BUNDESMINISTERIUM
FÜR GESUNDHEIT

AGES

REPORT ON ZOONOSES AND ZOONOTIC AGENTS 2008

Human Medicine

Federal Ministry of Health
Austrian Agency for Health and Food Safety

FORE

Alois Stöger, dipl.
Federal Minister of Health

Zoonoses are diseases or infections naturally transmitted between animals and humans. Foodborne zoonoses, such as salmonellosis or campylobacteriosis, still cause a significant disease burden, with more than 350,000 cases reported throughout the EU in 2007 alone. Due to effective legislation at a European level and strict transposition into national law, zoonoses which used to be endemic in Austria, such as bovine tuberculosis or brucellosis in cattle and small ruminants, have been successfully eradicated, earning Austria the official statuses "officially tuberculosis free", "officially free of bovine brucellosis", and "officially free of Brucella melitensis". In other areas, the successful implementation of pertinent EU regulations through the work of the veterinary departments of the Ministry of Health has caused the number of human cases of salmonellosis to come down from more than 8,300 in 2002 to 3,196 in 2008 - a reduction by more than 60 percent. This positive development bears proof of the excellent cooperation between veterinarians and all those involved in the production of foods - from farmers to food industry.

However, in addition to efforts at combating zoonoses along the entire food chain, from the environment to veterinary medicine and food production, I consider it a priority to also get the consumers involved: By giving consumers ready access to data on the frequency of infections and the safe storage and correct preparation of food, we enable every Austrian to take his or her share of responsibility for food safety. This brochure is an important contribution towards making the facts and figures about zoonoses in Austria accessible to a broader public.

As Federal Minister of Health, let me express my sincere appreciation for all those working at controlling and preventing foodborne zoonoses.

WORD

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ACKNOWLEDGEMENT

The authors wish to thank all public health officers, veterinarians, food inspectors, staff members of the institutes of human and veterinary medicine, and staff members of the food and feeding stuff laboratories for collecting and making available to us the data used to produce this report.

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INTRODUCTION

Zoonoses are infectious diseases transmissible from animals to humans. Transmission may be by direct contact with infected animals, consumption of contaminated foods, particularly those of animal origin, or indirect contact, such as environmental contamination. Infants, the elderly, pregnant women, and immunocompromised individuals are known to be the most vulnerable to acquiring zoonoses.

Austria has had a long history of controlling zoonotic agents in livestock. Owing to the successful implementation of surveillance programs, Austria's farm animals have been officially free of brucellosis and tuberculosis since 1999. Today, human infections caused by the gastrointestinal pathogens *Salmonella and Campylobacter* are the most prevalent zoonoses, most of them contracted by consuming contaminated foods. Combating these pathogens in animals is difficult, because they may infect livestock without causing symptomatic disease. Thus, animals may harbour great numbers of pathogens without actually falling ill. Therefore, unless food is prepared with great care, humans may contract an infection when consuming products derived from or having come in contact with infected animals or their excrements.

In recent years, new pathogens have emerged, and outbreaks of emerging zoonoses, such as Severe Acute Respiratory Syndrome (SARS, spreading from Asia) and West Nile Virus infection (in the USA), have caused novel forms of epidemics.

Also, known bacteria may acquire new pathogenic features and cause severe disease, such as verotoxin-producing *Escherichia coli* (VTEC) strains. In humans, this pathogenic variant of the otherwise harmless intestinal inhabitant *E. coli* has repeatedly caused disorders dominated by bloody diarrhoea and has, in rare cases, even lead to life-threatening haemolytic uraemic syndrome (HUS). Multiresistant pathogens – organisms resistant to antimicrobial agents from more than two different classes of substances usually effective against the same bacterial species – pose an additional risk to humans. Examples of multiresistant organisms are methicillin-resistant *Staphylococcus aureus* (MRSA), extended-spectrum ß-lactamase (ESBL)-producing enterobacteria, and *Salmonella* Typhimurium DT104.

The Austrian Agency for Health and Food Safety (AGES) closely collaborates with the Federal Ministry of Health (BMG) and the Federal Ministry for Agriculture, Forestry, Environment and Water Management (BMLFUW) in monitoring and controlling zoonoses in Austria based on state-of-the-art scientific methods.

SURVEILLANCE OF ZOONOSES IN AUSTRIA

Zoonosis surveillance is designed to collect, on an ongoing basis, information on the occurrence of zoonotic agents throughout the entire food life cycle – from the environment to veterinary medicine and food production through to the consumer. Based on these data, measures can be taken to disrupt the chain of pathogenic transmission to protect humans against zoonoses.

The annual zoonoses reports to be drawn up annually by each member state of the European Union detail the results of each country's surveillance activities. The compiled Community report can be downloaded from the website of the European Food Safety Authority (EFSA): http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902269834.htm

Monitoring programs

Monitoring is the continuous collection of health or environmental data to allow changes in the prevalence of infection (percentage of diseased or infected individuals in a given population) to be detected at an early stage.

Monitoring systems observe, collect, and evaluate data in a repetitive manner to answer specific predefined questions. Sample selection is based on sampling plans developed on the basis of epidemiological requirements, with the time and place of sampling determined randomly.

As in previous years, the Department for Animal Health, Trade with Living Animals, and Veterinary Legislation of the Consumer Health Division of the Federal Ministry of Health set up a surveillance program targeting selected pathogens in cattle, sheep, goats, pigs, and poultry and testing for antibiotic resistances. The program was implemented throughout Austria by specifically commissioned veterinarians and with the active support of AGES.

Surveillance programs

The aim of zoonosis surveillance is to monitor animal populations to allow changes in their health status to be detected as early on as possible and to take targeted counteractive measures. According to the World Health Organisation (WHO), surveillance programs are currently the most important tools to control what are called 'foodborne infectious diseases' and to combat notifiable animal diseases (e.g., BSE, bovine tuberculosis, and rabies). Based on EU legislation, competent departments of the Ministries of Health and Agriculture, Forestry, Environment and Water Management initiate surveillance programs in their areas of responsibility – i.e., for both animals and humans, from feeding stuffs to food products.

Austria: officially free of certain animal diseases

The veterinary sections of the Consumer Health and Health Prevention Division of the Ministry of Health defines, on the basis of EU legislation, which diseases are to be classified as notifiable epizootics in Austria.

Being aware of the epizootic situation both in Europe and worldwide enables health authorities to take prompt prophylactic action, such as restricting trade with live animals, in order to prevent pathogenic spread.

At a European level, the trade with livestock and livestock products is strictly regulated. EU member states successful at eradicating certain animal diseases are granted a status referred to as "officially free" of epizootics (e.g., bovine tuberculosis or *Brucella melitensis* in small ruminants). To keep this status, the veterinary agencies of the respective countries are obliged to carry out annual surveillance and control programs to fulfil EU requirements. The aim of achieving certified absence of epizootics is to keep Austria's livestock healthy and to assure trading benefits for Austria's agriculture.

Cooperation between specialties

Identifying emerging or re-emerging infectious diseases is a challenging task. Successfully tackling it requires the intensive cooperation between experts of varied disciplines, such as human and veterinary medicine, food hygiene, microbiology, and epidemiology. Information exchange at an international level plays an important role in guaranteeing that the surveillance of zoonoses is based on state-of-the-art science.

National reference centres and laboratories

According to the Epidemiology Act, the Zoonoses Act, and the Food Safety and Consumer Protection Act (LMSVG), any zoonotic agents isolated from humans, animals, or foods must be sent to the competent national reference centre or laboratory for confirmation and typing.

In the process of establishing a European network for epidemiological surveillance of infectious diseases in humans, each member state nominated competent national reference centres for determination of the most important human infectious agents. In the areas of veterinary medicine and food analysis, national reference laboratories were nominated. The Austrian reference centres and laboratories are listed in the annex to this brochure.

Recording data on infectious diseases in humans

A physician consulted by a patient with a notifiable infectious disease has to notify the competent municipalities of the case. Data are collected nationwide and published regularly by the Ministry of Health, e.g., in the form of the monthly bulletin of notifiable infectious diseases, the "Monatliche Statistik meldepflichtiger Infektionskrankheiten". Preliminary case numbers for a given year are published at the beginning of each subsequent year, after which numbers are finalized and published in a final report.

The numbers of notified cases in this report are based on preliminary data.

The case numbers published by the reference centres are the numbers of microbiologically confirmed cases of infection, and these may differ from the numbers of cases officially notified to the Ministry of Health.

ZOONOSES AND ZOONOTIC AGENTS SUBJECT TO MANDATORY SURVEILLANCE IN AUSTRIA

SALMONELLOSIS

Salmonellosis is an infectious disease caused by *Salmonella* species – motile, rod-shaped bacteria which can affect both animals and humans. In Europe, most human cases of foodborne salmonellosis are caused by the serotypes *S.* Enteritidis and *S.* Typhimurium.

Occurrence

Salmonellosis occurs worldwide, and it has diverse modes of transmission. Farm animals can become infected by eating contaminated feeding stuffs. In poultry, *Salmonella* infection may not become clinically manifest and go unnoticed. As a result, entire laying hen flocks may become permanent asymptomatic carriers capable of transmission. Transmission of the pathogen from an infected laying hen prior to egg deposition may cause some eggs to be contaminated, which, unless thoroughly cooked, pose a threat to human health. In environments of high humidity and temperature, the pathogen can also migrate through thin or defective faeces-covered egg shells.

