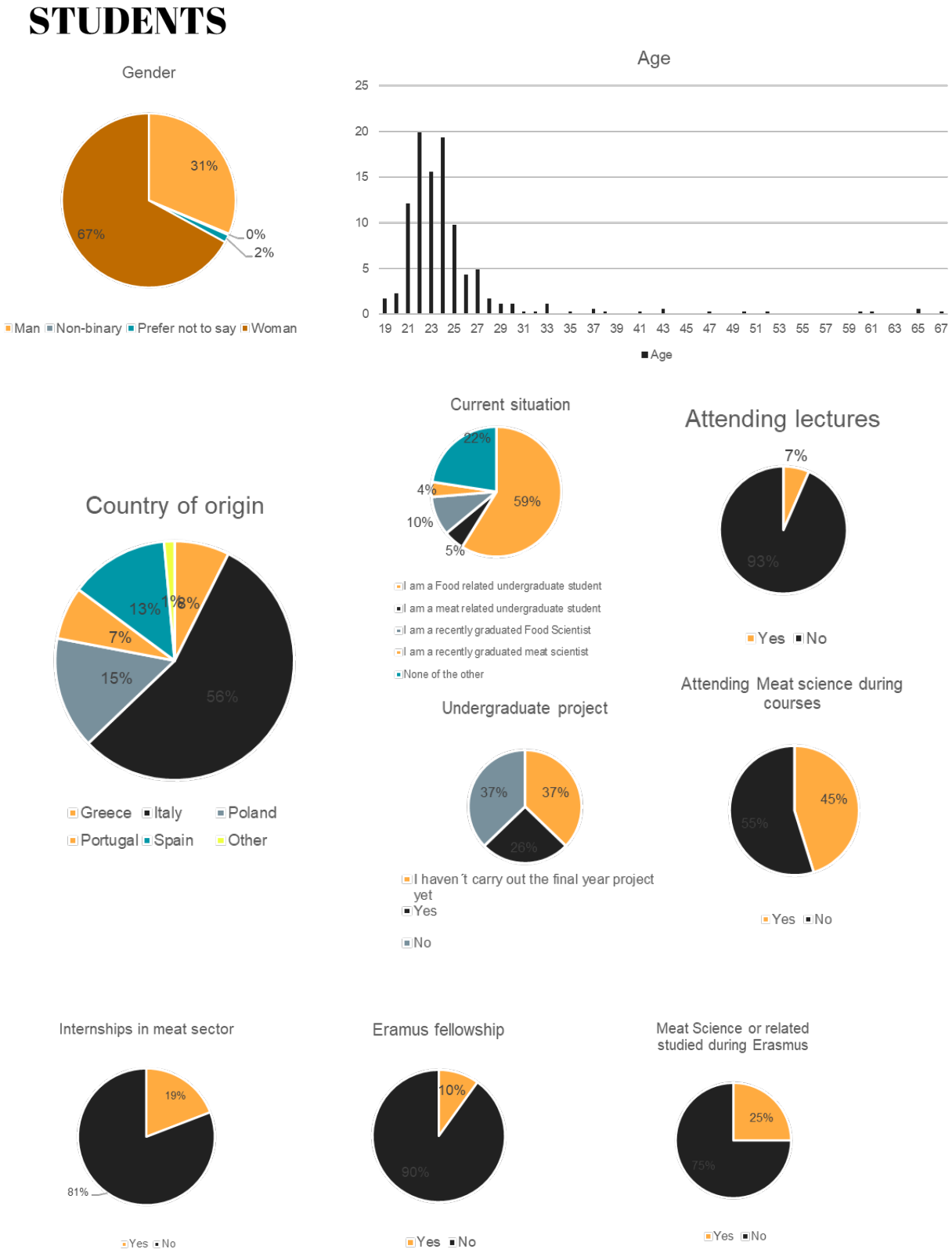

Fig. 1. Some statistical data regarding "students" questionnaires

Top-5 priority topics

Most important

Less important

Topic	N	Mean	Median	Standard deviation
Meat and Meat Products Quality Control (laboratory)	119	8.89	10	1.79
Meat Safety and Risk Analysis	119	8.83	10	1.99
Meat and meat products quality assurance	119	8.76	10	1.96
Meat storage and shelf life	119	8.73	10	2.02
Meat microbiology	119	8.52	9	2.11
Novel Technologies in Meat Processing	118	8.39	9	2.01
Meat and health	119	8.38	9	1.94
Sustainability of meat production	119	8.29	9	2.24
Meat/Beef traceability	119	8.28	9	2.08
Meat chemical composition and meat biochemistry	119	8.22	9	2.1
Training in research and development of Meat Products	119	8.21	9	2.14
European Meat and Meat Products Law	119	8.08	9	2.26
The making process of meat products	119	8.06	8	1.98
Sustainability of the meat subsystem	119	7.93	8	2.32
Meat industry by-products and wastes	118	7.89	8	2.15
Entrepreneurship and innovation in meat and meat products	119	7.76	8	2.21
Meat-purpose animal production	119	7.71	8	2.52
Meat processing facilities	119	7.66	8	2.42
Traditional Meat Product	119	7.24	7	2.22
Anthropology of meat (producing and eating)	119	7.22	8	2.35
Meat culinary techniques	119	7.14	7	2.24

Fig. 2. Priority topics for future professional activities (students, scale 1-10)

The top 5 priority topics selected by students (Fig. 2) are:

1. Meat and Meat Products Quality Control (laboratory);
2. Meat Safety and Risk Analysis;
3. Meat and meat products quality assurance;
4. Meat storage and shelf life;
5. Meat microbiology.

Conversely, the **5 topics less covered in the curriculum** are: Anthropology of meat (producing and eating), Sustainability of the meat subsystem, Training in research and development of Meat Products, Meat culinary techniques, Entrepreneurship and innovation in meat and meat products.

Most included

Less included

Topic	N	Mean	Median	Standard deviation
Meat chemical composition and meat biochemistry	115	7.98	8	2.09
Meat microbiology	115	7.83	8	2
Meat Safety and Risk Analysis	115	7.77	8	1.87
Meat storage and shelf life	115	7.74	8	1.85
Meat-purpose animal production	116	7.59	8	2.04
The making process of meat products	115	7.59	8	2.29
Meat/Beef traceability	114	7.31	8	2.13
Meat and meat products quality assurance	115	7.17	8	2.4
Meat and Meat Products Quality Control (laboratory)	115	6.93	7	2.74
Meat and health	114	6.84	7	2.49
European Meat and Meat Products Law	115	6.83	7	2.33
Meat processing facilities	114	6.74	7	2.74
Sustainability of meat production	116	6.61	7	2.64
Traditional Meat Product	114	6.58	7	2.65
Meat industry by-products and wastes	115	6.22	7	2.66
Novel Technologies in Meat Processing	114	5.98	7	2.97
Anthropology of meat (producing and eating)	114	5.94	7	3.01
Sustainability of the meat subsystem	114	5.8	6	2.96
Training in research and development of Meat Products	115	5.68	6	2.98
Meat culinary techniques	114	5.39	5	2.94
Entrepreneurship and innovation in meat and meat products	114	5.35	6	3.1

Fig. 3. Extent of inclusion of the topics in the curriculum (students, scale 1-10)

Learning method	N	Mean	Median	Standard deviation
Laboratories	112	8.55	9	2.13
Visits to meat plants	114	7.95	9	2.64
Student-centred learning (problem-based learning, case studies, etc.)	113	7.8	8	2.32
Master classes	113	7.33	8	2.39

Fig. 4. Usefulness of learning methodologies present in courses (students, scale 1-10)

The most useful learning methodologies, as reported by the students are laboratory activities and visits to meat plants (Fig. 4).

