Q FEVER GUIDE

Stronger Together Against Q Fever

Information and Recommendations
for Public Health and Veterinary Services
on Infections with *Coxiella burnetii*
in Humans and Domestic Ruminants

Imprint

Authors	Fenja Winter*, Maik Konrad*, Clara Schoneberg, Benjamin U. Bauer, Christian Berens, Amely Campe, Dimitrios Frangoulidis, Andrea Helbich, Michael R. Knittler, Anja Lührmann, Katja Mertens-Scholz, Silke F. Fischer°, Martin Ganter°, Martin Runge°
	*= contributed equally; °=contributed equally; 1=corresponding author
Editing	Q-GAPS
Translation	Andrea Helbich, Dimitrios Frangoulidis, Katja Mertens-Scholz, Benjamin U. Bauer
Publisher	DVG Service GmbH, Gießen, Germany
Edition	English Edition, 1st Edition 2026, (Based on the German 1st Edition, 2023)

Bibliographic information of the German National Library

The German National Library has recorded the original German publication *(Q-Fieber-Leitfaden – Gemeinsam stärker gegen Q-Fieber)* in the German National Bibliography; detailed bibliographic information is available on the internet at http://dnb.ddb.de.

Original German publication printed in Germany

DRUCKEREI SCHRÖDER Lindauer&Wolny GbR

ISBN 978-3-86345-665-8

English edition based on the German original

ISBN 978-3-86345-788-4

Publisher: DVG Service GmbH
An der Alten Post 2, 35390 Gießen 0641 9844460
info@dvg.de – www.dvg.de

This guide is based on the "Guideline for Q Fever Baden-Wuerttemberg 2017: Recommendations for Combating Q Fever in Small Ruminants in Baden-Württemberg" (Chemisches und Veterinäruntersuchungsamt Stuttgart, State Health Office Baden-Wuerttemberg Stuttgart, Friedrich-Loeffler-Institut, Sheep Health Service of the Baden-Wuerttemberg Animal DiseaseFund, Task Force Animal Disease Control Baden-Wuerttemberg, Department of Consumer Protection and Animal Health at the District Council Calw and University of Hohenheim, Germany). It has been revised and developed as part of the Interdisciplinary German Q Fever Research Program (Q fever GermAn Interdisciplinary Program for reSearch – Q-GAPS).

This guide was funded by the Federal Ministry of Education and Research (BMBF) under project numbers 01KI1726A-G, 01KI2008A-E, and 01KI1731 as part of the National Research Network on Zoonotic Infectious Diseases.

Contents

Figures

Tables

Abbreviations

AHL	Animal Health Law
BfR	German Federal Institute for Risk Assessment
BioStoffV	German Biological Agents Ordinance
BMLEH	Federal Ministry of Agriculture, Food and Regional Identity
C. burnetii	*Coxiella burnetii*
DIVA	Differentiation of Infected and Vaccinated Animals
DNA	Deoxyribonucleic Acid
DVG	German Veterinary Medical Society
EDTA	Ethylene Diamine Tetraacetic Acid
EEA	European Economic Area
ELISA	Enzyme-linked Immunosorbent Assay
EU	European Union
EWR	European Economic Area
FLI	Friedrich-Loeffler-Institut
IBIZ	Institute for Bacterial Infections and Zoonoses, FLI
IfSG	German Infection Protection Act
IFT	Indirect Immunofluorescence Test
IgA	Immunoglobulin A
IgG	Immunoglobulin G
IgM	Immunoglobulin M
LCV	Large Cell Variant
MLVA	Multiple Locus Variable-Number of Tandem-Repeats (VNTR) Analysis
MST	SNP-based Multispacer-Sequence-Typing Polymerase Chain Reaction
QFS	Q fever fatigue syndrome
Q-GAPS	Q fever GermAn Interdisciplinary Program for reSearch
RKI	Robert Koch Institute
SCV	Small-Cell Variant
SNP	Single Nucleotide Polymorphism
SurvStat@RKI	RKI online database for data on notifiable diseases and pathogen detection in accordance with the German Infection Protection Act
StIKo Vet	German Veterinary Standing Committee on Vaccination
Tier-LMHV	Ordinance on the Hygiene of Foodstuffs of Animal Origin

TKrMeldpflV	German Regulation on Notifiable Animal Diseases
TRBA	German Technical Rules for Biological Agents
TSN	Animal Disease Notification System
USAMRIID	U. S. Army Medical Research Institute of Infectious Diseases
ViehVerkehrsV	Regulation of Livestock Movement
VAH	German Association for Applied Hygiene
VNTR	Multiple-Locus Variable-Number of Tandem Repeats
WOAH	World Organisation for Animal Health

Foreword

Q-GAPS (Q fever GermAn Interdisciplinary Program for reSearch) is an interdisciplinary consortium of scientists that has committed itself to implementing the One Health concept. One of Q-GAPS' objectives is to support public health and veterinary services in the prevention and control of Q fever. Therefore, this Q fever guide is intended for employees in public health and veterinary services as well as for others interested in Q fever.

In line with the One Health concept, we aim to encourage interdisciplinary action with this Q fever guide because only together can we effectively fight Q fever in both humans and animals.

The Q fever guide provides background information on Q fever in humans and animals, formulates recommendations for various Q fever scenarios and offers support material. A key focus of this guide is on interdisciplinary collaboration in planning and implementing measures against Q fever. With the help of the Q-GAPS support material which includes questionnaires, press releases and information flyers for specific groups, this guide supports staff from the health authority and Offices for Veterinary Affairs in dealing with Q fever-related issues.

This guide as well as the support material can be downloaded from the Q-GAPS website **www.qfever.info**
The provided support material can be freely used as templates and may require individual adaptation to the local outbreak situation.

Your Q-GAPS Consortium

Supplementary Information for the English Version of this Q Fever Guide

Following the successful release of the German version of the Q fever guide (*Q-Fieber-Leitfaden – Gemeinsam stärker gegen Q-Fieber*), we wished to make this comprehensive resource accessible to an international audience. Recognising that regulations and frameworks differ widely between countries, we chose to present the relevant German legislation that applies when dealing with *Coxiella burnetii*. While we are aware that significant differences exist among national systems, we believe that illustrating the "German approach" may be informative for others and could serve as a potential blueprint or toolbox, though we also acknowledge that there is always room for improvement.

We would like to express our sincere gratitude to Associate Professor Katrina L. Bosward (The University of Sydney, Camden, Australia), Professor Stephen R. Graves (Australian Rickettsial Reference Laboratory, Geelong, Australia) and Dr Jan-Henrik Roest (Ministry of Agriculture, Fisheries, Food Security and Nature, Den Haag, The Netherlands) for their valuable comments on the English version of this guide. They are all experts with many years of experience in the field of Q fever, and their diverse perspectives on *C. burnetii* have helped us to broaden our own beyond German borders.

It is our hope that this guide will contribute to a better understanding and management of the "enigmatic" pathogen *Coxiella burnetii* worldwide.

PD Dr. med. Dimitrios Frangoulidis,

Dr. rer. nat. Andrea Helbich,

Dr. rer. nat. Katja Mertens-Scholz,

PD Dr. med. vet. habil. Benjamin U. Bauer

BACKGROUND INFORMATION

AETIOLOGY

Coxiella burnetii

Coxiella (C.) burnetii is an obligate intracellular, non-motile, Gram-negative bacterium. At least two different forms of *Coxiella* can be observed. These include the metabolically active, replicative "Large-Cell-Variant" (LCV) and the dormant "Small-Cell-Variant" (SCV) with properties that functionally resemble those of bacterial spores. The SCV exhibits high resistance to chemical disinfectants and external physical influences such as heat and desiccation. This enables the pathogen to persist for years outside a host, for example in dust or wool. Additionally, *C. burnetii* can be widely dispersed by the wind. Clark et al. (2018) summarise in their review that *C. burnetii* can be spread up to 18 km under winds conditions. However, the infection risk is highest in rural areas within a radius of 5 km from the source of infection. Urban outbreaks generally occur over shorter distances, although there is limited evidence for this. Wind speed and direction, the distribution of animal products and animal density can influence the spread of *C. burnetii*. The pathogen is endemic worldwide, except in New Zealand and Antarctica. In Germany, *C. burnetii* is classified as risk group 3 pathogen in accordance with the German Biological Agents Ordinance (BioStoffV), meaning that handling pathogens and materials containing it requires high safety measures (e.g. respiratory protection). [See also page 14: German Biological Agents Ordinance (BioStoffV)].

Humans

Humans become infected, primarily by inhaling contaminated aerosols or dust, with a small number of bacteria being sufficient for an infection. The main reservoir for the zoonosis Q fever is domestic ruminants (sheep, goats and cattle). Other domestic and wild animals, birds, insects as well as ticks, can also excrete *C. burnetii*, although these animal species are rarely associated with infections in humans. The most common source of a Q fever outbreak in the German population is infected small ruminants (sheep and goats) that excrete the pathogen. This excretion of the pathogen occurs in large quantities during birth or an abortion through birth fluids and afterbirth material. Furthermore, the animals excrete the pathogen to a lesser extent through milk, urine and faeces. Individuals with close contact to small ruminants or animal products from sheep and goats have an increased risk for a *C. burnetii* infection. The risk group for a *C. burnetii* infection includes animal owners themselves, their employees and family members, as well as visitors, sheep shearers, animal traders, abattoir personnel, veterinarians and veterinary staff (in practices and laboratories). In addition to these specific professional groups, individuals attending events where small ruminants are exhibited are also exposed to an increased risk of infection. These events include, for example, breeding shows, farmers' markets or farm open days. Visiting a petting zoo, spending holidays on a farm or participating in animal-assisted therapy (e.g. in nurseries, schools or care homes) involving contact with small ruminants also entails a risk of transmission to humans. Since the pathogen can be spread through contaminated dust and also by the wind, sheep and goats excreting the pathogen at distances in the single-digit kilometre range also pose a risk of infection to humans. Moreover, the pathogen is highly environmentally resistant (lasting for several months, even for years). [See also page 1: *Coxiella burnetii*].

Other infection routes for the population, although very rare, include the use of blood transfusions or live cell therapy, as well as obstetrics in infected women or sexual transmission. The consumption of raw milk and raw milk products as a route of infection has not yet been clearly understood.

Animals

Animals also become infected, primarily by inhaling dust and aerosols containing bacteria. Introduction of the pathogen into the herd can occur, especially through the purchase of infected animals or neighbouring herds, as well as through other domestic animals, such as cats. Transmission through mating is under discussion. Transmission through ticks has also not as yet been clearly understood. However, tick excrement is likely to play a significant role in spreading *C. burnetii*. Infected ticks excrete large amounts of the pathogen with their faeces. This can lead to contamination of the wool or fur. In practice, it is often challenging to trace the origin of an infection. Infected domestic ruminants can excrete the pathogen for several weeks through vaginal secretions, milk, faeces and urine. If multiple ruminant species are kept on a farm, preventive and control measures should be implemented across species.

CLINICAL INFORMATION

Humans

You can find the case definitions of the Robert Koch Institute (RKI) for reporting cases of disease or death and the detection of pathogens here (in German).

Further definitions are available from the European Centre for Disease Prevention and Control (ECDC) here and from the Communicable Diseases Network Australia (CDNA) here.

Acute Q Fever

Approximately 1-3 weeks after infection, about 40% of those infected may experience clinical symptoms such as fever, muscle aches and chills, severe retroorbital headache, sweats, a dry, stabbing cough, facial flushing, pharyngitis, chest pain, muscle aches, loss of appetite and fatigue. In around 10% of cases, atypical pneumonia with unproductive cough and/or granulomatous acute hepatitis may occur. Q fever pneumonia does not show characteristic radiological changes (occasionally pneumonic and interstitial infiltrates and enlarged hilar lymph nodes) and is typically self-limiting. The infection can, very rarely, lead to myocarditis, pericarditis or meningoencephalitis. Please note: in cases of clinical suspicion of endocarditis (including heart valve changes, subfebrile temperatures), medical confirmation of the presence of chronic Q fever is always required.

Chronic Q Fever

In approximately 1% of cases, an acute *C. burnetii* infection leads to chronic Q fever, i.e. chronification (after more than 6 months of persistent infection), which often clinically manifests as endocarditis. In general, the vascular endothelium seems to be particularly affected in chronic infections. However, relevant pre-existing conditions must also be considered as possible risk factors. Patients with existing cardiovascular diseases or severe immunosuppression showed a significantly increased risk for a transition to chronic *C. burnetii* infection. In a Dutch study, conducted following the world's largest Q fever outbreak, 30% of patients who exhibited a combination of acute Q fever with aortic/iliac changes or other vascular endothelial changes developed chronic Q fever. Much less frequently, conditions such as granulomatous hepatitis or osteomyelitis may occur. Chronic disease requires extended therapy (several years) and when not treated, the mortality rate is associated with a high complication rate of up to 40%.

Infection during Pregnancy

The risk of stillbirth (mostly when there is an initial infection in the first trimester of pregnancy), premature birth, placentitis leading to abortion or low birth weight of the newborn may be increased due to an acute infection as well as chronic Q fever. Intrauterine transmission with long-term effects on the child has not been described. Pregnant women diagnosed with an acute *C. burnetii* infection should have the course of the *C. burnetii* infection clarified through blood testing after the pregnancy is concluded. Women with acute Q fever are

recommended not to breastfeed, regardless of whether they have been treated with antibiotics or not, as *C. burnetii* can be transmitted through breast milk and the use of antibiotics may not completely prevent bacterial excretion through breast milk.

Q Fever Fatigue Syndrome (QFS)

Following an acute Q fever, persistent symptoms and restrictions in carrying out day-to-day activities can occur in up to 40% of cases, lasting for 12-24 months. The most common symptoms of Q Fever Fatigue Syndrome include fatigue, lack of concentration, muscle pain and night sweats. A year later, many affected individuals also report that they were still unable to return to previous activity levels and levels of performance at work. Therapeutically, this symptomatic complex is a challenge, as the disease cannot be influenced by administering antibiotics. In addition, a diagnostic laboratory test for detecting the disease is not possible. Therefore, psychosomatic and behavioural therapeutic rational approaches are recommended.

Animals

Q fever symptoms in domestic ruminants (sheep, goats and cattle) can vary widely. In particular, in sheep and cattle, an infection with *C. burnetii* can occur without clinical signs of illness. In contrast, goats often experience abortions. Generally, abortions, stillbirths, births of weak lambs, kids or calves, and retarded expulsion of the afterbirth can be associated with a *C. burnetii* infection in domestic ruminants. Q fever is thus a nonspecific clinical condition that should be considered as a differential diagnosis in cases of reproductive disorders and diagnostically clarified. The shedding of the pathogen can occur intermittently.

You can find the Official Collection of Methods of the Friedrich-Loeffler-Institut (FLI) for diagnosing Q fever here (in German) and the Terrestrial Manual from WOAH here.

DIAGNOSTICS

Humans

Q fever can be diagnosed by PCR as well as by detection of antibodies against *Coxiella* antigens.

Indirect Detection

Indirect Immunofluorescence Test (IFT)

The IFT allows for the quantitative determination of *C. burnetii* antibodies against Phase I and Phase II antigens. Reactive sera in the enzyme-linked immunosorbent assay (ELISA) should be confirmed by IFT (serological reference method). IFT is also considered the reference method for follow-up checks to rule out chronic infection. In cases of suspected Q fever, serum is typically used for specific antibody detection. The sample transport should be rapid and chilled (not frozen). Long-term storage of sera is done at -80 °C. Medical examination material is classified as "Biological Substance, Category B" (UN 3373) for transportation. [See also page 14: BioStoffV].

Interpretation of Possible Results:

The antibody titre progression against Phase I and Phase II antigens allows differentiation between acute, preceding and chronic Q fever. Simultaneous testing of consecutive serum samples is useful for evaluating the antibody titre progression. Antibody reactivities ≥ 1:16 against Phase I and Phase II antigens are considered positive. For IgM antibody detection, patient serum must undergo pretreatment to avoid interference by rheumatoid factors and IgG antibodies. Antibodies against *C. burnetii* are expected to be detectable at the earliest 1 – 2 weeks after infection. Isolated Phase II IgM detection indicates acute infection. Detection of Phase II IgM and Phase II IgG indicates acute phase or early convalescence. In all patients, low Phase I antibody titres occur around 6 – 8 weeks later. In approximately 20% of cases, antibodies against Phase I IgA can also be detected during convalescence (Wagner-Wiening et al., 2006). Consequently, the appearance of Phase I IgG and Phase I IgA antibodies should not automatically be considered an indication of chronic infection. Only in the presence of high Phase I and Phase II IgG antibody titres (IFT > 1:512) should the possibility of chronic infection be considered and ruled out accordingly. An early indication of chronic infection arises from the reappearance of Phase I and Phase II antibody titres weeks or months after the primary infection.

Table 1 Antibody constellations during the course of *C. burnetii* infection

	Antibody Constellations			
	Phase II		Phase I	
***C. burnetii* infection status**	**IgG (quant.)**	**IgM**	**IgG**	**IgA**
Recent infection of *C. burnetii* suspected	–	+	–	–/+/++
Acute Q Fever	++/+++	++/+++	–	–/+
Convalescence	++/+++	++	–/+	–/+
Preceding infection of *C. burnetii*	+/++	–/+	–/+	–
Chronic Q fever suspected	++/+++	–/+/++	++/+++	–/+/++

– not detectable; + detectable; ++ elevated titre; +++ strongly elevated titre; Reference: Frangoulidis D, Fischer SF (2015).

Enzyme-linked Immunosorbent Assay (ELISA):

Commercially available ELISAs allow for qualitative or semiquantitative detection and differentiation of specific IgG, IgA and IgM antibodies. This test can detect non-complement-binding IgM in the first week of illness. Especially in outbreak situations, these ELISAs are useful, particularly due to the rapidfity of the method and the possibility of automation.

However, all positive ELISA results need to be confirmed by IFT which is considered the reference method. Serum is used for specific antibody detection, and it should be transported rapidly and refrigerated (not frozen). Long-term storage is done at -80 °C. Medical examination material is transported as "Biological Substance, Category B" (UN 3373). [See also page 14: (BioStoffV)].

Direct Detection

Polymerase Chain Reaction (PCR)

PCR involves the detection of genomic sequences of the IS*1111* element, which occurs in the Coxiella genome in up to approximately 110 copies as a transposon-like element. Various protocols have been published for real-time PCR with specific online detection of the amplicates (LightCycler®, TaqMan®), allowing identification within a few hours from various samples (blood, serum, tissues, bone marrow). In addition to the IS*1111* gene sequence, the com1, sod and icd genes can also be used as target sequences. DNA detection of Coxiella can be performed with patient serum, but EDTA or citrate blood (also for cultivation from the leukocyte layer), bone marrow aspirate, sputum, urine and tissue samples are better suited. Rapid and cooled (not frozen) sample transport is important. Long-term storage should be at -80 °C. Medical examination material is classified as "Biological Substance, Category B" (UN 3373) for transport. [See also page 12: German Biological Agents Ordinance (BioStoffV)].

National Reference Laboratory

Ministry of Social Affairs, Health and Integration, Department 7, Division 73
State Health Office Baden-Wuerttemberg
Laboratory for Q Fever / *Coxiella burnetii*
Address: Nordbahnhofstr. 135, 70191 Stuttgart, Germany

You can find the Homepage of the German National Reference Laboratory Q Fever here (in German).

Animals

An infection should be confirmed by direct detection of *C. burnetii* (PCR or culture) by means of a serological test. In Germany, Q fever or the detection of *C. burnetii* is notifiable in cattle, sheep and goats in particular.

You can find the Official Collection of Methods of the Friedrich-Loeffler-Institut (FLI) for diagnosing Q fever here (in German) and the Terrestrial Manual from WOAH here.

Indirect Detection

A serological test for the detection of *Coxiella* antibodies does not reliably identify an acute infection but indicates a past infection. Using serum samples, the vaccination status of the animals must also be considered since there is no DIVA vaccine available for *C. burnetii* (DIVA stands for differentiation of infected and vaccinated animals).

Enzyme-linked Immunosorbent Assay (ELISA)

You can find the Official Collection of Methods of the Friedrich-Loeffler-Institut (FLI) here (in German) and the Terrestrial Manual from WOAH here.

The list of substances approved under § 11 (2) German Animal Health Law (TierGesG), as of March 9, 2022 can be found here (in German).

Direct Detection

The most informative test for detecting a *C. burnetii* infection is the examination of afterbirth material, organ material from aborted or stillborn lambs/kids/calves, milk samples or vaginal swabs using real-time PCR to detect the DNA of the pathogen. This test can confirm the current shedding of *C. burnetii*. Various commercially available PCR methods approved by the FLI are available. It is important to note that pathogen shedding can occur intermittently.

Culture and Real-time Polymerase Chain Reaction (PCR)

You can find the Official Collection of Methods of the Friedrich-Loeffler-Institut (FLI) here (in German) and the Terrestrial Manual from WOAH here.

The list of substances approved under § 11 (2) German Animal Health Law (TierGesG), as of 9 March 9, 2022 can be found here (in German).

German National Reference Laboratory

Friedrich-Loeffler-Institut, Institute for Bacterial Infections and Zoonoses (IBIZ)
National Reference Laboratory for Q Fever

Head of National Reference Laboratory: Dr. rer. nat. Katja Mertens-Scholz
Address: Naumburger Str. 96a, 07743 Jena, Germany
Phone +49 3641 804-2499
Fax +49 3641 804-2228

Email contact National Reference Laboratory

You can find the Homepage of the National Reference Laboratory for Q Fever here.

Genome Sequence Typing

The Multiple Locus Variable Number of Tandem Repeats Analysis (MLVA/VNTR) enables the typing of entire genome sequences with high discriminatory power. Another method used is the Single Nucleotide Polymorphism (SNP)-based Multispacer-Sequence-Typing (MST) procedure, by which, however, only a rough resolution as to regional distribution can be attained. Even though these methods do not play a role in acute diagnostics, they can be important when there is a Q fever outbreak. For example, the VNTR/MLVA method has proved sufficiently appropriate when investigating chains of infection. This kind of typing was even possible directly from clinical samples when the world's largest Q fever outbreak in the Netherlands (2007 – 2010) occurred. However, due to insufficient standardisation, these methods are currently applied in specialised scientific institutions only.

For further information on various typing methods for *C. burnetii* and their significance, please refer to a review by Frangoulidis et al. (2022).

TREATMENT

Humans

Acute Q Fever

Acute Q fever is treated with antibiotics. The duration of treatment is 14 days, with doxycycline being the first-line medication. Children are administered antibiotics from other drug classes such as macrolides, the dosage being adapted to the child's weight. In cases of acute Q fever during pregnancy, an antibiotic from a different drug class, such as cotrimoxazole, is recommended (Please be advised that cotrimoxazole should only be administered until 32nd week of pregnancy). When treating pregnant women with cotrimoxazole, the increased requirement of folic acid due to pregnancy must be adapted by substituting with folinic acid (not folic acid). It is essential to note that when angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers are taken simultaneously, a clinically relevant hypercalcaemia may be the result, which increases the risk of sudden cardiac death. Women suffering from acute *C. burnetii* infection are recommended not to breast-feed their child, no matter whether they were treated with antibiotics or not, as the Q fever pathogen can be passed through breast milk and it is possible that the administration of antibiotics cannot completely prevent the bacteria from being shed into the breast milk.

Chronic Q Fever

The treatment of chronic infection is prolonged and requires high self-discipline from the patient. It should be conducted by experienced medical specialists. Should chronification have already occurred, a 24-month combined therapy with, for example, doxycycline and hydroxychloroquine, is carried out. Alternative antibiotic regimens are possible and must be adapted individually. Regular follow-up testing of antibody levels in the blood is necessary during therapy. Additionally, blood level checks (for doxycycline and hydroxychloroquine) should be conducted regularly. A periodic examination of the fundus of the eye is advisable, since chloroquine, depending on the dosage, can lead to eye damage.

Q Fever Fatigue Syndrome (QFS)

Therapeutically, this complex of symptoms is challenging since antibiotic treatment is ineffective in improving the syndrome. Additionally, there is no diagnostic laboratory test available for confirmation. Therefore, psychosomatic and behavioural therapeutic approaches are recommended.

Post-exposure Prophylaxis for Q Fever

In Germany, there is no approved vaccine for humans. Globally, there is only one vaccine approved in Australia. However, if contact with *C. burnetii* cannot be ruled out, it is possible

to undertake post-exposure prophylaxis recommended by the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID). The administration of doxycycline for 5–7 days should start around the 8th–12th day after exposure.

Animals

Based on current knowledge, the treatment of animals with the goal of significantly reducing or stopping the excretion of the pathogen is not possible. Treatment with oxytetracycline does not lead to a significant reduction in pathogen shedding. However, vaccination against *C. burnetii* in infected animals does reduce pathogen shedding in the long term. To prevent an acute Q fever outbreak in herds of ruminants (sheep, goats and cattle), animals should be prophylactically vaccinated.

Prophylaxis in Animals

There is an approved vaccine in Germany for cattle, goats and sheep. A vaccination plan should be developed in collaboration with a veterinarian. Each animal must first be given basic immunisation (twice, at 3-week intervals). Subsequently, regular booster shots are recommended. Depending on the occurrence and risk of infection, the vaccination regimen can be adjusted. The German Animal Disease Funds in individual federal states may partially or even completely cover the costs of the vaccine and vaccination by veterinarians. The conditions for cost coverage should be clarified with the respective Animal Disease Fund in advance.

You can find the guideline of the Working Group on Ruminants of StIKo Vet, which serves as a decision-making aid for practicing veterinarians here (in German).

You can find the "Statement on the off-label use of immunological veterinary medicinal products" from StIKo Vet here (in German).

EPIDEMIOLOGY

Humans

Q fever in humans occurs worldwide, with the exception of New Zealand and Antarctica. In Europe, an increasing trend of Q fever in the population was observed between 2012 and 2016, while the number of confirmed Q fever cases declined again from 2017 onwards. Most human Q fever cases in Europe were associated with *C. burnetii* genotypes present in the small ruminant population. In 2018, 29 EU/EEA countries reported 794 confirmed cases of Q fever. The three countries with the highest number of confirmed cases in 2018 were Spain, France and Germany. In 2021, 264 cases were reported from 25 member states. In Germany, sporadic cases are reported nationwide, but outbreaks in the population are more frequently reported in the southern federal states of Germany and are often associated with Q fever in small ruminants. Due to the concept of passive surveillance, the number of reported cases also depends on the awareness of relevant groups of people and can be much higher than average during major outbreaks. [See also page 1: AETIOLOGY].

Animals

Q fever in animals also occurs worldwide, with the exception of New Zealand and Antarctica. In Germany, Q fever or the detection of *C. burnetii* is notifiable in cattle, sheep and goats in particular, with most cases of Q fever being reported in cattle. This can be explained not only by the total number of cattle compared to sheep and goats but also by more frequent examination of cattle in routine diagnostics and the different course of the disease in cattle, leading to more frequent investigations in this species than in small ruminants.
As is the case in human medicine, awareness of the disease is crucial, as evidenced by the increase in reported cases in cattle, sheep and goats following outbreaks in the human population in Bad Sassendorf/Soest, Germany in 2003 and in Jena, Germany in 2005. [See also page 1: AETIOLOGY]

LAWS, REGULATIONS, DIRECTIVES

German Infection Protection Act (IfSG)

In accordance with § 3 of the German Infection Protection Act (IfSG), informing the public about the dangers and prevention of notifiable diseases is a public duty. Q fever in humans is a notifiable disease in Germany in accordance with IfSG. In accordance with § 7 (1) and § 8 (2) of the IfSG, the health authority is directly or indirectly informed by the reporting laboratory of the detection of *C. burnetii* if an acute infection is confirmed. The responsible health authority can propose measures in livestock to the competent authority in the event of imminent danger and order such measures itself in accordance with IfSG (§ 16 in conjunction with § 25, § 69). The powers of the authorised persons of the responsible authority and the health authority to "conduct investigations and monitor the measures ordered" are regulated in § 16. The legal powers of the health authority in the context of an outbreak investigation and the necessary questioning of persons, especially about the nature, cause, source of infection and spread of the disease, are specified in §§ 25, 26. Close cooperation between the health authority and the Office for Veterinary Affairs is strongly recommended at this point.

You can find the IfSG in the respective current version here (in German).

Animal Health Law (AHL)

In March 2016, the European Parliament and the Council adopted the Animal Health Law (AHL), which has been in effect since 21 April 2021. Overall, the unified, comprehensive new AHL supports the EU animal husbandry sector in its pursuit of competitiveness and a safe and smooth EU market for animals and their products, also in line with the One Health approach. Q fever is a notifiable disease of Category E subject to surveillance in accordance with Annex II of the Implementing Regulation (EU) 2018/1882 and in accordance with Regulation (EU) 2016/429 within the EU. Regulations for prevention and control measures of animal diseases listed in the table of the Implementing Regulation should only be applied for in the species stated. In the case of Q fever, these are *Bison* (Bison), *Bos* (cattle), *Bubalus* (buffalo), *Ovis* (sheep) and *Capra* (goat). Vectors are not given.

The occurrence of the disease should be reported to the responsible authorities by the business (especially animal owners) and all other natural and legal entities as soon as possible. The competent authority forwards each report via the German Animal Disease Notification System (TSN) to the German Federal Ministry of Agriculture, Food and Reginal Identity (BMELH). The BMELH reports to the European Commission and the rest of the member states in case of a disease outbreak. An outbreak must be reported immediately to the responsible Office for Veterinary Affairs for risk management measures to be implemented in time. National control measures are possible if there are not any impediments to intra-European Community movements. European member states can implement additional national legislation on disease control if needed to control local or national outbreaks.

You can find the EU Regulation 2016/429 EU Animal Health Law in the respective current version here.

You can find the EU Implementing Regulation 2018/1882 (List of relevant animal species) in the respective current version here.

You can find the EU Implementing Regulation 2020/2002 (Duty to report) in the respective current version here.

You can find the Delegated Regulation EU 2018/1629 (List of animal diseases) in the respective current version here.

You can find the Delegated Regulation EU 2020/689 (Diagnostics/surveillance) in the respective current version here.

German Regulation on Notifiable Animal Diseases (TKrMeldpflV), German Animal Health Act (TierGesG)

The detection of Q fever or *C. burnetii*, especially in domestic ruminants (cattle, sheep and goats), is notifiable in Germany in accordance with the German Regulation on Notifiable Animal Diseases (TKrMeldpflV). The heads of Veterinary Investigation Offices, Offices of Veterinary Affairs or other public or private inspection bodies, as well as veterinarians who detect notifiable diseases in the course of their professional activities, are obliged under national law to report the occurrence of the disease or the pathogen to the competent authority without delay. The report must include the date of detection, the species affected, the herd affected and the district or independent town/city. In addition, § 5 of the German Animal Health Act (TierGesG) regulates measures for the detection of animal diseases, even in the case of non-notifiable animal diseases. Section 35 of the German Animal Health Act (TierGesG) also regulates the mutual notification of the competent authorities. The obligation to notify the public health authority includes notifiable animal diseases or notifiable animal diseases that can be transmitted to humans. It also specifies the type of data that can be exchanged and the circumstances in which this is possible.