Salmonella generally grow at temperatures between 10°C–47°C and are not killed by deep-freezing. A sure way of eliminating the pathogen is by heat treatment at temperatures above 70°C for at least 15 seconds.

Reservoir

Farm and domestic animals (particularly poultry and reptiles), wild animals (birds)

Mode of transmission

Transmission of *Salmonella* occurs mainly through consumption of raw or insufficiently heated foods of animal origin (eggs, poultry, meat, and milk). Homemade products containing raw eggs, such as tiramisu, mayonnaise, creams, and ice cream, may also be contaminated.

Raw or insufficiently cooked meats (e.g., poultry, minced meat, or raw sausage) present a risk if, during the food manufacturing process, they are mixed with other products that are not going to be cooked prior to consumption (e.g., potato salad). Transmission to other foods (cross-contamination) can occur through inadequately cleaned kitchen commodities, such as chopping boards, knives, and towels, or through neglected washing of hands. When preparing meals, special attention should be paid to kitchen hygiene and sufficient refrigeration of raw products.

Direct transmission of the pathogens from person to person (faecal-oral) is theoretically possible but will rarely happen with *Salmonella* due to the high dose of inoculum required for infection (minimum 1,000 microorganisms).

Incubation period

6–72 hours, usually 12–36 hours

Symptoms

Symptoms include nausea, diarrhoea, fever, vomiting, cardiovascular problems, and abdominal cramps. Normally, the symptoms last only for a few hours or days. Depending on the number of ingested bacteria, many infections take a mild or asymptomatic course. In the elderly, dehydration and the resulting cardiovascular problems can lead to severe and life-threatening disease.

Diagnosis

Detection of the pathogen is done by culturing the causative organism from stool (faeces), or from blood or pus. A test for specific antibodies in blood is not conclusive.

Therapy

In the absence of risk factors, patients with gastroenteritis caused by *Salmonella* infection should not routinely be treated with antibiotics because antibiotic treatment can prolong the period of bacterial shedding. Usually, supportive therapy restoring the fluid and electrolyte balance is sufficient.

Preventive measures

Foods, especially meat, poultry, eggs, and fresh pasta, should be well cooked and should not be stored at room temperature longer than necessary. After handling raw poultry, it is essential to wash hands before doing other kitchen work. Liquid from defrosted meat should immediately be poured into the sink and rinsed off with hot water. All cooking areas and equipment which were in contact with raw poultry or eggs must be cleaned with detergents and hot water. Fresh prepared meals which are not eaten at once should be left to cool down and immediately stored in the refrigerator.

People with salmonellosis are not allowed to work in any food-processing or food-serving establishment.

Serotyping and phage typing

Typing of all *Salmonella* isolates takes place in the AGES National Salmonella Reference Centre (NRZS) in Graz. Serotyping is done according to the Kauffmann-White scheme. Bacteriophages are used to further group *S.* Enteritidis isolates into phage types (PT) and *S.* Typhimurium into definitive types (DT).

There are more than 2,500 known *Salmonella* serotypes. In 2008, 68.5% of all serotypes isolated from humans in Austria were *S.* Enteritidis, and 11.6% were *S.* Typhimurium. The main PTs of *S.* Enteritidis were PT8, PT4, and PT21.

Table 1: Ten most frequent *Salmonella* serotypes in humans in Austria, 2008

	Number	**Percent**
S. Enteritidis	2,200	68.5
S. Typhimurium	374	11.6
Monophasic group B *Salmonella*	95	3.0
S. Infantis	55	1.7
S. Saintpaul	36	1.1
S. Hadar	26	0.8
S. Agona	24	0.7
S. Newport	23	0.7
S. Thompson	23	0.7
S. Abony	17	0.5
Other serotypes or non-typeable isolates	323	10.7
Total number of primary human isolates	**3,196**	**100**

Salmonellosis in Austria in 2008

Humans

In 2008, the NRZS received 3,196 human primary isolates for typing. The 2008 incidence rate of 38 cases per 100,000 population was 21.1% lower than in 2007, showing that the measures taken to control the transmission of *Salmonella* in Austria, such as mandatory vaccination of laying hens against *S.* Enteritidis, have been successful. Compared with the year 2002, the incidence rate dropped by 62% (2002: 8,405 primary isolates). The reduction in the number of human primary isolates was almost exclusively due to the reduction in *S.* Enteritidis (2002: 7,459 primary isolates; 2008: 2,200; –70.5%). In contrast, no clear trend has been seen for *S.* Typhimurium (2003: 476 primary isolates; 2004: 697; 2005: 385; 2006: 627; 2007: 354; 2008: 374).

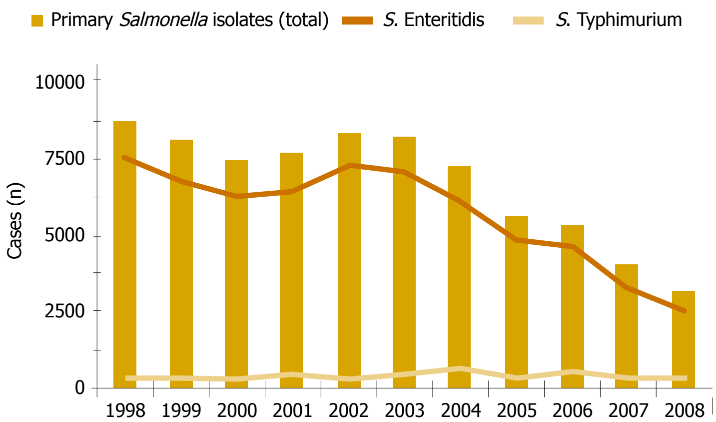
In Austria, the number of notified cases of salmonellosis in 2008 was 2,790, with salmonellosis again ranking second among reported causes of bacterial food poisoning, the most common being campylobacteriosis with 4,963 notified cases.

Austria and the EU compared: 2007

Even though the Austrian incidence rate of notified human salmonellosis cases of 40.7 per 100,000 population still exceeded the European average[1] of 31.1 per 100,000, Austrian incidence rates continued to converge with European figures (2004: 89.5 in Austria; 42.2 in the EU). The European salmonellosis incidence rate of 31.1 per 100,000 population was lower than the European campylobacteriosis incidence rate of 45.2, clearly showing that *Campylobacter* spp. were the most common causes of bacterial gastroenteritis.

[1]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-27.

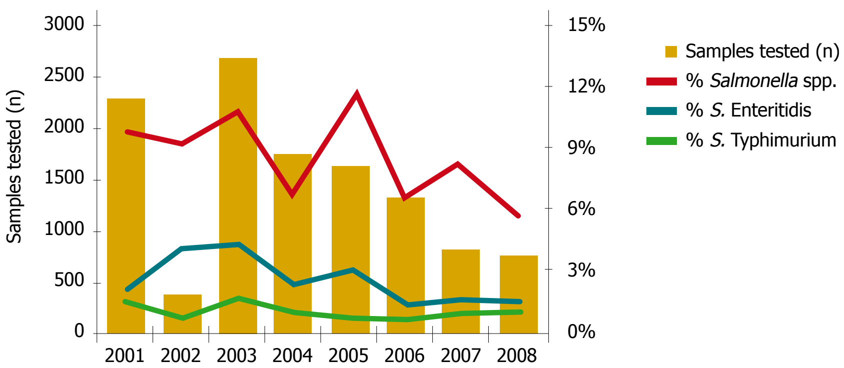
Figure 1: Number of primary human isolates of *Salmonella* in Austria, 1998–2008



Food and food products
The revision and sampling plans of the Federal Ministry of Health specify the number of food enterprises (food manufacturers, retail outlets, restaurants etc.) and food products that must be tested in each province in a given year. During these inspections, samples are taken and food processing procedures assessed.

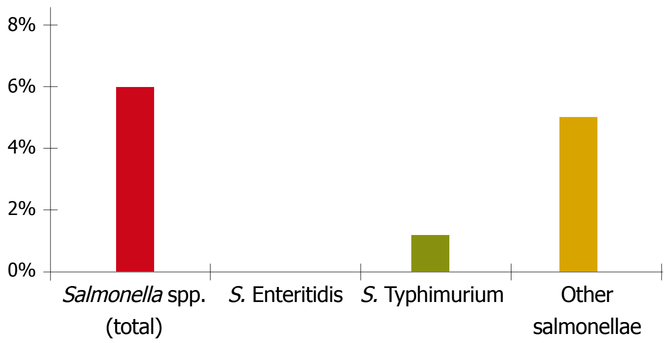
In 2008, the following foods tested positive for *Salmonella* spp.: 6.4% (23/359) of raw chicken meat samples; 14.7% (5/34) of raw turkey samples; 4.1% (13/315) of ready-to-eat chicken product samples; 0.02% (1/46) of fresh chicken meat samples; and 2.2% of samples of unspecified animal origin. Of the 124 raw beef samples tested, none was *Salmonella* positive, and only 0.3% (1/290) of raw pork samples tested were positive. Of the 2,204 samples of milk, milk products, and cheese, none were positive for *Salmonella* spp. Of the 162 units of table eggs, 2 samples (1.2%) were positive for *Salmonella* spp., both *S.* Enteritidis.