Factors of influence on obtained data.

Priority topics

- The priority topic score of "Meat animal production" and "Sustainability of animal production" was influenced by **gender**.
- The priority topic score of "European meat and meat products law" was influenced by the **current situation**, as who was a recently graduated Food Scientist or Food technologist gave a lower score compared to the other groups.
- No significant effects were highlighted for other factors, such as country of origin or undergraduate project.

Topics covered in the curriculum.

- The **country of origin** had a significant effect on the scores related to topics covered in the curriculum for "Anthropology of meat" and "Meat culinary techniques" with students from Greece giving high scores, while conversely students from Italy giving the lowest ones.
- "European Meat and Meat Products Law" score was influenced by the students' **current situation**, with undergraduate Meat and Food-related students giving lower scores compared to recently graduated ones.

- Respondents who are currently performing (or have already performed) their **undergraduate project** gave higher scores to "The making process of meat products" compared to those students who have not already perform it.

Professors

Descriptive statistics about the group of professors who responded to the questionnaire is reported in Fig 5. Most professors were female (55%), currently teaching topics directly related to Meat Science and Technology with the majority of them teaching that topic since more than 10 years. Most professors are also performing research studies related to Meat Science and Technology, with more than 50% collaborating with meat industries.

Most respondents were from Italy, followed by Poland, Spain, Greece and Portugal.

Regarding University of origin, they reported that exists at least one subject or course where the meat science and technology represents at least 50% of the total content. Conversely, the majority of respondents report the absence of a master degree in meat science.

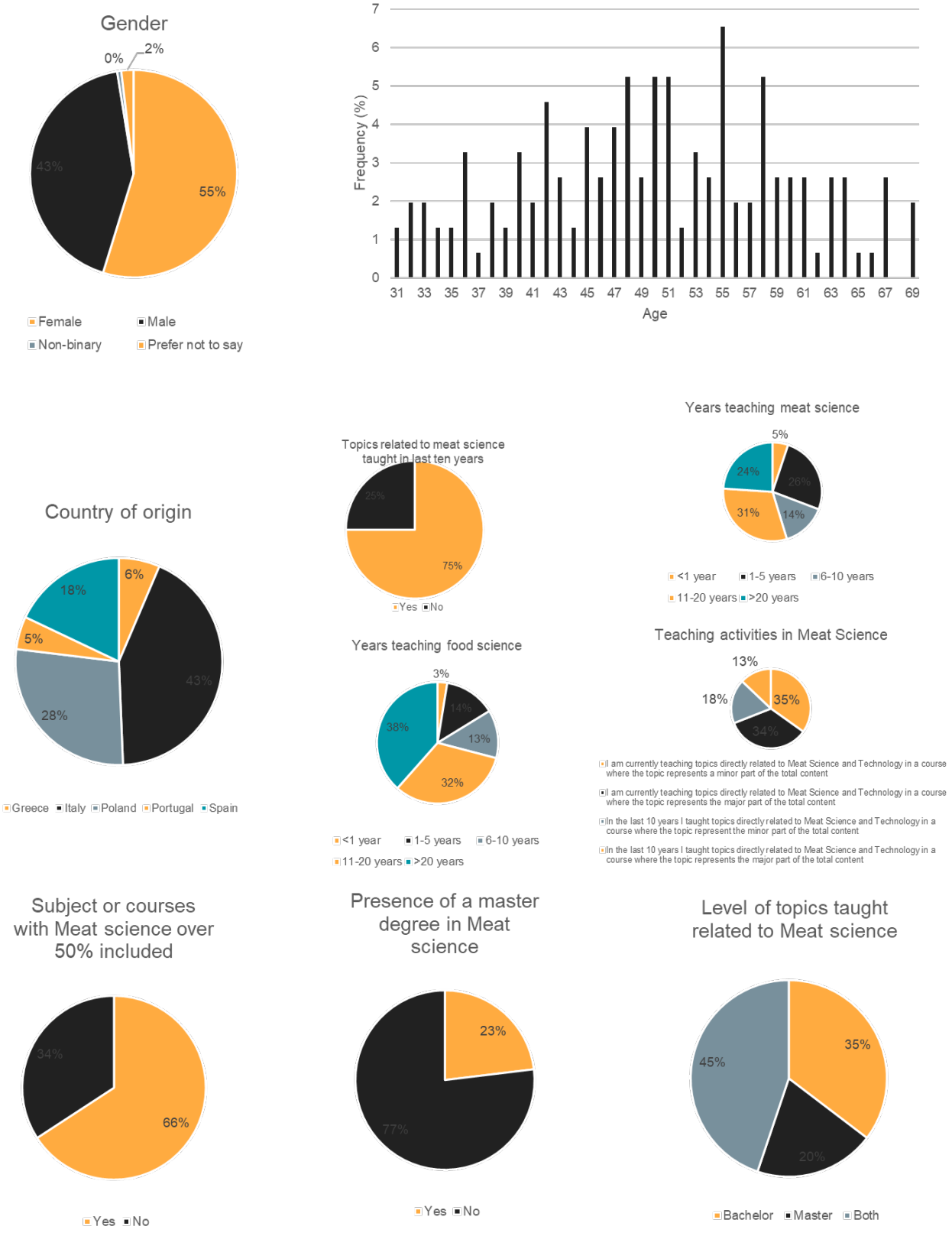

Fig. 5. Some statistics regarding "professors" questionnaires (continued)