You can find the German Regulation on Notifiable Animal Diseases (TKrMeldpflV) in the respective current version here (in German).

You can find the German Animal Health Act (TierGesG) in the respective current version here (in German).

German Biological Agents Ordinance (BioStoffV)

The German Biological Agents Ordinance (Ordinance on Safety and Health Protection when Handling Biological Agents (BiostoffV)) is a regulation designed to protect employees and the environment when working with biological agents. In Germany, *C. burnetii* is assigned to risk group 3 of the German Biological Agents Ordinance (BioStoffV), which means that high safety measures (e.g. respiratory protection) are required when handling pathogens and materials containing pathogens. Non-focused diagnostics are assigned to risk group 2.

You can find the current version of the German Biological Substances Ordinance (BioStoffV) here (English version available).

Technical Regulations for Biological Agents (TRBA)

The following Technical Regulations for Biological Agents (TRBA) should be considered when dealing with Q fever:

• **TRBA 100** and **TRBA 500** describe protective measures and activities involving biological agents in laboratories.

• **TRBA 120** describes measures to protect employees from hazards of biological agents when handling laboratory animals.

• **TRBA 200** describes the requirements for technical expertise in accordance with the German Biological Agents Ordinance (BioStoffV).

• **TRBA 260** deals with protective measures when working with biological agents in veterinary medicine and similar activities, which is of particular importance.

• T**RBA 400** is a guideline for risk assessment and for informing employees about activities involving biological agents.

• In accordance with § 3 BioStoffV and the classification criteria for biological agents/risk groups (**TRBA 450**), *C. burnetii* is classified in risk group 3 by **TRBA 466**. However, this applies to targeted activities with the pathogen.

• In accordance with the BioStoffV, a risk assessment should be carried out first (§ 4 BioStoffV). Guidelines for this are described in **TRBA 400** and **TRBA 500**, which consider various criteria such as the pathogen, risk group classification, transmission routes, the type of activity (operating procedures, work processes, work equipment), the type, duration and frequency of employee exposure, and activity-related knowledge (e.g. load/exposure situation).

• Subsequently, the assignment of protection levels (§ 5 BioStoffV) should be made. For non-targeted activities, the degree of infection hazard is regulated according to the risk groups of potential biological agents, the probability of occurrence, the type of activity and the type, duration, level and frequency of the determined exposure (protection levels in accordance with the **BioStoffV** in the **health service**).

You can find the TRBAs in the respective current version here (English version available).

Disinfectant Lists

For the disinfection of surfaces/materials contaminated with *C. burnetii*, recommendations from various institutions are available:

You can find the disinfectant list of the German Association for Applied Hygiene (VAH) in the respective current version here (English version available).

You can find the disinfectant list of the Robert Koch Institute (RKI) in the respective current version here (in German).

You can find recommendations for disinfection in case of animal diseases from the Friedrich-Loeffler-Institut (FLI) here (in German).

You can find the chapter "Recommendations for disinfection in case of animal diseases/Q fever" from the Friedrich-Loeffler-Institut (FLI) in the respective current version here (in German).

You can find the disinfectant list of the German Veterinary Medical Society (DVG) in the respective current version here (in German).

Recommendations of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) on Hygienic Requirements for the Keeping of Ruminants

You can find the "Announcement of recommendations on hygiene requirements for the keeping of ruminants" by the BMELH of 7 July 2014 (BAnz. AT 01.08.2014 B1) here (in German).

Q Fever Guidelines Baden-Wuerttemberg

You can find the recommendations for the control of Q fever in small ruminants in Baden-Wuerttemberg here (in German).

Lower Saxony Chamber of Agriculture Biosecurity Guidelines for Cattle Farming

You can find the guidelines from the Lower Saxony Chamber of Agriculture, which contains an analysis of the existing risks of pathogen introduction in animal husbandry and recommendations for the development of measures here (in German).

Guideline and Statement of the German Veterinary Standing Committee on Vaccination (StiKo Vet)

You can find the guideline of the Working Group on Ruminants of StIKo Vet, which serves as a decision-making aid for practicing veterinarians here (in German).

You can find the "Statement on the off-label use of immunological veterinary medicinal products" from StIKo Vet here (in German).

Statements from the German Federal Institute for Risk Assessment (BfR)

You can find the statement No. 018/2010 from BfR dated 15 March 2010, "Q Fever: Transmission of *Coxiella burnetii* through the consumption of foods of animal origin is unlikely" here.

You can find the statement from BfR dated 17 June 2003, "Q Fever: Transmission of the pathogen *Coxiella (C.) burnetii* in animal populations and through food to humans" here (in German).

RKI Guide "Q Fever"

You can find the RKI guide "Q Fever" here (in German).

Framework Concept: Recognising, Assessing and Successfully Managing Epidemiologically Significant Situations (RKI)

You can find the RKI's framework concept describing existing structures, processes and recommendations for dealing with epidemiologically significant situations here (in German).

FELASA Recommendations for the Health Monitoring of Experimental Units of Calves, Sheep and Goats – Report of the Federation of European Laboratory Animal Science Associations (FELASA) Working Group on Animal Health

You can find the report "FELASA Recommendations for the Health Monitoring of Experimental Units of Calves, Sheep, and Goats" by the Federation of European Laboratory Animal Science Associations (FELASA) Working Group on Animal Health here.

RECOMMENDATIONS FOR ACTIONS

This chapter provides specific recommendations for the health authorities and Offices of Veterinary Affairs aiming to actively support personnel in their joint communication, planning and implementation of measures against Q fever in humans and ruminants (sheep, goats and cattle). These recommendations are based on the regulations and legislation in Germany and may need to be adapted to local conditions when applied abroad. Examples of German regulations are given to demonstrate specific legal actions to control Q fever. The main goal is to act quickly and effectively to reduce or prevent Q fever cases in both human and animal populations. For each scenario described in this chapter, Q-GAPS support material are available, such as questionnaires, press releases and information flyers for specific groups. The recommendations and support material provided can be used freely as templates and may need to be adapted to the local outbreak situation. [See also from page 63 onwards: Q-GAPS support material].

A key focus of this guide is on interdisciplinary collaboration in planning and implementing measures against Q fever. In the case of an outbreak investigation, hierarchical structures should be considered; therefore, the scope of measures should initially be focused on one district. Additionally, it is recommended to engage with representatives from neighbouring districts, as they may be affected by airborne spread.

Figure 1 shows all the groups of persons and institutions that should be considered in Q fever management within a district or independent town/city.
For sustainable success in fighting Q fever, developing a diagnostics and action plan, considering local conditions (risk groups, type and management of animal husbandry, geography, etc.) is crucial. Outbreak investigations and subsequent measures must therefore be individually adjusted to the local situation. This chapter provides recommendations for various Q fever scenarios based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

Various scenarios and recommendations for action are listed in **Figure 2** to help the reader to identify the relevant scenario, including recommendations for action and possible follow-up scenarios. The scenarios and recommendations are presented graphically and in text form based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

Symbols and their meanings in the graphs are shown in **Figure 3**.

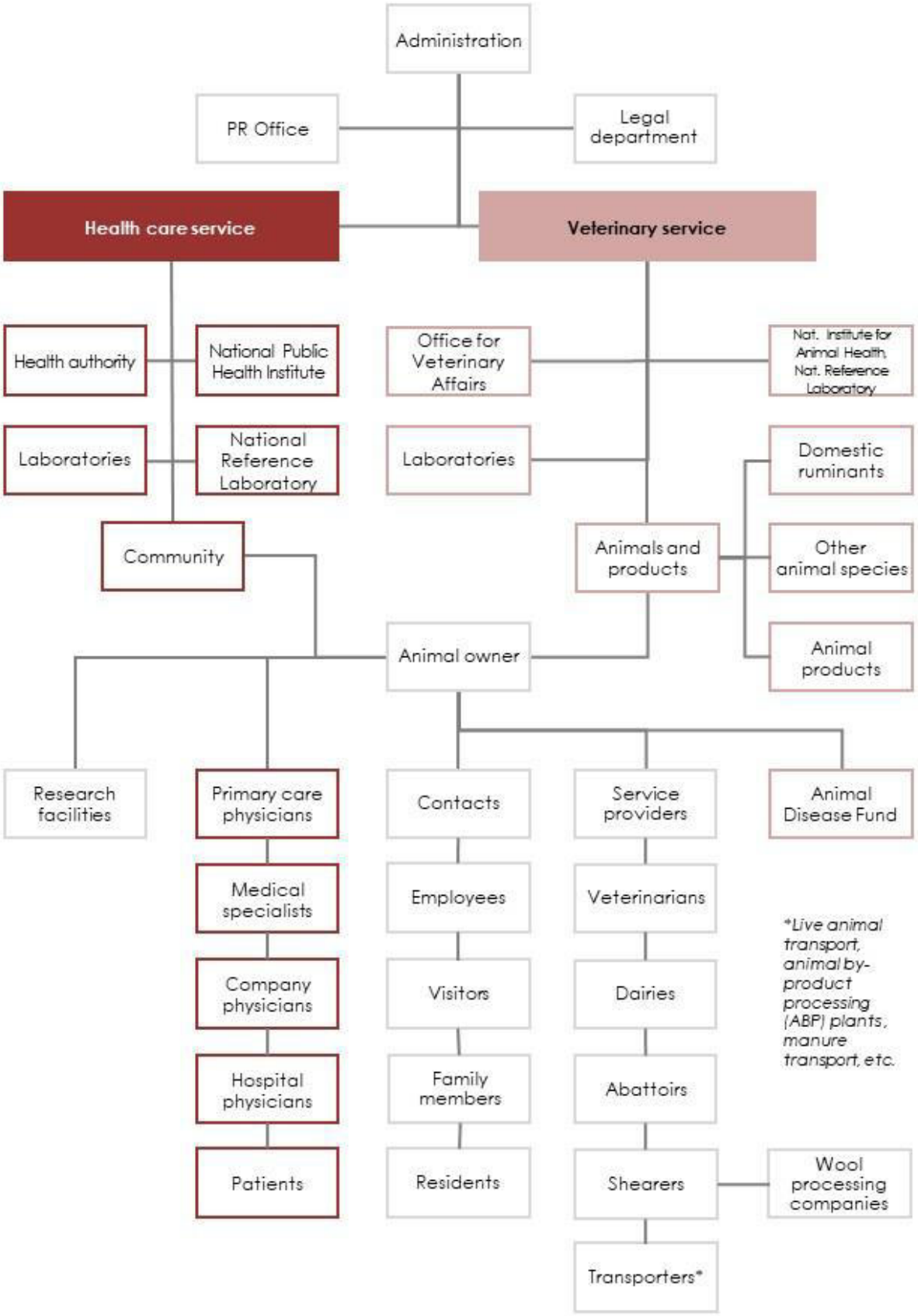


Figure 1 Q Fever Management - Groups/Institutions to Be Considered

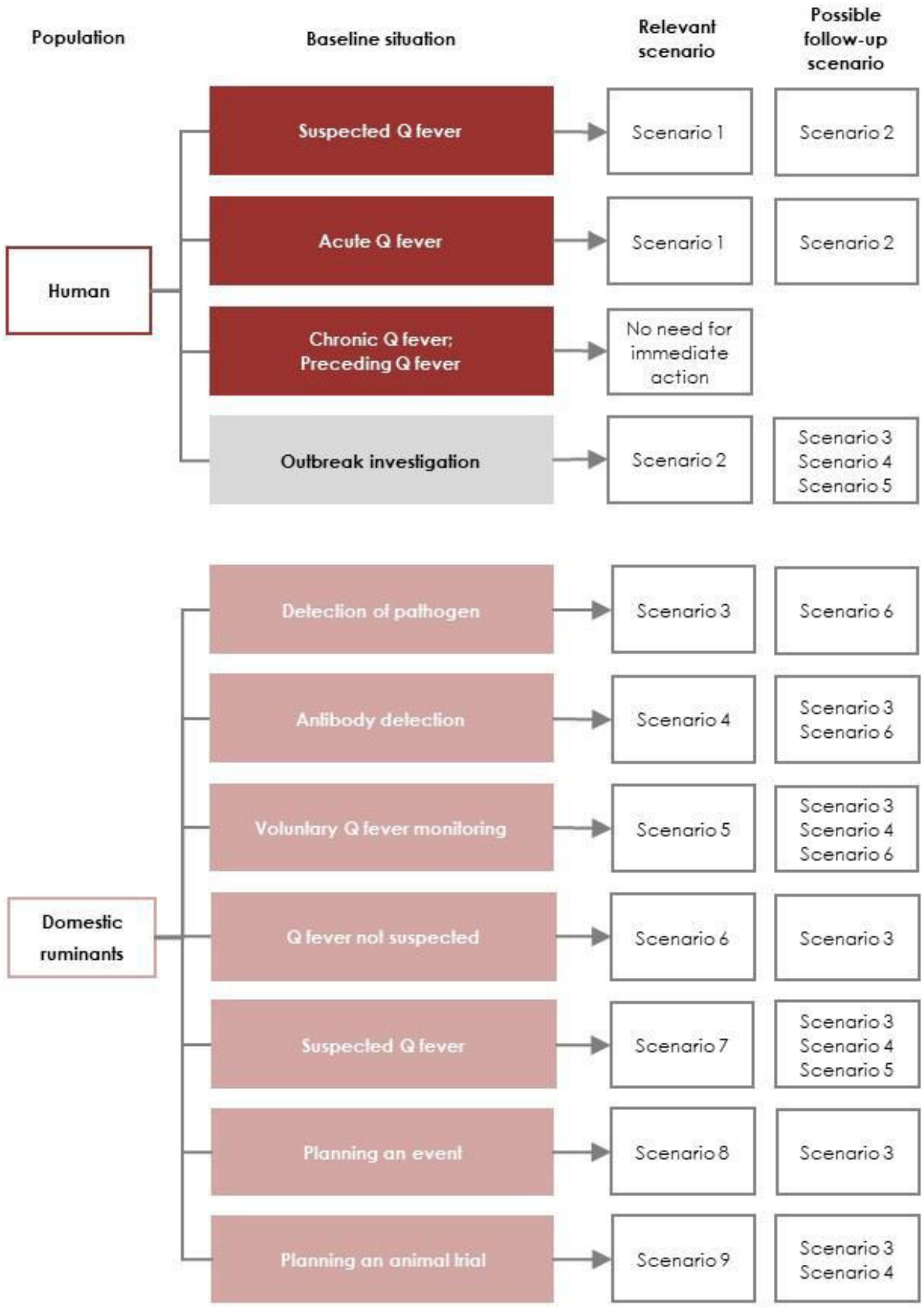


Figure 2 Q Fever Management – Orientation for Chapter Selection

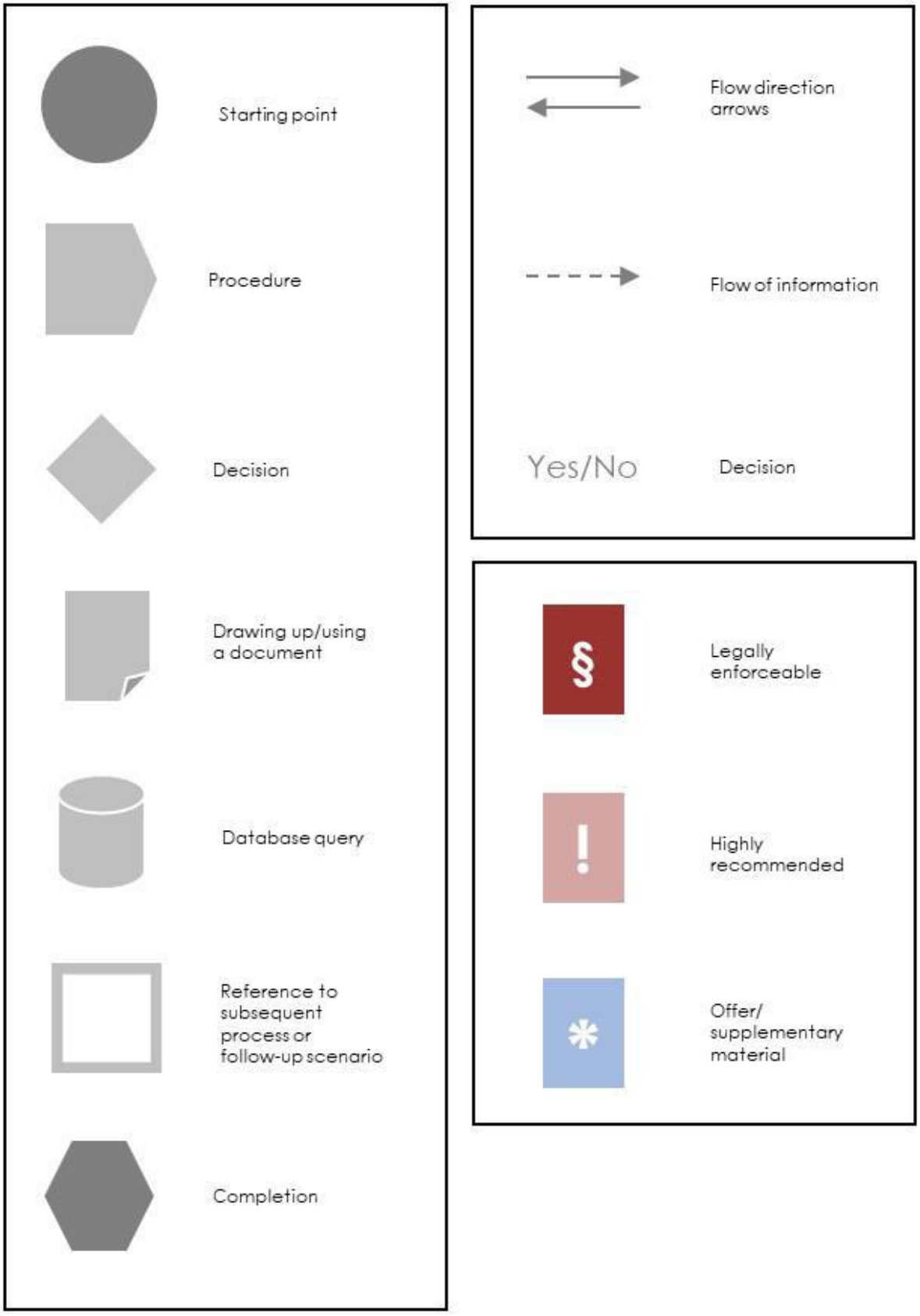


Figure 3 Legend – Graphical Representation of Scenarios and Recommendations for Actions

SCENARIO 1: Q FEVER SUSPECTED IN THE HUMAN POPULATION

If individual cases of Q fever are suspected in the human population, it should be taken seriously, as localised epidemics are possible and are often detected late due to the non-specific symptoms. Cooperation between healthcare professionals, patients, laboratory staff, the German National Reference Laboratory for *C. burnetii*, the health authority and the National Public Health Institute (e.g. Robert Koch Institute (RKI)) is essential from the onset of the key symptoms of Q fever to the investigation of an outbreak.

Figure 4 shows a potential process flow for dealing with Q fever suspected in the human population.

The process steps for all parties involved are discussed in detail below, and recommendations for the health authority are made based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

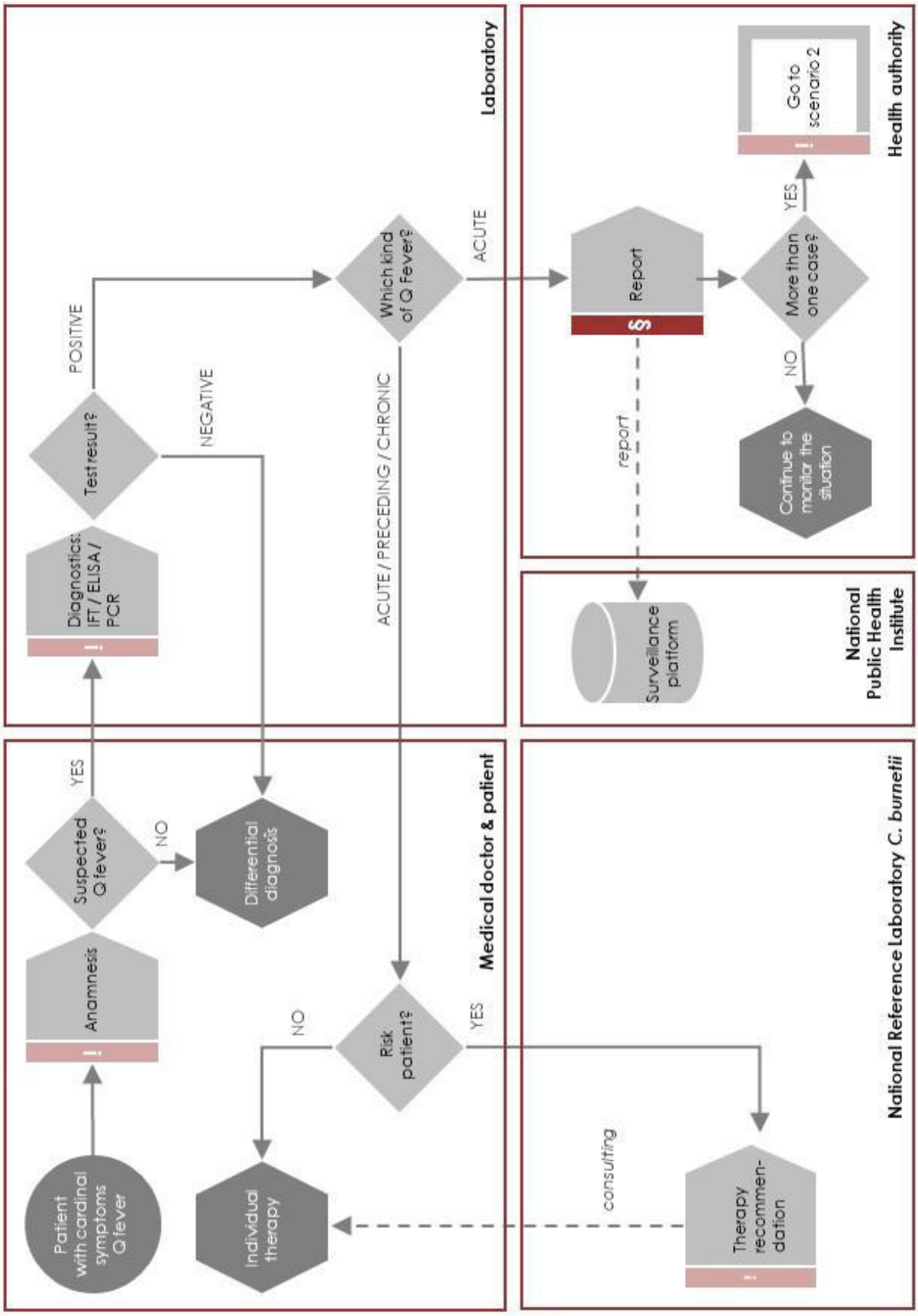


Figure 4 Process Flow Scenario 1: Q Fever Suspected in the Human Population

» Medical Doctors & Patients

Key symptoms of Q fever in humans include flu-like symptoms such as fever, body aches and chills, as well as severe retroorbital headache. Atypical pneumonia, granulomatous acute hepatitis and rarely, myocarditis, pericarditis or meningoencephalitis can also occur. Asymptomatic acute Q fever should be considered. [See also page 3: CLINICAL INFORMATION].

For anamnesis these key symptoms are important indications of a possible *C. burnetii* infection. However, Q fever is usually only considered a differential diagnosis when there is an accumulation of atypical pneumonia cases in the human population which require hospitalisation. People who have close contact with domestic ruminants are at increased risk of becoming infected with the pathogen *C. burnetii*. As the pathogen can also be spread by the wind via contaminated dust, sheep and goats shedding the pathogen at distances in the single-digit kilometre range also pose a risk of infection in humans.
Moreover, the pathogen is highly environmentally resistant (lasting for several months to years). [See also page 1: AETIOLOGY].

To confirm the differential diagnosis of Q fever, Q fever diagnostics involving blood tests using immunofluorescence tests, ELISA, or, if necessary, PCR is required. A serum sample should be sent to a laboratory. The attached preliminary laboratory report should indicate that Q fever is suspected. Serological detection of *C. burnetii* phase I and phase II antibodies is necessary to distinguish between acute, chronic or previous Q fever. [See also page 5: DIAGNOSTICS]. In case of a positive result, the type of Q fever and the risk for individual patients should be considered to determine the necessary individual therapy. [See also page 10: TREATMENT]. In addition, the German National Reference Laboratory for *C. burnetii* can be contacted for therapy recommendations. [See also page 7: German National Reference Laboratory].

» Laboratory

For Q fever diagnostics, a blood test using immunofluorescence tests, ELISA, or, if necessary, PCR is required. Serological detection of *C. burnetii* phase I and phase II antibodies is necessary to distinguish between acute, chronic or previous Q fever. It is essential to protect laboratory staff from laboratory infections. [See also page 5: DIAGNOSTICS].
The laboratory informs the attending medical doctors about the laboratory results. In Germany, acute Q fever in humans is a notifiable disease in accordance with the German Infection Protection Act (IfSG). In accordance with § 7 (1) IfSG, the health authority must be notified of the direct or indirect detection of *C. burnetii*, insofar as an acute infection is indicated, with the obligation to report the patient's name. [See also page 13: German Infection Protection Act (IfSG)].

» German National Reference Laboratory for Q Fever / *C. burnetii*

German National Reference Laboratory is designated by the RKI and provides advisory expertise on Q fever. [See also page 7: German National Reference Laboratory].

You can find further information from the RKI on the spectrum of tasks of the German National Reference Laboratory here (available in English language).

» Health Authority

In case of laboratory evidence of acute Q fever, a notification is sent to the local health authority. [See also page 13: German Infection Protection Act (IfSG)].

Recommendation for the Health Authority

- If only one case has been reported, continue monitoring the situation.
- If more than one case has been reported, an outbreak investigation is urgently recommended.

→ For further action, refer to **Scenario 2: Outbreak Investigation**

SCENARIO 2: Q FEVER OUTBREAK INVESTIGATION FOLLOWING REPORTS IN THE HUMAN POPULATION

The occurrence of more than one confirmed acute Q fever case is considered an outbreak. The most common source of Q fever infection in the human population is infected domestic ruminants. A joint outbreak investigation involving the health authority and Office for Veterinary Affairs in coordination with the laboratory, the responsible (district/city) administration department, as well as animal owners and veterinarians, is therefore highly advisable to protect the public from possible further infections.

Figure 5 shows a possible process flow for an outbreak investigation.

The process steps for all parties involved are discussed in detail below, and recommendations for the health authority and Office for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

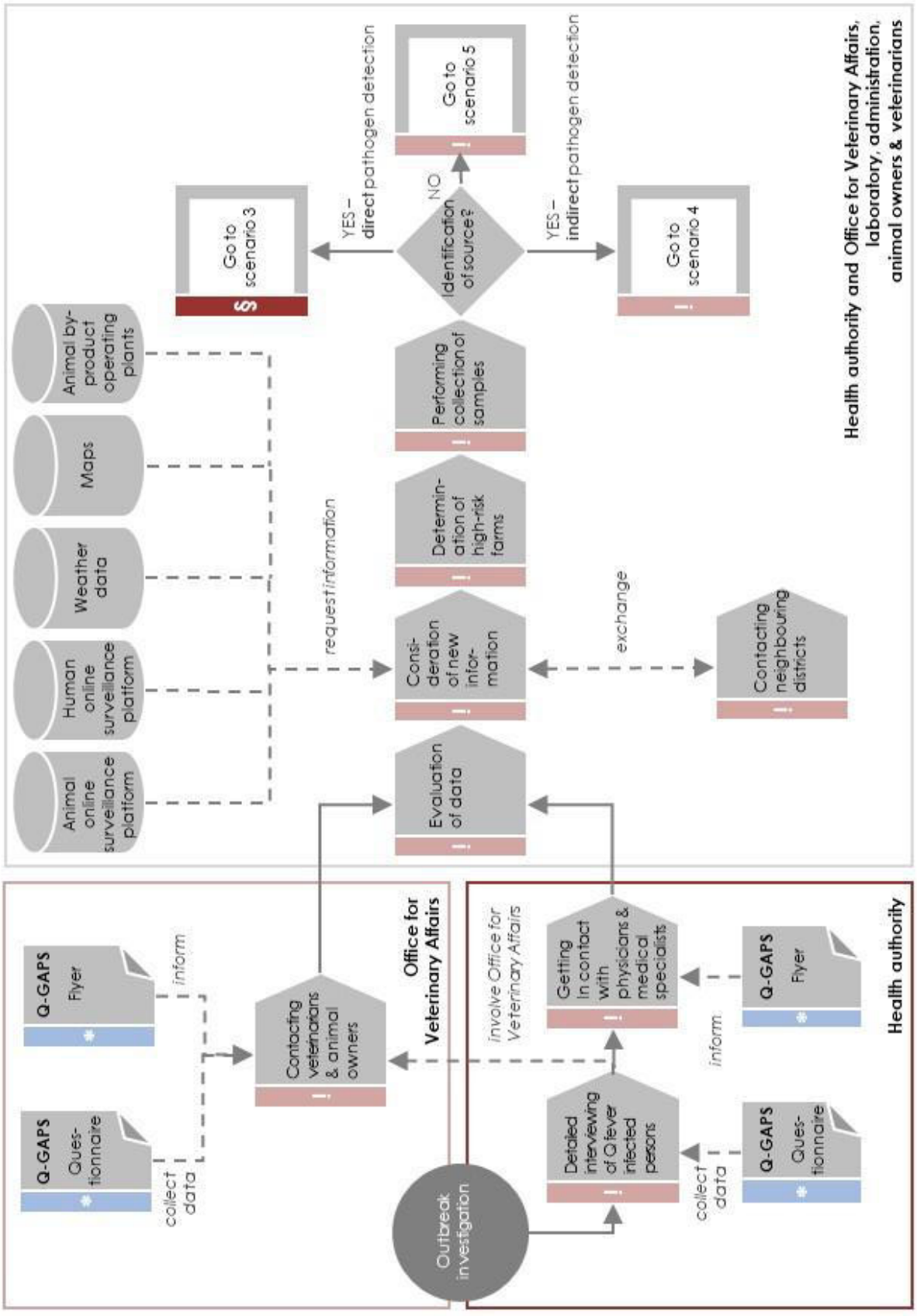


Figure 5 Process Flow Scenario 2: Q Fever Outbreak Investigation Following Reports in the Human Population

» Health Authority

In case of more than one reported case of Q Fever, an outbreak investigation is strongly recommended.