Figure 2: Number of samples tested according to the revision and sampling plan for poultry (products) and proportions of samples positive for *Salmonella* spp. or for the serotypes *S.* Enteritidis and *S.* Typhimurium in Austria, 2001–2008 (The most common serotype in 2008 was *S.* Enteritidis, detected in 1.5% of samples tested.)



Animals
For humans, foods of animal origin are the most important source of infection with salmonellae. To determine the importance of various animal species as reservoirs for salmonellae, EU-wide basic studies have been performed in several animal populations (see earlier editions of this brochure). In 2008, breeding pigs – i.e., the parent or grandparent animals of rearing pigs, were chosen for such a basic study. Throughout Austria, 252 breeding pig holdings were randomly selected to be included in the study. For each holding, aggregate faeces samples of 10 pigsties each were tested for salmonellae. Overall, 15/252 (6%) breeding pig holdings were found to be positive for *Salmonella* spp. In this animal population, the presence of serotypes relevant for humans, i.e., *S.* Enteritidis and *S.* Typhimurium, is very low; *S.* Enteritidis was not identified in any and *S.* Typhimurium was identified in 3 (1.2%) of the holdings tested. This confirms the expected low relevance of pigs as reservoirs for human salmonella infections in Austria. European results have so far not become available. Figure 3 illustrates the Austrian results of the study.

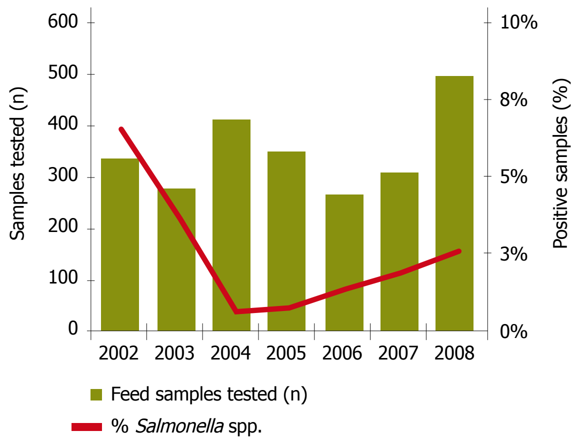
Figure 3: Prevalence of *Salmonella* spp., *S.* Enteritidis, *S.* Typhimurium and other salmonellae among breeding pigs in Austria (n=252)



Feeding stuffs
Feeding stuffs in Austria are subject to continuous monitoring, with samples drawn at farms, slaughterhouses, feeding stuff manufacturers, and retailers. Both prefabricated feed mixtures and individual ingredients are officially tested.

In 2008, 14 of the 497 tested feed samples were positive for *Salmonella* spp., the most common serotype being *S.* Montevideo, which was found in 3 samples. Figure 4 shows the proportion of samples positive for *Salmonella* spp. over the past years.

Figure 4: Number of officially tested feed samples in Austria and proportion of samples positive for *Salmonella* spp., 2002–2008



CAMPYLOBACTERIOSIS

Campylobacteriosis is an infectious disease caused by *Campylobacter* spp. – bacteria in the shape of tiny spiral rods. The most common species is *C. jejuni. C. coli* is responsible for on 5%–10% of human infections. These bacteria are sensitive to low pH environments and are effectively eliminated by pasteurisation.

Occurrence

Campylobacteriosis occurs worldwide and mainly during warm seasons. Next to *Salmonella, Campylobacter* is the most important pathogen causing foodborne enteric diseases in humans. In 2008, campylobacteriosis was again the most frequently notified foodborne infectious disease in Austria, even though there was a slight decrease in incidence.

Reservoir

The carriage rate of *Campylobacter* spp. is high in poultry, pigs, cattle, and pets, such as dogs and cats. In animals, these pathogens are natural intestinal inhabitants rarely causing enteric disease.

Mode of transmission

In humans, campylobacteriosis is mainly a foodborne infection, with inadequately cooked poultry, minced meat, and raw milk the main sources of infection. Special attention should be paid to hygiene during food preparation to avoid cross-contamination between raw meat and other foods. Direct transmission from person to person (faecal-oral) has rarely been observed.

Incubation period

Generally 2–5 days, depending on the amount of ingested bacteria

Symptoms

High fever with abdominal pain, watery to blood-stained diarrhoea, headache, and fatigue for 1–7 days. In rare cases, Guillain-Barré syndrome, a nervous system disease, can occur as a complication of campylobacteriosis.

Diagnosis

Campylobacteriosis is diagnosed by isolation of the pathogen from stool specimens.

Therapy

The disease is usually self-limiting and therapy which equalizes the body's water and electrolyte balance is sufficient. Infants and patients with high temperature or immunocompromised individuals can be treated with antibiotics.

Campylobacteriosis in Austria in 2008

Humans

In 2008, 4,963 cases of campylobacteriosis were notified. Even though the number of infections decreased compared with 2007, campylobacteriosis remains the most frequently reported foodborne infection in Austria, with an incidence rate of 59.6 per 100,000 population. Whereas a consistent increase in the number of human cases of campylobacteriosis was seen until 2007 – most likely as a result of the higher sensitivity of modern laboratory techniques and improved diagnosis rather than a true increase in the prevalence of *Campylobacter* spp. – case numbers decreased in 2008. The incidence of campylobacteriosis will receive continued scrutiny.

Austria and the EU compared: 2007

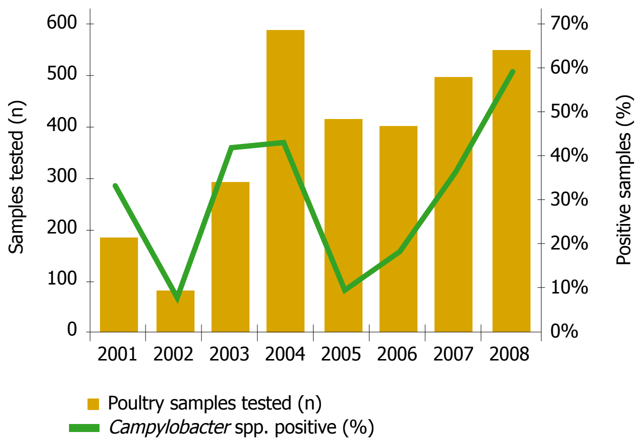
The incidence rate of notified human campylobacteriosis cases in Austria of 70.1 per 100,000 population is clearly above the EU average[2] of 45.2 per 100,000 population. The European campylobacteriosis incidence rate of 45.2 per 100,000 is higher than the European incidence rate of salmonellosis of 31.1, clearly demonstrating that *Campylobacter* spp. continue to be the most common causes of bacterial food poisoning.

[2]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-24.

Food and food products

In 2008, 138 raw poultry samples were tested in Austria. In addition, 408 broiler carcasses were evaluated as part of the European basic study (see also next section): Overall, 331 samples from both programs were *Campylobacter*-positive – a further increase in the poultry category (2006: 18.3%; 2007: 36.1%; 2008: 60.6%). 10 pork samples and 2 beef samples were tested, none of which were *Campylobacter*-positive. Of the 25 raw milk samples tested for *Campylobacter* spp., one (4%) was positive.

Figures 6 a and b: Poultry, beef and pork samples tested for *Campylobacter* spp. in Austria, 2001–2008



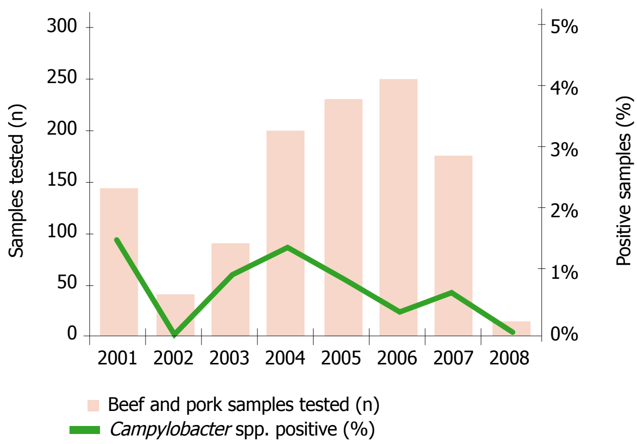
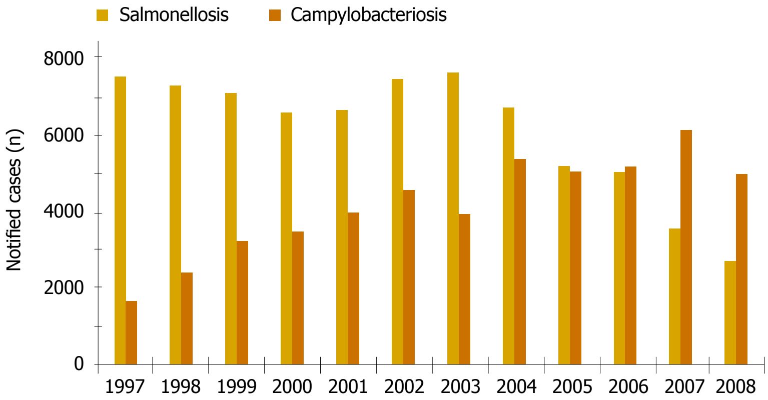


Figure 5: Number of cases of campylobacteriosis and salmonellosis in Austria, 1997–2008



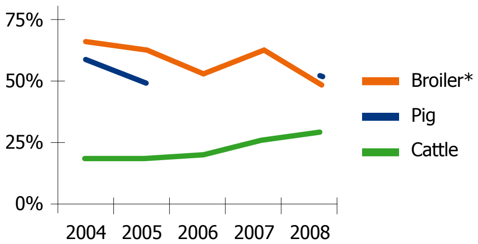
Animals

Since 2004, Austrian poultry, cattle, and pig holdings have undergone annual testing in accordance with the national regulation on monitoring programs for selected zoonotic agents in cattle, sheep, goats, pigs, and poultry (Federal Gazette II Nr. 81/2005). In 2008, the monitoring of poultry was replaced by a European basic study in broilers, with the animals' intestinal contents tested for *Campylobacter* after slaughtering. In addition, one roasted chicken from each flock was tested for the presence of *Campylobacter* and *Salmonella.* In all animal species included in the monitoring program, sampling was carried out throughout the year based on a randomised sampling plan.

