evfst EUROPEAN VETERINARY FOOD SAFETY TEACHERS

European Catalogue for Teaching Food, Meat and Dairy Hygiene

1st Edition 2018

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Preamble

The 1st edition of the "European Catalogue for Teaching Food, Meat and Dairy Hygiene" was developed by academic lecturers of the "European Veterinary Food Safety Teachers (EVFST)"* working group and reflects their harmonised perception of the knowledge and skills in Food Hygiene that veterinary students should acquire at veterinary schools during their undergraduate training. It is based on the 3rd edition of the teaching catalogue prepared by the Deutsche Veterinärmedizinische Gesellschaft (DVG; German Veterinary Society) working group "Teaching in the food hygiene subjects of the German-speaking countries" published in 2014**.

Aims of the Catalogue

With this Catalogue the following main objectives are pursued:

- Listing of the basic Food Hygiene teaching content, within the Veterinary Public Health Curriculum, in European Veterinary educational institutions to allow veterinary graduates to perform safely food hygiene activities consistently throughout Europe and therefore facilitate mobility of veterinarians across European countries.
- Provision of support for the definition of Learning Outcomes of Food Hygiene courses to achieve Day One Competence and beyond.

Some of the content of the Food Hygiene Catalogue requires underpinning knowledge and understanding of important related subjects such as anatomy, biochemistry, microbiology, parasitology, pathology, pharmacology, toxicology, clinical subjects, etc.

Furthermore, the Catalogue does not contain any indication regarding the length of time or the teaching methods to be used, nor the correlation of lectures, practical courses or seminars for delivering the learning outcomes of the Food Hygiene courses. Moreover, it is not intended to indicate the chronology by which the content is taught.

The Role of Veterinarians in Food Safety

Food safety has to be assured at all stages of production based on the principle of shared responsibilities. This poses a big challenge for the veterinary profession since food originates from different sources (e.g. dairy, fish farming, honeybees, etc.) and flows of commodities are becoming more and more diverse because of globalization. Veterinarians are responsible for protection of the food chain starting at the source to the end-product offered for sale to the consumers.

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**https://lebensmittelhygiene.vetmed.uni-leipzig.de/studium/→ Download Katalog der Lehrinhalte (pdf) or dvg.net

The FAO/WHO/OIE define the contribution of Veterinary Medicine in the field of Food Hygiene within the area of "Veterinary Public Health" as follows:

- *Veterinary public health contributes to public health through the knowledge, skills and resources of veterinary science. This generally relates to the understanding, prevention and control of zoonotic diseases and food safety issues.*

The scope of veterinary responsibilities in Food Hygiene as part of Veterinary Public Health are depicted in Figure 1. However, the content of this teaching catalogue is compiled primarily, to prepare veterinary students to fulfill the role of Official Veterinarian as defined by Regulation (EC) No 854/2004 or follow up Regulations and the Day One Competencies.

