List Products and Services

IVD GmbH

Analytical Laboratory accredited by the German Accreditation Authority (DAkkS) according to the European standard DIN EN ISO/IEC 17025

Farm Animals: SWINE, RUMINANTS & POULTRY

HUMAN

IVD GmbH Innovative Veterinary Diagnostics
Albert-Einstein-Str. 5
30926 Seelze-Letter
Germany

for *Leptospira* spp.

Deutsche Akkreditierungsstelle D-PL-18303-02-00

2022/2023 INNOVATIV DURCH FORSCHUNG IVD GmbH

QS-approved laboratory

Version of March 2025

General information
Samples are analysed individually. All prices listed are per sample and do not include statutory VAT. Please note that we do not accept payment via cheque.
Our General Terms and Conditions of Sale apply to all services; these can be viewed in our premises or on our homepage: https://www.ivd-gmbh.de.
Our privacy policy can be found at https://www.ivd-gmbh.de/datenschutz.
Please contact us in case of special diagnostic services, analyses or questions. We are prepared to answer any question and consider any request within the areas of our professional and technical expertise.
There is a surcharge for diagnostic services below a minimum charge of € 10.00.
A surcharge plus VAT will be assessed for retroactive modifications of orders authorised/requested/required by the customer.

Selection and submission of samples

The materials best suited for serological examinations are serum or blood without anticoagulants.
The use of plasma (addition of EDTA, Li-heparin, citrate) can cause artefacts in the complement fixation test (CFT) and in agglutination reactions (HI, MAT, RBT and others).
Tissue and swab samples collected immediately *post mortem* from typical lesions are often more suitable for the molecular biological and cultural detection of agents than samples which can be taken *intra vitam*.

Shipping recommendations

When pathogen levels are low, both analytical sensitivity and diagnostic certainty of molecular biological analyses are enhanced by immediate shipment of cooled samples, due to retardation of autolysis. Chill fresh tissues prior to shipment and include frozen gelpacks with the shipment; enclose paperwork in waterproof packaging. When shipping fresh tissues, consider the possibility of shipping delays due to weekends or holidays.
Information on regulations for the shipment of hazardous materials can be found on our home page: https://www.ivd-gmbh.de.

The IVD GmbH laboratory is accredited according to European standard DIN EN ISO /IEC 17025. IVD has performed diagnostic testing for infectious agents of farm animals, horses, dogs, cats and exotic animals since 1997.

Tests that do not conform to the regulations of the national accreditation body of Germany are marked with a superscript circle (°).
In test reports, only the method is reported, when using commercial test kits also the manufacturer is mentioned, not the batch number of the test kit or the version number of the manual (simplified report).

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MATERIAL FOR SAMPLING, PACKAGING AND TRANSMITTAL OF SPECIMEN

The IVD GmbH provides its customers with material for taking samples of meat juice, oral fluid as well as sample containers for histological examination in smaller packaging units. The packaging corresponds to ADR regulation P650 for mail delivery to our laboratory.

	Minimum purchase/ packaging unit (PU)	Price in € per PU
Suesse Post Box (suitable for 12-16 blood samples or 5 fecal samples) incl. 1 protective bag with absorbent insert	20 pc.	23.70
Suesse Post Box Maxi (suitable for 24-32 blood samples or 10 fecal samples) incl. 2 protective bags with absorbent insert	15 pc.	26.20
Protective Bag with absorbent insert (for 6-8 blood or 5 fecal samples)	50 pc.	20.20
Protective Bag LARGE with absorbent insert (for 3 fecal poaches)	25 pc.	14.90
Protective Container with absorbent insert and screw cap (only for single samples)	50 pc.	16.10
Fecal Tube with screw cap 76x20 mm	100 pc.	17.80
Formalin filled sample tubes for histological examinations (100 ml urine cup with screw cap filled with 50 ml 4% Formalin)	40 pc.	17.80
Meat Juice Collector with Stopper	70 pc.	16.10
FTA Cards (4 spots each)	1 pc.	6.50
DBS (Dried Blood Spots - 5 spots each)	5 pc.	10.10
Cold Pack (according to availability)	max. 1 pc. per box	free of charge
Mycoplasma Medium	on request	
Fecal Sampling Horse & Small Animal Kit each shipping box (Suesse Post Box) contains • 1 sample collection guide for pet owners • 3 compostable feces bag • 1 protective bag large	10 pc.	19.10
IVD Swine Oral Fluid Kit each kit contains • 1 user manual • 1 chewing rope made of cotton appr. 70 cm Ø 16 mm with fastening rope appr. 150 cm Ø 3 mm	1 pc.	9.60
• 1 pair of disposable gloves • 1 large plastic bag for oral fluid collection • 1 sample tube • 2 small plastic bags • 1 adhesive label	from 12 pc. each	9.00