In 2008, the intestinal contents of 923 slaughtered cattle were tested for *Campylobacter* spp. in Austria, and 263 samples (28.5%) tested positive. Of the 408 broiler flocks, 195 (47.8%) were positive for *Campylobacter.* After a 3-year break, pigs were again tested in 2008, with results similar to those obtained previously. Thus, *Campylobacter* spp. were detected in 143/286 pigs (50%). In all of these cases, the species isolated was *C. coli,* a species of negligible concern for humans.

Of the 408 broilers tested within the context of the basic study, more than two thirds were *Campylobacter*-positive; *Salmonella* were found in only 10 of the chickens analyzed (2.5%).

Figure 7: Detection of *Campylobacter* spp. in the intestines of slaughtered pigs, cattle, and poultry flocks in Austria, 2004–2008 (*before 2008, poultry flocks; in 2008, broiler flocks only)



BRUCELLOSIS

Brucellosis is an infectious disease caused by *Brucella* species – short, non-motile, non-spore-forming, rod-shaped bacteria occurring worldwide. They are sensitive to heat and all commonly used disinfectants.

Occurrence

B. melitensis affects mainly sheep and goats in Mediterranean countries. In humans, infection with *B. melitensis* is referred to as Malta fever. *B. abortus* causes abortion in cattle and Bang's disease in humans. *B. suis* is uncommon in Europe and is found mainly in pigs and hares.

Reservoir

Infected farm animals (cows, goats, sheep, and pigs)

Mode of transmission

Transmission to humans takes place via contaminated food (raw milk and milk products) or through direct contact with infected animals or their secretions. Direct transmission from person to person occurs very rarely (in isolated cases, via breast feeding or blood transfusion).

Incubation period

Usually 5–60 days

Symptoms

Up to 90% of all *Brucella* infections are subclinical, i.e., they are only detectable by demonstration of specific antibodies in the blood of infected persons, reflecting a successful immune response. At the beginning of acute brucellosis, symptoms are often unspecific and can include fatigue, low-grade fever, headache, and arthralgia. After a short symptom-free interval, flu-like symptoms with a night-time rise in temperature up to 40°C are observed, frequently associated with low blood pressure and swelling of the liver, spleen, and lymph nodes. Without antibiotic treatment, the disease can heal spontaneously or become chronic with recurrent bouts of fever.

Diagnosis

Diagnosis by culture should be based on multiple blood samples, ideally taken before the initiation of antibiotic therapy. Bone marrow, urine, and other tissues are also used to detect the bacteria, as is serological testing for specific antibodies.

Therapy

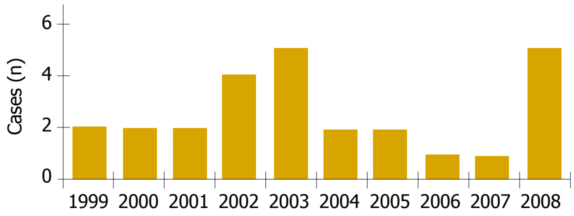
Treatment with antibiotics

Brucellosis in Austria in 2008

Humans

In Austria, brucellosis in humans occurs only sporadically. In 2008, there were 5 documented cases, all of which were found to be imported.

Figure 8: Number of human brucellosis cases, 1999–2008



Austria and the EU compared: 2007

With <0.1 per 100,000 population, the incidence rate of confirmed human brucellosis cases in Austria is similar to the EU average[3] of 0.1 per 100,000. Throughout the EU, the number of notified cases has been on the decrease. Expectedly, it was lowest in countries having been officially declared free of brucellosis and whose small ruminants have been officially free of *Brucella melitensis*. Also, these countries reported that any human cases had been imported. In contrast, the cases that occurred in Greece, Italy, Portugal, and Spain accounted for 83% of cases reported in the EU in 2007.

[3]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-24.

Food and food products

Because Austria has been declared brucellosis-free, food is not tested for *Brucella* spp.

Animals

In Austria, cattle populations were officially declared free of *Brucella abortus* in 1999, and sheep and goats were declared free of *Brucella melitensis* in 2001, conferring upon Austria the statuses OBF (Officially Brucellosis Free) and OBmF (Officially *Brucella melitensis* Free).

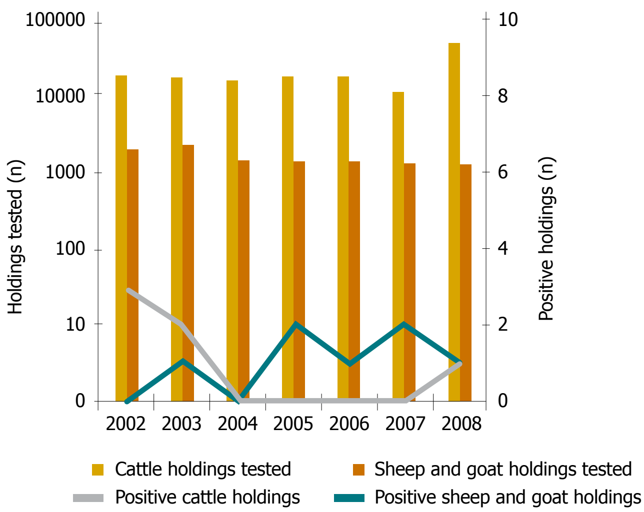
Bovine brucellosis (*B. abortus*):

In 2008, Austria's new Bang's disease regulation entered into force, requiring all of Austria's 37,858 milk-producing cattle farms to have their bulk tanks analyzed. None of the farms were positive for *Brucella*. Of the non-milk-supplying cattle holdings, 4,254 were selected according to a risk-based sampling plan, with blood samples for serological analysis drawn from 36,772 bovines older than 2 years. The only animal positive for *B. abortus* underwent confirmatory microbiology, which failed to confirm presence of the pathogen.

Ovine and caprine brucellosis (*B. melitensis*):

To keep the OBmF status, Austria has to demonstrate annually that fewer than 0.2% of all sheep and goat holdings are infected. In 2008, blood samples from 13,560 sheep and goats from 1,580 holdings throughout Austria were tested based on a risk-based sampling plan. Two animals of one holding tested positive on serology, but positivity could not be confirmed microbiologically.

Figure 9: Number of tested holdings of cattle and small ruminants and number of serologically positive holdings in Austria, 2002–2008 (In none of the serologically positive cases was an infection confirmed microbiologically.)



LISTERIOSIS

Listeriosis is an infectious disease caused by *Listeria monocytogenes* – a short, non-spore-forming, rod-shaped bacterium.

Occurrence

The pathogen is widely distributed in the environment – from sewage water to soil and plants. Food products of animal origin, such as raw milk, soft cheese, smoked fish, and raw meat, can become contaminated during the production process (e.g., during milking or slaughter). The bacterium may be found in food-processing plants, where it is feared for becoming a 'domestic pathogen' that is difficult to eliminate. Unlike most other zoonotic bacteria, *L. monocytogenes* can multiply in low-temperature environments, such as refrigerators.

Reservoir

Ruminant animals (especially cattle, sheep, and goats) and contaminated production facilities

Mode of transmission

Consumption of contaminated foods of animal or vegetable origin is the main transmission route. Even though transmission among humans (e.g., nosocomial infection of neonates) and infection through direct contact with carrier animals can occur, this route of transmission is rare.

Incubation period

In case of foodborne infection, symptoms occur within 3–70 days.

Symptoms

In healthy adults, infection with *L. monocytogenes* does in most cases not cause disease, even though some may develop diarrhoea. In immunocompromised individuals, such as neonates, the elderly, and patients with chronic diseases, invasive listeriosis with sudden intense headache, high fever, nausea, and vomiting can occur. In pregnant women, the infection is mostly asymptomatic; however, infection of the unborn child may result in preterm or still birth. Infected infants often develop meningitis.

Diagnosis

Listeriosis is confirmed by culturing the infectious agent from blood, cerebrospinal fluid, pus, or stool.

Therapy

Treatment with antibiotics. Despite specific therapy, up to 30% of invasive listerioses result in death.