Recommendation for the Health Authority:

- Conduct a detailed interview with Q fever patients by systematically questioning those patients already known, looking for commonalities such as place of residence, animal contact, which may indicate a possible source of infection.
- Involve the competent Offices for Veterinary Affairs in the outbreak investigation. Conducting parallel or consecutive tests in livestock may quickly identify the source of infection, allowing the necessary protective measures to be taken and the outbreak to be contained.
- Contact general practitioners and hospitals in the affected region to inform them about symptoms, long-term effects and treatment recommendations. Pay special attention to at-risk groups (individuals with pre-existing conditions, pregnant women). Ask colleagues for help in identifying other affected individuals. [See also Page 1: BACKGROUND INFORMATION].

→ Use the **Q fever questionnaire "Outbreak Investigation in Livestock"**

→ Use **Q fever information flyers for "Medical Doctors" and the "General Population"**

» Office for Veterinary Affairs

Indicators of a source of infection include abnormalities in livestock, such as abortion and stillborn offspring or the presence of newly introduced animals in the affected region (migratory sheep farming, agricultural shows). The lambing period of sheep and goats poses a particular risk for Q fever outbreaks, as large amounts of the pathogen can be shed with the birth products. Consider the occurrence of Q fever cases in the population during the lambing season (observe seasonal/out-of-season lambing). It is crucial to protect individuals in contact with animals from infection.

Recommendation for the Office for Veterinary Affairs:

- Assist the health authority in investigating the outbreak. By conducting parallel or sequential tests on livestock, the source of infection may be identified quickly, allowing the necessary protective measures to be taken and the outbreak to be contained. This will protect not only the human population, but also animal owners and colleagues.
- Contact local veterinarians and animal owners to inform them about symptoms, (long-term) consequences, and treatment recommendations for humans and animals. Pay special attention to at-risk groups (individuals with pre-existing conditions, pregnant women). Request the support of colleagues to identify a possible source of infection and to locate other affected individuals.
- Conduct a detailed survey of livestock in the affected region by systematically interviewing livestock owners about their animals and farm management.

→ Use the **Q fever questionnaire "Outbreak Investigation in Livestock"**

→ Use **Q fever information flyers for "Animal Owners & Veterinarians"**

» Health Authority, Office for Veterinary Affairs, Laboratory, Administration Department, Animal Owners & Veterinarians

Data collected from interviews with patients and animal owners are the basis for identifying the source of an outbreak. It is recommended that these data are evaluated and the results are communicated within an interdisciplinary team consisting of the health authority and the Office for Veterinary Affairs. The advantages of this interdisciplinary collaboration are the exchange of different professional perspectives on the zoonosis Q fever and the building of trust between the groups/institutions involved, which is crucial for further action.

In addition to the mentioned data from the interviews, other information can be used for outbreak investigations. For instance, the Animal Disease Reporting System (TSN) of the Friedrich-Loeffler-Institut (Federal Institute for Animal Health) is the reporting system for animal diseases in Germany. It contains information such as the date of detection, the animal species affected, the livestock affected, and the administrative district/independent town/city. Access to the TSN is personalised and can be requested by staff of the public veterinary services and public health services, i.e. it is interdisciplinary. However, an outbreak of an animal disease, an officially confirmed suspected case or - as in the case of Q fever - the detection of a notifiable animal disease can only be entered in the system by staff of the veterinary authorities at district level.

In Germany, the German Electronic Reporting and Information System for Infection Protection (DEMIS), SurvStat@RKI, and SurvNet are the reporting tools of the National Public Health Institute (Robert Koch Institute). The online database, SurvStat@RKI, provides access to data on notifiable diseases and pathogen detection. A simplified dataset is available via Open Access.

As dust containing pathogens can be widely dispersed by wind, data from the Meteorological Service can provide information on the climatic conditions during the Q fever outbreak. Look for dry, windy weather in the preceding weeks and consider the wind direction.

It is also advisable to use maps when investigating an outbreak. Particular attention should be paid to the spatial distance between animal holdings and the location/residence of the patients interviewed. It is also advisable to use maps for the outbreak investigations. Here, particular attention should be paid to the spatial distance between animal holdings and location/residence of the patients interviewed. The vegetation/topography of the region (e.g. open areas/forests, mountains/valleys) and the proximity to recreational facilities (e.g. nature reserves, campsites) are also indicators of a possible source of infection of the outbreak.

Data from animal by-product operating plants might contain information on deliveries of abortion material. If necessary, these data can be queried to identify farms with conspicuous abortion events. It should be noted that, particularly in sheep and cattle, infection with *C. burnetii* can occur without clinical signs of disease, i.e. without abortion.
As Coxiella does not stop at national borders, it is advisable to exchange information with public health and veterinary officials from neighbouring districts or administrative areas to inform colleagues about the current outbreak and to gain knowledge about a potential infection event in neighbouring districts or administrative areas.

After the evaluation of all collected data, high-risk farms can be identified as potential sources of infection. A multidisciplinary team - from the local health authority, the Office for Veterinary Affairs, the laboratory and the administration department - is recommended to plan further action and to finance testing and possible protective measures.
Sampling of the high-risk farms can then be officially ordered and carried out. Animal owners and veterinarians should also be informed about the planned tests and possible consequences.

Recommendations for the Health Authority and Office for Veterinary Affairs

- Evaluate the questionnaires in collaboration with an interdisciplinary team – health authority and the Office for Veterinary Affairs.
- Find out about data on previous Q fever reports and in livestock in the region in question to establish a possible link with the current cases. Look for data on wind direction and precipitation over the past few weeks. This information will allow you to estimate the direction from which the Coxiella may have been spread by the wind. Also consider the vegetation/topography of the region, as these factors can either facilitate or hinder spreading.
- Contact public health and veterinary officials from neighbouring districts or administrative areas and exchange information about the current outbreak and potential infection scenarios in the neighbouring districts or administrative areas.
- Determine high-risk farms as potential sources of infection after having evaluated all data collected. Please note that Q fever diagnostics must ALWAYS be carried out to identify a source of infection. Determining high-risk farms alone is not sufficient for identification.
- Plan the next steps as well as the financing of the sampling process and potential protective measures in collaboration with an interdisciplinary team involving the health authority, the Office for Veterinary Affairs, laboratory and the administration department. Order and supervise the sampling of high-risk farms. Ensure that all necessary steps are taken.
- Inform animal owners and veterinarians of the planned tests and potential consequences. Ensure that the stigmatisation of animal owners is prevented.
- Take samples from the following herds/flocks:
    - All herds/flocks with a potential risk of pathogen transmission:
        - Herds/flocks associated with acute Q Fever patients who had close contact prior to infection and came in contact either knowingly or unknowingly.

          Remember that…

          … births and abortions in domestic ruminants are associated with human infections. The incubation period in humans is approximately 1-3 weeks.

          … dust containing pathogens can also be spread by the wind. Sheep and goats that shed pathogens over distances in the single-digit kilometre range can pose a risk of infection to humans.

          … the pathogen is highly environmentally resistant (several months to years).

          … a farm has different locations / migratory routes.
        - Herds/flocks from which animals have been exhibited at agricultural shows.

- Herds/flocks from which animals have been used for therapy/educational purposes
- Take samples from the following animals within the selected herds:
- Collect samples from all ruminants that have given birth within the last 8 days. [See also page 1: AETIOLOGY].
- Perform the following diagnostics:
- Collect vaginal swabs peripartum and have the samples tested using real-time PCR to detect pathogen DNA. Depending on the approval of the test kit, pooling of samples may be permitted. This test can confirm the current shedding of *C. burnetii*.
- In addition, collect blood samples to detect Coxiella antibodies. While this test cannot definitively detect acute infection, it will indicate previous infection and potential previous shedding. Furthermore, the vaccination status of animals must be considered in this test, as there is no DIVA vaccine available for *C. burnetii*. [See also page 7: DIAGNOSTICS/Animal].

If the sampling has resulted in indirect detection of *C. burnetii*, further action is strongly recommended.

→ For further action proceed to **Scenario 4: Detection of C. burnetii antibodies in livestock**

If the sampling has only produced negative test results, further action is still strongly recommended.

→ For further action proceed to **Scenario 5: Voluntary Q fever monitoring**

If the sampling has shown a direct pathogen detection, reporting might be mandatory depending on national legislation.

→ For further action proceed to **Scenario 3: Detection of C. burnetii-pathogen in livestock**

→ Use the Q Fever questionnaire **"Outbreak Investigation in the Human Population"**

→ Use the Q fever questionnaire **"Outbreak Investigation in Livestock"**

→ Use data from surveillance platforms (e.g. TSN and SurvStat@RKI [See also page 12: EPIDEMIOLOGY].)

→ Refer to data from the metrological service

→ Use existing maps of the respective region

→ Refer to data from the animal by-product operating plants

SCENARIO 3: DETECTION OF C. BURNETII PATHOGEN IN LIVESTOCK

The identification of a potential source of infection by direct pathogen detection implies the necessity for measures to protect the human population. For these measures to be effective, close collaboration between experts from the health authority and Office for Veterinary Affairs, the National Animal Health Institute (e.g. Friedrich-Loeffler-Institut), laboratories, the relevant (district/town/city) administration department, and livestock owners as well as veterinarians is highly useful.

Figure 6 shows a possible process flow following the detection of *C. burnetii* pathogens in livestock.

The process steps for all parties involved are discussed in detail below, and recommendations for the health authority and Office for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

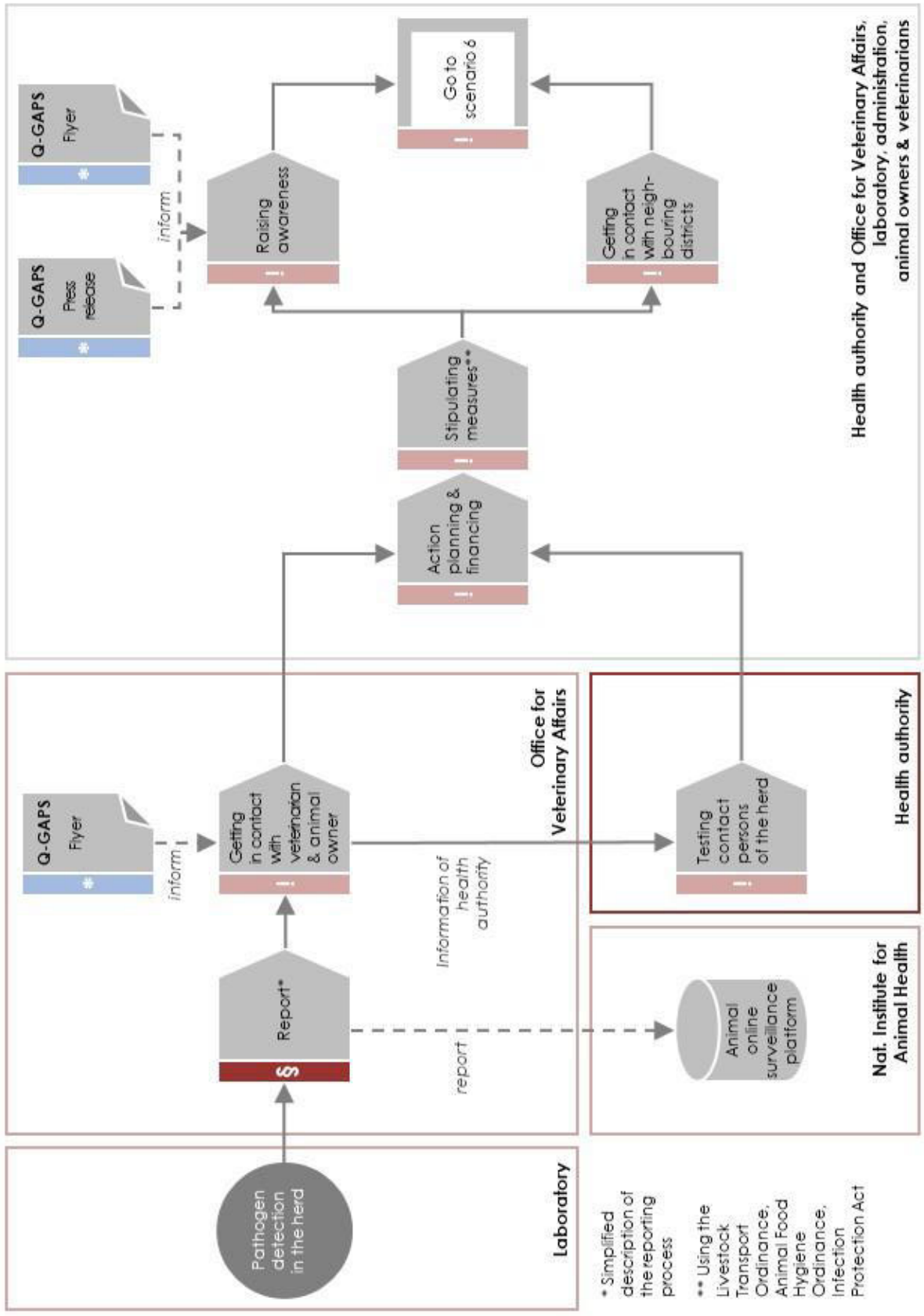


Figure 6 Process Flow Scenario 3: *C. burnetii* Pathogen Detection in Livestock

» Laboratory

Upon detecting the presence of *C. burnetii* in a herd, the pathogen must be reported to the Office for Veterinary Affairs depending on the local legislation. For instance, in Germany, the test result must be reported in accordance with the German Regulation on Notifiable Animal Diseases (TKrMeldpflV), as Q fever is a notifiable animal disease. [See also page 14: TKrMeldpflV, TierGesG].

» National Institute for Animal Health

In Germany, the Animal Disease Reporting System (TSN) of the National Institute for Animal Health (Friedrich-Loeffler-Institut) is the reporting system for animal diseases in Germany. In the case of a Q fever report, the TSN contains information such as the date of detection, the animal species affected, the livestock affected and the district or town/city. Access to the TSN is personalised and can be requested by staff of the Office for Veterinary Affairs and health authority, i.e. an interdisciplinary team. [See also page 12: EPIDEMIOLOGY].

» Office for Veterinary Affairs

Following the detection of *C. burnetii* in livestock, it is crucial to prevent the spreading of the infection to other animals and humans. It is important to protect individuals in contact with animals from infection.

Recommendation for the Office for Veterinary Affairs

- Report the detection of the pathogen via TSN to the National Institute for Animal Health.
- Contact the animal owner and veterinarians of the affected herd to inform them about the zoonotic nature of Q fever. Encourage animal owners and veterinarians to have themselves, their family members and employees tested for Q fever and to participate actively in the planning and implementation of any voluntary measures to protect the public from Q fever.
- Explain to the animal owner, if necessary, that measures can be officially ordered on the affected farm. For instance, Regulation of Livestock Movement (ViehVerkehrsV), the Ordinance on the Hygiene of Foodstuffs of Animal Origin (Tier-LMHV) and the Infection Protection Act (IfSG) to protect the public from Q fever can be applied in Germany.
- Inform the relevant health authority about the outbreak of a notifiable animal disease (German Animal Health Act § 35) and support further testing and measures for the livestock or contact persons once the health authority has initiated testing.

→ Use the **Q fever information flyer for "Animal Owners & Veterinarians"**

» Health Authority

After having been informed about the detection of *C. burnetii* in a herd of domestic ruminants (direct pathogen detection) by the Office for Veterinary Affairs, it is urgently

necessary to prevent the spreading of the infection to humans and to initiate corresponding tests. The responsible health authority can propose measures for the livestock to the competent authority under the German Infection Protection Act (IfSG) (§ 16 in conjunction with § 25, § 69) or, in the case of imminent danger, order such measures to be carried out if the affected livestock poses a risk to the human population. In addition to protecting the general population, it is advisable to test for Q fever for persons with close contact to the affected herd (e.g. animal owners, veterinarians, etc.).

Recommendation for the Health Authority

- Initiate an outbreak investigation in collaboration with the Office for Veterinary Affairs and offer Q fever testing to individuals who had close contact with the affected herd. Discuss with the Office for Veterinary Affairs the tests that may need to be carried out on livestock.

» Health Authority, Office for Veterinary Affairs, Laboratory, Administration Department, Animal Owners & Veterinarians

- Plan the next steps as well as the financing of the sampling process and potential protective measures in collaboration with an interdisciplinary team involving the health authority and the Office for Veterinary Affairs, the laboratory and the administration department.
- Given the wide variety of ways in which sheep, goats and cattle are kept and managed, an individual action plan needs to be drawn up. Also, consider the vaccination status of the animal population. [See also page 7: Indirect detection/Animals].
- Consider the following short-term measures:
    - Lambing/calving and shearing in enclosed spaces.
    - Wearing personal protective equipment: wearing an FFP3 respirator mask is particularly important during the lambing/calving season; protective clothing should only be worn within the respective herd.
    - Storing afterbirths in a closed container until they are disposed of by animal by-product operating plants.
    - Cleaning and disinfection of stables, milking parlours, operating rooms, work clothing, work materials and containers for afterbirth disposal.
    - Educating employees and family members about the risks and necessary hygiene measures. Particular caution is required for pregnant women; their presence and activities should be avoided during Q fever incidents.
    - Erecting a sign near the stables: "Valuable livestock – Do Not Enter. Authorised Personnel Only."
    - Not allowing unauthorised persons access to the livestock.
    - Not offering raw milk or raw milk products to consumers. It is important to stop drinking raw milk and eating raw milk products. Pasteurisation leads to the inactivation of the bacterium.
    - Storing manure for 9 months under foil and away from the human population. Subsequently, the manure can be spread on arable land and should be immediately incorporated into the soil. Manure spreading should not occur in dry weather and wind.

- In some countries, a vaccine is available for ruminants; therefore, protect your herd by vaccinating against *Coxiella burnetii*.

NOTE:

- Some animal disease funds may fully/partially cover the costs of the vaccine.
- Consider the following long-term measures:

  Monitor livestock identified as potential sources of infection for the human population for several years (at least the next 2 years). Close cooperation and communication with animal owners and veterinarians are recommended to detect reshedding of the pathogen by animals as soon as possible and to prevent a new outbreak in the human population.

  - Test the herd/flock regularly for *C. burnetii* infection.
  - Test female animals in particular that have given birth or aborted recently.
  - Advise animal owners and veterinarians on the following measures:
    - Vaccination of the herd/flock
    - Quarantine and PCR testing of all animals bought additionally
    - Quarantine and PCR testing of all bucks/bulls intended for reproduction in the herd/flock
- Arrange these measures in the livestock using local laws and supervise their implementation. Inform animal owners and veterinarians about the planned tests and potential consequences.
- Conduct public awareness campaigns about Q fever in general and the current situation locally to avoid panic in the population and stigmatisation of animal owners. Release an official statement on the current Q fever situation as well as on at-risk groups, transmission routes, possible Q fever symptoms and recommended protective measures via the press office of the district/independent town/city and contact the press in the affected region. Inform residents and (family) doctors in the risk area about Q fever.
- Contact officials of health authority and Office for Veterinary Affairs in neighbouring districts or administrative areas and inform colleagues about the outbreak situation.

After all measures have been implemented, it is possible that the livestock may be reclassified as "Livestock not suspected of Q fever".

→ For further action proceed to **Scenario 6: Livestock not suspected of Q fever**

→ Use the **Q Fever Information Flyer for "Animal Owners & Veterinarians"**

→ Use the template **Q Fever Press Release "Q Fever occurred"**

→ Use the **Q Fever Information Flyers for "Medical Doctors" and "General Population"**

SCENARIO 4: C. BURNETII ANTIBODY DETECTION IN LIVESTOCK

If antibodies against *C. burnetii* are detected, further PCR diagnostics, such as vaginal swabs and/or bulk tank milk, are necessary to determine whether the pathogen is currently being shed. If this is the case, measures to protect the population may be necessary. For these measures to be effective, close collaboration of professionals from the (federal state) health authority and Office for Veterinary Affairs, the Federal Institute for Animal Health, the federal state laboratory/private laboratory, the relevant (district/city) administration department, and livestock owners as well as veterinarians, is most useful.

If *C. burnetii* is not detected by PCR, it can be assumed that the pathogen is not currently being shed, and the infection is very likely to have run its course. Then, it should be clarified whether other pathogens are responsible for the clinical symptoms. Furthermore, measures should be taken to prevent a recurrence of *C. burnetii* infection.

Under German legislation, the sole detection of antibodies against *C. burnetii* in ruminants without clinical symptoms such as abortions, stillbirths and infertility is not notifiable to the responsible Offices for Veterinary Affairs in accordance with the German Regulation on Notifiable Animal Diseases (TKrMeldpflV). It is the veterinarians' and animal owners' responsibility to initiate further diagnostic or control measures.

In contrast, antibody detection against *C. burnetii* in clinically affected animals must be reported (German Regulation on Notifiable Animal Diseases (TKrMeldpflV). In this case, a Q fever infection in the herd/flock is suspected, and the Offices for Veterinary Affairs inform the health authority in accordance with the German Animal Health Act (TierGesG) § 35.

Figure 7 shows a possible process flow after the detection of antibodies in a herd/flock.

The process steps for all parties involved are discussed in detail below, and recommendations for the health authority and the Offices for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

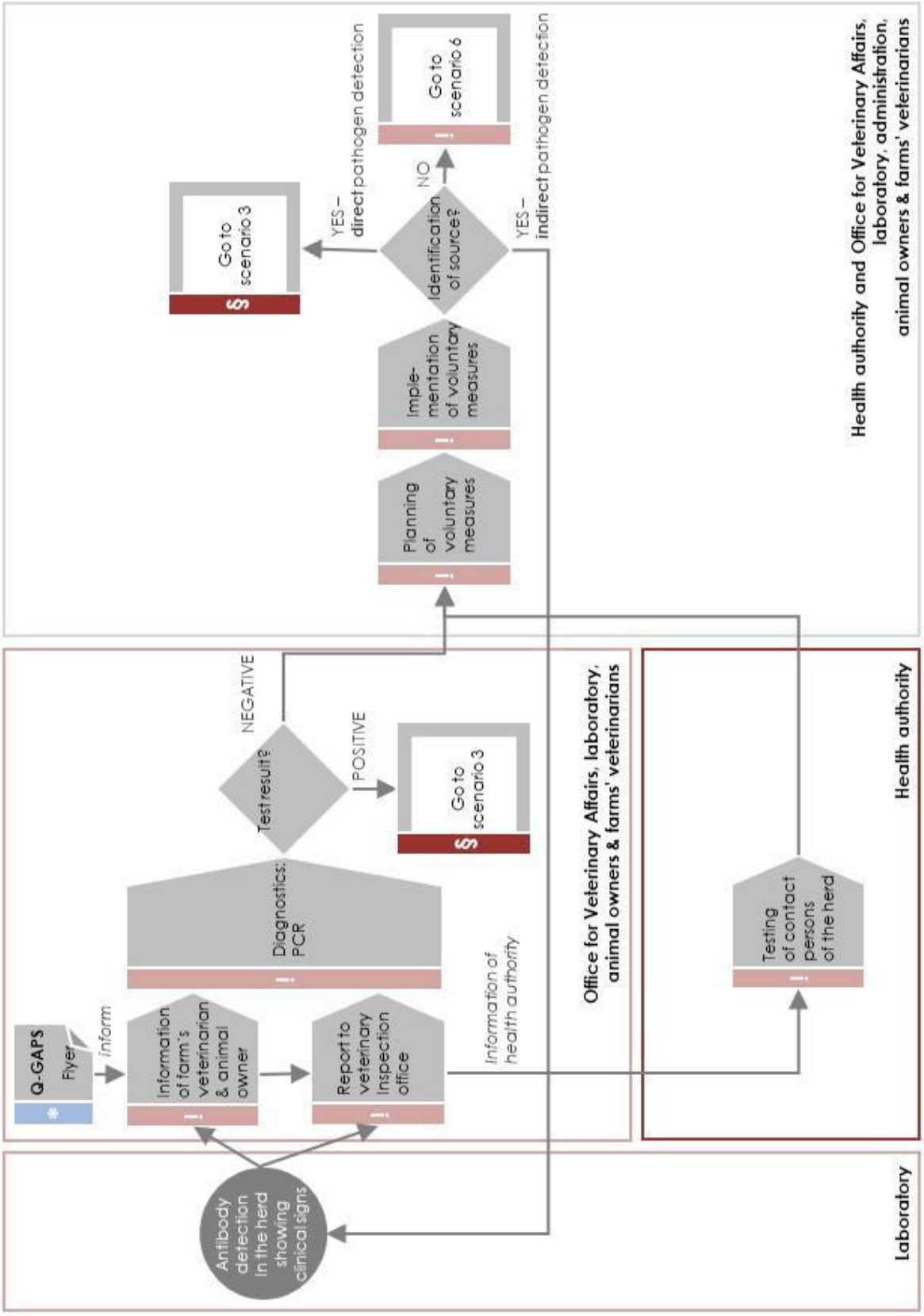


Figure 7 Process Flow Scenario 4: *C. burnetii* Antibody Detection in Livestock

» Laboratory

Laboratories detecting antibodies against *C. burnetii* in ruminants can report the test result to the Office for Veterinary Affairs. In Germany, there is NO notification required for a sole antibody detection without corresponding symptoms in accordance with the Regulation on Notifiable Animal Diseases (TKrMeldpflV). However, notification is required if there are clinical symptoms. [See also page 14: TKrMeldpflV, TierGesG].

» Office for Veterinary Affairs, Laboratory, Animal Owners, and Veterinarians

In the case of antibody detection (without additional clinical symptoms such as abortions, stillbirths, and infertility), where NO notification is required, all parties involved should remain vigilant and initiate further investigations if necessary. It is important for all involved parties to work together to prevent the spread of a possible infection to other animals and humans. In such a situation, it is crucial to protect individuals with contact to animals from infections. A serological test for detecting Coxiella antibodies does not reliably detect an acute infection but indicates a previous infection. In this test, the vaccination status of the animals must also be considered, as there is no DIVA vaccine available for *C. burnetii*. [See also page 7: DIAGNOSTICS/Animal].

Recommendation for the Office for Veterinary Affairs

- If you are informed by a testing facility that *C. burnetii* antibodies have been detected in livestock, contact the owner and veterinarians of the affected herd/flock to clarify whether there are any corresponding clinical signs. Inform stakeholders of the zoonotic nature of Q fever. Encourage animal owners and veterinarians to have themselves, their family members and employees tested for Q fever and to participate actively in the planning and implementation of any voluntary measures to protect the public from Q fever.
- If there are also suspicious clinical symptoms present (abortions, stillbirths and infertility), reporting might be mandatory depending on national legislation. Further diagnostic tests for clarification should be performed. If necessary, inform the responsible health authority about the confirmed suspicion of a notifiable animal disease and after an investigation has been initiated by the health authority, support further tests and measures in the herd/flock or among the contact persons.
- Perform PCR tests in the facility (e.g. peripartum vaginal swabs, bulk tank milk) to exclude/confirm current pathogen shedding.
- Even if the sampling results in a negative pathogen detection, close monitoring of the livestock is still strongly recommended.

If the sampling results in a direct pathogen detection, reporting might be mandatory depending on national legislation.

→For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in the Livestock**

→ Use the **Q Fever Information Flyer for "Animal Owners & Veterinarians"**

» Health Authority

If there are both antibody detection and clinical symptoms in livestock, and the suspicion of a *C. burnetii* infection has been substantiated by diagnostic tests, you will be informed by the Office for Veterinary Affairs. To prevent the spreading of the infection to humans, the responsible health authority, in collaboration with the Office for Veterinary Affairs, can initiate further measures in the animal population.

Recommendation for the Health Authority:

- Verify in collaboration with the Offices for Veterinary Affairs the necessity of an appropriate investigation, such as by ordering further testing of livestock using PCR (direct pathogen detection).

» Health Authority, Office for Veterinary Affairs, Laboratory, Administration Department, Livestock Owners & Veterinarians

Recommendation for the Health Authority and Office for Veterinary Affairs

- If a *C. burnetii* infection (antibody detection and clinical symptoms) is suspected, collaboratively plan additional voluntary tests and the financing of tests and potential protective measures in an interdisciplinary team - including the (federal state) health authority and Office for Veterinary Affairs, federal state laboratory/private laboratory, administration department, livestock owners, and veterinarians.
- Given the wide variety of ways in which sheep, goats and cattle are kept and managed, an individual voluntary testing plan needs to be drawn up. Also, consider the vaccination status of the herd. [See also page 7: DIAGNOSTICS/Animal].
  - Take samples from the following animals within the selected herds/flocks:
    - Collect samples from all ruminants that have given birth within the last 8 days. [See also page 1: AETIOLOGY].

Perform the following diagnostics:

- Collect vaginal swabs peripartum and have the samples tested using real-time PCR to detect pathogen DNA. Depending on the approval of the test kit, pooling of samples may be permissible. This test can confirm the current shedding of *C. burnetii*.
- Additionally, collect blood samples to detect Coxiella antibodies. While this test cannot definitively detect acute infection, it will indicate previous infection and potential previous shedding. Furthermore, the vaccination status of animals must be considered in this test, as there is no DIVA vaccine available for *C. burnetii*. [See also page 7: DIAGNOSTICS/Animal].

If all voluntary examinations have been conducted, and if antibodies are repeatedly detected, it is strongly recommended to monitor the livestock annually during the main birthing season and restart the process outlined in this chapter.

→ For further action proceed to **Scenario 4: *C. burnetii* Antibody Detection in Livestock.**

If all voluntary examinations have been conducted, and NO source of infection has been identified it is possible that the livestock may be reclassified as "Livestock not suspected of Q Fever".

→ For further action proceed to **Scenario 6: "Livestock not suspected of Q fever."**

If all voluntary examinations have been conducted and a direct pathogen detection has been confirmed, reporting might be mandatory depending on national legislation.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in Livestock.**

SCENARIO 5: VOLUNTARY Q FEVER MONITORING

If there has been NO evidence of Q fever infection in an animal population so far, and voluntary Q fever monitoring of the livestock is to be carried out, the recommended tests outlined in this chapter should be performed. For these measures to be effective, close collaboration of professionals from the Offices for Veterinary Affairs, laboratory as well as livestock owners and veterinarians is useful.

Figure 8 shows a possible process flow for these further investigations.