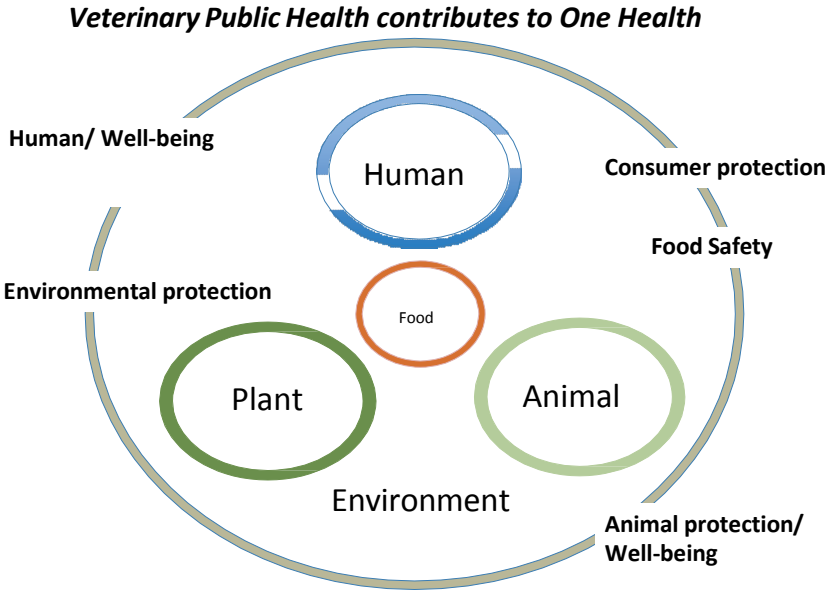

Figure 1: The scope of veterinary responsibilities in Food Hygiene as part of Veterinary Public Health (Teaching catalogue; 2014)

The mentioned teaching contents integrate into the „One Health Initiative" - a global strategy for national and international cooperation of different disciplines to achieve optimal health and welfare of humans, animals and environment.

P.G. Braun, K. Houf and A. Seguino 11.06.2018

Food Hygiene

A. Basic principles of food hygiene and technology

1. Objectives, significance and historical development of food hygiene and its position within the area of Veterinary Public Health (VPH)

2. Organisation of food control

- National and EU Food control
- Tasks and role of veterinarians in food control and in the food industry

3. Food law (general)

- General principles of food law
  - Principles of legislation
  - Consumer protection policy of the EU
  - International trade law pertaining to food
  - Basic requirements for the marketability of food
- EU and national law
  - Directive (EC) No 178/2002, EU hygiene package and follow-up regulations
  - Further relevant national and EU legal provisions
  - Legislation on product liability, food labelling, food additives, residues and contaminants
  - Basic principles of legislation on food supplements, genetic modified organisms and novel food

4. Quality and safety of food

- Quality concepts, quality control, hygiene as quality factor
- Generally accepted trade practice
- Product liability, duty of care
- Quality assurance, quality management
- Food safety management
- In-house control programmes
- HACCP concept, risk analysis, risk assessment, risk communication
- Good Manufacturing Practices (GMP)/Good Hygienic Practices (GHP)
- Hygiene requirements for food premises, processes and staff
- Hygiene training of staff
- Cleaning and disinfection

5. Basic principles of official food control

- Organisation of official controls, sampling
- Control of materials and articles intended to come into contact with foodstuffs
- Administrative courts, right of appeal, fines, administrative and criminal offences*= only applicable if required by specific country day one competencies

6. Nutritional, pathophysiological and dietary implications of food consumption

7. Food microbiology

- Microorganisms in the food chain
  - Ecology (natural presence in soil, water, animals and humans, biofilms)
- Microbiological contamination of food
  - Contamination processes (primary/secondary contamination, cross-, de-, recontamination)
  - Sources of contamination
  - Generation time, lag-phase, growth kinetics, sublethal damage
  - Significance of bacterial counts
  - Marker organisms, microbiological limits (food safety criteria, process hygiene criteria)
- Tenacity and factors influencing survival and inactivation of microorganisms
  - Extrinsic/intrinsic factors (temperature, a_w-value, pH value, sodium chloride, Eh value, nitrate/nitrite)
  - Hurdle concept
  - Predictive microbiology
- Selected characteristics of microorganisms
  - Pathogenicity and virulence factors
  - Toxin production
  - Antimicrobial resistance properties
  - Enzyme activity
- Starter and protective cultures
- Pre- and probiotics

8. Biological hazards

- Zoonoses and zoonotic agents
- Food-borne bacterial pathogens
  - Infection/intoxication/toxiinfection
  - Epidemiology, pathogenesis, clinical signs, prophylaxis, virulence factors, pathogenic behavior
  - Pathogens: *Salmonella, Campylobacter, Staphylococcus aureus, Clostridium perfringens, Clostridium botulinum, Escherichia coli/*STEC/EHEC*, Listeria, Shigella, Yersinia, Vibrio, Bacillus cereus*, etc.
- Viruses
- Protozoa

- Parasites
- Prions
- Mycotoxins
- Biogenic amines
- Natural toxins in food (toxic fish, shellfish poisoning)
- Monitoring and control of zoonoses (food-borne infections) in all stages of the food and feed chain
    - Directive 2003/99/EC on the monitoring of zoonoses and zoonotic agents
    - Control programmes
    - Outbreak investigations
- Food allergy, food intolerance
- Transmission of resistance genes