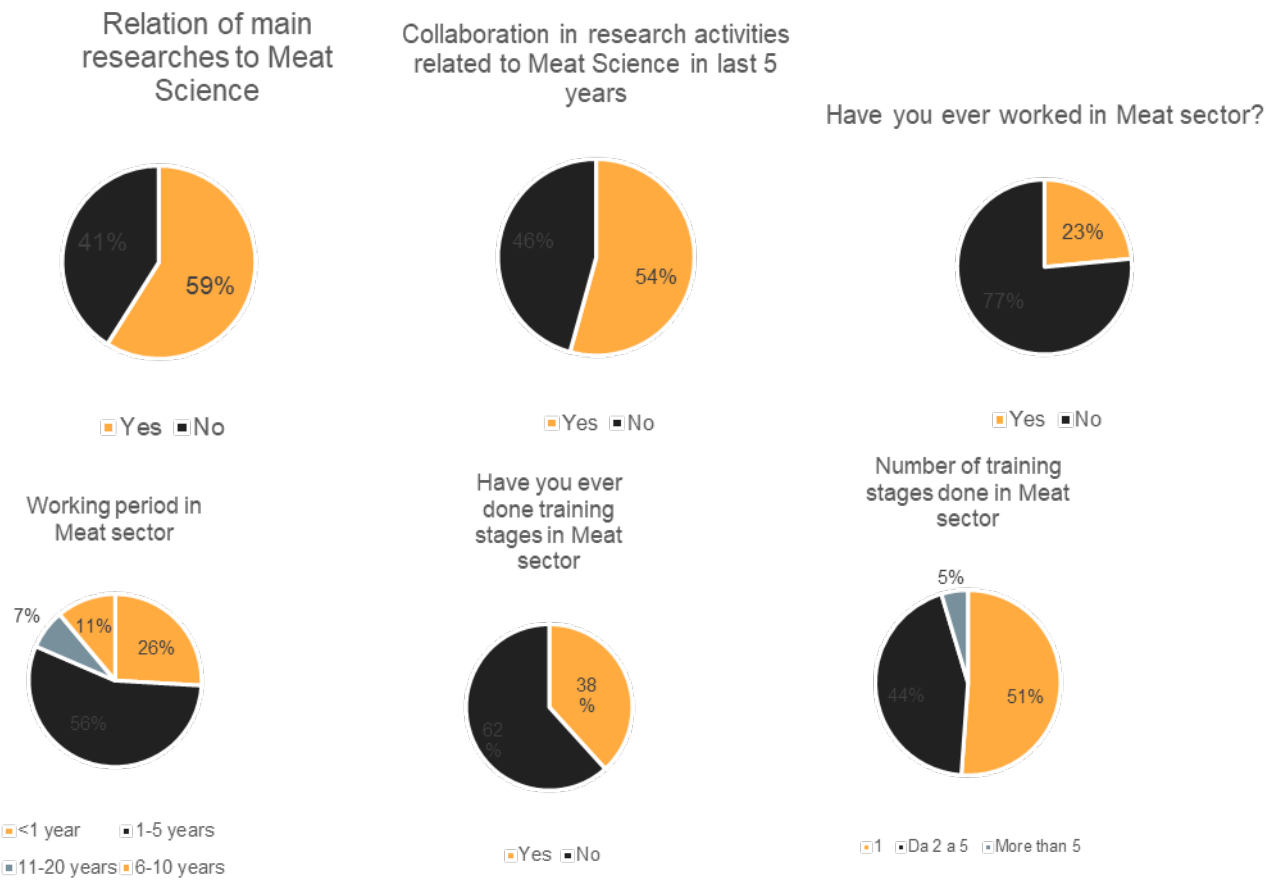

Fig. 5. Some statistics regarding "professors" questionnaires (continued).

Top-5 priority topics

Most important

Less important

Topic	N	Mean	Median	Standard Deviation
Meat storage and shelf life	115	8.59	9	2
Novel Technologies in Meat Processing	114	8.57	9	2
Meat Safety and Risk Analysis	115	8.49	9	2
The making process of meat products	115	8.48	9	2
Sustainability of meat production	115	8.41	9	2
Meat and health	113	8.39	9	2
Meat/Beef traceability	115	8.37	9	2
Training in research and development of Meat Products	115	8.35	8	1
Meat microbiology	114	8.32	8.5	2
Meat and Meat Products Quality Control (laboratory)	115	8.3	8	2
Meat and meat products quality assurance	115	8.23	8	2
European Meat and Meat Products Law	114	8.21	8	2
Meat chemical composition and meat biochemistry	115	8.16	8	2
Meat industry by-products and wastes	114	8.1	8	2
Entrepreneurship and innovation in meat and meat products	115	7.96	8	2
Traditional Meat Products	115	7.87	8	2
Sustainability of the meat subsystem	114	7.82	8	2
Meat processing facilities	115	7.77	8	2
Meat animal production	115	7.28	8	2
Meat culinary techniques	115	6.83	7	2
Anthropology of meat (producing and eating)	115	6.32	7	2

Fig. 6. Priority topics for students' future professional activities (professors, scale 1-10)

The top 5 priority topics selected by professors (Fig. 6) as important for future students' careers are:

1. Meat storage and shelf life;
2. novel technologies in meat processing;
3. meat safety and risk analysis;
4. the making process of meat products;
5. sustainability of meat production.

Conversely, the **5 topics less covered in the curriculum** by the professors are: meat industry by-products and wastes, meat culinary techniques, entrepreneurship and innovation in meat and meat products, sustainability of the meat subsystem, anthropology of meat (producing and eating).

Most included

Less included

Topics	N	Mean	Median	Standard deviation
Meat chemical composition and meat biochemistry	113	7.22	8	2.24
The making process of meat products	112	7.14	8	2.55
Meat storage and shelf life	113	6.8	7	2.13
Meat Safety and Risk Analysis	112	6.63	7	2.46
Meat and Meat Products Quality Control (laboratory)	112	6.5	7	2.8
Meat microbiology	112	6.45	7	2.47
Traditional Meat Products	113	6.21	7	2.65
Meat and meat products quality assurance	113	5.96	7	2.83
Novel Technologies in Meat Processing	113	5.78	6	2.69
Meat processing facilities	112	5.63	6	2.75
Meat and health	113	5.46	5	2.75
Meat/Beef traceability	113	5.42	6	2.72
Meat animal production	113	5.38	6	3.11
European Meat and Meat Products Law	112	5.37	6	2.76
Training in research and development of Meat Products	113	5.12	5	2.87
Sustainabilityof meat production	113	4.73	5	2.79
Meat industry by-products and wastes	113	4.41	4	2.8
Meat culinary techniques	113	4.37	4	3.21
Entrepreneurship and innovation in meat and meat products	112	4.29	5	2.82
Sustainability of the meat subsystem	112	4.22	4	2.78
Anthropology of meat (producing and eating)	112	3.7	3	2.92

Fig. 7. Extent of topics included in the curriculum taught (professors, scale 1-10)

Factors of influence on obtained data.

Priority topics

- The **country of origin** influenced the score of a number of different topics (Meat chemical composition and meat biochemistry, Meat microbiology, Meat safety and risk analysis, Meat storage and shelf life, Meat/beef traceability, Meat culinary techniques, The making process of meat products, Meat processing facilities, Novel technologies in meat processing, Meat and meat products quality control (laboratory), Meat and meat products quality assurance, Entrepreneurship and innovation in meat and meat products). In general, the panel from **Italy** attributed lower scores to the above-mentioned topics than the other countries.
- **Females** gave significantly higher priority scores than **males** to topics such as: Meat chemical composition and meat biochemistry, Meat microbiology, Meat safety and risk analysis, Meat storage and shelf life, Meat and meat products quality control (laboratory), European meat and meat products law.
- Professors who started teaching food science-related topics recently (<**1 year**) attributed lower scores to the priority of Meat culinary technique topic.
- Professors **teaching meat-related topics only in Master's degree** courses gave significantly lower priority scores than who is **teaching in Bachelor's or both Master's and Bachelor's courses** to the following topics: Meat chemical composition and meat biochemistry; Meat microbiology; Meat Safety and Risk Analysis; Meat storage and shelf life; Meat culinary techniques; The making process of meat products; Meat processing facilities; Novel Technologies in Meat Processing; Meat and Meat Products Quality Control (laboratory); Meat and meat products quality assurance; European Meat and Meat Products Law.

Topics included in the curriculum

- **Italy** and **Portugal** attributed lower inclusion scores for Meat chemical composition and biochemistry, meat storage and shelf life, novel technologies in meat processing, meat and meat products quality control (Italy only). **Poland** attributed significantly higher scores for meat culinary techniques than other countries. **Greece** attributed significantly higher scores for meat storage and shelf life.
- No significant effects on the different scores related to the topics included in the curriculum were detected for factors such as: **gender, the years of experience in teaching food or meat related topics, the course level in which Professors are teaching**.

Level of knowledge

- The **country of origin** of the Professors influenced the opinion related to the **level of knowledge gainable by the students** with their meat courses of many different topics (please see Annex 3 for the list).
- No significant effects on the different scores related to the topics included in the curriculum were detected for factors such as: **gender, the years of experience in teaching food or meat related topics, the course level in which Professors are teaching**.

Level of knowledge

- No significant effects were detected for any considered factor.

Learning methodologies

- Professors from **Italy** reported a lower utilization of laboratory activities compared to the other countries, while professors from **Portugal** reported a lower score for lectures. **Italian** professors also consider less useful laboratories as learning methodology, compared to other countries.
- No significant effects were detected for other considered factors.

Meat sector professionals

Most MIPs are female, coming mainly from Spain and Poland, followed by Italy, Greece and Portugal. They have a MSc and BSc (the majority with 53%) level of studies, mostly in studies related to Food Science and Technology (88%); moreover, the majority had attended a meat science module (81%). The majority would offer internships to students or already do/did (>80%). 36% of them work in the food industry by more than 10 years, while in meat industry, more than 40% has a long working experience (more than 10 years). As for their opinion about the meat science knowledge and skills of the Food Science/FST graduates they host, it is neutral.