The process steps for all parties involved are discussed in detail below, and recommendations for the health authority and the Office for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

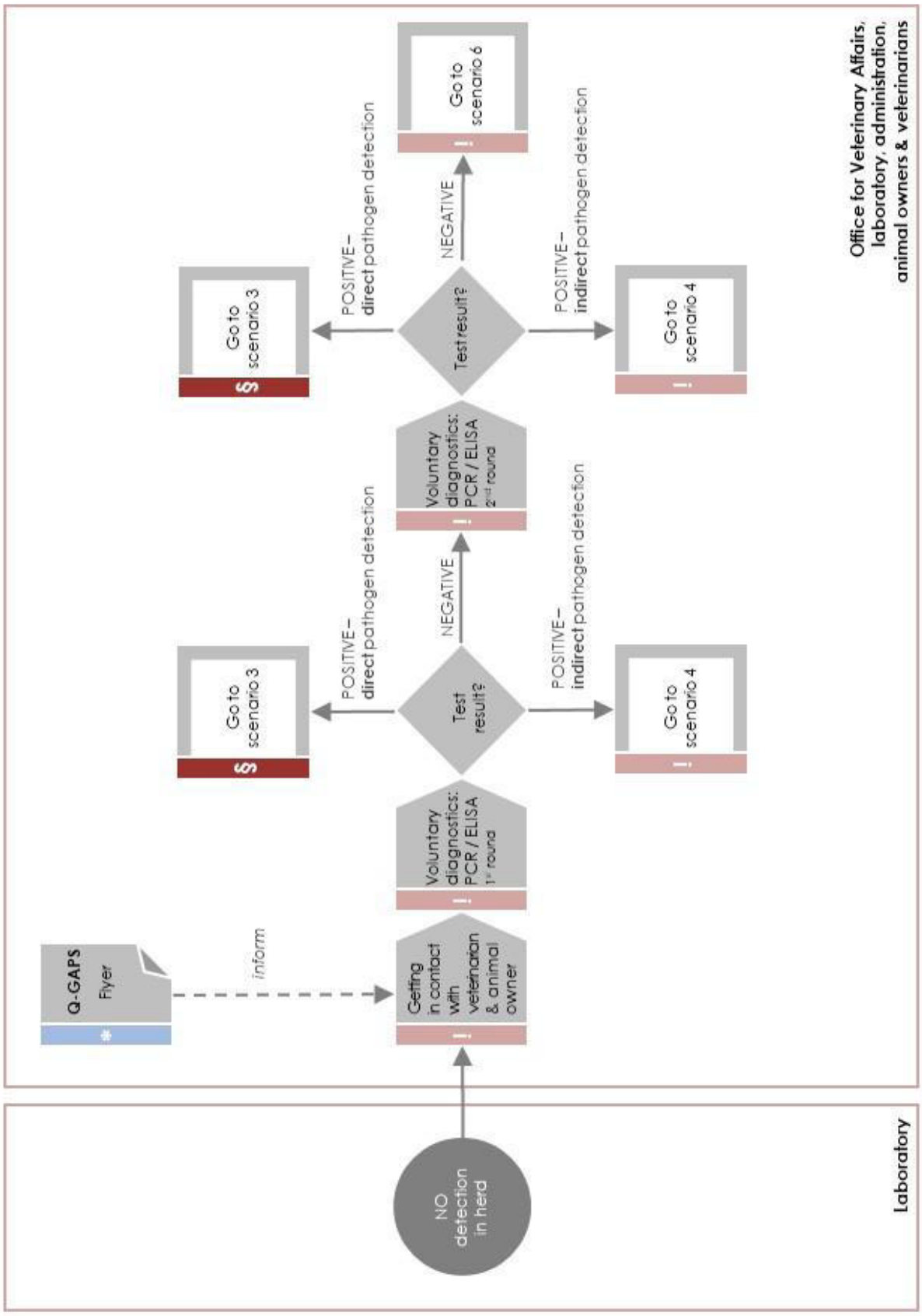


Figure 8 Process Flow Scenario 5: Voluntary Q Fever Monitoring

» Laboratory

If there is neither a positive pathogen detection nor a positive antibody detection, a *C. burnetii* infection in the respective herd is not detectable. However, it is important to consider that pathogen shedding can occur intermittently. Additionally, pathogens/pathogen DNA or antibodies may not be detectable at the time of the previous test or may not yet be present. [See also page 7: DIAGNOSTICS/Animal].

» Office for Veterinary Affairs, Laboratory, Animal Owners & Veterinarians

If there has been NO evidence of Q fever infection in an animal herd so far and voluntary Q fever monitoring of the herd is to be carried out, testing as described in this chapter is recommended. It is important to consider that pathogen shedding can occur intermittently. Additionally, pathogens/pathogen DNA or antibodies may not be detectable at the time of the previous tests or may not yet be present. [See also page 7: DIAGNOSTICS/Animal]

Recommendation for the Office for Veterinary Affairs

- Contact the animal owner and veterinarians of the farm to be tested to inform them about the zoonotic nature of Q fever. Encourage animal owners and veterinarians to have themselves, their family members and employees tested for Q fever and to participate actively in the planning and implementation of any voluntary measures to protect the public from Q fever.
- Plan the voluntary additional investigations and the financing of the examinations and any protective measures. Given the wide variety of ways in which sheep, goats and cattle are kept and managed, an individual voluntary testing plan needs to be drawn up. Also, consider the vaccination status of the livestock. [See also page 7: DIAGNOSTICS/Animal].

- Take samples from the following animals within the selected herds/flocks:
  - Collect samples from all ruminants that have given birth within the last 8 days. [See also page 1: AETIOLOGY]

- Calculate the number of animals within a given herd/flock that should be sampled (sample size):
  - Use the formula "Sampling for the detection of the disease/absence of disease" (Dohoo et al. 2009, page 54, Eq.2.17):

$$n = \left(1 - (\alpha)^{\frac{1}{D}}\right) * \left(N - \left(\frac{D-1}{2}\right)\right)$$

The following applied to this formula:

n = required sample size

α = 1-confidence level (usually = 0.05)

D = estimated minimum number of infected animals in the herd/flock (Number of animals in the herd/flock * minimum expected prevalence)

N = number of animals in the herd/flock

Example: Calculation of the sample size

Table 2 below shows the sample size (n) required to detect at least one infected animal with 95% confidence (1-a) when the expected proportion of infected animals in the herd is 10% (minimum expected prevalence).

NOTE:

- The within-flock prevalence of 10% is based on Wolf et al. (2020). That study is the basis for estimating the prevalence of Q fever in the German sheep and goat population.
  - Consider new empirical evidence on within-flock prevalence at the time of sampling when determining the individual sample size.
  - Seek advice from epidemiological institutes on the calculation of the individual sample size in the selected flock.

Table 2 Example – sample size for voluntary monitoring for the detection of the disease/absence of the disease (minimum expected prevalence = 10%) according to Dohoo et al (2009) page 54, Eq.2.17.

Number of breeding yearlings and dams (N)	Sample size (n)
10	10
20	15
30	18
40	20
50	22
100	25
150	26
200-400	27
≥ 450	28

Perform the following diagnostic procedures:

- Collect peripartum vaginal swabs and analyse the samples by real-time PCR to detect the presence of *C. burnetii* DNA. Depending on the approval of the test kit, samples may be pooled. This test can confirm current *C. burnetii* shedding.
- Additionally, take blood samples to detect Coxiella antibodies. This test cannot reliably confirm acute infection but will indicate previous infection and potential previous shedding. In this examination, consider the vaccination status of the animals, as there is no DIVA vaccine available for *C. burnetii*. [See also page 7: DIAGNOSTICS/Animal].

If the first round of sampling provides indirect detection, further action is strongly recommended.

→ For further action proceed to **Scenario 4: *C. burnetii* Antibody Detection in Livestock**

If the first round of sampling provides ONLY NEGATIVE test results, repeat the sampling during the next main lambing/calving season.

If the first round of sampling confirms a direct pathogen detection, reporting might be mandatory depending on national legislation.

NOTE:

- Animals in herds/flocks that did not show Coxiella shedding or serologically positive results in previous tests are immunologically naive. In such herds/flocks, there is a risk of strong pathogen shedding after infection.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in Livestock**

→ Use the **Q Fever Information Flyer for "Animal Owners & Veterinarians"**

- Repeat sampling in the next main lambing/calving season (2nd round).

If after the second round of sampling all voluntary tests have been repeated, and NO pathogen source has been identified, it is possible that the livestock may be reclassified as "Livestock not suspected of Q Fever".

→ For further action proceed to **Scenario 6: Livestock not suspected of Q Fever**

→ Consider the following reasons for a non-identifiable *C. burnetii* infection in this herd:

- Ruminants can intermittently shed *C. burnetii*, resulting in false-negative test results. [See also page 7: DIAGNOSTICS/Animal].

→ Consider alternative sources of infection and consider whether they could be responsible for the current outbreak of Q fever in the human population:

- *C. burnetii* is highly environmentally resistant. Contamination by dust may have occurred a long time ago and may not be directly linked to a specific outbreak in the animal population.
- *C. burnetii* can be spread by wind over long distances. The source of infection "livestock" may be outside the area where the outbreak in the human population has been detected.
- *C. burnetii* is also shed by other domestic and wild animals (e.g. cats, dogs, South American camelids, fallow deer). Thus, other species may need to be considered as an infection source.
- *C. burnetii* infections due to the consumption of raw milk and raw milk products are very rare but should still be considered. (Imported) food may be a potential source of infection.
- *C. burnetii* infections due to the use of fresh cell therapy are very rare but should still be considered.
- *C. burnetii* infections due to human-to-human transmission (childbirth, sexual transmission, bone marrow and blood donation) are very rare but should still be considered. [See also page 1: AETIOLOGY].

If all voluntary tests have been carried out and the second round of sampling has resulted in the direct detection of the pathogen, reporting might be mandatory depending on national legislation.

NOTE:

- Animals in herds or flocks that have shown neither Coxiella shedding nor serologically positive results in previous tests should be considered immunologically naive. In such herds there is a risk of significant pathogen shedding following infection.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in Livestock**

SCENARIO 6: LIVESTOCK NOT SUSPICIOUS OF Q FEVER

Proof of the absence of Q fever in livestock may not be conclusive due to the intermittent shedding of the pathogen and/or the absence of an antibody response. Nevertheless, voluntary measures combined with thorough testing can contribute to confirming a (high-risk) farm on which NO fever pathogen has been repeatedly detected, as at least a "Livestock not suspicious of Q fever." For these measures to be effective, close collaboration of professionals from the (federal state) Offices for Veterinary Affairs, state laboratory/private laboratory as well as livestock owners and veterinarians is useful.

Figure 9 shows a potential process flow for confirming a "Livestock not suspicious of Q fever." The process steps for all parties involved are discussed in detail below, and recommendations for the Offices for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

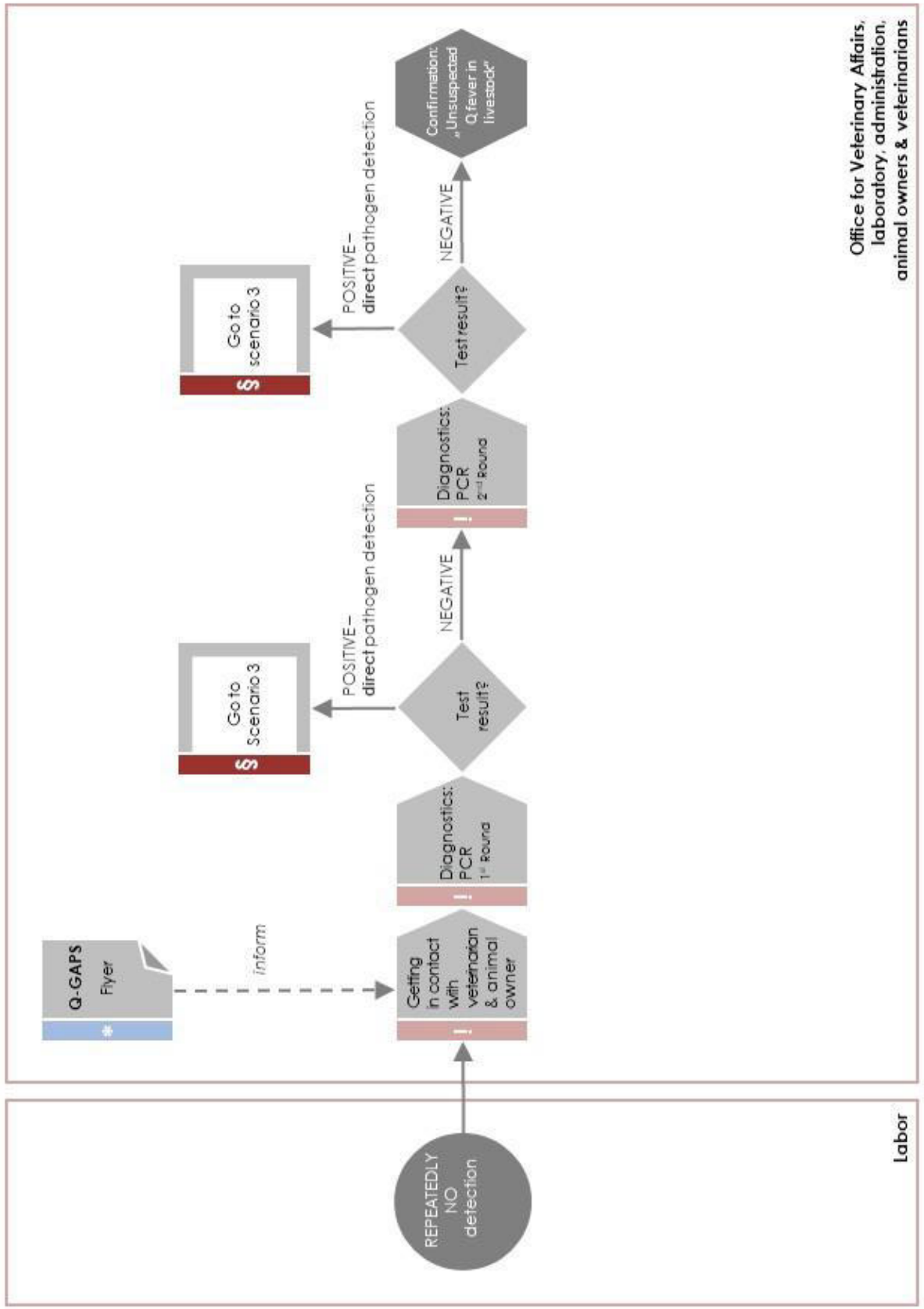


Figure 9 Process Flow Scenario 6: Animal Population Not Suspected of Q Fever

» Laboratory

If neither pathogen nor antibody detection is repeatedly positive, *C. burnetii* infection is currently undetectable in the relevant herd/flock. However, it is important to consider that shedding of the pathogen may occur intermittently. In addition, the pathogen or pathogen-specific antibodies may no longer be detectable or may not have been detected at the time of previous testing. [See also page 7: DIAGNOSTICS/Animal].

» Office for Veterinary Affairs, Laboratory, Animal Owners & Veterinarians

The implementation of voluntary measures combined with intensive testing can contribute to confirming a high-risk farm that has repeatedly NOT been detected Q fever pathogens as at least a "Livestock not suspicious of Q fever."

Recommendation for the Office for Veterinary Affairs

- Contact the animal owner and veterinarians to be tested to inform them about the zoonotic nature of Q fever. Encourage animal owners and veterinarians to have themselves, their family members and employees tested for Q fever and to participate actively in the planning and implementation of any voluntary measures to protect the public from Q fever.
- Plan the voluntary additional investigations and the financing of the examinations and any protective measures. Given the wide variety of ways in which sheep, goats and cattle are kept and managed, an individual voluntary testing plan needs to be drawn up. Also, consider the vaccination status of the livestock. [See also page 7: DIAGNOSTICS/Animal].
- Perform on-farm PCR testing (e.g. peripartum vaginal swabs, bulk tank milk) to exclude/confirm ongoing pathogen shedding.

- Take samples from the following animals within the herds/flocks:
  - All female yearlings/heifers and dams/cows within 8 days after lambing/calving. [See also page 1: AETIOLOGY].

- Calculate the number of animals within a given herd/flock that should be sampled (sample size):

→ Use the **formula "Sampling for the detection of the disease/absence of disease"** [See page 54: Sampling Size/Dohoo et al. 2009, page 54, Eq.2.17]

- Perform the following diagnostic procedures:
  - Collect peripartum vaginal swabs and analyse the samples by real-time PCR to detect the presence of *C. burnetii* DNA. Depending on the approval of the test kit, samples may be pooled. This test can confirm current *C. burnetii* shedding.

If the first round of sampling provides direct pathogen detection, reporting might be mandatory depending on national legislation.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in Livestock**

→ Use the **Q Fever Information Flyer for "Animal Owners & Veterinarians"**

If the first round of sampling does NOT provide a direct pathogen detection, repeat the sampling during the next main lambing/calving season.

If the second round of sampling repeatedly DOES NOT result in direct detection of the pathogen, the livestock may be reclassified as "Livestock not suspected of Q Fever".

NOTE:

- This status is temporary and ONLY valid at this time.

To maintain this status, PCR testing is required for at least two consecutive lambing seasons AND at each main lambing/calving period.

If the sampling in the 2nd round confirms a direct pathogen detection, reporting might be mandatory depending on national legislation.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in the Animal Population**

→ Use the **Q Fever Information Flyer for "Animal Owners & Veterinarians"**

SCENARIO 7: Q FEVER SUSPECTED IN LIVESTOCK

If there are reproductive disorders such as abortions, stillbirths and infertility, a possible infection with *C. burnetii* should be considered. Q fever suspected in livestock should be taken seriously due to the zoonotic potential of the pathogen. However, due to its non-specific symptoms, Q fever is rarely recognised or diagnosed early, which may result in potential infections in the human population. Close cooperation between livestock owners, veterinarians and laboratory staff is essential from the onset of clinical suspicion of Q fever up until the detection of the pathogen or antibodies in livestock.

Depending on the test result, different actions are required. Direct pathogen detection (see Scenario 3) or pathogen-specific antibody detection (see Scenario 4) implies the need for measures to protect the population. If neither pathogen nor antibody detection is confirmed, *C. burnetii* infection in the affected herd is currently undetectable. However, it should be borne in mind that pathogen shedding may occur intermittently and that the pathogen or pathogen-specific antibodies may not have been detectable at the time of previous testing.

Figure 10 shows a potential process flow in the case of clinical suspicion of Q fever in livestock.

The process steps for all parties involved are discussed in detail below, and recommendations for the Offices for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

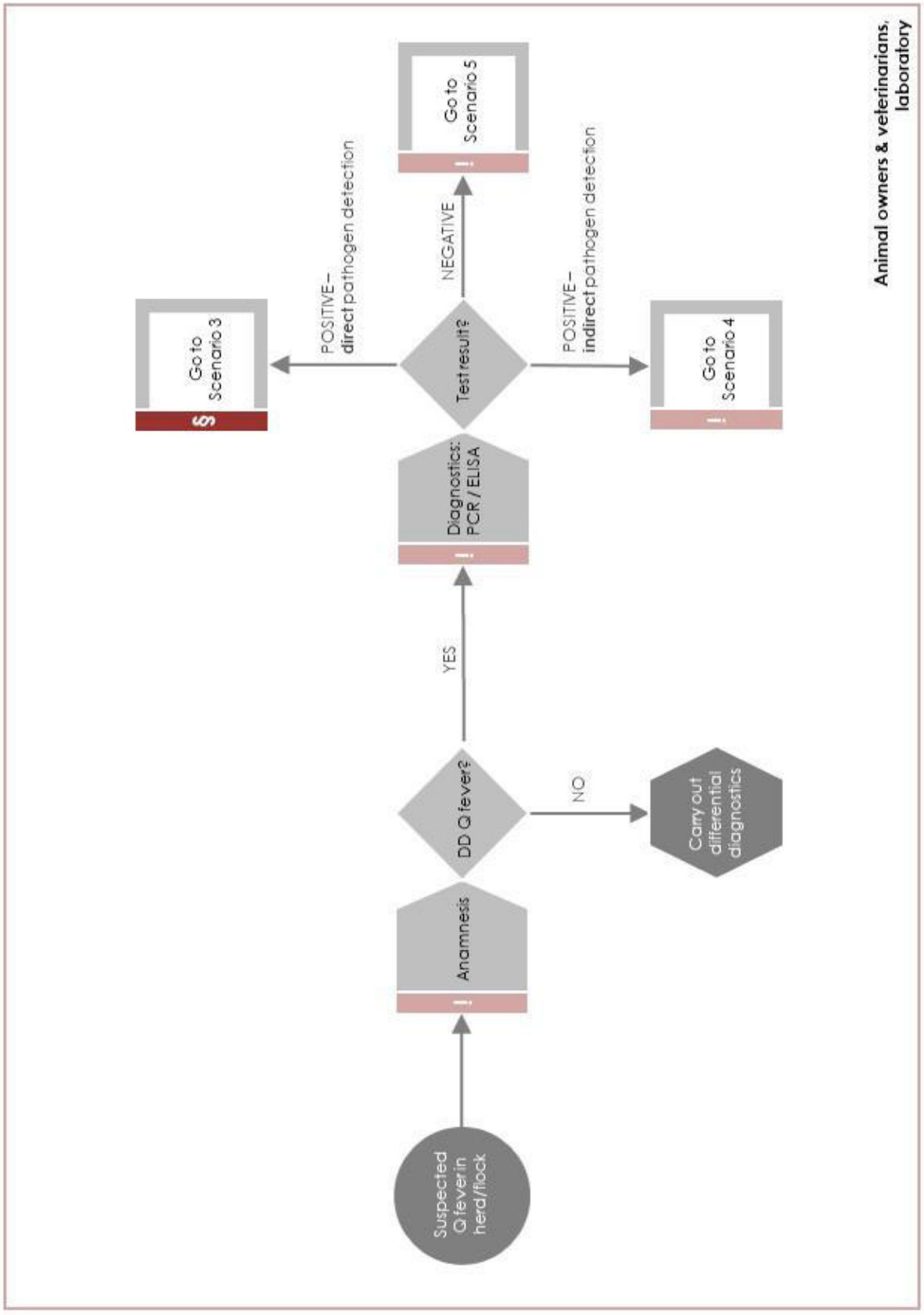


Figure 10 Process Flow Scenario 7: Q Fever Suspected in Livestock

» Animal Owners & Veterinarians

Q fever in livestock is suspected when reproductive disorders such as abortions, stillbirths and infertility occur, with these symptoms varying in intensity. Particularly in sheep and cattle, infections with *C. burnetii* can occur without clinical signs of disease, i.e. without abortion. In contrast, goats often experience abortions. Generally, abortions, stillbirths, the birth of weak lambs, kids, or calves, and the delayed expulsion of the afterbirth can be associated with a *C. burnetii* infection in ruminants. Q fever thus presents itself as a nonspecific disease that should be considered as a differential diagnosis in cases of reproductive disorders and diagnostically clarified. Pathogen shedding can occur intermittently.

Direct detection of *C. burnetii* (e.g. by PCR) can be used to confirm the differential diagnosis of Q fever. Indirect antibody tests (serology) indicate previous or acute infection. In Germany, Q fever or the detection of *C. burnetii* is particularly notifiable in cattle, sheep and goats. The laboratory should be informed of the suspicion of Q fever in the attached preliminary laboratory report. Individuals with animal contact should be protected from potential infection. In the case of a positive test result reported by the laboratory, individual measures should be taken, considering the zoonotic potential, and measures to protect the human population should be implemented.

» Laboratory

Diagnosis of Q fever should include direct detection of *C. burnetii* (PCR) and indirect antibody testing (serology). It is important to protect staff from laboratory infections. [See also page 7: DIAGNOSTICS/Animal]. Q fever or the detection of *C. burnetii* is notifiable in cattle, sheep and goats. Testing facilities are required by federal state law to report the occurrence of the disease or the pathogen immediately to the competent authority, specifying the date of detection, the affected animal species, the affected herd/flock and the district or independent town/city. [See also page 14: TKrMeldpflV, TierGesG].

» Office for Veterinary Affairs

In Germany Q fever or the detection of *C. burnetii* is notifiable in cattle, sheep and goats. If a notifiable disease is diagnosed, reporting the occurrence of the disease or the pathogen immediately to the competent authority under federal state law might be mandatory depending on national legislation, specifying the date of detection, the affected animal species, the affected herd/flock and the district or independent town/city. [See also page 14: TKrMeldpflV, TierGesG].

Recommendation for the Offices for Veterinary Affairs and Veterinarians:

- If laboratory diagnostic tests are negative, you can advise the animal owners to consider voluntary Q fever monitoring.

→ For further action proceed to **Scenario 5: Voluntary Q fever Monitoring**

If you receive information about antibody detection, further steps are recommended.

→ For further action proceed to **Scenario 4: *C. burnetii* Antibody Detection in Livestock**

If the sampling results in a direct pathogen detection, reporting might be mandatory depending on national legislation.

→ For further action proceed to
Scenario 3: *C. burnetii* Pathogen Detection in Livestock

SCENARIO 8: EVENTS/ZOOS WITH DOMESTIC RUMINANTS (ON OWN PREMISES/EXTERNAL PREMISES) AND PUBLIC

Events involving domestic ruminants, both on the owners' own premises and external premises, pose a risk of Q fever outbreaks in the population. An example is the Q fever outbreak in Soest (Germany) in 2003, which was attributed to a farmers' market with animals (Porten et al., 2006). On-farm events include activities such as open farm days or farm fairs, petting zoos, holiday events/overnight stays, animal-assisted therapy (visits by people from outside the farm, such as from nurseries, schools or care homes), or courses involving close contact with animal (shearing, hoof care, etc.). Events on external premises include activities such as breeding shows, farmers' markets or animal-assisted therapy (animal visits to nurseries, schools or care homes). To minimise this risk, close collaboration among animal owners, event organisers, as well as (federal state) Offices for Veterinary Affairs and laboratory staff is necessary.

Figure 11 shows a possible process flow for events with domestic ruminants.

The process steps for all parties involved are discussed in detail below, and recommendations for the Offices for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

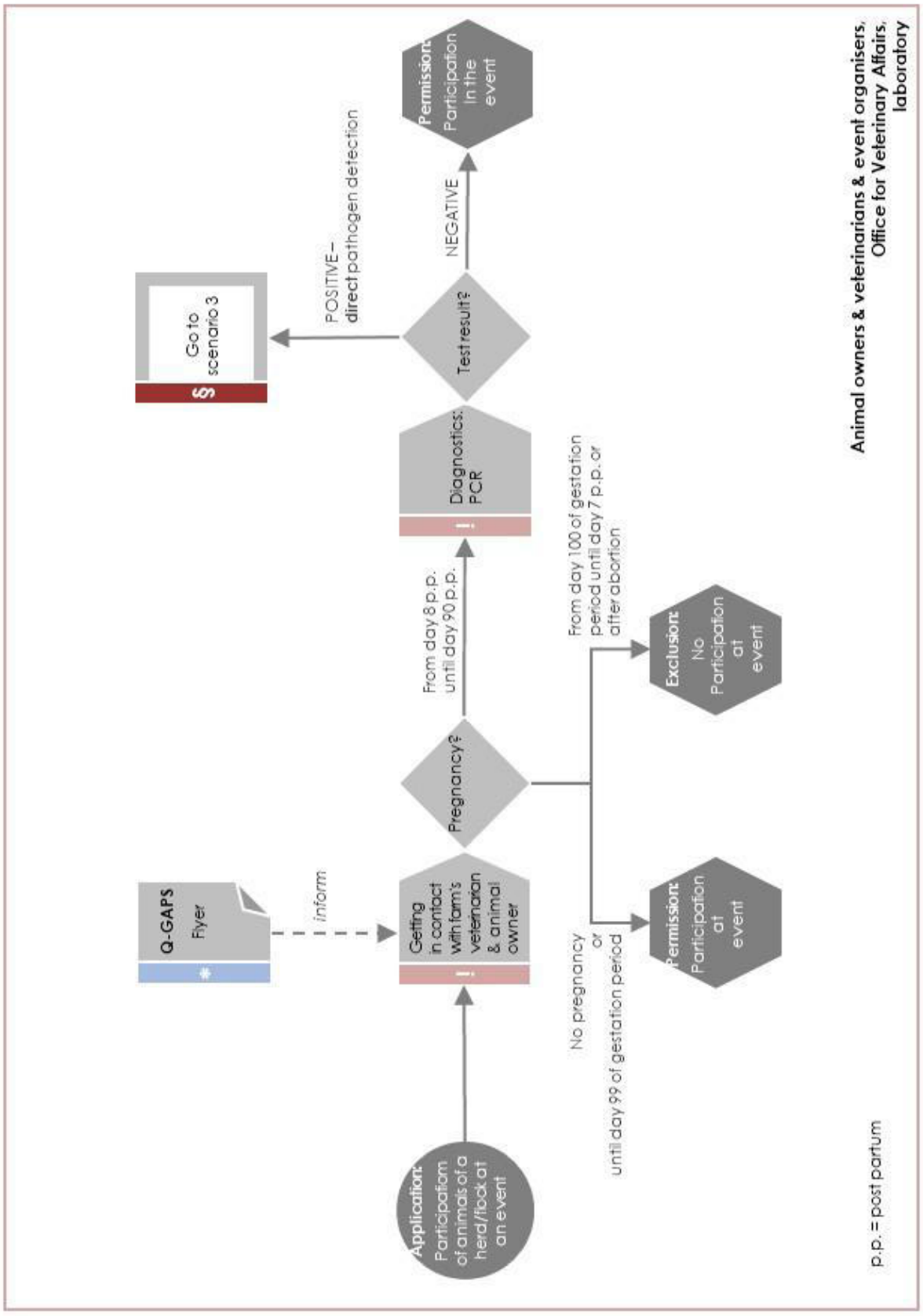


Figure 11 Process Flow Scenario 8: Events with Domestic Ruminants (on Own Premises/External Premises)

» Animal Owners, Organisers, Office for Veterinary Affairs & Laboratory

Q Fever symptoms in domestic ruminants (sheep, goats and cattle) can vary widely. In particular, in sheep and cattle, an infection with *C. burnetii* can occur without clinical signs of illness. In contrast, goats often experience abortions. Generally, abortions, stillbirths, births of weak lambs, kids or calves, and retarded expulsion of the afterbirth can be associated with a *C. burnetii* infection in domestic ruminants. Q fever is thus a nonspecific clinical disease that should be considered as a differential diagnosis in cases of reproductive disorders and diagnostically clarified.

Pathogen shedding of the pathogen can occur irregularly through birth fluids, milk and faeces. As symptom-free animals may also shed the pathogen, it is strongly recommended NOT to exhibit any female animals from the 100th day of pregnancy until the 7th day after birth. Female animals from day 8 up to day 90 postpartum should be tested for acute pathogen shedding by PCR and ONLY those with negative test results should be allowed to participate at the event. Animals that have recently aborted should generally NOT be on show at events, as other abortion agents, such as *Chlamydia abortus*, also pose zoonotic risks.

Recommendation for the Office for Veterinary Affairs

- Contact animal owners and veterinarians of the animals to be exhibited to inform them about the zoonotic nature of Q fever. Explain that further action is necessary to protect the human population from Q fever.
- Communicate to the organisers and animal owners that NO female animals should be exhibited from the 100th day of pregnancy until the 7th day after birth/abortion.
- Immediately PRIOR to the event, conduct a PCR test on female animals between 8 and 90 days post-birth that are to be used for show purposes, to rule out/detect ongoing pathogen shedding.

If the sample does NOT provide direct pathogen detection, the animal may be allowed to participate at the event.

NOTE:

- This status is limited in time and applies ONLY to the current period of time.