Preventive measures

The compliance with common kitchen hygiene rules is important to avoid infections with *L. monocytogenes.*

Rules to minimise the risk of foodborne infection include:

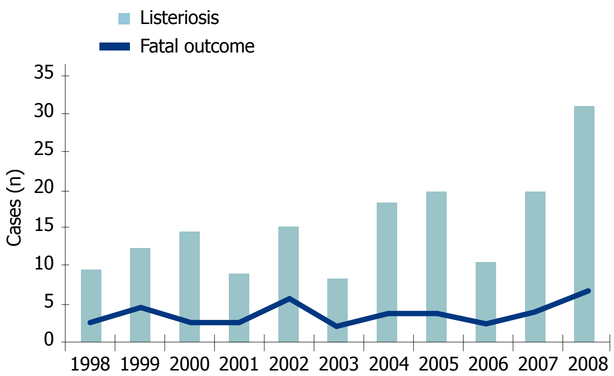
- Thoroughly cooking meat and fish dishes
- Boiling raw milk before consumption
- No consumption of raw minced meat

Regular washing of hands (before and after the preparation of meals) is an important measure of protection against pathogens. Vegetables and salads should be washed properly before eating. Meat and raw vegetables should be prepared on separate kitchen worktops or at separate times. Worktops should always be cleaned thoroughly after use. During storage in the refrigerator, freshly cooked meals should be covered to avoid later contamination.

Listeriosis in Austria in 2008

Humans
In 2008, 31 human cases of invasive listeriosis were notified, 4 of which occurred in pregnant women. Thus, listeriosis is a rare infectious disease in Austria, with a 2008 incidence rate of 0.38 per 100,000 population. With 6 of the 31 patients succumbing to the disease, the death rate was 19%. Two of the 31 cases of invasive listeriosis were due to foodborne outbreaks involving another 12 individuals affected by *Listeria* gastroenteritis. The infection had been due to the consumption of home-made head cheese, with the causative strain isolated from the remaining product.

Figure 10: Culture-confirmed cases of invasive listeriosis and number of fatalities in Austria, 1998–2008



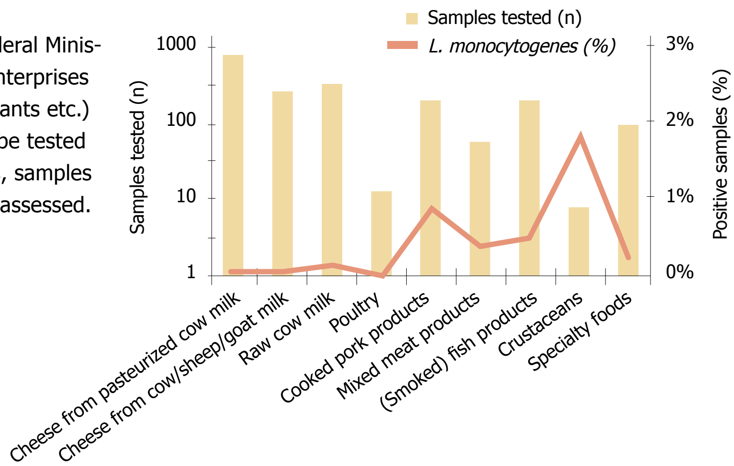
Austria and the EU compared: 2007
With 0.2 per 100,000 population, the incidence rate of confirmed human listeriosis cases in Austria is somewhat lower than the EU average[4] of 0.3 per 100,000.

[4]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-26.

Food and food products
The revision and sampling plans of the Federal Ministry of Health specify the number of food enterprises (food manufacturers, retail outlets, restaurants etc.) and foodstuffs in each province that must be tested in any given year. During these inspections, samples are taken and food processing procedures assessed.

In 2008, the following foods tested positive for *L. monocytogenes*: Cheese from pasteurised cow milk: 3/717 (0.4%) of samples tested were positive, with one sample showing a pathogen content of more than 100 colony-building units per gram [CBU/g]); mixed cheese from cow, goat, and sheep milk: 1/222 (0.5%) of samples tested were positive, with a pathogen content of more than 100 CBU/g; raw cow milk: 7/319 (2.2%) of samples tested positive, with 3 samples showing a pathogen content above 100 CBU/g. Cooked pork products: 15/197 (7.6%) samples tested were positive, with one sample showing a pathogen content above 100 CBU/g. None of the 14 poultry samples tested was positive for *L. monocytogenes*. Of the mixed meat products tested, 3/67 samples (4.5%) were positive for *L. monocytogenes*, the pathogen content being below 100 CBU/g in all samples. 10/202 (smoked) fish samples (5%) and 2/11 crustacean samples (18.2%) were positive for *L. monocytogenes*, with one crustacean sample exceeding a pathogen content of 100 CBU/g. 3/105 samples of speciality foods (2.9%) were positive for *L. monocytogenes*, with a pathogen content below 100 CBU/g in all samples.

Figure 11: Foods of animal origin tested for *Listeria monocytogenes* in Austria, 2008



TRICHINELLOSIS

Trichinellosis, also called trichinosis or trichiniasis, is an infectious disease caused by the roundworm species *Trichinella spiralis*, also referred to as trichina worm.

Occurrence

Trichinellosis occurs worldwide as a mammalian zoonosis that is independent of climate conditions. Today, it is infrequently found in Europe.

Reservoir

Wild boars, domestic pigs, and horses

Mode of transmission

The infestation starts through ingestion of raw or undercooked meat containing encapsulated *Trichinella* larvae. The larvae are released through the action of digestive enzymes in the gut and, within a few days, develop into small worms in the mucosal cells of the upper small intestine. As early as 4–7 days after ingestion, the female worms begin to deposit up to 1,500 larvae. The juvenile larvae penetrate the intestinal mucosa and travel through the bloodstream to reach the muscles, where they form cysts and can survive for years. The preferred tissues are oxygen-rich muscles such as those of the diaphragm, neck, jaw, shoulder girdle, and upper arm.

Incubation period

The incubation period is generally between 5 and 15 days, depending on the number of ingested *Trichinella* larvae. Even though data on the number of ingested larvae required to cause clinical infection in humans vary, more than 70 larvae appear to be sufficient to cause an infection. Transmission from human to human is not possible.

Symptoms

The severity of the disease depends on the number of ingested larvae and the immune defence status of the affected person. When a large number of larvae is ingested, gastrointestinal disorders, such as diarrhoea and vomiting, can occur within the first week, followed by fever, chills, swelling of the eyelids, headache, and muscle pain.

Diagnosis

The presumptive diagnosis can be confirmed by determination of specific antibodies in the blood of the patient or by biopsy of infected skeletal muscle tissue.

Therapy

Individuals with mild infection normally recover without complications simply with bed rest and the aid of an analgesic or antifebrile. Severe infections are treated with anthelmintic (anti-worm) medication.

Preventive measures

The most important preventive measure is the mandatory inspection of carcasses of possible host animals to detect encapsulated larvae. Heating meat to over 70°C or deep-freezing it below –15°C will kill the parasite. Smoking, pickling, and drying are insufficient for irreversibly inactivating the larvae.

Trichinellosis in Austria in 2008

Trichinellosis in humans

All cases of trichinellosis notified to the Austrian health authorities in the past three decades were imported. In 2008, no single case of trichinellosis in humans was reported.

Austria and the EU compared: 2007

With not a single human case of trichinellosis, the incidence rate in Austria is below the EU average[5] of 0.2 per 100,000 population. The cases reported in Bulgaria, Poland, and Romania account for 92% of all cases notified in the EU.

[5]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-24.

Food and food products

In 2008, carcasses of 5,491,872 pigs and 903 horses underwent official meat inspection, with none of the specimens testing positive for *Trichinella* larvae.

Animals

Industrially raised pigs are normally free of *Trichinella* because they do not have the opportunity to feed on *Trichinella*-infested fresh meat. However, wild boars are potential *Trichinella* carriers.

Figure 12: Number of trichinellosis cases in Austria, 1997–2008

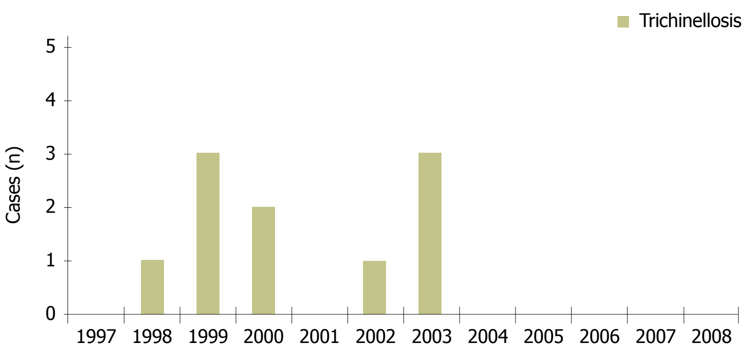
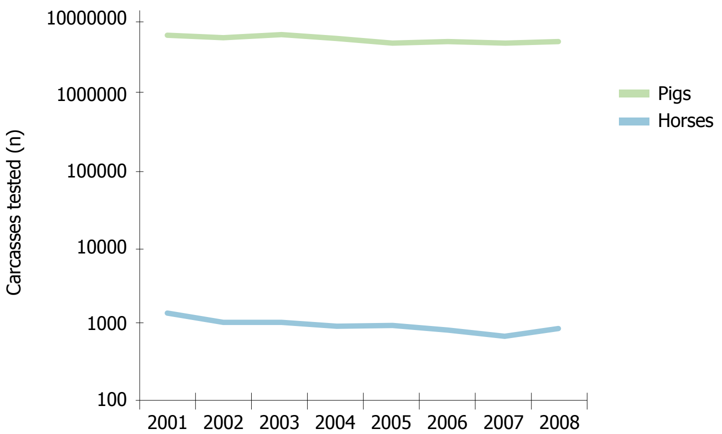


Figure 13: Number of carcasses tested for *Trichinella* in Austria, 2001–2008 (None of the samples tested were positive for larvae.)