Fig. 8. Some statistics regarding "professionals" questionnaires

Top-5 priority topics

Most important

Less important

Topic	N	Mean	Median	Standard deviation
Meat Safety and Risk Analysis	90	9.13	10	1.47
Meat storage and shelf life	90	9.03	10	1.46
Meat microbiology	89	8.84	10	1.57
Meat and meat products quality assurance	90	8.72	9	1.51
European Meat and Meat Products Law	90	8.58	9	2.01
Meat processing facilities	90	8.57	9	1.64
The making process of meat products	90	8.53	9	1.89
Novel Technologies in Meat Processing	90	8.49	9	1.83
Meat/Beef traceability	90	8.46	9	2.05
Meat and Meat Products Quality Control (laboratory)	90	8.37	9	1.9
Training in research and development of Meat Products	90	8.21	8	1.9
Meat chemical composition and meat biochemistry	89	8.16	8	1.74
Entrepreneurship and innovation in meat and meat products	90	7.89	8	2.02
Meat animal production	89	7.54	8	2.38
Traditional Meat Products	90	7.47	8	2.57
Meat industry by-products and wastes	90	7.27	8	2.34
Sustainability of meat production	89	7.19	8	2.56
Sustainability of the meat subsystem	90	7.14	8	2.39
Meat and health	90	7.13	7.5	2.34
Anthropology of meat (producing and eating)	90	6.89	7	2.42
Meat culinary techniques	90	6.61	7	2.44

Fig. 9. Priority topics for professional activities (professionals, scale 1-10)

The top 5 priority topics selected by professionals (Fig. 9) are:

1. Meat safety and risk analysis;
2. meat storage and shelf life;
3. meat microbiology;
4. meat and meat products quality assurance;
5. European meat and meat products law.

Factors of influence on obtained data.

Priority topics

- The panel from **Poland** reported the lowest scores for topics such as traditional meat products, meat and health and meat industry by products. Conversely, for the same topics, **Portugal** reported the highest ones.
- Who was **responsible of a department in the company** gave lower scores to sustainability of the meat subsystem topic.
- No significant effects of other considered factors (gender, years working in the Food/Meat sector, etc.)

Detailed results of data collection and analysis is reported in **Annex 3**

A4. INNOVATIVE MEAT SCIENCE EDUCATION CURRICULUM TRAINING GUIDE.

➢ According to the results of the questionnaires collected from the 3 targeted groups, the **top-4 priority topics** (common to priorities given by all target groups) and, therefore, those that the training material should include (as a minimum) are:

1. **Meat safety and risk analysis;**
2. **meat storage and shelf life;**
3. **meat microbiology;**
4. **meat and meat products quality assurance;**

In the lists of priority were also included:

5. **European meat and meat products law.**
6. **the making process of meat products;**
7. **sustainability of meat production**
8. **Meat and Meat Products Quality Control (laboratory);**

➢ In addition, there is a list of **topics of less covered by the current curricula** that could be considered by the project team as part of the topics to be developed in the training material:

Anthropology of meat (producing and eating), Sustainability of the meat subsystem, Training in research and development of Meat Products, Meat culinary techniques, Entrepreneurship and innovation in meat and meat products; meat industry by-products and wastes, meat culinary techniques.

Most of these topics will be included in the training material (see annex 4).

Based on the above data originating from the questionnaires analysis and additionally taking into consideration the current curriculum assessment performed, the partnership will agree to develop a meat science curriculum that will refer to:

1. **Meat safety and risk analysis;**
2. **meat storage and shelf life;**
3. **meat microbiology;**
4. **meat and meat products quality assurance;**
5. **European meat and meat products law.**
6. **the making process of meat products;**
7. **sustainability of meat production**
8. **Meat and Meat Products Quality Control (laboratory);**

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Date: 5th September 2023.

ANNEXES

ANNEX 1. Results curriculum assessment.

ANNEX 2. Questionnaires for training needs analysis.

ANNEX 3. Detailed results of the questionnaire analysis.

ANNEX 4. New topics included in the contents of the training material.

Annex 1

InnoMeatEdu Erasmus + Project.
Work package n°2 - Meat Sci. and Technology Training in HE: competence framework development
TRAINING NEEDS ANALYSIS
A1. Curriculum assessment

Aim of O1: to evaluate the competences (knowledge and skills) developed in Meat Science and Technology in the Food Science/FSTechnology of the European Higher Education organizations of the countries participating

Aim of A1: Current Food Science/Technology curricula assessment (Food Science/Technology Study Programmes of graduate level, bachelor) and definition of the modules/topics related to Innovative Meat Science to be developed as training material

Dates: completion by January 16th 2023.

Country	**University**	**Name of Study Programme 3-4 years**	**Courses including Meat Science (MS) and Innovative MS (IMS) topics in the partners universities:** Name of the course/year/compulsory (C) or elective (E)/MS-IMS/ects (estimation of credits dedicated to MS/IMS).	**Total ects MS/IMS**	**Comments related to the situation in other universities of the country**
Spain	**U. of León**	**Food Science and Technology-4 (Bachelor)**	• Meat and Fish Technology/3rd year/C/4.5 MS (0 IMS) ects • Food Composition and Properties/2nd	Total: 6 the whole course % MS= 75	In the degree of Food Science and Tecnology, Meat Science and Technology contents are taught, in many (c.a. 70%) universities, as the

			year/C/0.6 MS (0 IMS) ects		main component of compulsory or optional courses, named as Meat Technology, Meat and Fish Technology, Animal Origin Food Technology or Meat Industry. Moreover, in all of the universities Meat Science and Technology topics are introduced as a few specific lessons or topics in courses on Food Chemistry, Food Microbiology, Food Science, Food Technology, Food Hygiene, Design of Food Facilities, Animal Production, Raw Material Production, Food Analysis, Human Nutrition, Quality Control, Food law, Food Culture... In few universities among the Spanish ones, the Food Science and Technology degree include courses focused on IMS. In these cases, the subjects are named design and development of meat products In the degree of Veterinary the topics of Meat Science and Technology are included as specific topics in the courses of Food Technology and Food Inspection and Hygiene. Agronomy engineering degree– food Industry orientation. The meat science and technology topics can be the main part of a course named Meat Industry or Animal Origin Food Technology/Processing or more frequently can be included as specific topics in courses such as Food Quality, Food Science/Chemistry, Food Technology, Animal Production, Food
		Veterinary-5 (Master)	• Food Technology/5th year/C/2-MS (0 IMS) ects	Total: 10, the whole course %MS = 20	
			• Food Hygiene and Safety and Inspection/5th year/C/4-MS (0 IMS)	Total: 14 the whole course %MS = 29	
		Agronomy engineering degree-food industry orientation (Bachelor)	• Animal origin food industry/4th year/O/0.75-MS (0 IMS)	Total: 3 the whole course %MS = 25	

					Industry Design. Degrees pf human nutrition and pharmacy have got the course of Food Science (Bromatology). A specific minor part of this course is on meat and meat products.
Italy	**U. of Parma**	**Gastronomy science 3 years**	• Food microbiology/ 3rd year/C/MS/0,5 ects • Food Chemistry/1st year/C/DS/1 ects • Food and beverages / 3rd year/ MS / 1 ects • Food Technology 3 / 3rd year/ MS / 2 ects • Food and beverages 2 / 3rd year/ MS / 1.5 ects • Food Higiene and Inspection 3rd year/C/MS/2ects	MS=8 (4,44%) IMS=0 Total: 8 % IMS=0	Meat science is generally presented in all the FST courses in ITALY as part of microbiology, technology or raw material courses. Specific courses are presented only in few Universities and mainly as elective courses and/or for the masters degree. Other courses (Veterinary, Animal production, Economy) deal with meat science and count on teachers-programmes offered by FST
		Food science and Technology-3 years	• Food Inspection 2nd year/C/MS/2 ects	MS=1,5 (0,83%) IMS=0,5 Total: 2 % IMS=25%	
		Livestock science and animal production technologies (3 years Vet)	• Food Inspection I 3rd year/C/MS/3 ects • Food Inspection 3rd year/C/MS/3 ects	MS=4 (1,66%) IMS=2 Total: 6 % IMS=33	