If the sampling provides a direct pathogen detection, reporting might be mandatory depending on national legislation.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in Livestock**

→ Use the **Q Fever Information Flyer for "Animal Owners & Veterinarians"**

SCENARIO 9: ANIMAL EXPERIMENTS WITH RUMINANTS

Studies involving ruminants pose a risk of *C. burnetii* infection for staff in animal research facilities. For example, an outbreak of Q fever in Berlin (Germany) in 2021 was linked to an experiment on pregnant sheep (Ostach et al. 2025). To minimise this risk, close collaboration between owners, animal traders, animal research facilities and federal state/private laboratories is essential.

Figure 12 shows a possible process flow for animal experiments with ruminants.

The process steps for all parties involved are discussed in detail below, and recommendations for the Offices for Veterinary Affairs are given based on the outbreak situation in Germany. Adaption might be necessary if applied abroad.

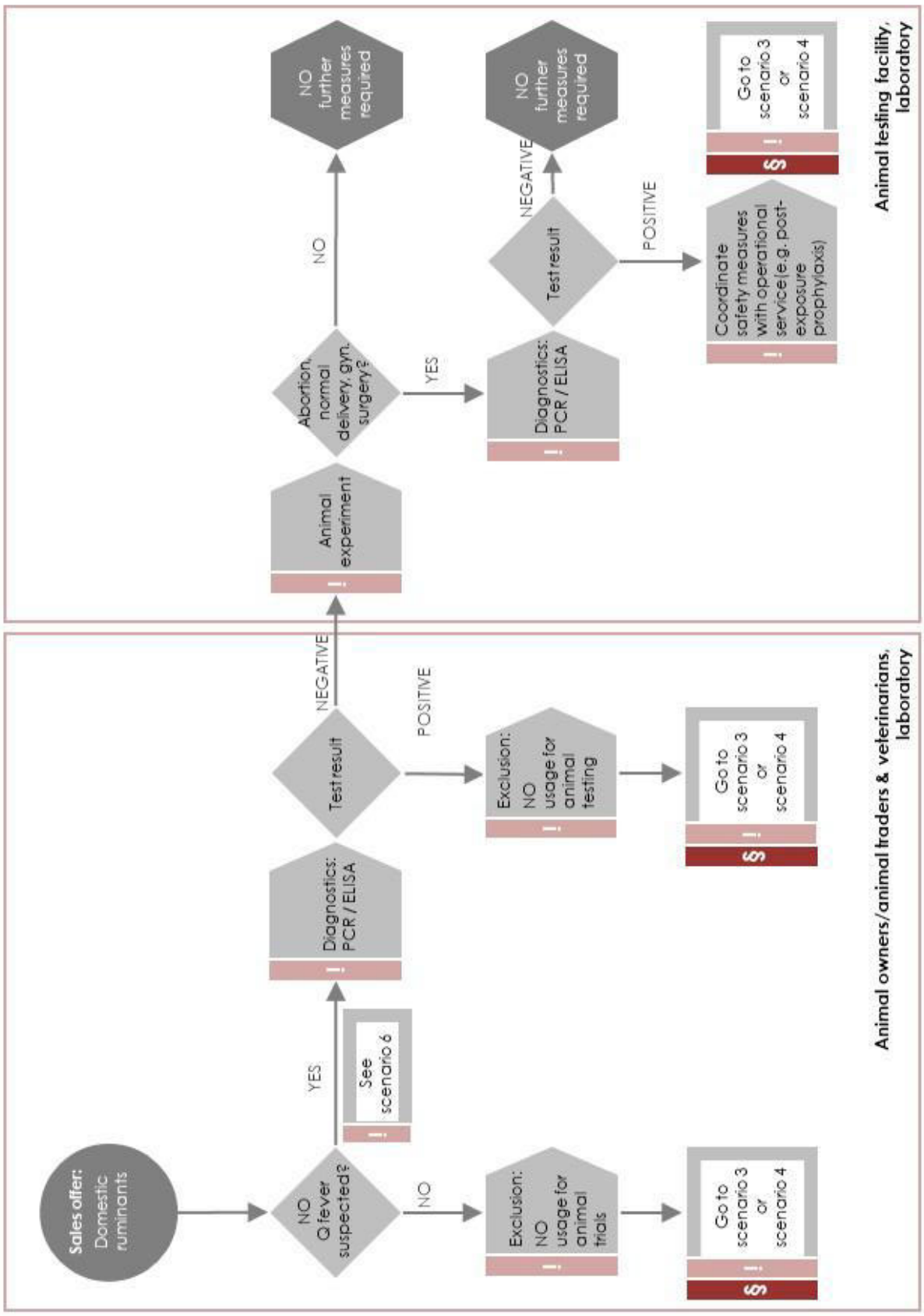


Figure 12 Process Flow Scenario 9: Animal Experiments with Ruminants

» Animal Owners/Traders and Laboratories

Q Fever symptoms in domestic ruminants (sheep, goats and cattle) can vary widely. In particular, in sheep and cattle, an infection with *C. burnetii* can occur without clinical signs of illness. In contrast, goats often experience abortions. Generally, abortions, stillbirths, births of weak lambs, kids or calves, and retarded expulsion of the afterbirth can be associated with a *C. burnetii* infection in domestic ruminants. Q fever is thus a nonspecific clinical disease that should be considered as a differential diagnosis in cases of reproductive disorders and diagnostically clarified. Pathogen shedding can occur irregularly through birth fluids, milk and faeces.

As even asymptomatic animals can shed the pathogen, it is strongly recommended to use animals only from "Livestock not suspected of Q fever" for studies. [See also page 48: Scenario 6]. In addition, these animals should be tested by PCR and serologically for Q fever. PCR testing can confirm or exclude acute pathogen shedding, whereas serological testing for Coxiella antibodies may not reliably detect acute infections but may indicate previous infections. The vaccination status of the animals must also be considered in serological testing, as there is no DIVA vaccine available for *C. burnetii*. It is strongly recommended that only animals that have tested negative (both PCR and serological) for Q fever be used in animal experiments.

» Animal Research Facilities

To minimise the risk of *C. burnetii* infection among staff involved in animal experiments with ruminants, it is strongly recommended to use animals only from "Livestock not suspected of Q fever" for studies. [See also page 48: Scenario 6] In addition, these animals should be tested by PCR and serologically for Q fever. PCR testing can confirm or exclude acute pathogen shedding, whereas serological testing for Coxiella antibodies may not reliably detect acute infections but may indicate previous infections. The vaccination status of the animals must also be considered in serological testing, as there is no DIVA vaccine available for *C. burnetii*. It is strongly recommended that only animals that have tested negative (both PCR and serological) for Q fever be used in animal experiments.

If pregnant females are used in the experiment, it is strongly recommended that PCR (using vaginal swabs/uterine swabs from Caesarean section) and serological testing for Q fever be performed in case of abortion, normal delivery or gynaecological intervention. [See also page 7: DIAGNOSTICS/Animal]. In case of a positive result, the occupational health authority should be informed and the need for post-exposure prophylaxis for all contact persons should be evaluated.

» Office for Veterinary Affairs

In Germany Q fever or the detection of *C. burnetii* is notifiable in cattle, sheep and goats. If a notifiable disease is diagnosed, reporting the occurrence of the disease or the pathogen immediately to the competent authority under state law is mandatory, specifying the date of detection, the affected animal species, the affected herd and the district or independent town/city. [See also page 14: TKrMeldpflV, TierGesG].

If you receive information about antibody detection, further action is strongly recommended.

→ For further action proceed to **Scenario 4: *C. burnetii* Antibody Detection in Livestock**

In case the sampling results in a direct pathogen detection, reporting is mandatory depending on national legislation.

→ For further action proceed to **Scenario 3: *C. burnetii* Pathogen Detection in Livestock**

In addition, immediately inform the medical department responsible for occupational safety to investigate the suspected accident (reportable incident).

Q-GAPS SUPPORT MATERIAL

(adaption might be necessary if applied abroad)

The Q-GAPS support material was developed to support interdisciplinary collaboration against Q fever for staff in health authorities and Offices for Veterinary Affairs. It is freely available on the Q-GAPS website **(https://q-gaps.de/en/q-fever-information.html)** and can be used as templates. It may need to be individually adapted to the outbreak situation, or if it is to be applied abroad.

The support material includes:

- **Q Fever Questionnaire "Outbreak Investigation Human Population"**
- **Q Fever Questionnaire "Outbreak Investigation Livestock"**
- **Template Q Fever Press Release**
- **Q Fever Information Flyer**

Q FEVER QUESTIONAIRE: OUTBREAK INVESTIGATION HUMAN POPULATION

This Q fever questionnaire has been developed for public health authorities to assist colleagues in outbreak investigations. The questionnaire can be freely used as a template.

This chapter contains

- a cover letter for participants
- a privacy policy
- the questionnaire
- notes on data analysis

Please ensure that the text is adapted to the local outbreak situation using the *text fields*.

The questionnaire can be downloaded from the Q-GAPS website **www.qfever.info**.

Responsible public health authority
Street, house number
Postcode, town/city

Date

Q fever questionnaire: Outbreak investigation population

Dear citizens,

Due to cases of Q fever **in the district/independent town/city...** in **people/animals**, we are conducting an outbreak investigation.

Q fever is a disease caused by the bacterium *Coxiella burnetii*. Both animals and humans can contract Q fever, with sheep, goats and cattle being the most common sources of human infection. These animals shed the pathogen in large quantities with the birth fluids and afterbirth during birth or abortion.

Humans can become infected by inhaling aerosols and dust containing the pathogen. Direct contact with the animals is not necessary for infection. In humans, infection with *Coxiella burnetii* is often asymptomatic, but about 40% of infected individuals experience flu-like symptoms, including severe retroorbital headache, high fever and fatigue. A chronic course of ill-health from Q fever is also possible, with individuals with pre-existing conditions and pregnant women being particularly susceptible.

In sheep and goats, infection with *Coxiella burnetii* can be completely asymptomatic, which can complicate outbreak investigations. More information on Q fever is available at www.qfever.info

To help prevent further cases of Q fever in the community and to better understand the cause of infection, we would like to ask you to answer the following questions. Please return this questionnaire, together with the completed and signed Data Protection Declaration to us.

Yours faithfully,

Name and signature of responsible staff member

Privacy Policy

The purpose of this survey is to conduct an outbreak investigation of Q fever *in the district/in the independent town or city of ....*. Participation in this survey is voluntary.

The personal data collected will be used confidentially by staff of the relevant health authority or Office for Veterinary Affairs for the purposes of the survey. For scientific purposes, the data can only be provided in pseudonymised form, without any possible reference to a specific person.

The data will be stored by the competent health authority or Office for Veterinary Affairs for the period *from ... to ...* You have the right to access your personal data, to request deletion of your data, and to withdraw your consent at any time, in accordance with applicable data protection legislation *in accordance with Art. X (Legislation, Country)*.

Person responsible for the survey

Name of the person responsible for the survey

Street, house number

Postcode, city

Phone number

Data Protection Officer

Name of Data Protection Officer

*Street, house number *

Postcode, town/city

Phone number

I hereby agree to the above privacy policy.

_____

Date Signature Survey Participant

Survey Participant

Name of survey participant

Street, house number

Postcode, town/city

Phone number

General Practitioner

Questionnaire for *C. burnetii* infected individuals

Identification information:

_____

Please mark the appropriate answer and provide details for the questions.
Please consider the last 3 months for your responses.

1. When and how were you diagnosed with acute Q fever?

☐ By pathogen detection on _____ (date)

☐ By antibody detection on _____ (date)

☐ Acute Q fever was not diagnosed

☐ Don't know

☐ No information

2. Did you and/or individuals in your household have contact with the following types of animals?

Sheep	☐ Yes	☐ No	☐ Don't know	☐ No information
Goats	☐ Yes	☐ No	☐ Don't know	☐ No information
Cattle	☐ Yes	☐ No	☐ Don't know	☐ No information
Bison/Buffalo	☐ Yes	☐ No	☐ Don't know	☐ No information
Alpaca/Llama	☐ Yes	☐ No	☐ Don't know	☐ No information
Cats (outdoor)	☐ Yes	☐ No	☐ Don't know	☐ No information
Dogs	☐ Yes	☐ No	☐ Don't know	☐ No information
Other animal types	☐ Yes	☐ No	☐ Don't know	☐ No information

If yes, which ones? _____

If you and/or individuals in your household had contact with at least one type of animal from Question No. 2, please proceed to Question No. 2.1. If you and/or individuals in your household had NO contact with at least one type of animal from Question No. 2, please proceed to Question No. 3.

2.1. When and where did you and/or individuals in your household have contact with the above-mentioned types of animals?

☐ On _____ (date) / _____ (location)

☐ Don't know

☐ No information

2.2. Did you and/or individuals in your household have contact with the above-mentioned types of animals due to your <u>occupational activities</u>?

☐ Yes, and specifically due to:

- ☐ Commercial farming
- ☐ Veterinary work
- ☐ Laboratory work
- ☐ Hunting
- ☐ Slaughtering/Meat processing
- ☐ Wool processing
- ☐ Other: _____

☐ No

☐ Don't know

☐ No information

2.3. Did you and/or individuals in your household have contact with the above-mentioned types of animals due to your <u>non-occupational activities</u>?

☐ Yes, and specifically due to:

- ☐ Hobby farming
- ☐ Private processing of animal products (raw milk, wool, …)
- ☐ Visiting a farm ☐ Visiting a farmers' market
- ☐ Attending an open farm day/agricultural show
- ☐ Visiting a (petting) zoo
- ☐ Visiting a circus
- ☐ Attending an animal breeding exhibition
- ☐ Hunting
- ☐ Other: _____

☐ No

☐ Don't know

☐ No information

2.4. Did you and/or individuals in your household have contact with the above-mentioned types of animals due to a <u>therapeutic or educational event</u>?

☐ Yes, specifically during an event:

- ☐ At nursery/kindergarden
- ☐ At school
- ☐ At a care home
- ☐ At a facility for people with disabilities
- ☐ Other: _____

☐ No

☐ Don't know

☐ No information

2.5. Do you live in <u>close proximity</u> to the above-mentioned types of animals?

☐ Yes, and the distance is (km): _____

☐ No

☐ Don't know

☐ No information

2.6. Did you and/or individuals in your household have contact with the above-mentioned types of animals for a reason <u>not previously mentioned</u>?

☐ Yes, and the distance is (km): _____

☐ No

☐ Don't know

☐ No information

3. Do you consume <u>raw milk and/or raw milk products</u> in your household?

☐ Yes

☐ No

☐ Don't know

☐ No information

Evaluation of Questionnaire:
Outbreak Investigation in the Human Population

The purpose of this questionnaire evaluation is to conduct an outbreak investigation for Q fever in a specific district or town/city. [See also page 26: Scenario 2]. Participation in this survey is voluntary. The personal data collected will be evaluated confidentially by staff of the relevant health authority and, if applicable, Office for Veterinary Affairs for the purposes of the survey. For scientific purposes, the data can only be provided in pseudonymised form, without any possible reference to a specific person. The data will be kept by the relevant health authority or a specified period of time. Survey participants have the right to access their personal data, to request deletion of their data, and to withdraw their consent at any time, in accordance with applicable data protection legislation **in accordance with Art. X (Legislation, Country)**.

Patient responses may provide information on the risk of *C. burnetii* infection from a particular livestock.

Recommendation for the Health Authority and Office for Veterinary Affairs

- Plot the patients' location on a map. Contact information for general practitioners would be helpful should they need to be contacted.
- Note that an outbreak investigation will only be carried out if more than one case of acute Q fever is diagnosed.
- Use the date of diagnosis and antibody titre to narrow down the time of infection, allowing for an incubation period of approximately 1-3 weeks. This estimation is crucial to identify a possible source of the pathogen.
- Note that in Germany infected sheep have been identified as the main cause of human Q fever. However, goats and cattle also shed large amounts of the bacterium and have caused significant outbreaks abroad. In addition, other domestic and wild animals can shed the pathogen, especially dogs and cats that have contact with sheep, goats or cattle and their excretions (e.g. afterbirth, faeces, urine, etc.). These species may also shed Coxiella during birth.
- Map the locations where contact has occurred.

Identify potential risk farms:

- Herds/flocks which the patients with acute Q fever had close contact with prior to infection, whether intentional or unintentional.
- Bear in mind that …

  … births and abortions in domestic ruminants are associated with human infection, with an incubation period in humans of approximately 1–3 weeks.

… that dust containing pathogens can be spread by the wind. Sheep and goats shedding pathogens over a distance of several kilometres may pose a risk of infection to humans.

… that the pathogen is environmentally resistant (several months to years).

… that a farm may have different locations or migration routes.

… that individuals involved in events (therapeutic or educational) with animals may be at increased risk of *C. burnetii* infection.

… that family members or colleagues of patients may also be infected.

… that people in close contact with patients may also be infected.

NOTE:

- Be aware that the analysis of the questionnaire is only suitable for identifying potential sources of infection. Q fever diagnosis must ALWAYS be carried out in addition to questionnaire analysis.

- Ensure that the potential involvement of animal owners is not stigmatising. Clearly communicate your approach to patients and animal owners.

Q FEVER QUESTIONNAIRE: ANIMAL OUTBREAK INVESTIGATION

This Q fever questionnaire has been developed for the Office for Veterinary Affairs to assist colleagues in outbreak investigations. The questionnaire can be freely used as a template. If other persons are found to be involved in the management of the livestock (question 5), it is advisable to communicate relevant information to the persons concerned and to the health authority.

This chapter contains

- A cover letter for participants
- A data protection declaration
- The questionnaire
- Guidelines for data evaluation

Please ensure that the text is adapted to the local outbreak situation using the *text fields*.

The questionnaire including the covering letter and data protection declaration can be downloaded from the Q-GAPS website **www.qfever.info**.

Responsible Office for Veterinary Affairs
Street, House Number
**Postcode*, Town/City*
Date

Q Fever Questionnaire: Livestock Outbreak Investigation

Dear livestock owner,

Due to **human/animal** cases of Q fever **in the district/town/city of…** we are conducting an outbreak investigation.

Q fever is a disease caused by the bacterium *Coxiella burnetii*. Both animals and humans can be affected by Q fever, with sheep, goats and cattle being the most common sources of human infection. These animals shed the pathogen in large quantities during birth or abortion, with birth fluids and afterbirth.

Humans can become infected by inhaling aerosols and dust containing the pathogen. Direct contact with the animals is not necessarily required for infection. In humans, infections with *Coxiella burnetii* are often asymptomatic, but about 40% of infected individuals may experience flu-like symptoms such as severe retroorbital headache, high fever and fatigue. Chronic Q fever is possible and people with pre-existing conditions and pregnant women are particularly susceptible.

In sheep and goats and cattle, infection with *Coxiella burnetii* can be completely asymptomatic, so owners are often unaware that their animals are shedding the pathogen. However, abortions, stillbirths, births of weak offspring and delayed expulsion of afterbirths should be taken seriously, as these are possible signs of Q fever in your animals. More information on Q fever can be found at www.qfever.info.

To prevent possible infection with the Q fever pathogen in the population, please answer the following questions and return them to us with the completed and signed Data Protection Declaration.

Yours faithfully,

Name and signature of responsible staff member

Privacy Policy

The purpose of this survey is to conduct an outbreak investigation of Q fever **in the district/in the independent town or city of ....**. Participation in this survey is voluntary.

The personal data collected will be used confidentially by staff of the relevant Office for Veterinary Affairs and, if applicable, the health authority for the purposes of the survey. For scientific purposes, the data can only be provided in pseudonymised form, without any possible reference to a specific person.

The data will be stored by the competent health authority or Office for Veterinary Affairs for the period **from ... to ...** You have the right to access your personal data, to request deletion of your data, and to withdraw your consent at any time, in accordance with applicable data protection legislation **in accordance with Art. X (Legislation, Country)**.

Responsible for the survey:

Name of the person responsible for the survey

Street, house number

Postcode, town/city

Phone number

Data Protection Officer

Name of Data Protection Officer

**Street, house number **

Postcode, town/city

Phone number

I hereby agree to the above privacy policy.

_____

Date Signature Survey Participant

Survey Participant

Name of survey participant

Street, house number

Postcode, town/city

Phone number/Fax

Veterinarian

Shepherd/Sheep shearer

Livestock Owner Questionnaire

Identification Information: _____

Please provide information about your livestock.

1. What animal species and how many animals per species do you keep?

Sheep	☐ Yes	☐ No	☐ Don't know	☐ No information
Number of ewes	_____			
Number of yearlings	_____			
Number of lambs	_____			
Number of rams	_____			
Goats	☐ Yes	☐ No	☐ Don't know	☐ No information
Number of does	_____			
Number of doelings	_____			
Number of kids	_____			
Number of bucks	_____			
Cattle	☐ Yes	☐ No	☐ Don't know	☐ No information
Number of cows	_____			
Number of heifers	_____			
Number of calves	_____			
Number of bulls	_____			
Bison/Buffalo	☐ Yes	☐ No	☐ Don't know	☐ No information
Total number	_____			
Alpaca/Llama	☐ Yes	☐ No	☐ Don't know	☐ No information
Total number	_____			
Cats	☐ Yes	☐ No	☐ Don't know	☐ No information
Total number	_____			

Dogs ☐ Yes ☐ No ☐ Don't know ☐ No information

Number of livestock guardian dogs _____

Number of sheepdogs _____

Other Animal Species ☐ Yes ☐ No ☐ Don't know ☐ No information

If yes, which ones? _____

Please check the appropriate answer and provide information for the questions.

2. Are there any births taking place in your livestock?

☐ Yes

☐ No

☐ Don't know

☐ No information

If you answered "Yes" to Question No. 2, please proceed to Question No. 2.1.

If you did NOT answer "Yes" to Question No. 2, please proceed to Question No. 3.

2.1. How many births occur in what time frame?

☐ Sheep Number: _____ Time frame: _____

☐ Goats Number: _____ Time frame: _____

☐ Cattle Number: _____ Time frame: _____

☐ Other, specify animal(s): _____

Number: _____ Time frame: _____

2.2. Do animals in your herd/flock show any signs of infertility, abortion, stillbirth, birth of weak lambs/kids/calves, and/or retained placenta?

☐ Yes Number: _____ Time frame: _____

☐ No

☐ Don't know

☐ No information

2.3. Do births occur outdoors?

☐ Yes

☐ No

☐ Don't know

☐ No information

2.4. Do you dispose of afterbirths via by-product operating plants?

☐ Yes

☐ No

☐ Don't know

☐ No information

3. Do you migrate with your sheep flock (transhumance)?

☐ Yes _____ (Migratory route)

☐ No

☐ Don't know

☐ No information

4. Where have your animals been located in the last 12 weeks?

Locations: _____

5. Do other individuals take care of your livestock?

☐ Yes

☐ No

☐ Don't know

☐ No information

6. Do you sell products directly from your farm?

☐ Yes

☐ No

☐ Don't know

☐ No information

7. Has anyone from outside the farm had contact with your livestock at public events? For example, farmers' markets, farm open days, sheep shearing events etc.?

☐ Yes

☐ No

☐ Don't know

☐ No information

8. Has <u>anyone from outside the farm</u> had contact with your livestock at <u>educational events</u>? For example, nursery or school groups, or farm visitors etc.?

☐ Yes

☐ No

☐ Don't know

☐ No information

9. Has your livestock been <u>vaccinated against *C. burnetii*</u>?

☐ Yes Species: _____ Date: _____

☐ No

☐ Don't know

☐ No information

10. Has there been a <u>confirmed case of Q fever</u> in your livestock?

☐ Yes Species: _____ Date: _____

☐ No

☐ Don't know

☐ No information

Evaluation of Questionnaire:

Outbreak Investigation in the Livestock

The purpose of this questionnaire evaluation is to conduct an outbreak investigation for Q fever in a specific district or town/city. [See also page 26 Scenario 2]. Participation in this survey is voluntary. The personal data collected will be evaluated confidentially by staff of the relevant Office for Veterinary Affairs and, if applicable, the health authority for the purposes of the survey. For scientific purposes, the data can only be provided in pseudonymised form, without any possible reference to a specific person. The data will be kept by the relevant Office for Veterinary Affairs for a specified period of time. Survey participants have the right to access their personal data, to request deletion of their data, and to withdraw their consent at any time, in accordance with applicable data protection legislation **in accordance with Art. X (Legislation, Country)**.

The responses of livestock owners may provide information on the risk of *C. burnetii* infection in the human population from a particular livestock.

Recommendation for the Health Authority and Office for Veterinary Affairs

- Map the locations of livestock herds or migratory sheep routes and include the locations of human Q fever cases. Contact details for veterinarians, shepherds and sheep shearers are helpful in the case of any joint action planning.
- Consider the presence and number of females/offspring as a potential indicator of reproductive events in livestock.
- Consider the number of animals and the composition of the herds when planning interventions (effort, feasibility, costs, etc.).
- Be aware that infected animals can shed large amounts of the pathogen, especially during birth or abortion. In addition, shedding occurs through milk, faeces and urine. Births and abortions in ruminants can be associated with human infection. Calculate the time between births in livestock herds and the occurrence of human cases of Q fever:

→ *The incubation period in humans is approximately 1-3 weeks.*

- Contact all persons responsible for livestock and inform them of the zoonotic nature of Q fever. Advise these individuals to be tested for Q fever.
- As the agent can be spread by contaminated dust and wind, sheep and goats shedding the agent within a few kilometres pose a risk of infection to humans. In addition, the pathogen is highly environmentally resistant (for several months to years).
- Pasteurisation inactivates the pathogen.
- Check whether infected people have attended events where animals from the farm have been on show.
- Remember that vaccination of animals reduces the shedding of the pathogen but cannot prevent it completely. Vaccination of animals often leads to seroconversion, so a positive antibody test may be due to vaccination.

- Note that a previous detection of Q fever does not provide information on the current situation in the herd. Therefore, up-to-date diagnostic is recommended. Consider the vaccination status of the herd/flock.

NOTE:

- Be aware that the analysis of the questionnaire is only suitable for identifying possible sources of infection. Q fever diagnosis must ALWAYS be carried out in addition to the analysis of the questionnaire.
- Ensure that stigmatisation of livestock owners is avoided. Clearly communicate your approach to patients and animal owners.

SAMPLE Q FEVER PRESS RELEASE

The Q Fever press release can be used freely as a template or you can copy and paste the text into your own template to use for your awareness raising activities.

Please pay attention to the text fields in the template. These need to be adapted to the local outbreak situation.

[Date]

Q fever **has occurred in the district/town/city of ...**.

Information on symptoms and precautions

Q fever is a disease caused by the bacterium *Coxiella burnetii*. Both animals and humans can become infected with and shed *Coxiella burnetii*. Sheep, goats and cattle are the most common source of infection for humans. They shed large amounts of the bacteria in birth fluid and afterbirth, particularly during birth or abortion. However, pets such as cats and dogs and wild animals can also shed the pathogen. Humans become infected very quickly by inhaling tiny airborne droplets and dust containing the pathogen. Direct contact with the animals is not necessary for infection. Human-to-human transmission is generally very rare.

In humans, infections with *Coxiella burnetii* are often asymptomatic, but many patients show flu-like symptoms with severe retroorbital headache, high fever and fatigue. A chronic course of ill-health from Q fever is possible. People with pre-existing conditions and pregnant women are particularly at risk. If you or a member of your family has any of the above symptoms, please contact your veterinarian or local health authority. A test for Q fever can be carried out using a blood sample. If Q fever is detected, it is recommended that the disease is specifically treated.

In animals, infection with *Coxiella burnetii* can be completely asymptomatic, so without regular testing, animal owners may not be aware that their animals are shedding the pathogen. However, fertility problems and abortions should be taken seriously as these are possible signs of Q fever. If your livestock shows signs of Q fever, have them examined by your veterinarian or contact your local Office for Veterinary Affairs, Q fever or the detection of *C. burnetii* may be mandatory depending on national legislation, especially in cattle, sheep and goats. If Q fever is detected in your livestock, the spread of infection to other animals is a risk.

You can find more information about Q Fever at www.qfever.info.

Q FEVER INFORMATION FLYERS

Q fever information flyers have been published for various target groups in different languages (German, English, French, Portuguese, Spanish) and can be used by you for awareness raising activities. On the following pages, you will find images of the flyers (front and back).

You can download the flyers from the Q-GAPS website **www.qfever.info**.

Here you will find info flyers for medical doctors, the general population, animal owners and veterinarians.

QFS/Post Q Fever Fatigue Syndrome

More frequent than expected

After the acute phase of Q fever persisting clinical symptoms occur in up to 40 % of cases. Patients also suffer from impairments of quality of life, lasting 12-24 months.

Most frequent symptoms:

- Fatigue
- Significant restrictions in carrying out everyday activities of daily living
- Lack of concentration
- Muscle aches
- Night sweats
- Also, the previous level of performance and working is not achieved after one year

Therapeutically, this symptom complex is a challenge, as the illness cannot be influenced by administration of antibiotics. Therefore, psychosomatic and behavioural approaches to treat this condition are recommended.

Clinical Relevance

After acute Q fever infection there is a relevant risk for medium- to long-term impairments of quality of live and performance.

Diagnose Q fever at an early stage and treat it to prevent long-term effects.

Further Information

Q-GAPS

Q-Fever **G**erm**A**n Interdisciplinary **P**rogram for Re-**S**earch

Coordinator: Prof. Dr. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de

Homepage: www.qfever.info
Email: info@q-gaps.de

Contact Q Fever Infections

Please contact your national or local health department or the relevant reference laboratory.

Issued by: Bundeswehr Institute for Microbiology, Munich
As of: January 2026

This flyer was financed by the Federal Ministry of Education and Research (project number 01KI1726A-G) as part of the National Network of Research of Zoonotic Infectious Diseases.

Q Fever

More Than A Flu

Information on Q Fever in Humans

SPONSORED BY THE
Federal Ministry of Education and Research

What is Q Fever?

Q fever is an endemic zoonotic disease in Germany and worldwide, caused by the bacterium *Coxiella (C.) burnetii*. Humans get infected mainly aerogenously by inhaling infectious material shed by animals (e.g. sheep, goats, cattle) or significantly less via contaminated food products (unpasteurized milk/milk products).
Q fever can be easily mixed up with flu due to the unspecific symptoms.

What is Q-GAPS?

Q-GAPS (**Q**-Fever **G**erm**A**n Interdisciplinary **P**rogram for Re**S**earch) is an interdisciplinary and unique consortium from different disciplines (medical doctors, veterinarians and biologists) with extraordinary expertise, competence and knowhow when it comes to the Q fever pathogen *C. burnetii* which will implement the "One Health" approach for Q fever.

Aim: Q-GAPS has committed itself to investigate unsolved questions relating to the epidemiology, immunology, pathogenesis, surveillance and control of *Coxiella burnetii* and to provide a knowledge network comprising all aspects of infection with *C. burnetii*.
With this flyer, Q-GAPS wishes to establish a general point of reference for medical doctors.