ECHINOCOCCOSIS

Echinococcosis is an infectious disease caused by larvae of the *Echinococcus* tapeworm genus. The two species relevant for Europe are *E. multilocularis*, the causative pathogen of alveolar echinococcosis, and *E. granulosus*, the causative organism of cystic echinococcosis.

Occurrence

Whereas *E. multilocularis* occurs mostly in the northern hemisphere (Central and Eastern Europe, areas in the former Soviet Union, Turkey, Japan, USA, and Canada), *E. granulosus* occurs worldwide, with clusters in the Mediterranean region and in the Balkan states.

Reservoir

E. multilocularis:	intermediate hosts: small rodents definitive hosts: foxes
E. granulosus:	intermediate hosts: sheep, pigs, cattle definitive hosts: dogs

Mode of transmission

E. multilocularis ("fox tapeworm"): The 2–3 mm long five-segmented worms live in the small intestines of foxes. Cats and dogs are only rarely infested. Every 1–2 weeks, the final segment of each tapeworm, which contains up to 500 eggs, detaches and is released into the environment via the host's faeces. If these contaminated faeces are ingested by adequate intermediate hosts (rodents), the eggs hatch and release larvae invading the host's intestinal mucosa and reaching the inner organs, especially the liver, through the bloodstream. They develop into alveolar cysts infiltrating liver tissue like a malignant tumour.
E. granulosus ("dog tapeworm"): The 3 - 6 mm long adult worms live in the small intestines of dogs. Every 1–2 weeks, the final segment of each tapeworm, which contains up to 1,500 eggs, detaches and is released into the environment via the host's faeces. These contaminated faeces are ingested by adequate intermediate hosts (sheep, pigs, and cattle) during grazing. The eggs develop into larvae, which penetrate the intestinal mucosa and reach the liver and other organs (e.g., lungs, heart, and spleen) via the bloodstream. Here, they develop into hydatid cysts forming thousands of small "heads". When definitive hosts (dogs) ingest or are fed with cyst-containing tissue from an intermediate host, the heads develop into adult tapeworms in the dog's intestines.

Humans may become infected via accidental ingestion of tapeworm eggs present in the faeces of affected definitive hosts.

Incubation period

Alveolar echinococcosis: 5–15 years
Cystic echinococcosis: months to years

Symptoms

Alveolar echinococcosis: The most common symptoms are pain in the upper abdomen, icterus, fatigue, weight loss, and an enlarged liver caused by tumour-like growth of the parasitic tissue.

Cystic echinococcosis: Frequent symptoms are pain in the right upper abdomen due to encapsulated cysts in the liver, which may be up to 30 cm in size. The lungs are less frequently affected, with lung involvement characterized by breathing difficulties and cough.

Diagnosis

Alveolar echinococcosis: Imaging procedures, such as sonography, lung x-ray, or computed tomography can reveal changes in the liver tissues, whose structural appearance varies and which may present as calcifications. The diagnosis can be confirmed by evidence of specific antibodies in the patient's blood.
Cystic echinococcosis: Imaging procedures show cyst formation in the affected organs. To confirm the presumptive diagnosis, the blood is tested for specific antibodies.

Therapy

Alveolar echinococcosis: Treatment aims at complete resection of parasitic tissues, even though this can generally only be achieved in the initial stages of infection. Therefore, therapy generally consists of a combination of surgical and pharmaceutical treatment.

Cystic echinococcosis: The aim is complete excision of the cysts. In most cases, surgical treatment is combined with anthelmintic therapy.

Preventive measures

Echinococcus eggs tolerate low temperatures and can therefore stay infectious for months. However, dehydration and high temperatures kill eggs within a short time.

To avoid an infestation with *E. multilocularis*, wash your hands after contact with foxes or fox furs.

To avoid infestation with *E. granulosus*, dogs should be de-wormed regularly and should not be fed with entrails from infested sheep.

Echinococcosis in Austria in 2008

Humans

In 2008, 2 cases of alveolar echinococcosis and 7 cases of cystic echinococcosis were diagnosed. Most cases were presumably acquired abroad.

Austria and the EU compared: 2007

In 2007, 17 cases of echinococcosis were notified in Austria, yielding an incidence rate of 0.2 per 100,000 population, a rate equal to the EU average[6]. The cases reported in Bulgaria, Germany, and Spain account for 91% of all cases in the EU.

[6]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-21.

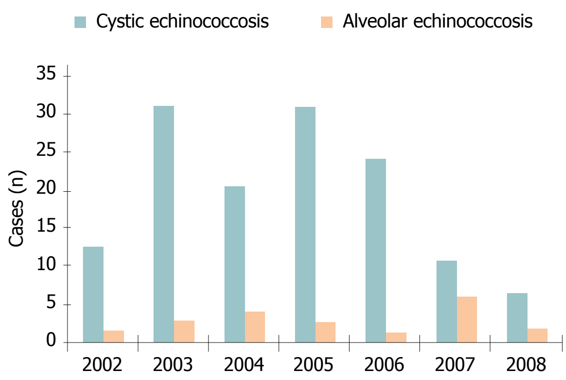
Food and food products

During mandatory meat inspection, every carcass of a potential intermediate host is examined for *Echinococcus* cysts. In 2008, 6,222,456 cattle, pig, and small ruminant carcasses underwent routine inspection, with less than 0.01% of carcasses positive for echinococcous cysts.

Animals

In Austria, dogs are generally free of the tapeworm *E. granulosus*. Foxes infected with *E. multilocularis* are mainly found in Vorarlberg and the Tyrol, but have meanwhile also been found in other provinces.

Figure 14: Number of echinococcosis cases (cystic and alveolar) in Austria, 2002–2008



TUBERCULOSIS FROM *MYCOBACTERIUM BOVIS*

Tuberculosis (TB, 'consumption') leads the statistics for lethal human infections worldwide. The most common pathogen of tuberculosis in humans is *Mycobacterium tuberculosis* – a non-motile, rod-shaped bacterium. *M. bovis* and *M. caprae* are responsible for bovine tuberculosis and for only about 1% of all human tuberculosis cases in Austria.

Occurrence

Tuberculosis is prevalent worldwide, especially in Africa, Asia, and Latin America. The risk of infection is particularly high for persons in close direct contact with patients with "open", i.e., infectious, tuberculosis. An alarming increase in tuberculosis caused by multi-drug resistant strains, particularly those resistant to the antimycobacterial drugs isoniazid and rifampicin, has been observed in recent years.

The bacteria can be inactivated through pasteurisation (temporary heating to over 70°C), but not by dehydration or refrigeration.

Reservoir

Humans are the only relevant reservoir for *M. tuberculosis*. Reservoirs for the zoonotic bacteria *M. bovis* and *M. caprae* include humans and cattle and occasionally goats and wild ruminants (e.g., deer).

Mode of transmission

Whether tuberculosis develops depends on the frequency and intensity of exposure, the amount of inhaled or orally ingested pathogens, and the health status of the affected person. The infection starts with inhalation of small airborne droplets released through the coughing or sneezing of infective carriers. In 80% of the patients, TB manifests in the lungs (pulmonary tuberculosis), even though it can also affect other organs. In open pulmonary tuberculosis, the bacteria have access to the respiratory tract.

Transmission through ingestion of raw (unpasteurised) milk from infectious cattle is theoretically possible, but of little relevance in Austria because Austria's cattle livestock has officially been declared free of tuberculosis.

Incubation period

The incubation period can last from months to many years.

Symptoms

Within 3–6 weeks after airborne infection, small foci of inflammation form in the lungs in response to the presence of bacteria; these lesions develop into small encapsulated lumps (tubercles). This form is referred to as "non-infectious tuberculosis" as it is not contagious because no pathogens are emitted. An active case of TB starts with the common symptoms of an influenza-like infection, e.g., fever, fatigue, loss of appetite, weight loss, and general malaise. If the respiratory tract is affected, cough, breathlessness, and blood-stained sputum can occur. Military tuberculosis occurs when the bacteria spread into the lungs and other organs via the bloodstream. In such cases, tuberculous meningitis can develop.

Diagnosis

Tuberculin skin test: To prove an infection without symptoms, the tuberculin skin test (Mendel-Mantoux method) can be used. This test assesses the immunological reaction of the patient to injected components of cultured mycobacteria. A positive test result can be obtained 6 weeks after an infection with mycobacteria. This skin test is increasingly being replaced by a blood test referred to as interferon gamma release assay.

Imaging procedures: Chest radiographs will reveal the characteristic changes in lung tissues. However, X-ray examination alone is not sufficient to distinguish between tuberculosis and other pulmonary diseases.

Bacteriological diagnosis: A positive culture test result confirms the diagnosis of tuberculosis. The advantage of bacteriological diagnosis is the possibility to test the pathogen for resistance to different antimycobacterial drugs (resistance testing).

Therapy

Because mycobacteria proliferate quite slowly and can rest in tuberculous granuloma for a long time, a long treatment duration is required, increasing the risk for the development of antimycobacterial resistance. In the case of confirmed tuberculosis, the patient has to be treated with a combination therapy including several specific antibiotics, including several specific antimycobacterial drugs. The treatment period is long (several months) to avoid potential relapse.