9. Chemical Hazards (residues and contaminants)

- Basic principles
    - Sources
    - Food chain
    - Adverse effects on health
    - Prophylaxis
    - Control, monitoring
    - Maximum residue limits
- Categories of substances
    - Veterinary medicinal products
    - Pesticides
    - Harmful substances originating from technological processes
    - Migration/nanoparticles
- Environmental contamination

10. Food and feed additives

11. Food spoilage

- Microbiological spoilage
- Spoilage by indigenous enzymes
- Spoilage by parasites and pests
- Chemical and physical causes of spoilage
- Principles of spoilage prevention

12. Food preservation

- Historical background
- Physical methods of preservation
- Chemical methods of preservation
- Biological methods of preservation
- Packaging

13. **Ecological aspects of production and processing of food (interaction food production and environment)**
    - Quality, safety and control of organic food
    - Legislation on organic food

B. Product-specific food hygiene and technology, process control

In general, following issues apply for the below mentioned product groups (A-H):

1. **Product-specific legislation**
2. **Product range**
    - Terminology, definitions, generally accepted trade practice, presentations, quality characteristics
    - Labelling and packaging if applicable
    - Composition
    - Technology
    - Microbiology
    - Changes (spoilage, defects, deceit)
    - Process control (health risks, CCP)

A. **Meat as raw material** (poultry, horse, cattle, goat, sheep, game, pork, ostrich, rabbit meat)

B. **Fats**

C. **Meat and meat products** (minced meat/minced meat products, cured and smoked meat products, sausages, delicatessen/meat-containing dishes, poultry meat products, canned food)

D. **Eggs and egg products**

E. **Fish and fishery products** (frozen, salted, fried, cooked, smoked fish, marinades, caviar, semi-preserved and preserved products)

F. **Crustaceans and molluscs**

G. **Honey**

H. **Food of plant origin**

C. Practical course on food analysis

1. Basic principles

- Product knowledge of the mentioned product groups
- Sensory evaluation
- Chemical methods of analysis (fat, protein, moisture, connective tissue, etc.)
- Microbiological methods of analysis and serological diagnosis of zoonotic agents
- Rapid methods
- Analysis of residues
- Gravimetry, histological analysis, immunological methods
- Animal species differentiation
- Preparation and implementation of quality assurance programs

2. Analysis of following product groups and interpretation of results, preparation of test reports including evaluation based on food law

- Meat of all species
- Fats
- Minced meat
- Cured and smoked meat
- Sausages
- Meat delicatessen/ready-to-eat products
- Canned food
- Deep-frozen products
- Fish, fishery products
- Crustaceans and molluscs
- Eggs
- Convenience, Fast Food
- Spices
- Honey
- Further products (i.e. plant food)

Meat Hygiene

A. Basic principles

1. Objectives and aims of meat hygiene

- Historical background
- Tasks of veterinarians associated with VPH and the food chain for meat: animal welfare, consumer and environmental protection, ante- / post-mortem inspection, audits of good hygiene practices, epizootics

2. Basic principles of meat hygiene (also compare food and milk hygiene and other disciplines of veterinary medicine)

- Organisation of hygiene controls in meat production and processing
- Basic principles of international agricultural policy, Common Agricultural Policy of the EU, WTO, SPS, Codex Alimentarius, OIE
- Quality management in agricultural practice
- Basic principles of meat processing and technology
- Basic principles, concepts and methods of good manufacturing practice and quality management in the meat sector as well as risk analysis and HACCP
- Prevention/reduction of risks to human health via meat consumption including basic epidemiological principles, monitoring and surveillance systems