Q Fever Diagnostics

Serological detection of specific antibodies against both phase variants of *C. burnetii* by means of an immunofluorescence test (IFT) or ELISA is the gold standard in humans. An acute infection can be distinguished from a chronic one due to the height of antibody titre (IgG and IgM, phase I and II). However, reactive results in ELISA should be principally confirmed by IFT. In addition, PCR should be performed to detect specific Coxiella DNA. PCR has proved effective, as specific antibodies cannot be detected when there is an acute infection, especially in the early phase of the disease, and the infection could be undetected or is not diagnosed until a second serum is tested.

Acute Q Fever

Clinics in Humans

After an incubation period of 1 – 3 weeks about 40 % of infected people show clinical symptoms, with the infection being asymptomatic in all other cases. Clinical symptoms can be flu-like symptoms like heavy retroorbital headache, fever, weariness, aching limbs and chills.

Manifestations in organs such as atypical pneumonia, granulomatous hepatitis can be observed in about 10 % of cases. The infection very rarely results in a myocarditis, pericarditis or meningoencephalitis.

An acute infection and chronic Q fever can increase the risk of still birth (mostly when there is an initial infection in the first trimester of pregnancy), a premature birth, placentitis or low birth weight. A transmission of the pathogen to the foetus in the womb resulting in long term effects for the child has not been described, as yet.

Therapy

First line medication: doxycycline (Dosage: 2 x 100 mg/day, 14 days).

In case of pregnancy: cotrimoxazol (Dosage: 800mg/160mg, 2x daily).

Alternative antibiotics: macrolids (azithromycin, clarithromycin) or fluoroquinolones.

A serological follow-up of patients with acute Q fever within a year to exclude chronification is recommended.

A *C. burnetii* infection has to be excluded in the case of all culture negative endocarditis, aortic / illiacal changes and before cardiac surgeries.

Chronic Q Fever

Diagnosed too rarely and too late

An acute *C. burnetii* infection leads to chronical Q fever in 1 % of cases (after more than 6 months of persistent infection), and frequently manifests clinically in the form of an endocarditis. Less often, for example granulomatous hepatitis or osteomyelitis occurs. Frequently these disorders and symptoms occur many years later after a symptom-free interval. Chronical disease requires extended therapy (several years) and mortality is associated with a high complication rate of up to 40 % when not treated.

Risk groups

Patients with pre-existing cardiovascular diseases or severe immune suppression show a significantly increased risk for a transition to chronic *C. burnetii* infection.

Thus, according to a study from the Netherlands cases with aortic/illiacal changes and other vascular endothelium changes in combination with acute Q fever show a 30 % risk of developing chronical Q fever.

Recommendations

After acute Q fever a 12-months antibiotic prophylaxis with doxycycline in combination with hydroxychloroquine can prevent the development of chronification in the risk groups mentioned above.

Regular (at least annual) follow-ups in patients of risk groups with high phase I specific IgG antibodies are recommended.

When chronification (chronic Q fever) has already occurred a combined therapy of at least 18-24 months with e.g. doxycycline and hydroxychloroquine is carried out.

In the case of chronic Q fever regular follow-ups are also required.

TIP Further information on Q fever: www.qfever.info or info@q-gaps.de

Figure 13 Flyer for Medical Doctors, English (copyright www.q-gaps.de)

Post Q Fever Fatigue Syndrome

Possible even in the case of a mild course of the disease

After the acute phase of Q fever persisting clinical symptoms occur in up to 40 % of cases. Patients also suffer from impairments of quality of life, lasting 12-24 months.
The following ailments can occur:

Most frequent symptoms:

- Fatigue
- Significant restrictions in carrying out everyday activities of daily living
- Lack of concentration
- Muscle aches
- Night sweats
- Also, the previous level of performance and working is not achieved after one year

Therapeutically, Post Q Fever Fatigue Syndrome is a challenge, because the illness cannot be influenced by administration of antibiotics. Therefore, psychosomatic and behavioural approaches to treat this condition are recommended.

After an acute Q fever infection always bear in mind the possibility of Post Q Fever Fatigue Syndrome.

Further Information

Q-GAPS

Q-Fever **Ger**m**A**n Interdisciplinary **P**rogram for Re**S**earch

Coordinator: Prof. Dr. Anja Lührmann,
Anja.Luehrmann@uk-erlangen.de

Homepage: www.qfever.info
Email: info@q-gaps.de

Contact Q Fever Infections

Please contact your national or local health department or the relevant reference laboratory.

Issued by: Public Health Department of Baden-Wuerttemberg & Bundeswehr Institute for Microbiology, Munich

As of: January 2026

This flyer was financed by the Federal Ministry of Education and Research (project number 01KI1726A-G) as part of the National Network of Research of Zoonotic Infectious Diseases.

Q Fever

More than a Flu

Information for the General Public on Q Fever in Humans

Q Fever ResearchGerman Interdisciplinary Program Q-GAPS

SPONSORED BY THE
Federal Ministry of Education and Research

What is Q Fever?

Q fever is a disease caused by the bacterium *Coxiella (C.) burnetii*. Humans as well as animals can get ill from Q fever (so-called zoonosis).

In Germany, humans mainly get infected by the pathogen via infected sheep or goats. Cattle, cats and other species are less frequently the source of Q fever infections in humans.

Infected animals shed *C. burnetii* in large quantities especially when giving birth or during abortion. Despite shedding the pathogen sheep and goats do not always show signs for an infection.

Humans can get easily infected by inhaling dust particles containing bacteria. *C. burnetii* is spread by the wind, therefore direct contact with an infected animal is not necessarily required for transmission.

Humans can be easily infected by inhaling dust containing the pathogen.

Acute Q Fever

After an incubation period of 1 – 3 weeks about 40 % of infected people show clinical symptoms, with the infection being asymptomatic in all other cases (60 %).

Often flu-like symptoms like:

- Fever
- Aching limbs
- Chills
- Retroorbital headache (behind the eyes)

Rarely:

- Pneumonia
- Inflammation of liver

Acute Q Fever is frequently asymptomatic/with minor symptoms. Well treatable with antibiotics. Bear in mind risk groups and the possibility of chronic forms.

Should you or your family members show any ailments mentioned above, contact your general practitioner or the local health authorities (bear in mind **risk groups**).
Q fever can be detected by means of a blood test.

When Q fever is detected the disease can be targeted effectively by antibiotics.

For further information see www.q.fever.info or write to info@q-gaps.de

Chronical Q Fever

After 6 months up to 10 years an acute *C. burnetii* infection can lead to chronical Q fever in one percent of cases. Chronical disease mostly requires therapy with antibiotics for several years and mortality is associated with a high complication rate of up to 40 % when not treated.

Typical signs of chronification are:

Frequently:
- Endocarditis

Rarely:
- Inflammation of liver

Risk groups

Due to their profession there is a particular risk of being infected by *C. burnetii* for people being close to sheep, goats, cattle or materials of these animals.

For pregnant women an acute infection and chronic Q fever can increase the risk of still birth or premature birth as well low birth weight. A transmission of the pathogen to the foetus in the womb resulting in long term effects for the child has not been described, as yet.

Patients with pre-existing cardiovascular diseases or severe immune suppression (suppression of the body's own defence system) show a significantly increased risk for a transition to chronic *C. burnetii* infection.

Diagnose Q fever at an early stage and treat it to prevent long-term effects.

Figure 14 Flyer for the General Public, English (copyright www.q-gaps.de)

Q Fever in humans

People get infected by breathing in dust or airborne droplets containing the bacterium *Coxiella burnetii* when having direct or indirect contact with infected sheep and goats.

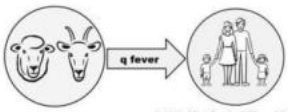
After an infection with *Coxiella burnetii* 60 % of infected people are asymptomatic, however 40 % show clinical symptoms for Q fever such as:

- Flu-like symptoms like e.g. severe retroorbital headache, high temperature, weariness, aching limbs, chills
- Pneumonia
- Inflammation of liver

If you believe you or your family members are suffering from any of the above symptoms, consult your general practitioner or the local health department. Q fever can be detected by means of a blood test.
When Q fever is detected the disease can be Effectively targeted by antibiotics.

Testing for Q fever as well as early and targeted therapy in humans are important .

Protect your health and your family's health !



© VKA / Fotolia © VEGE.co / Fotolia

Who can I turn to?

Q-GAPS

Q-Fever GermAn Interdisciplinary Program for ReSearch

Coordinator: Prof. Dr. Anja Lührmann,
Anja.Luehrmann@uk-erlangen.de

www.qfever.info; info@q-gaps.de

Q fever in sheep & goats

Please contact your national or local Office for Veterinary Affairs or the relevant reference laboratory.

Q Fever in humans

Please contact your national or local health department or the relevant reference laboratory.

Issued by: University of Veterinary Medicine Hannover, Foundation; Department of Biometry, Epidemiology and Information Processing; Clinic for Swine and Small Ruminants, Forensic Medicine and Ambulatory Service

As of: January 2026

This flyer was financed by the Federal Ministry of Education and Research (project number 01KI1726A-G) as part of the National Network of Research of Zoonotic Infectious Diseases.

Q-Fever

A Risk for Humans and Animals

© Zummolo/Fotolia

Information on Q Fever in Humans & Small Ruminants

SPONSORED BY THE

Federal Ministry of Education and Research

Q Fever

What is it all about?

The bacterium *Coxiella burnetii* is a pathogen which causes a human and animal disease called Q fever or coxiellosis .

The pathogen can be transferred from animals to humans.
In most countries, humans mainly get infected by the pathogen during lambing season. Cattle and other species are less frequently the source of Q fever infections in humans.

Q fever in sheep & goats

Sheep and goats can get infected with *Coxiella burnetii* by inhaling dust or droplets containing bacteria in the environment or get infected via other routes.

Infected small ruminants shed *Coxiella burnetii* in large quantities together with birth fluids and the afterbirth, especially when giving birth. In addition, there is shedding of bacteria via milk, urine and faeces.

Especially sheep can experience an infection with *Coxiella burnetii* without any clinical signs of disease. However, the following symptoms indicative of Q fever should be taken seriously in small ruminants:

- Abortion
- Stillbirths
- Delivery of weak offspring (lambs/ calves)
- Delayed expulsion of the afterbirth

Q fever in my herd/flock - What to do if Q fever is suspected?

Should your sheep or goats show signs of Q fever, have your animals examined by your veterinarian.

The most meaningful test for verifying Q fever is the molecular biological analysis of afterbirth material, dead lambs/kids/calves, vaginal swabs or preputial swabs for detecting pathogen DNA.
Using this analysis, a current shedding of *Coxiella burnetii* can be detected .

Blood analysis of antibodies does not reliably detect an acute infection, however, shows a recent infection.

What to do after a diagnosis?

In most countries, Q fever is a reportable animal disease. When Q fever is detected in your herd/flock spreading of infection to other animals and to humans should be prevented .

Q fever is a risk for the health of humans and small ruminants

Take measures in both veterinary herd health management and hygiene!

Q Fever Control Measures:

- ✓ Make sure births and shearing occur in closed premises.
- ✓ Store afterbirth material in a closed container until they are disposed of by animal by-product operating plants).
- ✓ Disinfect your working clothes and working material.
- ✓ Inform your colleagues and family members about necessary protective and hygiene measures. Particular caution is required for pregnant women; their presence and activities should be avoided during Q fever incidents.
- ✓ Erect a sign near your stables:
  "Valuable livestock – Do Not Enter. – Authorized Personnel Only."
- ✓ Do not allow unauthorised persons access to the livestock.
- ✓ Do not offer raw milk or raw milk products to consumers and stand down from drinking raw milk and eating raw milk products. The process of pasteurisation results in inactivation of the pathogen.
- ✓ Store sheep and goat manure under foil for 9 months as well as away from the population, before manure is applied to fields.
- ✓ In some countries, a vaccine is available for ruminants, therefore protect your herd by vaccination against *Coxiella burnetii*.

TIP Further information as to Q fever:
www.qfever.info or info@q-gaps.de.
Flyer "Information for the General Public on Q Fever in Humans"

Figure 15 Flyer for Animal Owners and Veterinarians, English (copyright www.q-gaps.de)

Syndrome de fatigue post -fièvre Q

Plus fréquent qu'on ne le pense

Après une infection aiguë par la fièvre Q, des symptômes cliniques ainsi qu'une altération de la qualité de vie persistent dans jusqu'à 40 % des cas et peuvent durer de 12 à 24 mois.

Symptômes les plus fréquents:

- Sensation de fatigue
- Limitations dans la vie quotidienne
- Troubles de la concentration
- Douleurs musculaires
- Sueurs nocturnes
- Le niveau de performance et de travail d'avant la maladie n'est souvent pas re trouvé au bout d'un an

Le syndrome de fatigue post-fièvre Q représente un défi thérapeutique, car l'administration d'antibiotiques ne permet pas d'influencer la maladie. C'est pourquoi des approches thérapeutiques psychosomatiques et comportementales sont recommandées.

Pertinence clinique

Après une infection aiguë par la fièvre Q, il existe un risque pertinent d'altération de la qualité de vie et des performances à moyen et long terme.

Reconnaître et traiter la fièvre Q à un stade précoce afin d'éviter les séquelles.

Informations supplémentaires Q-GAPS

Q-Fever **G**erm**A**n Interdisciplinary **P**rogram for Re**S**earch

Programme de recherche de la fièvre Q allemand, interdisciplinaire

Page d'accueil: www.qfever.info
E-Mail: info@q-gaps.de

À qui s'adresser?

Dr Marvin L. Tossou | Surgeon
Army Training Hospital -
University Hospital Center of Parakou
E-Mail: marvinl12@yahoo.fr

Créé par: Institut de Microbiologie de l'armée allemande, Munich

Mise à jour: Janvier 2026

Ce dépliant a été financé par le Ministère fédéral de l'Education et de la Recherche sous le numéro de projet 01KI1726A-G en tant que partie du Réseau national de recherche sur les maladies infectieuses zoonotiques.

La FièvreQ

Plus qu'un état grippal

C. burnetii en culture cellulaire
Cliché MTB

Informations sur la fièvre Q chez les êtres humains

Qu'est-ce que la fièvre Q?

La fièvre Q est une maladie des êtres humains et des animaux en Allemagne et du monde entier causée par la bactérie *Coxiella (C.) burnetii*. La transmission de l'agent pathogène des animaux à l'homme se fait principalement par voie aérienne en inhalant des particules de poussière contenant la bactérie des animaux (par exemple des moutons, des chèvres, des bovins) ou bien plus rarement de façon orale par des aliments contaminés (du lait non pasteurisé/de produits laitiers non pasteurisés).
En raison des symptômes peu spécifiques la fièvre Q peut facilement être confondue avec un état grippal.

Qu'est-ce que Q-GAPS?

Q-GAPS (**Q**-Fever **G**erm**A**n Interdisciplinary **P**rogram for Re**S**earch) est un consortium interdisciplinaire de médecins humains et vétérinaires ainsi que de biologistes. Il dispose d'une expertise et de compétences exceptionnelles, ainsi que d'un large éventail de connaissances sur l'agent pathogène de la fièvre Q, *C. burnetii*, afin de mettre en œuvre la stratégie One Health pour la fièvre Q.

Objectif: Traiter et clarifier les questions non résolues à ce jour concernant l'épidémiologie, l'immunologie, la pathogenèse, la surveillance et le contrôle de *C. burnetii*, y compris la mise à disposition d'un réseau de connaissances pour tous les aspects de l'infection à *C. burnetii*.
Avec ce dépliant, Q-GAPS souhaite fournir une base d'information générale aux médecins.

Diagnostic de la fièvre Q

L'étalon-or du diagnostic de la fièvre Q chez l'homme est la détection d'anticorps spécifiques dans le sérum contre les deux variantes de phase de *C. burnetii* par test d'immunofluorescence ou ELISA. Le niveau des titres d'anticorps (IgG et IgM, phases 1 et 2) permet de distinguer une maladie aiguë d'une maladie chronique. Cependant, les résultats réactifs en ELISA doivent toujours être confirmés par un test d'immunofluorescence.
En outre, une PCR devrait être effectuée pour détecter l'ADN spécifique de la coxielle. La PCR s'est avérée utile, car aucun anticorps spécifique n'est encore détectable en cas d'infection aiguë, surtout dans la phase précoce de la maladie, et l'infection pourrait passer inaperçue sans l'utilisation d'une PCR ou n'être diagnostiquée que par l'analyse d'un second sérum.

Fièvre Q aiguë

Clinique humaine

1 à 3 semaines après l'infection, environ 40 % des personnes infectées ont des problèmes de santé, tandis que chez les 60 % restants, l'infection est asymptomatique. Les troubles cliniques se manifestent sous la forme de symptômes pseudo-grippaux tels que de fortes céphalées rétro-orbitaires, de la fièvre, de la fatigue, des douleurs dans les membres et des frissons.

Des manifestations organiques telles qu'une pneumonie atypique, une hépatite granulomateuse se manifestent dans environ 10 % des cas. Très rarement, la maladie entraîne une myocardite, une péricardite ou une méningo-encéphalite.

Les femmes enceintes peuvent également être exposées à un risque accru d'avortement (le plus souvent en cas d'infection primaire au premier trimestre), d'accouchement prématuré, une placentite ou d'un faible poids à la naissance. Une transmission de la mère à l'enfant à naître dans l'utérus avec des conséquences tardives pour l'enfant n'a pas été décrite jusqu'à présent.

Thérapie

Médicament de première ligne: doxycycline
(Posologie : 2 x 100 mg/jour, 14 jours).
En cas de grossesse : cotrimoxazole
(Posologie : 800mg/160mg, 2x par jour).
Antibiotiques alternatifs: Macrolides (azithromycine, clarithromycine) ou fluoroquinolones.

Il est recommandé de procéder à un nouveau contrôle sérologique des patients atteints de fièvre Q aiguë dans un délai d'un an afin d'exclure une chronicisation.

Une infection à *C. burnetii* doit être exclue pour toutes les endocardites à culture négative, les matériaux valvulaires/ vasculaires modifiés et avant les interventions de chirurgie cardiaque correspondantes.

La fièvre Q chronique

Un diagnostic trop rare et trop tardif

Dans environ 1% des cas une infection par *C. burnetii* peut entraîner 6 mois à 10 ans plus tard une fièvre Q chronique, qui se manifeste très souvent cliniquement sous la forme d'une endocardite. Beaucoup plus rarement, on observe par exemple une hépatite granulomateuse ou une ostéomyélite. Il n'est pas rare que ces troubles et symptômes n'apparaissent que des années plus tard, après un intervalle asymptomatique. La maladie chronique est longue à traiter (plusieurs années) et, associée à un taux de complications élevé, elle présente une mortalité pouvant atteindre 40 %.

Groupes à risque

Les personnes souffrant de maladies cardio-vasculaires ou d'une immunosuppression sévère présentent un risque fortement accru de passage à une infection chronique de *C. burnetii*.

Ainsi, selon une étude néerlandaise, les modifications aortiques/iliaques et autres modifications de l'endothélium vasculaire en particulier, associées à une fièvre Q aiguë, présentent une prévalence de 30 % de développement d'une fièvre Q chronique.

Recommandations

Une antibioprophylaxie de 12 mois avec de la doxycycline en combinaison avec de l'hydroxy-chloroquine après une maladie aiguë peut empêcher le développement d'une chronicité chez les groupes à risque susmentionnés.

Effectuer régulièrement (au moins une fois par an) des contrôles de l'évolution chez les patients des groupes à risque présentant des taux élevés d'anticorps IgG spécifiques de la phase 1.

En cas de chronicité, un traitement combiné d'au moins 18 à 24 mois avec de la doxycycline et de l'hydroxychloroquine est administré.

Des contrôles réguliers sont également nécessaires en cas de fièvre Q chronique.

Figure 16 Flyer for Medical Doctors, French, Benin (copyright www.q-gaps.de)

Syndrome de fatigue post-fièvre Q

Possible même en cas d'évolution bénigne

Après une infection aiguë par la fièvre Q, des symptômes cliniques ainsi qu'une altération de la qualité de vie persistent dans jusqu'à 40 % des cas et peuvent durer de 12 à 24 mois.

Symptômes les plus fréquents:

- Sensation de fatigue
- Limitations dans la vie quotidienne
- Troubles de la concentration
- Douleurs musculaires
- Sueurs nocturnes
- Le niveau de performance et de travail d'avant la maladie n'est souvent pas retrouvé au bout d'un an.

Le syndrome de fatigue post-fièvre Q représente un défi thérapeutique, car l'administration d'antibiotiques ne permet pas d'influencer la maladie. C'est pourquoi des approches thérapeutiques psychosomatiques et comportementales sont recommandées.

Après une infection aiguë par la fièvre Q, toujours penser à la possibilité d'un syndrome de fatigue post-fièvre Q.

Informations supplémentaires

Q-GAPS

Q-Fever **Germ**A**n** Interdisciplinary **P**rogram for Re**S**earch

Programme de recherche de la fièvre Q allemand, interdisciplinaire

Page d'accueil: www.qfever.info
E-Mail: info@q-gaps.de

À qui s'adresser?

Dr Nestor D. NOUDEKE | Epidemiologist
Eng, DVM, M.Sc, Ph.D
Resident Advisor BENIN
FETP Front line and Intermediate
African Field Epidemiology Network
US Centers for Disease Control and Prevention
☎ +229 97 88 90 30

Créé par: Département de la santé du Land de Bade-Wurtemberg & Institut de Microbiologie de l'armée allemande, Munich

Mise à jour: Janvier 2026

Ce dépliant a été financé par le Ministère fédéral de l'Education et de la Recherche sous le numéro de projet 01KI1726A-G en tant que partie du Réseau national de recherche sur les maladies infectieuses zoonotiques.

La Fièvre Q

Plus qu'un état grippal

Informations destinées à la population sur la fièvre Q chez les êtres humains

Qu'est-ce que la fièvre Q?

La fièvre Q est une maladie des êtres humains et des animaux (soit disant zoonose) causée par la bactérie *Coxiella (C.) burnetii*.

La transmission de l'agent pathogène des animaux à l'homme se fait principalement par des moutons et des chèvres. Les bovins, les chats, et les autres espèces animales sont moins souvent à l'origine d'infections par la fièvre Q chez l'homme.

Les animaux infectés excrètent *C. burnetii* en grande quantité, surtout pendant la mise bas ou un avortement. Malgré l'excrétion de la bactérie, les moutons et les chèvres ne présentent pas toujours de signes d'infection.

Les humains peuvent très facilement s'infecter en inhalant des particules de poussière contenant la bactérie. *C. burnetii* se propage par le vent, c'est pourquoi un contact direct avec un animal infecté n'est pas forcément nécessaire pour la transmission.

Les personnes peuvent facilement s'infecter en respirant des poussières contenant des agents pathogènes.

Fièvre Q aiguë

1 à 3 semaines après l'infection, environ 40 % des personnes infectées ont des problèmes de santé, tandis que chez les 60 % restants, l'infection est asymptomatique.
Les symptômes suivants peuvent apparaître:

Souvent des symptômes pseudo-grippaux tels que:

- Fièvre
- Douleurs musculaires
- Frissons
- Maux de tête sévères (derrière les yeux)

Plus rarement:

- Pneumonie
- Inflammation du foie

La fièvre Q aiguë souvent ne se manifeste que peu, voire pas de symptômes. Se laisse bien traiter par des antibiotiques. Tenir compte des groupes à risque et la possibilité d'une évolution chronique.

Si vous ou un membre de votre famille présentez les symptômes susmentionnés, consultez votre médecin.

Un test de dépistage de la fièvre Q peut être effectué à l'aide d'une prise de sang.

En cas de détection de la fièvre Q, la maladie peut être traitée de manière ciblée à l'aide d'antibiotiques.

La fièvre Q chronique

Dans environ 1% des cas une infection par *C. burnetii* peut entraîner 6 mois à 10 ans plus tard une fièvre Q chronique.
Cette maladie chronique doit généralement être traitée par des antibiotiques pendant plusieurs années et présente un taux de mortalité élevé en l'absence de traitement.

Les signes typiques sont:

Fréquent:

- Des inflammations de la membrane cardiaque

Rare:

- Inflammation du foie

Groupes à risque

Les personnes qui sont en contact avec des moutons, des chèvres ou des bovins ou des matériaux provenant de ces animaux dans le cadre de leur travail présentent un risque accru d'infection à *C. burnetii*.

Les femmes enceintes peuvent également être exposées à un risque accru d'avortement et d'accouchement prématuré, ainsi qu'à un faible poids à la naissance, en cas d'infection aiguë ou de fièvre Q chronique. Une transmission de la mère à l'enfant à naître dans l'utérus avec des conséquences tardives pour l'enfant n'a pas été décrite jusqu'à présent.

Les personnes souffrant de maladies cardio-vasculaires ou d'une immunosuppression sévère (suppression des défenses naturelles de l'organisme) présentent un risque fortement accru de passage à une infection chronique.

Reconnaître et traiter la fièvre Q à un stade précoce afin d'éviter les séquelles.

Figure 17 Flyer for the General Public, French, Benin (copyright www.q-gaps.de)

La fièvre Q chez les êtres humains

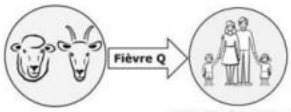
La transmission à l'Homme se fait par voie aérienne, en inhalant des poussières ou des gouttelettes contenant des bactéries lors d'un contact direct ou indirect avec des moutons ou des chèvres.
Après une infection par *Coxiella burnetii*, la maladie est asymptomatique dans 60% des cas. Cependant, environ 40% des êtres humains infectés de la fièvre Q auront des symptômes similaires à ceux de la grippe. Les signes et les symptômes comprennent:

- Céphalées
- Forte fièvre
- Sensation de fatigue
- Douleurs musculaires
- Frissons
- Pneumonie
- Inflammation du foie

Si vous ou les membres de votre famille présentez les symptômes susmentionnés, consultez votre médecin. Un test de dépistage de la fièvre Q peut être effectué à l'aide d'une prise de sang. Si la fièvre Q est détectée, la maladie peut être traitée de manière ciblée.

Le dépistage de la fièvre Q et le traitement précoce et ciblé chez les êtres humains sont importants.

Protégez votre santé et de votre famille!



© VKA / Fotolia © VIGE.co / Fotolia

À qui s'adresser?
Q-GAPS

Q fever GermAn Interdisciplinary Program for research

Programme de recherche de la fièvre Q allemand, interdisciplinaire

Page d'accueil: www.qfever.info
E-Mail: info@q-gaps.de

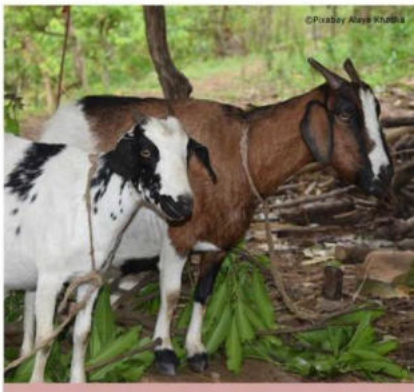
Créé par: Fondation de l'école supérieure vétérinaire de Hanovre
Institut de biométrie, d'épidémiologie et de traitement de l'information;
Clinique des petits animaux à onglons et de médecine légale et clinique ambulatoire

Mise à jour: Janvier 2026

Ce dépliant a été financé par le Ministère fédéral de l'Education et de la Recherche sous le numéro de projet 01KI1726A-G en tant que partie du Réseau national de recherche sur les maladies infectieuses zoonotiques.

La Fièvre Q

Un risque pour les êtres humains et les animaux



Informations sur la fièvre Q chez les humains & les petits ruminants

Q Fever German Interdisciplinary Program for Research Q-GAPS

SPONSORISÉ PAR LE Ministère fédéral de l'Education et de la Recherche

La fièvre Q?

Qu'est-ce que c'est?

La fièvre Q ou la coxiellose est une maladie des êtres humains et des animaux, causée par le germe (bactérie) *Coxiella burnetii*.

La transmission de l'agent pathogène des animaux à l'homme est possible. Elle se fait principalement par des moutons et des chèvres infectés pendant la période d'agnelage.

Les bovins et les autres espèces animales sont moins souvent à l'origine d'infections par la fièvre Q chez l'homme.

La fièvre Q chez les moutons et les chèvres

Les moutons et les chèvres peuvent être infectés par *Coxiella burnetii* via des poussières dans l'environnement ou des gouttelettes contenant des bactéries et par d'autres moyens.

Les petits ruminants infectés excrètent *Coxiella burnetii* en grande quantité, en particulier pendant l'agnelage, avec le liquide amniotique et le placenta. De plus, la bactérie est excrétée dans le lait, l'urine et les selles d'un animal infecté.

Chez les moutons en particulier, une infection par *Coxiella burnetii* peut être asymptomatique. Chez les petits ruminants, les symptômes suivants doivent être pris au sérieux comme signes de fièvre Q:

- Avortement
- Mort-né
- Naissance d'agneaux faibles en vie
- Retard dans l'expulsion du placenta

La fièvre Q dans mon troupeau – que faire en cas de suspicion?

Si vos moutons ou vos chèvres présentent des signes de fièvre Q, faites examiner vos animaux par votre vétérinaire.

Le test le plus probant pour la fièvre Q est l'analyse par biologie moléculaire du matériel postnatal, des agneaux morts, des écouvillons vaginaux ou des écouvillons prépuitiaux pour détecter l'ADN de l'agent pathogène.

Cet examen permet de mettre en évidence une excretion récente de Coxiella burnetii. L'examen sérologique d'un échantillon de sang ne détecte pas avec certitude une infection aiguë, mais indique de manière fiable une infection passée.

Que faire en cas de diagnostic?

En cas de détection de la fièvre Q dans votre troupeau, il convient d'empêcher la propagation de l'infection à d'autres animaux et à l'homme.

La fièvre Q est un risque pour la santé des hommes et des petits ruminants.

Prenez des mesures dans la gestion du troupeau et de la santé ainsi que dans l'hygiène!

Mesures à prendre en cas de fièvre Q:

- ✓ Veillez à ce que la mise à bas et la tonte aient lieu dans des locaux fermés.
- ✓ Conservez tous les placentas dans un récipient fermé jusqu'à leur évacuation. Il est recommandé d'incinérer les placentas et puis les enfuir.
- ✓ Nettoyez et désinfectez vos vêtements et votre matériel de travail.
- ✓ Informez les employés, les membres de la famille et les visiteurs des mesures d'hygiène nécessaires. Il faut accorder une attention particulière aux femmes enceintes. En cas d'épidémie de fièvre Q, leur présence et l'exercice de leurs activités doivent être évités.
- ✓ Signalez vos locaux d'élevage par des panneaux:

  "Cheptel ovin/caprin de valeur - accès interdit aux personnes non autorisées".
- ✓ Empêchez l'accès de personnes étrangères à l'exploitation à vos moutons et chèvres.
- ✓ Ne donnez pas de lait cru ou de produits à base de lait cru aux consommateurs et abstenez-vous de consommer du lait cru ou des produits à base de lait cru. La pasteurisation entraîne l'inactivation de l'agent pathogène.
- ✓ Stockez le fumier de mouton et de chèvre pendant 9 mois sous film plastique et à l'écart de la population avant de l'épandre sur des champs.