		Food System Sustainability and MAnagement	∉ Food Higiene and Inspection 3rd year/C/MS/2ects	MS=1,5 (0,83%) IMS=0,5 Total: 2 % IMS=25	
Poland	**University of Warmia and Mazury in Olsztyn**	**Faculty of Food Sciences** Food Technology and Human Nutrition	Bachelor degree (I°) Food Technology- Technology of meat and meat products /2nd year/E/MS/3 ECTS Technology and chemistry of meat /3th year/E/MS/13 ECTS Unconventional animal row materials – Fish /3th year/E/MS/3 ECTS Unconventional animals materials –Hunting animals/ 3th year/E/MS/3 ECTS Methods for evaluating meat and meat products /3th year/E/IMS/1 ECTS Health-promoting additives in meat products I°/3th year/E/IMS/2 ECTS Poultry and eggs processing/ I°/3th year/E/MS/8 ECTS Speciality Seminar / I°/3th year/E/IMS/2 ECTS Preservation of materials and food products/ I°/3th year/C/MS/2 ECTS Hydrocolloids in meat processing/I°/4th year/C/MS/3 ECTS Meat storage I°/4th year/E/MS/6 ECTS Technological design of food industry plants I°/4th year/C/MS/4 ECTS **Master degree (II°)**	MS=45 IMS=5 Total: 50 % IMS= 10 MS=0 IMS=6 Total: 6	**Poland** The Faculty of Food Sciences, UWM, is the only faculty in Poland which offers an extensive meat technology and science program to students, including 3 semesters of subjects closely related to the meat technology and science. Others universities which offers programs in food technology such as those located in Warsaw, Lublin, Poznan, Szczecin, Kraków and Wroclaw, have only 1 subject closely related to meat sciences (such as meat technology) as a part of food technology program.

		Food Safety and Certification	Contemporary trends in production of meat products II°/1st year/ C/IMS/3 ECTS Contemporary trends in production of meat/ II°/2nd year/E/IMS/3 ECTS	% IMS= 100 MS=6 IMS=0 Total: 6	
		Gastronomy-Culinary Art	Technology and hygiene of animal origin products (I) I°/2nd year/C/MS/6 ECTS	% IMS= 0 MS=5 IMS=3 Total: 8	
		Faculty of Veterinary Medicine – field of study: Veterinary	Unconventional raw materials in gastronomy/ I°/2nd year/E/IMS/3 ECTS Commodity of animal origin food products I°/2nd year/C/MS/5 ECTS	% IMS= 37.5 MS=18 IMS=0 Total: 18	
		School of Public Health - field of study: Dietetics **Faculty of Animal Bioengineering -** field of study: Food production bioengineering	Hygiene of animal origin products I/5th /C/MS/5 ECTS Hygiene of animal origin products II/6th /C/MS/5 ECTS Hygiene of meat and slaughter animals I/4th /C/MS/4 ECTS Hygiene of meat and slaughter animals II/5th /C/MS/4 ECTS	% IMS= 0 MS=4 IMS=0 Total: 4	
		Faculty of Animal Bioengineering - field of study: Animal Science (Quality Management Systems for Food Products of Animal Origin)	Basis of Food Commodity Science/I/1st/C/MS/4ECTS	% IMS= 0 MS=3.5 IMS=0 Total: 3.5	

			Commodity Science of Animal Products/ I°/2th year/E/MS/3.5 ECTS **Master degree II°** Meat processing/ 1st year/E/MS/4 ECTS	% IMS= 0 MS=4 IMS=0 Total: 4 % IMS= 0	
Portugal	**University of Évora** **University of Lisbon (Veterinary Medicine Faculty)** **University of Tras-os-Montes e**	**Integrated Master in Veterinary Medicine** **Integrated Master in Veterinary Medicine** **Food Safety Master** **Zootechnical Engineering**	• **Animal Products Technology I** • **Animal Products Technology II** • **Animal Products Technology** • **Animal Origin Products Valorization and Differentiation** • **Animal origin food Technology and quality** • **Innovation, new products development and**	MS=2,5 IMS=0 Total: 2,5 MS=2,5 IMS=0,5 Total: 3 MS=1,5 IMS=0,5 Total: 2 MS=0,5 IMS=0 Total: 0,5 MS=2 IMS=0,5 Total: 2,5	In the Portuguese universities many courses have Food Quality and Safety; Technological Processes and Food Quality; Food hygiene and Safety; Food Technology and Innovation; and other subjects in which meat and products evaluation is included Several Agriculture Schools of Polytechnical institutes offer Animal Products (Meat) Technology subjects included in their courses' curricula (with an average of 5 ETCs per Course/Curricular Unit). There isn't clear evidence of the

	Alto Douro	**Zootechnical Engineering (Master)**	**sensory analysis** • **Transformation and innovation of animal origin products**	MS=1,5 IMS=0,5 Total: 2 MS=1,5 IMS=0 Total: 1,5	percentage of use of innovation in Meat Science though there are some topics related to innovation in the Courses/Curricular Units referred in the list presented) Overall, Meat Science courses have between 4 and 6 ECTs.
		Food Engineering (Master)	• **Animal origin products technology** • **Animal Products Technology II**	MS=0,5 IMS=0 Total: 0,5	
		Integrated Master in Veterinary Medicine	• **Animal Products Technology (optional)**	MS=1,5 IMS=0,5 Total: 2	
	Beja Polytechnic Institute	**Agronomy**	• **Raw material of animal origin**	MS=1 IMS=0 Total: 1	
		Food Science and Technology	• **Meat and fish Technology**	MS=1,5 IMS=0 Total: 1,5	
	Bragança Polytechnic Institute	**Food Engineering**	• **Meat and meat products technology** • **Quality Analysis and control of meat and meat products**	MS=3 IMS=0,5 Total: 3,5 MS=6 IMS=3 Total: 9	
		Animal Science Technologies Master	• **Meat Science**	MS=6 IMS=2 Total: 8 MS=6 IMS=2 Total: 8	
				% IMS=10/47,5=21,05	
Greece	**University of Thessaly**	**Animal Science / 5 year**	∉ **Meat Technology C/4th / 4 ECTS** ∉ **Food of Animal Origin Hygiene C/5th / 7ECTS**	MS=43 IMS=10 Total: 53	Meat science is generally presented in all the FST courses and also in Veterinary Medicine bachelor in

		Food Science/5 year **Veterinary Medicine /5 year** **Nutrition and Dietetics/ 5 year**	∉ **Food of Animal Origin Quality Control Systems E/4th/ 4ECTS** ∉ **Meat and Meat Products Technology and Quality Control C/4TH/6** ∉ **Food Safety and Quality C/ 5TH/ 4 ECTS** ∉ **Food of Animal Origin Technology C/2nd/4ECTS** ∉ **Food of Animal Origin Hygiene C/4TH/4ECTS** ∉ **Food chemistry and technology C/2ND/5ECTS** ∉ **Food Safety C/3RD/5ECTS**	% IMS= 18,9%	Greece as part of food chemistry, food microbiology and food technology. Specific courses are presented only in few Universities (as compulsory courses) and in some masters degree.