3. Hygiene and technology of meat production

- Tasks of slaughterhouses and meat processing establishments
- Structural, operational and hygiene requirements for slaughterhouses and meat processing establishments
- Transportation of slaughter animals
    - Pre-transport handling, transport of slaughter animals (moving, loading, rest periods)
    - Animal welfare
    - Influences on meat quality
- Meat production technology
    - Slaughter lines: cattle, pig, small ruminants, horses, poultry, rabbits
    - Animal welfare
    - Methods of stunning
    - Shechita, ritual slaughter
    - Illegal slaughter
    - Chilling and freezing technology, storage, thawing
    - Meat transport
    - By-products
    - Post-mortem changes
    - Classification of carcasses, cutting, meat cut

- Hygiene management in meat production
  - Responsibilities of the food business operator
  - Food business operators own checks
  - Official control
  - Minimum requirements for staff hygiene, rooms, facilities and equipment
  - Process control (health risks, CCP)

4. European and national meat hygiene legislation

- Legislation on veterinary medicine aspects of health protection food safety, animal health, animal welfare and medicinal products, especially
  - Directive (EC) No 178/2002 und EU hygiene package along with implementation regulations (national legislation on meat hygiene(e.g. Food Hygiene Regulation on Food of Animal Origin, general administrative regulation)
- Adjoining legislation, especially on
  - Animal welfare and epizootics, disposal of offal, animal by-products, TSE, environment

5. Ante-mortem and post-mortem inspection

- Basic principles
  - Responsibilities of the food business operator
  - Food chain information
  - Official veterinarian, approved veterinarian, official auxiliary, internal personnel, professional qualification and education
  - Methods of examination
  - Principles of assessment
- Staff protection, animal welfare, environmental protection
- Special forms of slaughter (such as emergency, domestic, ritual slaughter)
- Ante-mortem inspection
  - Ante-mortem inspection at the holding farms
  - Control of animal transport
  - Ante-mortem inspection at the slaughterhouse
  - Decisions after ante-mortem inspection (e.g. prohibition of slaughter, measures concerning animal welfare)
- Post-mortem inspection
  - Post-mortem inspection procedures: cattle, swine, sheep, goats, horses, poultry, rabbits
  - Risk-based post-mortem inspection
    - standard inspection procedure, visual inspection
    - extended inspection, inspection in the event of doubt
  - Conditions for meat inspection, minimum inspection time and maximum number of inspected animals
- Further official tests
  - Principles and diagnostic application of current tests in meat hygiene
  - Examination for Trichinella in meat
  - Microbiological/bacteriological examinations
  - Antibiotic susceptibility testing and examinations on residues and contaminants
  - Examinations for defects in meat quality

- Findings of ante-mortem and post-mortem inspections
  - Infectious diseases (zoonoses, epizootics)
  - Parasitoses in slaughter animals
  - Residues and contaminants in meat
  - Changes in meat quality
  - Technopathies
- Decisions and measures after post-mortem inspection
  - Basic principles
  - Examples (e.g. trichinellosis, cysticercosis, tuberculosis, findings of further tests)
  - Treatments in order to render meat fit for consumption
  - Health marking (according to EU and national rules)
- Documentation, records, communication of inspection results
  - Information and communication technology
  - Meat inspection statistics
  - Monitoring and surveillance systems
- Disposal of animal by-products not intended for human consumption (category 1, 2 and 3)

6. Game meat, meat of exotic species

- Legislation
  - Protection of species
  - National and European legal provisions concerning hygienic and hunting of wild animals (e.g. Game law)
- Economic, hygienic and nutritional significance of game meat
- Hunting (wildlife management, wild game species, appropriation, hunting methods, closed seasons)
- Handling after killing
- Official inspections (wild game, farmed game)
- Diseases of game
- Hygiene and critical points in production of game meat

7. Import and export of meat

- Internal market
- Third countries, import controls

8. Quality meat programs

9. Quality assurance systems in meat production enterprises

B. Practical courses, demonstrations

1. **Inspection of food chain information**

2. **Ante-mortem inspection, inspection at the holding of provenance**

3. **Demonstration of stunning devices, slaughtering**

4. **Examination for *Trichinella***

5. **Process hygiene**

6. **Bacteriological examinations, antibiotic susceptibility testing**

7. **Additional examinations (e.g. pH measurements, water binding capacity)**

8. **Inspection procedures**
   - Cattle
   - Pigs
   - Horses
   - Small ruminants
   - Poultry, rabbits
   - Game (farmed game/wild game)