Figure 18 Flyer for Animal Owners and Veterinarians, French, Benin

Síndrome de Fadiga Pós-Febre Q

Possível mesmo em casos leves da doença

Após a fase aguda da febre Q, até 40 % dos casos ainda apresentam sintomas clínicos e comprometimentos na qualidade de vida, que podem persistir por 12 a 24 meses.

Principais sintomas:

- Fadiga (cansaço/exaustão)
- Comprometimento significativo na capacidade de execução de atividades diárias
- Dificuldade de concentração
- Dores musculares
- Suores noturnos
- O nível de desempenho e a capacidade de trabalho anteriores não são alcançados mesmo após um ano

A síndrome de fadiga pós-febre Q representa um desafio terapêutico, pois a doença não pode ser influenciada pela administração de antibióticos, razão pela qual recomendam-se abordagens psicossomáticas de tratamento e terapias comportamentais.

Relevância Clínica

Após uma infecção aguda por febre Q, há um risco relevante a médio e longo prazo de comprometimento da qualidade de vida e de desempenho.

Diagnosticar e tratar a febre Q em um estágio inicial previne consequências de longo prazo.

Mais informações

Q-GAPS

Programa alemão de pesquisa interdisciplinar sobre febre Q

Coordenadora: Prof. Dr. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de

Homepage: www.qfever.info
E-Mail: info@q-gaps.de

Contato para casos de infecções por febre Q

Contactar a autoridade sanitária nacional/local ou o laboratório nacional/local de referência.

Publicado por: Instituto de Microbiologia da Bundeswehr, Munique, Alemanha

Tradução: Dr. Gustavo Rodrigues Makert dos Santos (Instituto Fraunhofer de Terapia Celular e Imunologia, Leipzig, Alemanha) e Fernando Makert (Inteligência Natural, Brasil)

Última atualização: Janeiro 2026

Este folheto foi financiado pelo Ministério Federal da Educação e Pesquisa (BMBF) sob o número de projeto 01KI1726A-G como parte da Rede Nacional de Pesquisa em Doenças Infecciosas Zoonóticas.

Febre Q

Mais do que apenas uma infecção gripal

Informações sobre febre Q em humanos

SPONSORED BY THE
Federal Ministry of Education and Research

O que é febre Q?

A febre Q é uma doença zoonótica endêmica no Brasil e em todo o mundo, causada pela bactéria *Coxiella* (C.) *burneti*.
A transmissão para humanos ocorre principalmente por via aerógena, através da inalação de secreções infecciosas de animais (como ovelhas, cabras, gado) ou, de forma muito mais rara, por via oral através de alimentos contaminados (leite/produtos lácteos não pasteurizados).
Devido aos sintomas não específicos, a febre Q pode ser facilmente confundida com uma infecção gripal.

O que é Q-GAPS?

Q-GAPS (**Q**-Fever **G**erm**A**n Interdisciplinary **P**rogram for Re**S**earch) é um consórcio interdisciplinar de médicos, veterinários e biólogos com extraordinária experiência, competência e amplitude de conhecimento sobre o patógeno da febre Q, *C. burnetii*, que irá implementar a estratégia One Health para a febre Q.

Objetivo: Abordar e esclarecer questões não resolvidas sobre epidemiologia, imunologia, patogênese, monitoramento e controle de *C. burnetii*, incluindo a criação de uma rede de conhecimento para todos os aspectos da infecção por *C. burnetii*.
Com este folheto, o Q-GAPS pretende fornecer um ponto de referência geral para os profissionais da medicina

Diagnóstico da febre Q

O padrão ouro para diagnóstico da febre Q em humanos é a detecção de anticorpos específicos no soro contra as duas variantes de fase de *C. burnetii* por meio de teste de imunofluorescência (IFT) ou ELISA. Com base nos níveis de anticorpos (IgG e IgM, Fase 1 e 2), é possível distinguir entre uma doença aguda e uma crônica. No entanto, resultados reativos em ELISA devem ser confirmados por IFT. Além disso, deve ser realizado uma PCR para detectar o DNA específico de *Coxiella*. A PCR é eficaz, pois durante a infecção aguda, especialmente na fase inicial da doença, ainda não há anticorpos específicos detectáveis, e a infecção poderia passar despercebida sem o uso da PCR ou ser diagnosticada apenas pela análise de um segundo soro.

Febre Q aguda

Clínica em humanos

Após um período de incubação de 1-3 semanas, cerca de 40% dos infectados apresentam sintomas clínicos, enquanto nos outros 60% a infecção é assintomática. Os sintomas clínicos podem ser semelhantes aos da gripe como cefaleia retro-orbital, febre, cansaço, dor nos membros e calafrios.

Manifestações em órgãos como pneumonia atípica e hepatite granulomatosa ocorrem em cerca de 10% dos casos. Muito raramente, a doença leva a miocardite, pericardite ou meningoencefalite.

A infecção aguda durante a gravidez pode aumentar o risco de aborto (principalmente quando a infecção inicial ocorre no primeiro trimestre de gravidez), parto prematuro, placentite ou baixo peso ao nascer. Ainda não foi descrita a transmissão intrauterina com sequelas tardias para a criança.

Terapia

Medicamento de primeira linha: Doxiciclina (Dose: 2 x 100 mg/dia, 14 dias).
Durante a gravidez: Cotrimoxazol (Dose: 800mg/160mg, 2x ao dia.
Antibióticos alternativos: Macrolídeos (Azithromicina, Claritromicina) ou fluoroquinolonas.

Recomenda-se um novo exame sorológico de pacientes com febre Q aguda no período de um ano para excluir uma possível evolução crônica.

Deve-se excluir a infecção por *C. burnetii* em casos de endocardite com cultura negativa, alterações aórticas/ilíacas e antes de cirurgias cardíacas.

Febre Q crônica

Quando o diagnóstico é raro e tardio

A infecção aguda por *C. burnetii* evolui para uma condição crônica em cerca de 1% dos casos (depois de a infecção persistir por mais de 6 meses), frequentemente manifestando-se clinicamente na forma de endocardite. Mais raramente, pode ocorrer, por exemplo, hepatite granulomatosa ou osteomielite. Não é incomum que essas queixas e sintomas apareçam anos depois de um período assintomático. A forma crônica requer terapia prolongada (vários anos) e, se não tratada, a taxa de complicações pode chegar a 40%, com risco significativo de mortalidade.

Grupos de risco

Pacientes com doenças cardiovasculares preexistentes ou imunossupressão grave apresentam um risco significativamente maior de transição para uma infecção crônica por *C. burnetii*.

Um estudo holandês mostra que alterações aórticas/ilíacas e outras alterações endoteliais vasculares, em combinação com febre Q aguda, apresentam um risco de 30% de evoluir para febre Q crônica.

Recomendações

Uma profilaxia antibiótica de 12 meses com doxiciclina em combinação com hidroxicloroquina após uma forma aguda pode prevenir a evolução para a forma crônica nos grupos de risco mencionados .

Também se recomenda a realização regular (no mínimo anualmente) de monitoramento em pacientes dos grupos de risco com altos níveis de anticorpos IgG específicos de fase 1.

Quando a forma crônica já se estabeleceu, uma terapia combinada de pelo menos 18-24 meses com doxiciclina e hidroxicloroquina deve ser realizada.

Também na febre Q crônica é necessário o monitoramento regular.

DICA Informações adicionais sobre o tema febre:
www.qfever.info ou info@q-gaps.de

Figure 19 Flyer for Medical Doctors, Portuguese (copyright www.q-gaps.de)

Síndrome de Fadiga Pós-Febre Q

Possível mesmo em casos leves da doença

Após a fase aguda da febre Q, até 40% dos casos ainda apresentam sintomas clínicos e comprometimentos na qualidade de vida, que podem persistir por 12 a 24 meses.

Principais sintomas:

- Fadiga (cansaço/exaustão)
- Comprometimento significativo na
- Capacidade de execução de atividades diárias
- Dificuldade de concentração
- Dores musculares
- Suores noturnos
- O nível de desempenho e a capacidade de trabalho anteriores não são alcançados mesmo após um ano

A síndrome de fadiga pós-febre Q representa um desafio terapêutico, pois a doença não pode ser influenciada pela administração de antibióticos, razão pela qual recomendam-se abordagens psicossomáticas de tratamento e terapias comportamentais.

Após uma infecção aguda por febre Q, sempre deve-se considerar a possibilidade da síndrome de fadiga pós-febre Q .

Mais informações

Q-GAPS

Programa alemão de pesquisa interdisciplinar sobre febre Q

Coordenadora: Prof. Dr. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de

Homepage: www.qfever.info
E-Mail: info@q-gaps.de

Contato para casos de infecções por febre Q

Contactar a autoridade sanitária nacional/local ou o laboratório nacional/local de referência.

Publicado por: Departamento de Saúde Estadual de Baden-Württemberg & Instituto de Microbiologia da Bundeswehr, Munique, Alemanha

Tradução: Dr. Gustavo Rodrigues Makert dos Santos (Instituto Fraunhofer de Terapia Celular e Imunologia, Leipzig, Alemanha) e Fernando Makert (Inteligência Natural, Brasil)

Última atualização: Janeiro 2026

Este folheto foi financiado pelo Ministério Federal da Educação e Pesquisa (BMBF) sob o número de projeto 01KI1726A-G como parte da Rede Nacional de Pesquisa em Doenças Zoonóticas.

Febre Q

Mais do que apenas uma infecção gripal

Informações para a população sobre febre Q em humanos

SPONSORED BY THE Federal Ministry of Education and Research

O que é febre Q?

Febre Q é uma doença causada pela bactéria *Coxiella* (C.) *burnetii*. Tanto humanos quanto animais podem contrair febre Q (chamada zoonose).

A transmissão do patógeno para os humanos ocorre principalmente através de ovelhas e cabras infectadas. Entretanto, bovinos, gatos e outras espécies animais são fontes muito mais raras de infecções por febre Q em humanos .

Animais infectados excretam *C. burnetii* em grandes quantidades, principalmente durante o parto ou um aborto espontâneo. Apesar da excreção da bactéria, ovelhas e cabras nem sempre mostram sinais de infecção.

Os humanos podem se infectar muito facilmente pela inalação de partículas de poeira contendo a bactéria. A *C. burnetii* é disseminada pelo vento, por isso o contato direto com um animal infectado não é necessariamente necessário para a transmissão .

Humanos podem se infectar facilmente pela inalação de poeira contendo o patógeno.

Febre Q Aguda

Uma a três semanas após a infecção, cerca de 40 % das pessoas infectadas apresentam sintomas clínicos, enquanto nos outros 60 % a infecção é assintomática.
Folgende Beschwerden können auftreten:

Frequentemente, os sintomas são semelhantes aos da gripe, como:

- Febre
- Dor nos membros
- Calafrios
- Cefaleia retro-orbital (atrás dos olhos)

E, raramente, podem ser:

- Pneumonia
- Hepatite

**A Febre Q Aguda frequentemente ou é assintomática ou apresenta poucos sintomas.
É tratável com antibióticos, apresentando bons resultados.
Atenção para grupos de risco e possibilidade de formas crônicas da doença.**

Se você ou seus familiares apresentarem os sintomas mencionados acima, consulte um clínico geral ou o centro de saúde responsável na sua região (atenção especial aos **grupos de risco**).
O teste para febre Q pode ser realizado com uma amostra de sangue.
Se a febre for detectada, ela pode ser tratada com eficiência mediante uso de antibióticos.

Consultar informações adicionais em www.fever.info ou info@q-gaps.de

Febre Q crônica

Em cerca de 1% dos casos, a infecção por *C. burnetii* pode-se transformar em febre Q crônica mesmo após 6 meses a 10 anos. A doença crônica geralmente requer terapia com antibióticos por vários anos, e, se não tratada, apresenta uma alta taxa de complicações de até 40%, associada a risco de mortalidade.

Os sinais típicos são:

Frequente:
- Endocardite

Raro :
- Hepatite

Grupos de risco

Devido à natureza de sua atividade, pessoas que trabalham com ovelhas, cabras, bovinos ou materiais desses animais correm um risco particularmente elevado de serem infectadas por *C. burnetii*.

Além disso, para gestantes, o risco de aborto e parto prematuro, bem como de baixo peso do bebê ao nascer, pode aumentar devido a uma infecção aguda e febre Q crônica. Ainda não foi descrita a transmissão da mãe para o feto dentro do útero com consequências posteriores para a criança.

Pessoas com doenças cardiovasculares existentes ou severa imunossupressão (supressão das defesas do organismo) apresentam um risco significativamente maior de transição para uma infecção crônica.

Diagnosticar e tratar febre Q precocemente previne consequências tardias.

Figure 20 Flyer for the General Public, Portuguese (copyright www.q-gaps.de)

Febre Q em humanos

Humanos são infectados por meio do contato direto ou indireto com ovelhas e cabras pela inalação de poeira ou gotículas contendo a bactéria *Coxiella burnetii*.

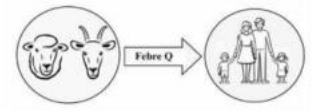
Após a infecção por *Coxiella burnetii*, a doença é assintomática em 60% dos casos, mas 40% dos pacientes afetados apresentam sintomas clínicos tais como:

- Sintomas semelhantes aos da gripe, como cefaleia retro-orbital forte, febre elevada, cansaço, dor nos membros, calafrios
- Pneumonia
- Hepatite

Se você ou seus familiares apresentarem os sintomas mencionados acima, consulte um clínico geral ou o centro de saúde responsável na sua região. O teste para febre Q pode ser realizado com uma amostra de sangue.
Se a febre for detectada, ela pode ser tratada com eficiência mediante uso de antibióticos.

O exame para febre Q e a terapia precoce específica para humanos são importantes.

Proteja a sua saúde e a saúde de sua família!



Com quem posso entrar em contato?

Q-GAPS

Programa alemão de pesquisa interdisciplinar sobre febre Q

Coordenadora: Prof. Dr. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de

www.qfever.info, info@q-gaps.de

Febre Q em ovinos e caprinos

Contactar a autoridade veterinária nacional/local ou o laboratório nacional/local de referência.

Febre Q em humanos

Contactar a autoridade sanitária nacional/local ou o laboratório nacional/local de referência.

Publicado por: Fundação da Universidade de Medicina Veterinária de Hanover
Instituto de Biometria, Epidemiologia e Processamento de Informações; Clínica de suínos e pequenos ruminantes e medicina forense e ambulatório, Hanover, Alemanha

Tradução: Dr. Gustavo Rodrigues Makert dos Santos (Instituto Fraunhofer de Terapia Celular e Imunologia, Leipzig, Alemanha) e Fernando Makert (Inteligência Natural, Brasil)

Última atualização: Janeiro 2026

Este folheto foi financiado pelo Ministério Federal da Educação e Pesquisa (BMBF) sob o número de projeto 01KI1726A-G como parte da Rede Nacional de Pesquisa em Doenças Infecciosas Zoonóticas.

Febre Q

Um risco para humanos e animais

Informações sobre febre Q em humanos & pequenos ruminantes

Q Fever German Network for Research Q-GAPS

SPONSORED BY THE Federal Ministry of Education and Research

Febre Q?

O que está por trás?

A bactéria *Coxiella burnetii* é o agente causador da doença conhecida como febre Q ou *Coxiellose* em humanos e animais.

A transmissão do patógeno para os humanos ocorre principalmente através de ovelhas e cabras infectadas.
Entretanto, bovinos, gatos e outras espécies animais são fontes muito mais raras de infecções por febre Q em humanos.

Febre Q em ovelhas e cabras

Ovelhas e cabras podem se infectar com *Coxiella burnetii* por meio de poeira ou gotículas no ambiente contendo bactérias e outras vias.

Ruminantes pequenos infectados eliminam *Coxiella burnetii* em grande quantidade especialmente durante o parto, com o líquido amniótico e a placenta. A eliminação das bactérias também ocorre através do leite, urina e fezes.

Particularmente em ovelhas, uma infecção por *Coxiella burnetii* pode ser assintomática.
Entretanto, os seguintes sintomas devem ser levados a sério como sinais de febre Q em pequenos ruminantes:

- Aborto
- Natimorto
- Nascimento de filhotes debilitados
- Retenção da placenta

Febre Q no meu rebanho - O que fazer em caso de suspeita?

Se suas ovelhas ou cabras apresentarem sinais de Febre Q, chame um veterinário para examinar os animais.

O teste mais confiável para Febre Q é a análise molecular de material de pós-parto, cordeiros, crianças ou bezerros mortos, amostras vaginais ou prepuciais para detecção do DNA do agente causador.
Por meio dessa análise, é possível detectar a eliminação ativa de *Coxiella burnetii*.

Uma análise sorológica de uma amostra de sangue não detecta com segurança uma infecção aguda, mas identifica de forma confiável uma infecção recente.

O que fazer após o diagnóstico?

Febre Q é uma doença animal de notificação obrigatória.
Caso a febre Q seja confirmada em seu rebanho, você deve prevenir a disseminação da infecção para outros animais e seres humanos.

A Febre Q representa um risco para a saúde de humanos e pequenos ruminantes .

Adote medidas de manejo do rebanho, saúde animal e higiene!

Medidas contra a febre Q:

- ✓ Garanta que os partos e a tosquia ocorram em ambientes fechados.
- ✓ Armazene todas as placentas e restos de partos em recipientes fechados até sua eliminação em estabelecimentos de coleta de cadáveres de animais (unidades de processamento de subprodutos de origem animal).
- ✓ Limpe e desinfecte as roupas de trabalho e materiais utilizados.
- ✓ Informe seus funcionários, familiares e v isitantes sobre as medidas de higiene necessárias. Deve-se ter cuidado especial com gestantes, que devem evitar permanecer e trabalhar nas áreas afetadas enquanto houver casos ativos de febre Q.
- ✓ Sinalize suas instalações com placas:

  „Ambiente restrito –
  Proibida a entrada de pessoas não autorizadas."
- ✓ Evite o acesso de pessoas não autorizadas à propriedade e aos seus rebanhos de ovelhas e cabras.
- ✓ Não ofereça leite cru ou produtos derivados de leite cru a consumidores e evite o consumo desses produtos crus. A pasteurização inativa o agente causador da doença.
- ✓ Armazene o esterco de ovelhas e cabras por 9 meses sob lona e longe da população antes de utilizá-lo como adubo.
- ✓ Vacine seu rebanho contra *Coxiella burnetii*.

CONSELHO Mais informações sobre a febre Q www.qfever.info ou info@q-gaps.de, Folheto „Informações para a população sobre febre Q em humanos"

Figure 21 Flyer for Animal Owners and Veterinarians, Portuguese (copyright www.q-gaps.de)

QFS / Síndrome de fatiga post fiebre Q

Más frecuente de lo esperado

Tras la fase aguda de la fiebre Q, los síntomas clínicos pueden persistir en hasta el 40 % de los casos. Asimismo, los pacientes pueden presentar un deterioro de la calidad de vida que se prolonga entre 12 y 24 meses.

Síntomas más frecuentes:

- Fatiga
- Restricciones significativas en la realización de actividades cotidianas
- Falta de concentración
- Dolores musculares
- Sudoración nocturna
- Además, el nivel previo de rendimiento laboral no se recupera ni siquiera después de un año.

Desde el punto de vista terapéutico, este conjunto de síntomas representa un desafío, ya que la enfermedad no responde a la administración de antibióticos. Por ello, se recomiendan enfoques psicosomáticos y conductuales para su tratamiento.

Relevancia clínica

Después de una infección aguda de fiebre Q, existe un riesgo significativo de deterioro de la calidad de vida y del rendimiento a mediano y largo plazo.

Diagnostique la fiebre Q en una etapa temprana y trátela para prevenir efectos a largo plazo.

Información Adicional

Q-GAPS

Programa Alemán Interdisciplinario de Investigación sobre la fiebre

Coordinadora: Prof. Dra. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de

Página Web: www.qfever.info
Correo electrónico: info@q-gaps.de

Contacto para infecciones por fiebre Q

Por favor, póngase en contacto con la autoridad veterinaria nacional o local, o con el laboratorio de referencia correspondiente.

Emitido por: Instituto de Microbiología de la Bundeswehr, Múnich

Traducción: Dra. Laura Chaverri Esquivel y Dra. Gaby Dolz, Universidad Nacional, Heredia, Costa Rica

Fecha: Octubre de 2025

Este folleto fue financiado por el Ministerio Federal de Educación e Investigación (proyecto número 01KI1726A-G), como parte de la Red Nacional de Investigación en Enfermedades Infecciosas Zoonóticas

Fiebre Q

Más que una gripe

C. burnetii en cultivo celular
Imagen del IBIS

Información sobre fiebre Q en Humanos

SPONSORED BY THE
Federal Ministry of Education and Research

¿Qué es la fiebre Q?

La fiebre Q es una enfermedad zoonótica endémica con distribución mundial, causada por la bacteria *Coxiella (C.) burnetii*. La transmisión en humanos ocurre principalmente por vía aerógena, al inhalar material infeccioso liberado por animales - como ovejas, cabras o bovinos - y, en menor medida, por el consumo de alimentos contaminados, como leche o productos lácteos no pasteurizados. La fiebre Q puede confundirse fácilmente con la gripe, debido a la inespecificidad de sus síntomas

¿Qué es Q-GAPS?

Q-GAPS (Programa Alemán Interdisciplinario de Investigación sobre la fiebre Q) es un consorcio único que reúne a médicos, veterinarios y biólogos con una destacada experiencia y conocimientos sobre *Coxiella burnetii*, el agente causal de la fiebre Q. El programa aplicará el enfoque "Una Salud" para abordar esta enfermedad.

Objetivo: Q-GAPS se ha comprometido a investigar preguntas aún no resueltas relacionadas con la epidemiología, inmunología, patogénesis, vigilancia y control de *Coxiella burnetii*, y a proporcionar una red de conocimiento que abarque todos los aspectos de la infección por *C. burnetii*.
Con este folleto, Q-GAPS desea establecer un punto de referencia general para los médicos.

Diagnóstico de Fiebre Q

La detección serológica de anticuerpos específicos contra ambas variantes de fase de *Coxiella burnetii*, mediante prueba de inmunofluorescencia (IFT) o ELISA, constituye el estándar de oro en humanos. La infección aguda puede diferenciarse de la crónica por la presencia de títulos elevados de anticuerpos IgG e IgM frente a las fases I y II. No obstante, los resultados reactivos obtenidos por ELISA deben confirmarse preferentemente mediante IFT. En fases iniciales de la infección aguda, aún no suele existir una respuesta serológica detectable. Por ello, se recomienda realizar una prueba PCR para identificar el ADN específico de *Coxiella burnetii*. Posteriormente, se debe confirmar el diagnóstico mediante una segunda prueba serológica.

Fiebre Q Aguda

Clínica en Humanos

Tras un período de incubación de 1 a 3 semanas, aproximadamente el 40 % de las personas infectadas desarrolla síntomas clínicos, mientras que en el resto la infección es asintomática. Estos síntomas pueden ser similares a los de una gripe e incluyen cefalea retroorbitaria intensa, fiebre, fatiga, dolores en las extremidades y escalofríos.

Las manifestaciones en órganos, como la neumonía atípica o la hepatitis granulomatosa, se presentan en aproximadamente el 10 % de los casos. En raras ocasiones, la infección puede provocar miocarditis, pericarditis o meningoencefalitis.

Una infección aguda o una fiebre Q crónica pueden aumentar el riesgo de muerte fetal - especialmente cuando la infección inicial ocurre durante el primer trimestre del embarazo -, así como de parto prematuro, bajo peso al nacer is o placentitis. Hasta el momento, no se ha documentado la transmisión del patógeno al feto con efectos a largo plazo para el niño.

Tratamiento

Medicamento de primera línea: doxiciclina (dosis: 2 x 100 mg/día, durante 14 días).
En caso de embarazo: Cotrimoxazol (dosis: 800 mg/160 mg, 2 veces al día).
Antibióticos alternativos: macrólidos (azitromicina, claritromicina) o fluoroquinolonas.

Se recomienda realizar un seguimiento serológico a los pacientes con fiebre Q aguda durante el año posterior a la infección, con el fin de descartar su cronificación.

Se debe excluir la infección por *C. burnetii* en todos los casos de endocarditis con cultivos negativos, cambios aórticos/ilíacos y antes de cirugías cardíacas.

Fiebre Q Crónica

Se diagnostica con poca frecuencia y demasiado tarde

Una infección aguda por *C. burnetii* deriva en fiebre Q crónica en el 1 % de los casos (después de más de 6 meses de infección persistente) y se manifiesta clínicamente con frecuencia como endocarditis. Menos frecuentemente se presenta como hepatitis granulomatosa u osteomielitis. Estos trastornos y síntomas suelen aparecer muchos años después de un intervalo sin síntomas. La enfermedad crónica requiere terapia prolongada (varios años), y la mortalidad está asociada a una alta tasa de complicaciones, de hasta un 40 % si no se trata.

Grupos de riesgo

Los pacientes con enfermedades cardiovasculares preexistentes o inmunosupresión grave presentan un riesgo significativamente mayor de desarrollar la infección crónica por *C. burnetti*.

Así, según un estudio realizado en los Países Bajos, los casos con alteraciones aórticas/ilíacas y otros cambios en el endotelio vascular, combinados con fiebre Q aguda, presentan un riesgo del 30 % de desarrollar fiebre Q crónica.

Recomendaciones

Tras un episodio agudo de fiebre Q, una profilaxis antibiótica de 12 meses con doxiciclina, en combinación con hidroxicloroquina, puede prevenir la cronificación en los grupos de riesgo mencionados anteriormente.

Se recomienda el seguimiento regular (al menos anual) en pacientes de grupos de riesgo con niveles elevados de anticuerpos IgG específicos de fase I.

Cuando ya se ha producido una cronificación (fiebre Q crónica), se realiza una terapia combinada de al menos 18-24 meses con, por ejemplo, doxiciclina e hidroxicloroquina.

En caso de fiebre Q crónica, también se requieren seguimientos periódicos.

CONSEJO:

Más información sobre la Fiebre Q:
www.qfever.info o info@q-gaps.de

Figure 22 Flyer for Medical Doctors, Spanish (copyright www.q-gaps.de)

Síndrome de Fadiga Pós-Febre Q

Possível mesmo em casos leves da doença

Após a fase aguda da febre Q, até 40% dos casos ainda apresentam sintomas clínicos e comprometimentos na qualidade de vida, que podem persistir por 12 a 24 meses.

Principais sintomas:

- Fadiga (cansaço/exaustão)
- Comprometimento significativo na
- Capacidade de execução de atividades diárias
- Dificuldade de concentração
- Dores musculares
- Suores noturnos
- O nível de desempenho e a capacidade de trabalho anteriores não são alcançados mesmo após um ano

A síndrome de fadiga pós-febre Q representa um desafio terapêutico, pois a doença não pode ser influenciada pela administração de antibióticos, razão pela qual recomendam-se abordagens psicossomáticas de tratamento e terapias comportamentais.

Após uma infecção aguda por febre Q, sempre deve-se considerar a possibilidade da síndrome de fadiga pós-febre Q .

Mais informações

Q-GAPS

Programa alemão de pesquisa interdisciplinar sobre febre Q

Coordenadora: Prof. Dr. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de

Homepage: www.qfever.info
E-Mail: info@q-gaps.de

Contato para casos de infecções por febre Q

Contactar a autoridade sanitária nacional/local ou o laboratório nacional/local de referência.

Publicado por: Departamento de Saúde Estadual de Baden-Württemberg & Instituto de Microbiologia da Bundeswehr, Munique, Alemanha

Tradução: Dr. Gustavo Rodrigues Makert dos Santos (Instituto Fraunhofer de Terapia Celular e Imunologia, Leipzig, Alemanha) e Fernando Makert (Inteligência Natural, Brasil)

Última atualização: Janeiro 2026

Este folheto foi financiado pelo Ministério Federal da Educação e Pesquisa (BMBF) sob o número de projeto 01KI1726A-G como parte da Rede Nacional de Pesquisa em Doenças Zoonóticas.

Febre Q

Mais do que apenas uma infecção gripal

Informações para a população sobre febre Q em humanos

SPONSORED BY THE Federal Ministry of Education and Research

O que é febre Q?

Febre Q é uma doença causada pela bactéria *Coxiella* (C.) *burnetii*. Tanto humanos quanto animais podem contrair febre Q (chamada zoonose).

A transmissão do patógeno para os humanos ocorre principalmente através de ovelhas e cabras infectadas. Entretanto, bovinos, gatos e outras espécies animais são fontes muito mais raras de infecções por febre Q em humanos .

Animais infectados excretam *C. burnetii* em grandes quantidades, principalmente durante o parto ou um aborto espontâneo. Apesar da excreção da bactéria, ovelhas e cabras nem sempre mostram sinais de infecção.

Os humanos podem se infectar muito facilmente pela inalação de partículas de poeira contendo a bactéria. A *C. burnetii* é disseminada pelo vento, por isso o contato direto com um animal infectado não é necessariamente necessário para a transmissão .

Humanos podem se infectar facilmente pela inalação de poeira contendo o patógeno.

Febre Q Aguda

Uma a três semanas após a infecção, cerca de 40 % das pessoas infectadas apresentam sintomas clínicos, enquanto nos outros 60 % a infecção é assintomática.
Folgende Beschwerden können auftreten:

Frequentemente, os sintomas são semelhantes aos da gripe, como:

- Febre
- Dor nos membros
- Calafrios
- Cefaleia retro-orbital (atrás dos olhos)

E, raramente, podem ser:

- Pneumonia
- Hepatite

**A Febre Q Aguda frequentemente ou é assintomática ou apresenta poucos sintomas.
É tratável com antibióticos, apresentando bons resultados.
Atenção para grupos de risco e possibilidade de formas crônicas da doença.**

Se você ou seus familiares apresentarem os sintomas mencionados acima, consulte um clínico geral ou o centro de saúde responsável na sua região (atenção especial aos **grupos de risco**).
O teste para febre Q pode ser realizado com uma amostra de sangue.
Se a febre for detectada, ela pode ser tratada com eficiência mediante uso de antibióticos.

Consultar informações adicionais em www.fever.info ou info@q-gaps.de

Febre Q crônica

Em cerca de 1% dos casos, a infecção por *C. burnetii* pode-se transformar em febre Q crônica mesmo após 6 meses a 10 anos. A doença crônica geralmente requer terapia com antibióticos por vários anos, e, se não tratada, apresenta uma alta taxa de complicações de até 40%, associada a risco de mortalidade.

Os sinais típicos são:

Frequente:
- Endocardite

Raro :
- Hepatite

Grupos de risco

Devido à natureza de sua atividade, pessoas que trabalham com ovelhas, cabras, bovinos ou materiais desses animais correm um risco particularmente elevado de serem infectadas por *C. burnetii*.