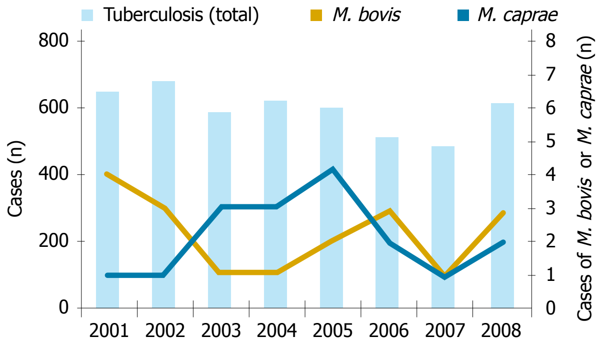
Preventive measures

Because there is no effective vaccine against tuberculosis, the most important measure is to identify infected persons and to treat them effectively. After making a diagnosis of tuberculosis, it is essential to actively search for those who have potentially been exposed to the patient (e.g., family, friends, coworkers, health care personnel etc.) to minimise the risk of secondary infections.

Tuberculosis in Austria in 2008

Humans
In 2008, 631 human cases of tuberculosis were notified, 409 of which were confirmed by culture. Three of the patients had been infected with *M. bovis* and 2 had been infected with *M. caprae*, keeping the number of zoonotic mycobacterioses at the low level seen in previous years.

Figure 15: Total number of human tuberculosis cases and numbers of confirmed *M. bovis* or *M. caprae* cases in Austria, 2001–2008

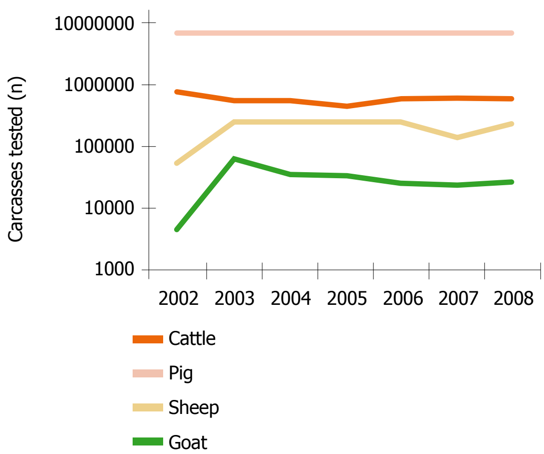


Austria and the EU compared: 2007
In 2007, 2 human cases of zoonotic tuberculosis, one each caused by *M. bovis* and *M. caprae*, were notified in Austria. Throughout the EU[7], 100 cases of *M. bovis* were notified; *M. caprae* was not listed separately. The "Officially Tuberculosis Free" (OTF) status for bovine herds is currently held by Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Slovakia, Sweden, Norway, and certain provinces in Italy.

[7]From the ECDC and WHO Report Tuberculosis surveillance in Europe 2007

Food and food products
In 2008, no case of *M. bovis* tuberculosis was detected in cattle, sheep, goats, and pigs. However, 14 cattle holdings had some isolated cases of infection with *M. caprae.*

Figure 16: Number of carcasses tested for tuberculosis in Austria, 2001–2008 (In 14 cattle holdings, single cases of infection with *M. caprae* were found.)



Animals

In 1999, Austria's cattle holdings were officially declared free of tuberculosis ("Officially Tuberculosis Free", OTF). The key components of the national tuberculosis surveillance program are mandatory slaughter animal and meat inspections.

In the spring of 2008, a slaughtered cow in the Tyrol was diagnosed with *M. caprae* tuberculosis during routine animal inspection. Subsequently, additional animals were found to be infected. Molecularbiological typing of the isolates showed that the causative strain was identical with the strain having caused isolated cases of tuberculosis among cattle and free-living red deer in Lechtal, the Tyrol. Epidemiological investigation of all newly occurring cases showed that the animals had either stayed in this alpine region or that they had come into direct contact with animals from infected holdings.

In the fall of 2008, the Federal Ministry of Health therefore required tuberculin skin tests to be performed in cattle subject to mandatory inspection in the affected Tyrolean districts. In 21 animals from 14 cattle holdings, infection with *M. caprae* was confirmed microbiologically.

In addition, any shot red deer was thoroughly tested, and a reduction of red deer stocks through increased shooting was mandated.

VEROTOXIN-PRODUCING *ESCHERICHIA COLI* (VTEC)

Verotoxin-producing *Escherichia coli* (VTEC) are mostly motile, rod-shaped bacteria characterised by their ability to produce special toxins. Based on their variable antigen structures, *E. coli* are classified into different serovars, the most important and common one being *E. coli* O157:H7. *E. coli* bacteria are sensitive to heat but survive in frozen food and acid environments. The term Shiga toxin-producing *E. coli* (STEC) is used synonymously with VTEC.

Occurrence

E. coli belong to the normal intestinal flora of warm-blooded animals, including humans. However, verotoxin-producing *E. coli* are pathogens that can produce severe diarrhoea in humans.

Reservoir

Ruminants (cattle, sheep, and goats) and wildlife animals (roe and deer)

Mode of transmission

Transmission of the bacteria is mainly through ingestion of the following foods: raw minced beef, pâté, salami, raw milk, or foods of plant origin grown on soil fertilized with bovine manure (e.g., sprouts). Other routes of transmission are through contact with ruminants (petting zoos) if hands are not cleaned properly (i.e., washed with soap) or through person-to-person contact, especially in social areas, such as kindergartens or senior residences. The infectious dose is very low (approx. 100 organisms).

Incubation period

2–8 days, usually 3–4 days

Symptoms

The disease starts with watery diarrhoea that may become blood-stained after a few days and may be accompanied by severe nausea, vomiting, and abdominal pain. In most cases, the illness is self-limiting and ends within 8–10 days. A few days after the onset of diarrhoea, about 10% of patients, especially infants, the elderly, and people with compromised immune systems, will develop a characteristic secondary disease, i.e., haemolytic uraemic syndrome (HUS). The toxins bind to receptors on the cell walls and damage them, leading to microvascular lesions and, subsequently, to renal failure, reduced urine output, anaemia, low platelet counts, intradermal haemorrhage, and neurological changes.

Diagnosis

If infection is suspected on clinical grounds, the diagnosis is based on detection of the bacteria by culturing from stool or by determination of specific antibodies in blood.

Therapy

Antimicrobial treatment is generally contraindicated, because the bacteria may produce more toxins under the influence of antibiotics, thus increasing the rate of complications. Correction of dehydration and electrolyte imbalances is sufficient. If severe secondary disease (e.g., HUS) develops, treatment at an intensive care unit and haemodialysis may be necessary.

Preventive measures

Food-related precautions: Because many types of farmed animals are possible reservoirs for VTEC bacteria, practicing good hygiene at all stages of production, processing, storage, transport, and retail of food products is of great importance, such as washing of hands after contact with animals and before food intake.

Precautions in the food processing industry: Persons infected with VTEC are not allowed to work in commercial food production, handling, or marketing until the local health authority has confirmed that they are no longer shedding the pathogen. This also applies to kitchen employees, e.g., in restaurants, cafeterias, hospitals, children's homes, and catering services.

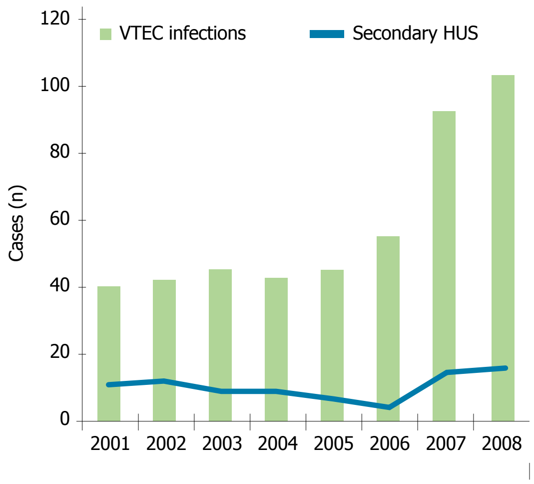
VTEC infection in Austria in 2008

Humans

In 2008, VTEC infection was diagnosed in 103 individuals. The increase in VTEC infections in recent years is mainly due to more intensive screening in Austria's westernmost province, the Tyrol. Whereas the number of reported VTEC infections has increased, the proportion of positive cases has remained unchanged.

In 17 of the 103 human cases, VTEC infection progressed to haemolytic-uraemic syndrome (HUS).

Figure 17: Number of VTEC infections and secondary HUS in Austria, 2001–2008



Austria and the EU compared: 2007

The incidence of confirmed cases of human VTEC infection in Austria is 1 per 100,000 population, i.e., almost twice the EU average[8] of 0.6 per 100,000. The cases reported in Germany and the United Kingdom account for 69% of all cases in the EU. The highest incidences are reported from Denmark and Sweden, with 2.9 cases per 100,000 population.

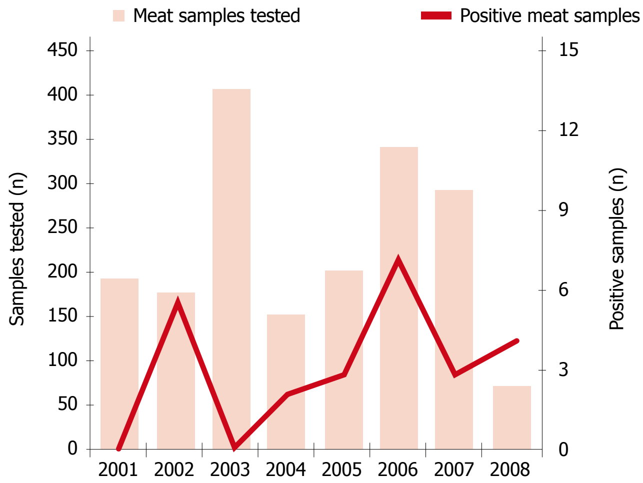
[8]From The Community Summary Report on Trends and Sources of Zoonoses and Zoonotic Agents in the European Union in 2007, The EFSA Journal; data based on EU-23.