9. **Cutting**

10. **Cleaning and disinfection, including detection methods**

11. **Preparation of test reports**

12. **Preparation and implementation of quality assurance progammes**

Dairy Hygiene

A. Basic principles

1. **General knowledge (see Food Hygiene 1-13)**
2. **Structure of dairy industry**
   - Economic impact of production and processing of milk on national and international markets
   - Principles of national, internal and international policies in agriculture (milk associations, IDF, Codex Alimentarius, etc.)
   - Marketing (incl. direct marketing, organic sector)
   - Veterinary responsibilities
3. **Product-specific regulations if applicable (country specific)**

B. Milk production

1. **Anatomical and physiological basics**
2. **Milk synthesis and composition**
   - Synthesis and composition of major compounds
     - Water, proteins and other nitrogenous substances, lipids, carbohydrates
     - Minerals, trace elements, vitamins, enzymes
   - Milk of other species (sheep, goat, buffalo, horse)
   - Factors influencing milk production, composition and technological properties
     - Genetics
     - Lactation stage and number
     - Keeping, feeding, climate
     - Diseases and medicinal therapy
   - Nutritional and technological significance of the compounds

3. Milking technology

- Manual milking
- Machine milking
  - Design of the cluster
  - Milking systems (small bucket, pipe milking system, milking parlour, milking robots)
  - Control milking technique
  - Hygiene of milking
- Milking and mastitis
  - Milking problems
  - Definition of mastitis (IDF) and mastitis causing agents
  - Influence on milk quality

4. Cooling

- Regulations

5. Cleaning and disinfection

- Substances and procedures

6. Quality of raw milk

- Requirements from EU and national legislation
  - Hygienic requirements for raw milk production
  - Hygienic requirements for dairies
  - Criteria for raw milk
- Requirements from national laws (if applicable)
  - Parameters, intervals and methods of control
  - Measures for the case of limit exceedance

C. Hygiene and technology of milk processing

In general, following issues apply for the below mentioned product groups (A-C):

1. **Product-specific legislation (if applicable)**
2. **Nutritional significance**
3. **Product range**
   - Terminology, definitions, generally accepted trade practice, presentations, quality characteristics
   - Labelling and packaging if applicable
   - Composition
   - Technology
   - Microbiology
   - Changes (spoilage, defects, deceit)
   - Process control (health risks, CCP)

A. Raw milk for direct consumption (country specific)

B. Heat treated milk

C. Milk products

- Cream products
- Preserved products
- Fermented products
- Mixed products
- Butter and milk fat spreads
- Cheese and whey
- Ice cream and desserts
- Milk protein products, lactose products, milk fat products

D. Practical courses

1. Basic principles:

- Sampling (producer, dairy, retail)
- Product knowledge (raw and heat treated milk, milk products)
- Sensory evaluation
- Rapid methods (density, freezing point, actual and potential acidity, electrical conductivity, verification of heat treatment)
- Microbiological methods of analysis and serological diagnosis of zoonotic agents
- Cytological analysis
- Chemical analysis
- Detection of antibiotics
- Preparation and implementation of quality assurance programs

2. Analysis of following product groups and interpretation of results, preparation of test reports including evaluation based on food law

- Raw and heat treated consumers milk
- Milk products

Explanatory notes

All the content of this catalogue **shall be regulated by the individual educational institution** or the respective professional bodies at their own discretions; there is no demand for unification. To avoid overlapping of content, some items can be taught by other disciplines within the Veterinary curriculum.

The knowledge which should be acquired during extramural practical trainings (as defined by the respective educational regulations) is **not** listed explicitly.

This catalogue is **not** intended to demand specific allocation of resources at the universities and faculties to achieve the learning objectives.

There are country specific requirements which need to be addressed in more detail and are under the responsibility of the individual educational institution to fulfill. Further, there are some food products or technologies that are not relevant to particular countries and therefore might not be considered.

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