IMS topics included currently in the Study Programmes of the partners (quantify the contents/skills developed* and add comments if necessary).

* 1 (minor); 2 (moderate); 3 (major).

In blue, mean>2.5.

	IMS TOPIC	SPAIN#	ITALY	POLAND	PORTUGAL	GREECE	MEAN
A. RAW MEAT SCIENCE	A1. Meat-purpose animal production	0	2	1	0	3	1,2

	A2. Sustainability of meat production	0	2	1	0	1	0,8
	A2. Meat chemical composition and meat biochemistry	0	2	2	0	2	1,2
	A3. Meat microbiology	0	2	1	0	2	0,8
	A5. Meat storage and shelf life	0	2	2	0	2	1,2
	A6. Meat traceability	0	2	1	0	2	0,8
B. MEAT AND MEAT PRODUCTS PROCESSING FUNDAMENTALS	B.1 Meat culinary techniques	0	1	2	0	1	0,8
	B2. Meat and meat products processing	0	2	2	2	2	1,6

	B3. Traditional Meat Products	0	2	1	2	2	1,4
	B4. Meat processing facilities	0	2	2	0	2	1,2
	B.5 Novel Technologies in Meat Processing	0	1	2	1	1	1
C. MEAT INDUSTRY	C1. Meat and Meat Products Quality Control (laboratory)	0	1	1	0	2	0,8
	C2. Meat and meat products quality assurance	0	2	1	0	3	1,2
	C3. Training in research and development of Meat Products	0	1	2	0	1	0,8
	C4. Entrepreneurship and innovation in	0	1	2	0	1	0,8

	meat and meat products						
D. MEAT PRODUCTS SUSTAINABILITY, NUTRIONAL ASPECTS AND HEALTH	D1. Anthropology of meat (producing and eating)	0	1	1	0	1	0,6
	D2.Meat and health	0	1	2	0	2	1
	D3 . Sustainability of the meat subsystem	0	2	1	0	1	0,8
	D4. Meat industry by-products and wastes	0	1	1	1	1	0,8
E. OTHER IDS TOPICS (indicate)							

In León, Spain we do not have lessons or competences on Innovative Meat Science Topics, ## In Portugal, the values refer to IPBragança

Annex 2

InnoMeatEdu Erasmus + Project.
Training Needs Analysis
Questionnaire

InnoMeatEdu *is an ERASMUS + KA2* ***project*** *managed by several European universities and communication and research centres that* ***aims at providing*** *an integrated meat science and technology* ***education experiences and material,*** *using Information and Communication Technologies and Open Educational Resources.*
Training need analysis *is considered fundamental for developing the content of that material, which will be aimed at improving the quality and pertinence of graduates' competences and industry requirements. So, your opinion is highly valuable and will be useful for the project.*
Questionnaires can be filled out in less than 10 minutes
Thank you in advance for your participation.

Target:
Academic staff teaching any subject related to food science and technology

1. Country of origin:
   - Greece
   - Italy
   - Poland
   - Portugal
   - Spain
   - Other … (free text)

2. Year of birth: … (free text)

3. Gender:
   - Female
   - Male
   - Nonbinary or agender
   - Prefer not to say

4. Have you **taught topics** directly **related** to **Meat** Science and Technology in the last ten years?
   - Yes
   - No (Please, do not continue with the questionnaire)

5. Years teaching in Food Science and Technology or related programme studies:

- <1 year;
- 1-5 years;
- 6- 10 years;
- 11-20 years;
- >20 years

6. Years teaching topics directly related to Meat Science and Technology:

- <1 year;
- 1-5 years;
- 6- 10 years;
- 11-20 years;
- >20 years

7. **Is there** at your university any **subject or course** where the **meat science** and technology topics represent **more than 50% (half or the major part)** of the total contents?
   - Yes
   - No

8. **Is there** at your university a **Master degree** specific for **meat** science and technology?
   - Yes
   - No

9. What **level do you teach** or have taught **topics** directly **related** to **Meat** Science and Technology?
   - Bachelor
   - Master
   - Both

10. Teaching activities in the field of meat science and technology (multiple choice)

- I am **currently** teaching **topics directly related to Meat Science and Technology** in a course where the topic represents the **major part** of the total content
- I am **currently** teaching **topics directly related to Meat Science and Technology** in a course where the topic represents a **minor part** of the total content
- **In the last 10 years I taught topics directly related to Meat Science** and Technology in a course where the topic represents the **major part** of the total content
- **In the last 10 years I taught topics directly related to Meat Science** and Technology in a course where the topic represent the **minor part** of the total content

11. Are your main **research activities** in the last two years directly **related to Meat Science** and Technology?
    - Yes
    - No

12. Please provide your **main research topics in Meat** Science and Technology in the last two years
    Free text, maximum three topics

13. Have you **collaborated** in your **research** activities with or provide **advisory or technical service to meat industries** or the meat **sector in the last 5 years**?
    - Yes
    - No (if no, go to question 17)

14. What **percentage** of your **time** dedicated to **research** or **technical activities in meat science and technology** do you spend in the **collaborative activities** with meat **industries** or the meat sector?
    - Less than 10%
    - 10-40%
    - 50%
    - 60-80%

- More than 80%

15. Please indicate **your main collaborative research or activity topics** for which you have **collaborated** with the **Meat Industry**
    Free text, maximum three topics

16. Please provide **the type** of **meat industry** or meat-related **organization** you have **collaborated** with (multiple choice)
    - small-local enterprises
    - small-medium enterprises
    - big enterprises
    - government
    - associations
    - other please indicate (free text)

17. Have you ever **worked** on the meat sector?
    - Yes
    - No (if not, go to question 19)

18. **How long** have you **worked** in the **meat sector**?
    - <1 year;
    - 1-5 years;
    - 6- 10 years;
    - 11-20 years;
    - >20 years

19. Have you ever done **internships** in the meat sector?
    - Yes
    - No (if not, please go to question 22)

20. **How many training stages or internships** have you done in the **meat sector**?
    - 1
    - 2-5
    - More than 5

21. **Where** did you **worked/did** the **internships**?
    - Meat industry
    - Meat association
    - Other please indicate (free text)

22. In a 1 to 10 scale, indicate **how important** do you think the following **Meat Science and Technology topics** are **for the future** professional activities of **your students**:
    (for each topic give a score as: 1-not important/relevant; 5-medium relevance; 10-highly important/essential)

    - Meat animal production
    - Sustainability of meat production
    - Meat chemical composition and meat biochemistry
    - Meat microbiology
    - Meat Safety and Risk Analysis.
    - Meat storage and shelf life
    - Meat/Beef traceability
    - Meat culinary techniques
    - The making process of meat products
    - Traditional Meat Products
    - Meat processing facilities
    - Novel Technologies in Meat Processing
    - Meat and Meat Products Quality Control (laboratory)
    - Meat and meat products quality assurance
    - Training in research and development of Meat Products
    - Entrepreneurship and innovation in meat and meat products
    - European Meat and Meat Products Law.
    - Anthropology of meat (producing and eating)
    - Sustainability of the meat subsystem
    - Meat and health
    - Meat industry by-products and wastes

23. In a 1 to 10 scale, indicate **to which extent the following topics are included** in the curriculum of the Food Science studies **where you teach**:
    (for each topic give a score as 1-not included at all; 5-average; 10-the most important topic)

- Meat animal production
- Sustainability of meat production
- Meat chemical composition and meat biochemistry
- Meat microbiology
- Meat Safety and Risk Analysis.
- Meat storage and shelf life
- Meat/Beef traceability
- Meat culinary techniques
- The making process of meat products
- Traditional Meat Products
- Meat processing facilities
- Novel Technologies in Meat Processing
- Meat and Meat Products Quality Control (laboratory)
- Meat and meat products quality assurance
- Training in research and development of Meat Products
- Entrepreneurship and innovation in meat and meat products
- European Meat and Meat Products Law.
- Anthropology of meat (producing and eating)
- Sustainability of the meat subsystem
- Meat and health
- Meat industry by-products and wastes