Além disso, para gestantes, o risco de aborto e parto prematuro, bem como de baixo peso do bebê ao nascer, pode aumentar devido a uma infecção aguda e febre Q crônica. Ainda não foi descrita a transmissão da mãe para o feto dentro do útero com consequências posteriores para a criança.

Pessoas com doenças cardiovasculares existentes ou severa imunossupressão (supressão das defesas do organismo) apresentam um risco significativamente maior de transição para uma infecção crônica.

Diagnosticar e tratar febre Q precocemente previne consequências tardias.

Figure 23 Flyer for the General Public, Spanish (copyright www.q-gaps.de)

Fiebre Q en humanos

Las personas se infectan al inhalar polvo o gotas en el aire que contienen la bacteria *Coxiella burnetii*, al tener contacto directo o indirecto con ovejas y cabras infectadas.

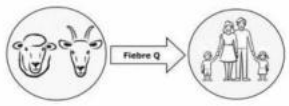
Tras una infección por *Coxiella burnetii*, aproximadamente el 60 % de las personas permanecerá asintomático; en cambio, el 40 % desarrollará síntomas clínicos de fiebre Q, tales como:

- Síntomas similares a la gripe como dolor de cabeza retroorbitario intenso, fiebre alta, fatiga, dolores en las extremidades, escalofríos
- Neumonía
- Inflamación del hígado

Si cree que usted o algún miembro de su familia presenta alguno de los síntomas mencionados anteriormente, consulte a su médico general o a las autoridades sanitarias locales.

La detección de la fiebre Q, así como el tratamiento temprano y específico en humanos, son fundamentales.

¡Proteja su salud y la de su familia!



¿A quién puedo acudir?
Q-GAPS

Programa Alemán Interdisciplinario de Investigación sobre la Fiebre Q

Coordinadora: Prof. Dra. Anja Lührmann, Anja.Luehrmann@uk-erlangen.de
www.qfever.info, info@q-gaps.de

Fiebre Q en ovejas y cabras

Por favor, póngase en contacto con la autoridad veterinaria nacional o local, o con el laboratorio de referencia correspondiente.

Fiebre Q en humanos

Por favor, póngase en contacto con la autoridad sanitaria nacional o local, o con el laboratorio de referencia correspondiente.

Emitido por: La Universidad de Medicina Veterinaria Hannover, Fundación; Departamento de Biometría, Epidemiología y Procesamiento de Información; Clínica para Cerdos y Pequeños Rumiantes, Medicina Forense y Servicio Ambulatorio

Traducción: Dra. Laura Chaverri Esquivel y Dra. Gaby Dolz, Universidad Nacional, Heredia, Costa Rica

Fecha: Octubre de 2025

Este folleto fue financiado por el Ministerio Federal de Educación e Investigación (proyecto número 01KI1726A-G), como parte de la Red Nacional de Investigación en Enfermedades Infecciosas Zoonóticas.

Fiebre Q

Un riesgo para humanos y animales

Información sobre fiebre Q en Humanos y pequeños rumiantes

SPONSORED BY THE
Federal Ministry of Education and Research

Fiebre Q
¿De qué se trata?

La bacteria *Coxiella burnetii* es un patógeno que causa una enfermedad tanto en humanos como en animales, conocida como fiebre Q o coxiellosis.

Este patógeno puede transmitirse de los animales a los humanos. En la mayoría de los países los humanos se infectan principalmente durante la temporada de partos.
El ganado bovino y otras especies son una fuente menos frecuente de infecciones por fiebre Q en humanos.

Fiebre Q en ovejas y cabras

Las ovejas y cabras pueden infectarse con *Coxiella burnetii* al inhalar partículas de polvo o gotas contaminadas presentes en el ambiente, así como por otras vías de transmisión.

Los pequeños rumiantes eliminan grandes cantidades de *Coxiella burnetii* junto con los fluidos del parto y la placenta, especialmente durante el nacimiento. Además, la bacteria también excreta por la leche, la orina y las heces.

En particular, las ovejas pueden estar infectadas con *Coxiella burnetii* sin mostrar signos clínicos de enfermedad.
Sin embargo, los siguientes síntomas indicativos de fiebre Q deben tomarse en serio en pequeños rumiantes:

- Aborto
- Parto de crías muertas
- Nacimiento de crías débiles
- Expulsión retardada de la placenta

¿Fiebre Q en mi hato?
- ¿Qué hacer ante la sospecha de fiebre Q?

Si sus ovejas o cabras presentan signos compatibles con fiebre Q, solicite la evaluación de un médico veterinario.

La prueba más útil para confirmar la enfermedad es el análisis molecular del material placentario, de crías muertas o de hisopados vaginales o prepuciales, con el fin de detectar el ADN del patógeno.

Este análisis permite identificar la eliminación activa de *Coxiella burnetii*. Por su parte, el análisis de sangre para la detección de anticuerpos no permite diagnosticar con certeza una infección aguda, aunque sí puede indicar una infección reciente.

¿Qué hacer si se confirma el diagnóstico?

La fiebre Q es una enfermedad de declaración obligatoria en animales. Cuando se detecta fiebre Q en su hato, se debe evitar la propagación de la infección a otros animales y a los humanos.

La fiebre Q representa un riesgo para la salud de los humanos y los pequeños rumiantes.

¡Implemente medidas tanto en la gestión sanitaria veterinaria como en la higiene!

Medidas de control de la fiebre Q:

- ✓ Procure que los partos y el esquileo se realicen en instalaciones cerradas.
- ✓ Guarde la placenta y demás restos del parto en un recipiente cerrado hasta que sean eliminados por una planta de procesamiento de subproductos animales.
- ✓ Desinfecte su ropa de trabajo y el equipo utilizado.
- ✓ Informe a sus colegas y familiares sobre las medidas de protección e higiene necesarias. Se debe prestar especial atención a las mujeres embarazadas, quienes deben evitar permanecer o trabajar en el lugar durante un brote de fiebre Q.
- ✓ Coloque un cartel cerca de los establos:
  „Ganado de alto valor – No ingresar. Solo personal autorizado."
- ✓ Evite que personas no autorizadas accedan a sus ovejas y cabras.
- ✓ No ofrezca leche cruda ni productos lácteos sin pasteurizar a los consumidores y absténgase de consumirlos. La pasteurización inactiva el patógeno.
- ✓ Almacene el estiércol de ovejas y cabras cubierto con lona durante 9 meses y lejos de la población antes de aplicarlo en los campos.
- ✓ En algunos países existe una vacuna disponible para rumiantes; por lo tanto proteja su hato mediante la vacunación contra *Coxiella burnetii*.

CONSEJO Más información sobre la fiebre Q: www.qfever.info o info@q-gaps.de, Folleto "Información para población general sobre la fiebre Q en humanos"

Figure 24 Flyer for Animal Owners and Veterinarians, Portuguese

SOURCES/FURTHER LINKS

Anderson AD, Szymanski TJ, Emery MP, Kohrs PH, Bjork AC, Marsden-Haug N, Nett RJ, Woodhall DM, Self JS, Fitzpatrick KA, Priestley RA, Kersh GJ. **Epizootiological investigation of a q fever outbreak and implications for future control strategies**. Journal of the American Veterinary Medical Association 2015; 247: 1379-1386. https://doi.org/10.2460/javma.247.12.1379.

Bauer BU, Knittler MR, Andrack J, Berens C , Campe A, Christiansen B, Fasemore AM, Fischer SF, Ganter M, Körner S, Makert GR, Matthiesen S, Mertens-Scholz K, Rinkel S, Runge M, Schulze-Luehrmann J, Ulbert S, Winter F, Frangoulidis D, S, Lührmann A. **Interdisciplinary studies on Coxiella burnetii: From molecular to cellular, to host, to one health research.** Int J Med Microbiol 2023; https://doi.org/10.1016/j.ijmm.2023.151590

Botelho-Nevers E, Fournier PE, Richet H, Fenollar F, Lepidi H, Foucault C, Branchereau A, Piquet P, Maurin M, Raoult D. ***Coxiella burnetii* infection of aortic aneurysms or vascular grafts: report of 30 new cases and evaluation of outcome.** European Journal of Clinical Microbiology & Infectious Diseases. 2007;26(9):635-640. https://doi.org/10.1007/s10096-007-0357-6.

Bundesinstitut für Risikobewertung (BfR). **BfR Opinion Nr. 018/2010, 15 March 2010 "Q fever: transmission of Coxiella burnetii through the consumption of foods of animal origin unlikely".** https://www.bfr.bund.de/cm/349/q_fever_transmission_of_coxiella_burnetii_through_the_consumption_of_foods_of_animal_origin_unlikely.pdf (access 25 February 2026).

Bundesinstitut für Risikobewertung (BfR). **Stellungnahme vom 17.06.2003 „Q-Fieber: Übertragung des Erregers *Coxiella (C.) burnetii* in Tierbeständen und durch Lebensmittel auf den Menschen".** https://www.bfr.bund.de/stellungnahme/q-fieber-uebertragung-des-erregers-coxiella-c-burnetii-in-tierbestaenden-und-durch-lebensmittel-auf-den-menschen/ (access 25 February 2026).

Bundesministerium für Landwirtschaft, Ernährung und Heimat (BMLEH). **Bekanntmachung von Empfehlungen für hygienische Anforderungen an das Halten von Wiederkäuern" vom 7. Juli 2014 (BAnz. AT 01.08.2014 B1).** https://www.bmleh.de/DE/themen/tiere/tiergesundheit/empfehlungen-hygiene.html (Access 25 February 2026).

Centers for Disease Control and Prevention (CDC). https://www.cdc.gov (access 25 February 2026).

Clark NJ, Magalhaes RJS. **Airborne geographical dispersal of q fever from livestock holdings to human communities: a systematic review and critical appraisal of evidence.** BMC Infectious Diseases 2018; 18. https://doi.org/10.1186/s12879-018-3135-4.

Commission Delegated Regulation (EU) 2018/1629 of 25 July 2018 amending the list of diseases set out in Annex II to Regulation (EU) 2016/429 of the European Parliament and of the Council on transmissible animal diseases and amending and repealing certain acts in the area of animal health ("Animal Health Law"). https://eur-lex.europa.eu/eli/reg_del/2018/1629/oj (access 25 February 2026).

Commission Delegated Regulation (EU) 2020/689 of 17 December 2019 supplementing Regulation (EU) 2016/429 of the European Parliament and of the Council as regards rules for surveillance, eradication programmes, and disease-free status for certain listed and

emerging diseases. https://eur-lex.europa.eu/eli/reg_del/2020/689/oj (access 25 February 2026).

Commission Implementing Decision (EU) 2018/945 of 22 June 2018 on the communicable diseases and related special health issues to be covered by epidemiological surveillance as well as relevant case definitions. https://eur-lex.europa.eu/eli/dec_impl/2018/945/oj/eng (access 25 February 2026).

Commission Implementing Regulation (EU) 2018/1882 of 3 December 2018 on the application of certain disease prevention and control rules to categories of listed diseases and establishing a list of species and groups of species posing a considerable risk for the spread of those listed diseases. https://eur-lex.europa.eu/eli/reg_impl/2018/1882/oj (access 25 February 2026).

Commission Implementing Regulation (EU) 2020/2002 of 7 December 2020 laying down rules for the application of Regulation (EU) 2016/429 of the European Parliament and of the Council with regard to Union notification and Union reporting of listed diseases, to formats and procedures for submission and reporting of Union surveillance programmes and of eradication programmes and for application for recognition of disease-free status, and to the computerised information system. https://eur-lex.europa.eu/eli/reg_impl/2020/2002/oj/eng (access 25 February 2026).

Communicable Diseases Network Australia (CDNA). CDNA surveillance case definitions. https://www.cdc.gov.au/resources/collections/cdna-surveillance-case-definitions?utm_source=health.gov.au#q (access 25 February 2026).

Deutsche Veterinärmedizinische Gesellschaft (DVG). **Desinfektionsmittelliste.** https://www.desinfektion-dvg.de/index.php?id=1793 (access 25 February 2026).

Dohoo IR, Martin W, Stryhn H. **Veterinary epidemiologic research.** Charlottetown, CAN: VER Inc, 2010. Seite 54. Eq 2.17.

European Centre for Disease Prevention and Control (ECDC). EU case definitions. https://www.ecdc.europa.eu/en/all-topics/eu-case-definitions (access 25 February 2026).

EFSA und ECDC. **The European Union One Health Report 2024 Zoonoses Report**. EFSA Journal; 23(12). Page 171-172. https://doi.org/10.2903/j.efsa.2025.9759.

European Safety Authority (EFSA). https://www.efsa.europa.eu/en (access 25 February 2026).

Federal Institute for Occupational Safety and Health (BAUA). **Technical Rules for Biological Agents (TRBA).** https://www.baua.de/EN/Service/Technical-rules/TRBA/TRBA (access 25 February 2026).

Frangoulidis D, Fischer SF. **Q-Fieber.** Deutsche Medizinische Wochenschrift. 2015;140:1206 - 1208. https://doi.org/10.1055/s-0041-103640.

Frangoulidis D., Walter M.C., Fasemore A.M. & Cutler, S. J. **Molecular Typing in Bacterial Infections**. *Coxiella burnetii*. In: de Filippis, I. (eds), Volume II. Springer, Cham, Switzerland, 2022. Pages 247–262.

Friedrich-Loeffler-Institut (FLI). **Empfehlungen des Friedrich-Loeffler-Instituts über Mittel und Verfahren für die Durchführung einer tierseuchenrechtlich vorgeschriebenen Desinfektion.** https://desinfektions-rl.fli.de/de/home (access 25 February 2026).

Friedrich-Loeffler-Institut (FLI). **Empfehlungen zur Desinfektion bei Tierseuchen/VII. Spezieller Teil / m19. Q-Fieber.** Version 0.1 vom 30.07.2020.

https://www.openagrar.de/servlets/MCRFileNodeServlet/openagrar_derivate_00025899/FLI-V7-m19-Q-Fieber-RL-Desinfektion-V01-2020-07-30.pdf (access 25 February 2026).

Friedrich-Loeffler-Institut (FLI). **National Reference Laboratory for Q Fever.** https://www.fli.de/en/institutes/institute-of-bacterial-infections-and-zoonoses-ibiz/reference-laboratories/nrl-for-q-fever/ (access 25 February 2026).

Friedrich-Loeffler-Institut (FLI). **Q-Fieber (*Coxiella burnetii*). Amtliche Methode und Falldefinition.** 2021. https://www.openagrar.de/receive/openagrar_mods_00059585 (access 25 February 2026).

German Association for Applied Hygiene. **VHA list of disinfectants.** https://www.vah-liste.de/en/ (access 25 February 2026).

Hagenaars JCJP, Renders NHM, van Petersen AS, Shamelian SOA, de Jager-Leclercq MGL, Moll FL, Wever PC, Koning OHJ. **Serological follow-up in patients with aorto-iliac disease and evidence of Q fever infection.** European Journal of Clinical Microbiology & Infectious Diseases. 2014;33(8):1407-1414. https://doi.org/10.1007/s10096-014-2084-0.

Hartzell JD, Wood-Morris RN, Martinez LJ, Trotta RF. **Q Fever: Epidemiology, Diagnosis, and Treatment.** Mayo Clinic Proceedings. 2008;83(5):574-579. https://doi.org/10.4065/83.5.574.

Infektionsschutzgesetz vom 20. Juli 2000 (BGBl. I S. 1045), das zuletzt durch Artikel 2 des Gesetzes vom 10. Dezember 2021 (BGBl. I S. 5162) geändert worden ist. http://www.gesetze-im-internet.de/ifsg/BJNR104510000.html (access 25 February 2026).

Klee SR, Ellerbrock H, Franz T, Linke S, Appel B. **Highly sensitive real-time PCR for specific detection and quantification of *Coxiella burnetii*.** BMC Microbiology. 2006;2. https://doi.org/10.1186/1471-2180-6-2.

Konsiliarlabor für Q-Fieber / *Coxiella burnetii*, Landesgesundheitsamt Baden-Württemberg, Referat 73 Gesundheitsschutz, Infektionsschutz und Epidemiologie, Abteilung 7, Ministerium für Soziales, Gesundheit und Integration. https://www.gesundheitsamt-bw.de/ueber-uns/kompetenzzentren/konsiliarlabor-q-fieber/ (access 25 February 2026).

Landwirtschaftskammer Niedersachsen. **Leitfaden Biosicherheit in Rinderhaltungen (2. Auflage, mit Anhang zur Paratuberkulose).** https://www.lwk-niedersachsen.de/lwk/news/24172_Leitfaden_Biosicherheit_in_Rinderhaltungen_%282._Auflage_mit_Anhang_zur_Paratuberkulose%29 (access 25 February 2026).

Million M, Thuny F, Richet H, Raoult D. **Long-term outcome of Q fever endocarditis: a 26-year personal survey.** Lancet Infect Dis. 2010; 10(8):527-535. https://doi.org/10.1016/S1473-3099(10)70135-3.

Ordinance on Safety and Health Protection at Workplaces Involving Biological Agents (Biological Agents Ordinance - BioStoffV). https://www.gesetze-im-internet.de/englisch_biostoffv/index.html (access 25 February 2026).

Ostach PK, Dülsner A, Keil A, Nagel-Riedasch S. **Management of zoonoses in research institutions – lessons learned from a *Coxiella burnetii* outbreak case**. Laboratory Animals. 2024;59(1):93-103. doi:10.1177/00236772241271028

Plummer PJ, McClure JT, Menzies P, Morley PS, Van den Brom R, Van Metre DC. **Management of *Coxiella burnetii* infection in livestock populations and the associated zoonotic risk: a consensus statement.** Journal of Veterinary Internal Medicine 2018; 1-14. https://doi.org/10.1111/jvim.15229.

Porten K, Rissland J, Tigges A, Broll S, Hopp W, Lunemann M, van Treeck U, Kimmig P, Brockmann SO, Wagner-Wiening C, Hellenbrand W, Buchholz U. **A super-spreading ewe infects hundreds with Q fever at a farmers' market in Germany.** BMC Infectious Diseases 2006, 6:147. https://doi.org/10.1186/1471-2334-6-147.

Q fever GermAn Interdisciplinary Program for research (Q-GAPS). https://q-gaps.de (access 25 February 2026).

Raoult D, Tissot-Dupont H, Foucault C, Gouvernet J, Fournier PE, Bernit E, Stein A, Nesri M, Harle JR, Weiller PJ. **Q fever 1985-1998. Clinical and epidemiologic features of 1,383 infections.** Medicine (Baltimore) 2000, 79(2):109-123. https://doi.org/10.1097/00005792-200003000-00005.

Rehbinder C, Alenius S, Bures J, de las Heras M, Greko C, Kroon PS, Gutzwiller A, Felasa Work Grp Anim Hlth. **FELASA recommendations for the health monitoring of experimental units of calves, sheep and goats - Report of the Federation of European Laboratory Animal Science Associations (FELASA) Working Group on Animal Health.** Laboratory Animals, 2000. 34(4): p. 329-350. https://journals.sagepub.com/doi/pdf/10.1258/002367700780387723.

Robert Koch-Institut (RKI). **Falldefinitionen.** https://www.rki.de/DE/Themen/Infektionskrankheiten/Meldewesen/Falldefinitionen/Downloads/Q-Fieber.pdf?__blob=publicationFile&v=3 (access 25 February 2026).

Robert Koch-Institut (RKI). **Liste der vom Robert Koch-Institut geprüften und anerkannten Desinfektionsmittel und –verfahren.** https://www.rki.de/DE/Themen/Infektionskrankheiten/Krankenhaushygiene/Desinfektionsmittelliste/Desinfektionsmittel-und-verfahren/desinfektionsmittel-und-verfahren-inhalt.html (access 25 February 2026).

Robert Koch-Institut (RKI). **Q-Fieber. RKI-Ratgeber.** https://www.rki.de/DE/Aktuelles/Publikationen/RKI-Ratgeber/Ratgeber/Ratgeber_Q-Fieber.html (access 25 February 2026).

Robert Koch-Institut (RKI). **Rahmenkonzept: Epidemisch bedeutsame Lagen erkennen, bewerten und gemeinsam erfolgreich bewältigen.** https://www.rki.de/DE/Content/Infekt/Preparedness_Response/Rahmenkonzept_Epidemische_bedeutsame_Lagen.html (access 25 February 2026).

Rodolakis A. **Q fever, state of art: epidemiology, diagnosis and prophylaxis.** Small Ruminant Research 2006; 62: 121-124. https://doi.org/10.1016/j.smallrumres.2005.07.038.

Roest HIJ, Dinkla A, Koets AP, Post J, van Keulen L. **Experimental *Coxiella burnetii* infection in non-pregnant goats and the effect of breeding.** Veterinary Research 2020, 51:74. https://doi.org/10.1186/s13567-020-00797-7.

Roest HIJ, Tilburg JJHC, Van der Hoek W, Vellema P, van Zijderveld FG, Klaassen CHW, Raoult D. **Review article, the q fever epidemic in The Netherlands: history, onset, response and reflection.** Epidemiology & Infection 2011. 139: 1-12. https://doi.org/10.1017/S0950268810002268.

Sidi-Boumedine K, Rousset E, Henning K, Ziller M, Niemczuck K, Roest HIJ, Thiéry R. **Development of harmonised schemes for the monitoring and reporting of q-fever in animals in the European Union.** EFSA Supporting Publications 2010, 7: 1-48. https://doi.org/10.2903/sp.efsa.2010.EN-48.

Stahl JP, Varon E, Bru JP. **Treatment of *Coxiella burnetii* endocarditis with hydroxychloroquine. Is it evidence-based?** Clinical Microbiology and Infection 2022. https://doi.org/10.1016/j.cmi.2022.02.008.

Ständige Impfkommission Veterinärmedizin (StIKo Vet) am Friedrich-Loeffler-Institut (FLI), Arbeitskreis Wiederkäuer. **Leitlinie zur Impfung von Rindern und kleinen Wiederkäuern.** https://www.openagrar.de/servlets/MCRFileNodeServlet/openagrar_derivate_00063990/Impfleitlinie_Wiederkaeuer_2025-01-06.pdf (access 25 February 2026).

Ständige Impfkommission Veterinärmedizin (StIKo Vet) am Friedrich-Loeffler-Institut (FLI), Kohn B. Moritz, A, Truyen U, Hartmann K, Feige K, Lohmann K, Müller K, Donat K, Ganter M, Böttcher J, Baums C, Höltig D, Rautenschlein S, Kaufer B, Bräuer G, Schroers-Jung V. **Stellungnahme zur nicht-zulassungskonformen Anwendung von immunologischen Tierarzneimitteln.** Greifswald - Insel Riems 2023. https://www.openagrar.de/receive/openagrar_mods_00090049 (access 25 February 2026).

Sting R, Stalb S, Fischer SF, Henning K, Kuhn R, Lieb H, Axt H, Bürstel D, Benesch C, Hölzle LE. **Leitfaden zum Q-Fieber Baden-Württemberg: Empfehlungen zur Bekämpfung des Q-Fiebers bei kleinen Wiederkäuern in Baden-Württemberg.** Stuttgart 2017. http://www.untersuchungsaemter-bw.de/pdf/Leitfaden_Q-Fieber_BW.pdf (access 25 February 2026).

Tiergesundheitsgesetz in der Fassung der Bekanntmachung vom 21. November 2018 (BGBl. I S. 1938), das zuletzt durch Artikel 104 des Gesetzes vom 10. August 2021 (BGBl. I S. 3436) geändert worden ist. http://www.gesetze-im-internet.de/tiergesg/BJNR132400013.html (access 25 February 2026).

Tierische Lebensmittel-Hygieneverordnung in der Fassung der Bekanntmachung vom 18. April 2018 (BGBl. I S. 480 (619)), die zuletzt durch Artikel 1 der Verordnung vom 11. April 2024 (BGBl. 2024 I Nr. 129) geändert worden ist. https://www.gesetze-im-internet.de/tier-lmhv/BJNR182800007.html (access 12 April 2026).

Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law'). https://eur-lex.europa.eu/eli/reg/2016/429/oj (access 25 February 2026).

Verordnung über meldepflichtige Tierkrankheiten in der Fassung der Bekanntmachung vom 11. Februar 2011 (BGBl. I S. 252), die zuletzt durch Artikel 1 der Verordnung vom 8. Juli 2020 (BGBl. I S. 1604) geändert worden ist.

Wagner-Wiening C, Brockmann S, Kimmig P. **Serological diagnosis and follow-up of asymptomatic and acute Q fever infections.** International Journal of Medical Microbiology 2006. https://doi.org/10.1016/j.ijmm.2006.01.045.

Wegdam-Blans MCA, Kampschreur LM, Delsing CE, Bleeker-Rovers CP, Sprong T, van Kasteren MEE, Notermans DW, Renders NHM, Bijlmer HA, Lestrade PJ, Koopmans MPG, Nabuurs-Franssen MH, Oosterheert JJ. **The Dutch Q fever Consensus Group. Chronic Q fever: Review of the literature and a proposal of new diagnostic criteria.** Journal of Infection. 2012;64(3):247-259. https://doi.org/10.1016/j.jinf.2011.12.014.

Winter F, Schoneberg C, Wolf A, Bauer BU, Prüfer TL, Fischer SF, Gerdes U, Runge M, Ganter M, Campe A. **Concept of an Active Surveillance System for Q Fever in German Small Ruminants - Conflicts Between Best Practices and Feasibility.** Frontiers in Veterinary Science, 2021. 8(59). https://doi.org/10.3389/fvets.2021.623786.

Wolf A, Prüfer T L, Schoneberg C, Campe A, Runge M, Ganter M, Bauer BU. **Prevalence of *Coxiella burnetii* in German sheep flocks and evaluation of a novel approach to detect an infection via preputial swabs at herd-level.** Epidemiol Infect 2020; 148: e88. https://doi.org/10.1017/S0950268820000801

World Organisation for Animal Health (WOAH). Q fever (version adopted in May 2018); in: **Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 2024**, 13th edition. https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/3.01.18_Q_FEVER.pdf (access 25 February 2026).

Viehverkehrsverordnung in der Fassung der Bekanntmachung vom 26. Mai 2020 (BGBl. I S. 1170). https://www.gesetze-im-internet.de/viehverkv_2007 (access 25 February 2026).

AUTHORS

Interdisziplinäres Deutsches Q-Fieber Forschungsprogramm

Q fever GermAn interdisciplinary Program for reSearch – Q-GAPS

e-mail info@q-gaps.de
http www.q-gaps.de

Subproject 1

Prof. Dr. Martin Ganter
PD Dr. Benjamin U. Bauer

Stiftung Tierärztliche Hochschule Hannover

Klinik für kleine Klauentiere und forensische Medizin
und Ambulatorische Klinik

Bischofsholer Damm 15
D-30173 Hannover

Tel. +49 511 856-7260
Fax +49 511 856-7684
e-Mail klklkl@tiho-hannover.de
http www.tiho-hannover.de/kliniken-institute/kliniken/klinik-fuer-kleine-klauentiere-und-forensische-medizin-und-ambulatorische-klinik

apl. Prof. Dr. Martin Runge

Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit (LAVES)

Lebensmittel- und Veterinärinstitut Braunschweig/Hannover
Eintrachtweg 17
D-30173 Hannover

Tel. +49 511 28897-240
Fax +49 511 28897-299
e-Mail poststelle@LAVES.Niedersachsen.de
http www.laves.niedersachsen.de

Subproject 2

PD Dr. Amely Campe
Dr. Clara Schoneberg
Dr. Fenja Winter

Stiftung Tierärztliche Hochschule Hannover

Institut für Biometrie, Epidemiologie und Informationsverarbeitung

WHO Collaborating Centre for Research and Training for Health at the Human-Animal-Environment Interface

Bünteweg 2
D-30559 Hannover
Tel. +49 511 953-7951
Fax +49 511 953-7974
e-Mail bioepi@tiho-hannover.de
http www.tiho-hannover.de/bioepi

Subproject 3

Dr. Katja Mertens-Scholz
Friedrich-Loeffler-Institut
Institut für bakterielle Infektionen und Zoonosen (IBIZ)
Nationales Referenzlabor für Q-Fieber
Naumburger Str. 96a
D-07743 Jena

Tel. +49 3641 804-2499
Fax +49 3641 804-2228
e-Mail katja.mertens-scholz@fli.de
http https://www.fli.de/de/institute/institut-fuer-bakterielle-infektionen-und-zoonosen-ibiz/referenzlabore/nrl-fuer-q-fieber/

Subproject 5

PD Dr. Dimitrios Frangoulidis

Sanitätsakademie der Bundeswehr
Unterstützungsbereich
Abt H / MI2 / Surveillance / MN FHP Nexus

Dachauer Straße 128
D-80637 München

Tel. +49 89 1249-7571
Fax +49 89 1249-7509
e-Mail DimitriosFrangoulidis@Bundeswehr.org

Dr. Andrea Helbich

Sanitätsakademie der Bundeswehr
Unterstützungsbereich
Abt H / MI2 / Surveillance / MN FHP Nexus

Dachauer Straße 128
D-80637 München

Subproject 6

PD Dr. Michael R. Knittler
Friedrich-Loeffler-Institut

Institut für Immunologie
Südufer 10
D-17493 Greifswald

Tel. +49 38351 71170
Fax +49 38351 71643
e-Mail Michael.Knittler@fli.de
http https://www.fli.de/de/institute/institut-fuer-immunologie-ifi/labore-arbeitsgruppen/labor-fuer-zellautonome-und-zellulaere-immunitaet/

Dr. Christian Berens
Friedrich-Loeffler-Institut

Institut für molekulare Pathogenese
Naumburger Str. 96 a
D-07743 Jena

Tel. +49 03641 8042500
Fax +49 03641 8042228
e-Mail Christian.Berens@fli.de
http https://www.fli.de/de/institute/institut-fuer-molekulare-pathogenese-imp/arbeitsgruppen-forschungsbereiche/ag-pathogenomik/

Subproject 7

Prof. Dr. Anja Lührmann
Universitätsklinikum Erlangen

Institut für Klinische Mikrobiologie Immunologie und Hygiene
Wasserturmstr. 3/5
D-91054 Erlangen

Tel. +49 9131 85 32577
Fax +49 9131 85 32573
e-Mail anja.luehrmann@uk-erlangen.de
http http://www.mikrobiologie.uk-erlangen.de

Subproject 8

Prof. Dr. Silke F. Fischer
Dr. Maik Konrad

Ministerium für Soziales, Gesundheit und Integration

Abt. 7 Landesgesundheitsamt, Referat 73, Konsiliarlabor für Q-Fieber / *Coxiella burnetii*
Nordbahnhofstr. 135
D-70191 Stuttgart

Tel. +49 711 25859-301
Fax +49 711 25859-265
http https://www.gesundheitsamt-bw.de/ueber-uns/kompetenzzentren/konsiliarlabor-q-fieber/