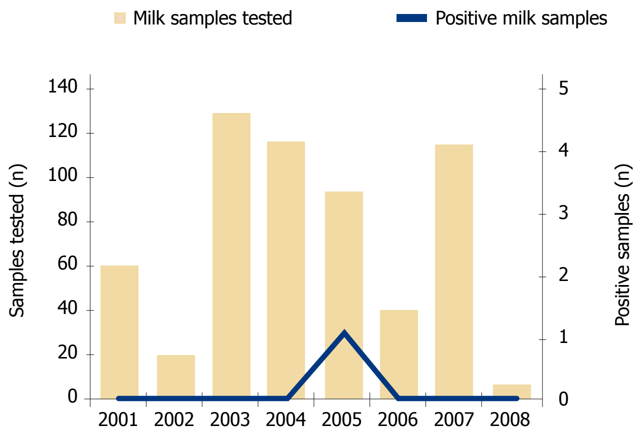
Food and food products

The revision and sampling plans of the Federal Ministry of Health specify the number of food enterprises (food manufacturers, retail outlets, restaurants etc.) and foodstuffs in each province that must be tested in any given year. During these inspections, samples are taken and food processing procedures assessed.

In 2008, VTEC were found in 4/73 meat samples tested (5.5%). These were fresh sheep meat samples, from which 6 different serovars were isolated, i.e., VTEC O6:H-, VTEC ONT:H2, VTEC O166:H28, VTEC O75:H-, VTEC O128:H-, and VTEC ONT:H14. None of the 96 strawberry samples and the 2 raw cow milk samples were positive for VTEC.

Figures 18 a and b: Numbers of meat/meat products and milk/milk products (cow, sheep, goat) tested for VTEC and number of positive samples in Austria, 2001–2008





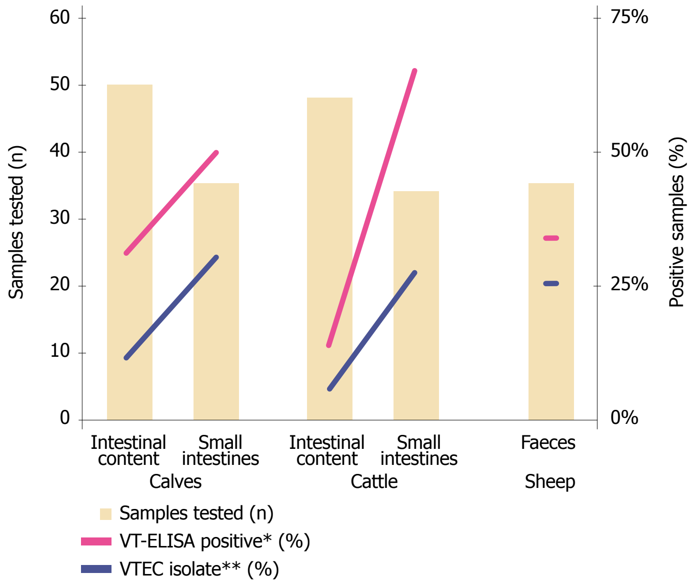
Animals

Since 2004, Austrian cattle and sheep holdings have undergone annual testing in accordance with the national regulation on monitoring programs for selected zoonotic agents in cattle, sheep, goats, pigs, and poultry (Federal Gazette II Nr. 81/2005). In 2008, specific randomised sampling plans were developed for calves, older cattle, and sheep.
In calves and older cattle, samples of intestinal content and small intestines were taken immediately after slaughtering for comparative analysis. In sheep, fresh faeces were taken.

Using VT-ELISA, the number of VT-positive samples was higher among small intestinal samples than among intestinal content samples of the same animals. However, VTEC was isolated from only 40% of VT-positive samples. Regardless of sample type, the proportion of VTEC-positive samples from calves and older cattle ranged between 12 - 19%. Of the sheep faeces samples tested, 26% were VTEC-positive.

In none of the cases could VTEC O157 be identified. However, VTEC O103:H2 and VTEC O111:H- were isolated in 2 animals, one calf and one older bovine; both of these serotypes were among the five most frequent VTEC serotypes causing human disease.

Figure 19: Numbers of intestinal content and small intestines samples from cattle, number of faeces samples from sheep and proportion of verotoxin- and VTEC-positive samples



*** VT-ELISA-positive:** Verotoxin identified in faeces sample after enrichment

**** VTEC isolate:** Verotoxin-producing *E. coli* cultivated from faeces sample

LIST OF NATIONAL REFERENCE CENTRES AND LABORATORIES, INCLUDING CONTACTS

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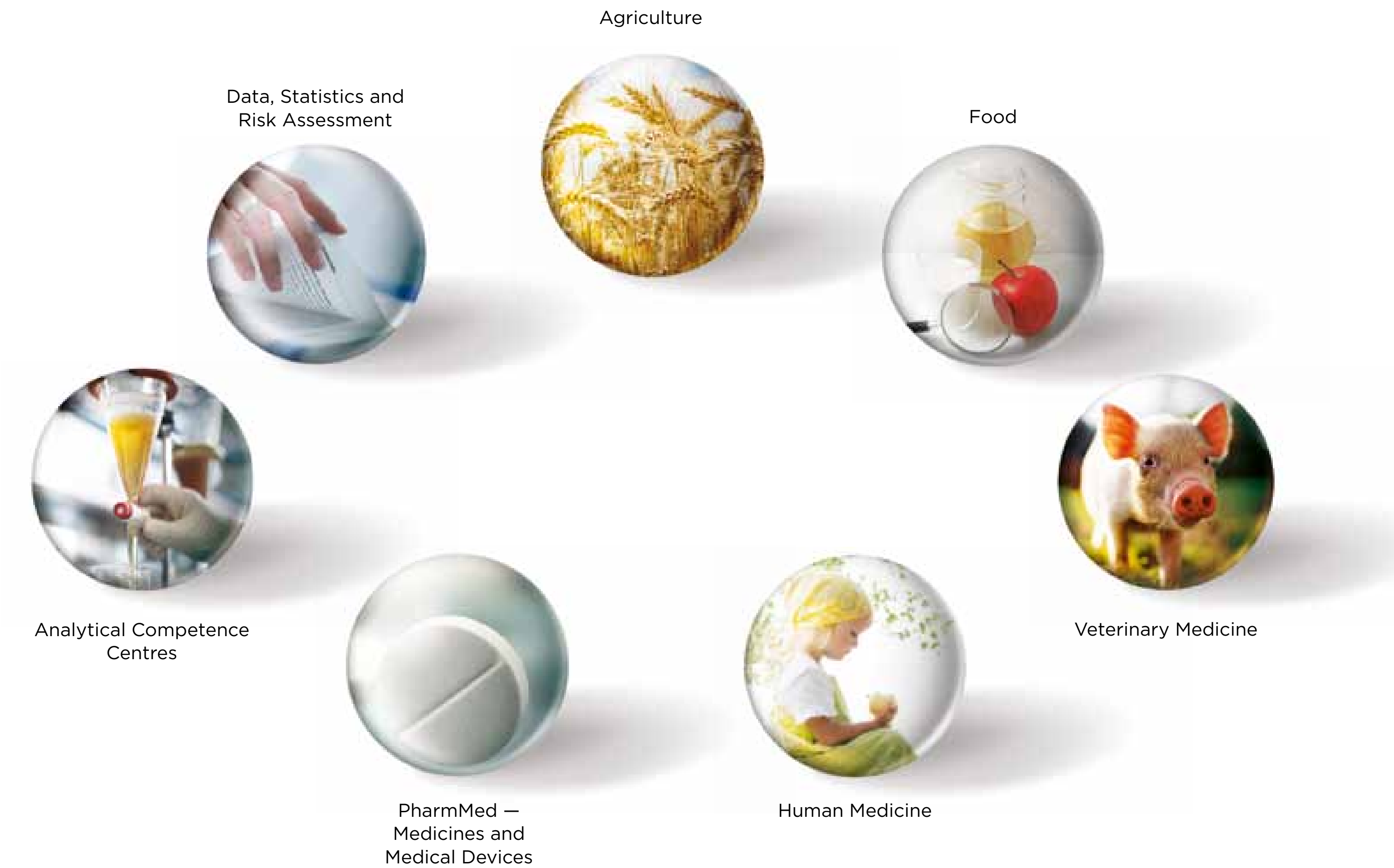
HEALTH FOR HUMANS, ANIMALS, AND PLANTS



Imprint

Published by:

Federal Ministry of Health
Radetzkystr. 2
1030 Wien
www.bmg.gv.at

AGES – Austrian Agency for Health and Food Safety
Spargelfeldstr. 191, 1220 Wien
www.ages.at

Photos: bmg, ages, agrarfoto, Fotolia
Graphic design: Agentur WIRZ
English translation: Gabriele Berghammer