24. Please indicate other topics of interest not included in the list above, if any … (free text, maximum 3).

25. In a 1 to 10 scale, indicate what is your opinion about the level of **Meat and Technology Science knowledge (24.1) and skills (24.2)** that the Food Science **students could gain** with your courses? (1-very poor 10- excellent)

24.1 Knowledge (for each point please make your assessment from 1 to 10):

- Meat animal production
- Sustainability of meat production
- Meat chemical composition and meat biochemistry
- Meat microbiology
- Meat Safety and Risk Analysis.
- Meat storage and shelf life
- Meat/Beef traceability
- Meat culinary techniques
- The making process of meat products

- Traditional Meat Products
- Meat processing facilities
- Novel Technologies in Meat Processing
- Meat and Meat Products Quality Control (laboratory)
- Meat and meat products quality assurance
- Training in research and development of Meat Products
- Entrepreneurship and innovation in meat and meat products
- European Meat and Meat Products Law.
- Anthropology of meat (producing and eating)
- Sustainability of the meat subsystem
- Meat and health
- Meat industry by-products and wastes

24.2 . **Skills** (for each point please make your assessment from 1 to 10):

- capability of applying knowledge to the work
- collection and interpretation of relevant data
- decision making
- problem solving
- planning
- communication
- autonomy
- creativity
- digital skills

26. In a 1 to 10 scale, indicate **to which extent the following learning methodology are included** in your courses the Food Science studies you teach:
(1-not included at all; 5-average; 10-the only method method)

- Student-centred learning (problem-based learning, case studies, etc.)
- Lectures
- Laboratories
- Visits to meat plants

27. In a 1 to 10 scale, indicate your feeling about the **usefulness of the following learning methodology** in the courses you teach: (1-They are not useful; 5-average; 10- They are extremely useful)

- Student-centred learning (problem-based learning, case studies, etc.)
- Lectures
- Laboratories
- Visits to meat plants

If desired, comment your response.

InnoMeatEdu Erasmus + Project.
Training Needs Analysis
Questionnaire

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Training need analysis *is considered fundamental for developing the content of that material, which will be aimed at improving the quality and pertinence of graduates' competences and industry requirements. So, your opinion is highly valuable and will be useful for the project.*
Questionnaires can be filled out in less than 10 minutes.
Thank you in advance for your participation.

Target:
STUDENTS AND GRADUATES (bachelor degree)

28. Country of origin:
    - Greece
    - Italy
    - Poland
    - Portugal
    - Spain
    - Other … (free text)

29. Year of birth: … (free text)

30. Gender:
    - Female
    - Male
    - Non-binary or agender
    - Prefer not to say

31. Current situation:
    - I am a **Food** Science, Food Technology or Food related **undergraduate** student
    - I am a **Meat** Science, Meat Technology or meat related **undergraduate** student
    - I am a recently (less than 2 years) **graduated Food** Scientist, Technologist or Food related specialist
    - I am a recently (less than 2 years) **graduated Meat** Scientist, Meat Technologist or Meat related specialist
    - None of the other (please do not continue with the questionnaire)

32. Have you attended or are you currently attending a **Meat Science or Meat Technology module or course** in your degree?
    - Yes
    - No (If no, please do not continue with the questionnaire)

33. Did you regularly **attend**(ed) to the **lectures** at the university?
    - Yes
    - No

34. **If** you did **not attend** the lectures at the university, **it was because**:
    - You were working
    - You couldn't afford travel expenses
    - You did not feel lectures useful or necessary for your following study
    - You were not interested or find it not interesting
    - Other reasons

35. Have you **benefited** from an **Erasmus fellowship** during your Food, Meat Science or Technology studies?
    - Yes
    - No (if no, please go to question 10)

36. Have you **studied any subject or course** related to **Meat** Science and Meat Technology during your Erasmus fellowship?
    - Yes
    - No

37. Was/Is your **final degree project** (undergraduate thesis project) **related** to **Meat** Science or Meat Technology?
    - Yes
    - No
    - I haven´t carry out the final year project yet

38. As a student or graduate, have you carried out **internships** at a **meat industry**?
    - Yes
    - No (if no, please go to question 13)

39. In a 1 to 10 scale, indicate **how did your courses** at the University **trained you on the skills and knowledge** below **to be used during your internship** at the Meat Industry?

    (1: my skills/knowledge were practically useless for undertaking my assigned tasks at the industry; 5: my skills/knowledge help me to undertake my assigned tasks at the industry but I had to learn by myself or been taught at the industry a half of the knowledge/skills required – 10: my skills/knowledge were totally useful for undertaking my assigned tasks at the industry)

    12.1. **Skills** (please make your assessment from 1 to 10):
    - capability of applying knowledge to the work
    - collection and interpretation of relevant data
    - decision making
    - problem solving

- planning
- communication
- autonomy
- creativity
- digital skills

12.2. **Knowledge** (please make your assessment from 1 to 10):

- Meat-purpose animal production
- Sustainability of meat production
- Meat chemical composition and meat biochemistry
- Meat microbiology
- Meat Safety and Risk Analysis.
- Meat storage and shelf life
- Meat/Beef traceability
- Meat culinary techniques
- The making process of meat products
- Traditional Meat Products
- Meat processing facilities
- Novel Technologies in Meat Processing
- Meat and Meat Products Quality Control (laboratory)
- Meat and meat products quality assurance
- Training in research and development of Meat Products
- Entrepreneurship and innovation in meat and meat products
- European Meat and Meat Products Law.
- Anthropology of meat (producing and eating)
- Sustainability of the meat subsystem
- Meat and health
- Meat industry by-products and wastes

12.3. Please give explanation for the most poorly scored points (free text)

40. In a 1 to 10 scale, indicate **how important** do you think the following **Meat** Science and Technology **topics** are for your future professional activities:
(for each topic please rate: 1-not important/relevant; 5-medium relevance; 10-highly important/essential)
    - Meat animals' production

- Sustainability of meat production
- Meat chemical composition and meat biochemistry
- Meat microbiology
- Meat Safety and Risk Analysis.
- Meat storage and shelf life
- Meat/Beef traceability
- Meat culinary techniques
- The making process of meat products
- Traditional Meat Products
- Meat processing facilities
- Novel Technologies in Meat Processing
- Meat and Meat Products Quality Control (laboratory)
- Meat and meat products quality assurance
- Training in research and development of Meat Products
- Entrepreneurship and innovation in meat and meat products
- European Meat and Meat Products Law.
- Anthropology of meat (producing and eating)
- Sustainability of the meat subsystem
- Meat and health
- Meat industry by-products and wastes

41. Please indicate other topics of high interest not included in the list above … (free text, maximum 3).

42. In a 1 to 10 scale, indicate **to which extent** the following **Meat** Science and Technology **topics are included** in the curriculum of the Food Science studies you have **completed or** are **attending**:

(for each topic please rate: 1-not included at all; 5-average; 10-the most important topic)

- Meat animals' production
- Sustainability of meat production
- Meat chemical composition and meat biochemistry
- Meat microbiology
- Meat Safety and Risk Analysis.
- Meat storage and shelf life
- Meat/Beef traceability
- Meat culinary techniques
- The making process of meat products
- Traditional Meat Products

- Meat processing facilities
- Novel Technologies in Meat Processing
- Meat and Meat Products Quality Control (laboratory)
- Meat and meat products quality assurance
- Training in research and development of Meat Products
- Entrepreneurship and innovation in meat and meat products
- European Meat and Meat Products Law.
- Anthropology of meat (producing and eating)
- Sustainability of the meat subsystem
- Meat and health
- Meat industry by-products and wastes

43. In a 1 to 10 scale, indicate **to which extent** the following **learning methodology are included in the courses** of the Food Science or related studies you have **completed or** are **attending**: (1-not included at all; 5-average; 10-the only method method)

- Student-centred learning (problem-based learning, case studies, etc.)
- Lectures
- Laboratories
- Visits to meat plants

44. In a 1 to 10 scale, indicate your degree of thinking about the **usefulness** of the following **learning methodology in the courses** the Food Science studies you have **completed or** are **attending**: (1-They are not useful; 5-average; 10- They are extremely useful)

- Student-centred learning (problem-based learning, case studies, etc.)
- Master classes
- Laboratories
- Visits to meat plants

If desired, comment your response (free text)

Training Needs Analysis Questionnaire

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Questionnaires can be filled out in less than 10 minutes
Thank you in advance for your participation.

Target:

Meat sector professionals (Meat industry and other stakeholders related to the Meat sector). The recipients should be professionals, graduates in food science and technology, veterinary, chemistry, human nutrition, agronomic engineer or other degrees related to food that have worked for at least 2 years in the meat sector in the last ten years.

45. Country of origin:
    - Greece
    - Italy
    - Poland
    - Portugal
    - Spain
    - Other … (free text)

46. Year of birth: … (free text)

47. Gender:
    - Female
    - Male
    - Nonbinary or agender
    - Prefer not to say

48. Academic Level
    - Bachelor

- MSc
- PhD

49. Have you **completed** in the past **University studies** directly related to **Food** Science and Technology?
    - Yes
    - No

50. Have you **attended** a **meat science or technology module** in your undergraduate / postgraduate studies?
    - Yes
    - No

51. Years working in the Food industry:
    - <1 year;
    - 1-5 years;
    - 6- 10 years;
    - 11-20 years;
    - >20 years

52. Years working in a Meat sector:
    - <1 year;
    - 1-5 years;
    - 6- 10 years;
    - 11-20 years;
    - >20 years

53. Indicate your tasks or position in the **meat industry** or meat related business: (you can choose more than one)
    - Meat Processing Equipment Operator
    - Technologist/Process Engineer
    - Quality Control Officer
    - Product Development Manager
    - Laboratory Manager
    - Laboratory staff
    - R&D Department
    - Accountant/Accounting Department
    - Production manager
    - Adviser/Consultant
    - Marketing Department

- Management Department (President)
- Food Safety Inspection
- Animal Care
- Other:..... (free text)

54. **Responsibility**, people in charge in the meat or meat-related industry
    - I'm the group leader
    - I'm the only responsible of the department
    - I'm part of a team with a supervisor
    - Other

55. In **what kind** of **meat** or **meat-related industry** are you currently **working or have you worked for two years in the past ten years**? (you can choose more than one)
    - Meat livestock
    - Slaughterhose and cutting plant
    - Meat Storage
    - Meat and meat products distribution
    - Facility for making meat preparations
    - Facility for making non-heated meat products
    - Facility for making heat-treated meat products
    - Catering focused on meat
    - Research center
    - By-products
    - Other, please specify …. (free text)

56. **Did/do you offer** or **would you be wishing** to offer **internships** for **Meat science and Technology teachers** at your facilities?
    - Yes, I did/do
    - No I did/do not
    - I would be wishing
    - I am not responsible for a team

57. **Did/do you offer** or **would be wishing** to offer **internships or job positions for Food Science and Technology students or graduates in your work-team** under your supervision at your facilities?

a) Yes, I did/do

b) No I did/do not (go 17)

c) I would be wishing (go 17)

58. In general, from 1 to 10, what is **your opinion** about the **Meat and** Technology Science **knowledge** and **skills** of the **Food Science and Technology students or graduates under your supervision** at your facilities? (1-very poor 10- excellent)

14.1 **Knowledge** on meat quality and meat processing (theoretical understanding of subjects such as meat microbiology, meat safety, meat chemistry, meat analysis, meat processing, meat control, meat law, meat nutrition, meat anthropology, meat business, etc)
(please make your assessment from 1 to 10)

14.2 **Skills** (capability of applying knowledge to the work, collection and interpretation of relevant data, decision making, problem solving, planning, communication, autonomy, creativity, digital skills)
(please make your assessment from 1 to 10)

59. If you are the manager of a team with **Food-Science and Technology graduates**, in general, what is **your opinion** about the **Meat** Science and Technology **knowledge** and **skills** of the Food Science **graduates** you work with at your facilities? (1-very poor 10- excellent)

15.1 **Knowledge** on meat quality and meat processing (theoretical understanding of subjects such as meat microbiology, meat safety, meat chemistry, meat analysis, meat processing, meat control, meat law, meat nutrition, meat anthropology, meat business, etc)
(please make your assessment from 1 to 10)

15.2 **Skills** (capability of applying knowledge to the work, collection and interpretation of relevant data, decision making, problem solving, planning, communication, autonomy, creativity, digital skills)
(please make your assessment from 1 to 10)

60. What's from 1 to 10 the **overall degree** of **satisfaction** with the **knowledge and skills of hosted students or graduates in your team** (1-not satisfactory; 5-medium relevance; 10-highly satisfied)

61. If **you studied Food Science** and Technology before working in the meat sector, **what is your opinion about the Meat Science and Technology** knowledge and skills that you **received at the university**? (1-very poor 10-excellent). If not, please go to the next question

17.1 Knowledge on meat quality and meat processing (theoretical understanding of subjects such as meat microbiology, meat safety, meat chemistry, meat analysis, meat processing, meat control, meat law, meat nutrition, meat anthropology, meat business, etc)
(please make your assessment from 1 to 10)

17.2 Skills (capability of applying knowledge to the work, collection and interpretation of relevant data, decision making, problem solving, planning, communication, autonomy, creativity, digital skills)
(please make your assessment from 1 to 10)

18 In a 1 to 10 scale, indicate **how important** do you think the **following Meat Science and Technology topics** are **for your professional activities**:
(for each topic please rate as: 1-not important/relevant; 5-medium relevance; 10-highly important/essential)

- Meat animals' production
- Sustainability of meat production
- Meat chemical composition and meat biochemistry
- Meat microbiology
- Meat Safety and Risk Analysis.
- Meat storage and shelf life
- Meat/Beef traceability
- Meat culinary techniques
- The making process of meat products
- Traditional Meat Products
- Meat processing facilities

- Novel Technologies in Meat Processing
- Meat and Meat Products Quality Control (laboratory)
- Meat and meat products quality assurance
- Training in research and development of Meat Products
- Entrepreneurship and innovation in meat and meat products
- European Meat and Meat Products Law.
- Anthropology of meat (producing and eating)
- Sustainability of the meat subsystem
- Meat and health
- Meat industry by-products and wastes

19 Please indicate other topics, if any, of interest not included in the above list … (free text).

20 What's from 1 to 10 the **overall degree of satisfaction** with **your work**? (1-not satisfactory; 5-medium relevance; 10-highly satisfied)

21 Any comments are welcome

Annex 4 New topics included in the contents of the training material.

1. **Meat safety and risk analysis;**
2. **meat storage and shelf life;**
3. **meat microbiology;**
4. **meat and meat products quality assurance; European meat and meat products la**

InnoMeatEdu

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4obs Accounting & Consulting

Co-funded by the European Union

The InnoMeatEdu project has been funded with support from the European Commission. This publication reflects the views only of the author and the European Commission support for the production of this publication does not constitute an endorsement of the contents and cannot be held responsible for any use which may be made of the information contained therein.