HUMANS
SEROLOGICAL TESTS (Antibody Detection)
Material: serum or blood without anticoagulants

Erysipelothrix rhusiopathiae (Erysipelas) ELISA°
Material: serum or blood without anticoagulants

Leptospira MAT°
Selected antigens of representative strains of different pathogenic serovars and serogroups
Material: serum or blood without anticoagulants

Testing for individual strains or serovars is possible after consultation

HUMANS
PCR TESTS (Antigen detection)

Leptospira realtime PCR
incl. differentiation of pathogenic *Leptospira* (subclades P1 and P2)
Material: body fluids or tissue depending on clinical manifestation

SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus Type 2, COVID-19 pathogen) realtime PCR°
Material: nasal swabs, pharyngeal swabs, nasopharyngeal swabs, BALF, TBS, sputum, gargle sample
Pool examinations by epidemiological units are also possible Pool formation per sample (human pathogenic)

also in dogs, cats, rabbits, golden hamsters, ferrets

All examinations can be carried out as a service for self-paying patients or private patients.

For the collection of gargle samples, we offer practical sets including suitable packaging and shipping material.
Find more information on our website at https://www.ivd-gmbh.de/home/

Test methods offered for various pathogen detections in pigs

	Indirect Pathogen Detection (Antibodies)						Direct Pathogen Detection							
Test methods / alphabetical list of pathogens	**ELISA**	**Serotyp. ELISA**	**CFT**	**HI**	**MAT**	**RBT**	**PCR**	**qPCR**	**Differentiation**	**Typing**	**Sequencing**	**Bact. Culture**	**Parasitology**	**IHC**
Actinobacillus pleuropneumoniae	●	●					●			●		●		●
ADV (Aujeszky's Disease Virus)	●													
ASFV (African Swine Fever Virus)	●													
Bordetella bronchiseptica												●		
Brachyspira species							●		●			●		
Brachyspira hyodysenteriae							●					●		
Brucella, *Brucella abortus*			●			●								
Campylobacter spec.							●							
Chlamydia							●							
Classical Swine Fever Virus (CSFV)	●													
Clostridium perfringens							●			●		●		
Clostridiodes difficile							●			●		●		
Coronavirus (PEDV, TGEV)							●		●					
Cryptosporidia													●	
Cystoisospora suis							●						●	
Enterococcus hirae, durans or villorum									●*			●		
Escherichia coli							●			●		●		
Eperythrozoon (Mycoplasma) suis							●							
Erysipelothrix rhusiopathiae (Erysipelas)	●											●		
Fusobacterium necrophorum												●		

	Indirect Pathogen Detection (Antibodies)						Direct Pathogen Detection							
Test methods / alphabetical list of pathogens	**ELISA**	**Serotyp. ELISA**	**CFT**	**HI**	**MAT**	**RBT**	**PCR**	**qPCR**	**Differentiation**	**Typing**	**Sequencing**	**Bact. Culture**	**Parasitology**	**IHC**
Glaesserella parasuis	●						●			●*		●		
Influenza A Virus (swIAV)	●			●			●			●	●			●
Lawsonia intracellularis (PIA)	●						●	●						●
Leptospira (pathogenic Serovars)					●		●		●					(●)
Mesomycoplasma flocculare							●*					●		
Mesomycoplasma hyopneumoniae	●						●					●		●
Mesomycoplasma hyorhinis	●						●					●		
Metamycoplasma hyosynoviae							●					●		
Parasite stages in feces, skin parasites (mites, lice)													●	
Pasteurella multocida toxin A							●			●*		●		
Porcine Circovirus 2	●						●	●			●			●
Porcine Circovirus 3							●							
PEDV (Porcines Epidemic Diarrhoea Virus)							●							
Porcine Parvovirus	●						●				●			
PRRSV	●						●		●		●			
Rotavirus Group A							●							●
Rotavirus Group C							●							
Salmonella	●						●			●*		●		
Schaalia (Actinomyces) hyovaginalis												●		
Sarcoptes scabiei var. suis (Scabies Swine)	●												●	
Staphylococcus aureus - MRSA										●*		●		
Staphylococcus chromogenes										●*		●		
Staphylococcus hyicus - Toxin detection										●*		●		
Streptococcus suis							●			●*		●		
SVDV (Swine Vesicular Disease Virus)	(●)													

	Indirect Pathogen Detection (Antibodies)						Direct Pathogen Detection							
Test methods / alphabetical list of pathogens	**ELISA**	**Serotyp. ELISA**	**CFT**	**HI**	**MAT**	**RBT**	**PCR**	**qPCR**	**Differentiation**	**Typing**	**Sequencing**	**Bact. Culture**	**Parasitology**	**IHC**
TGEV (Transmissible Gastroenteritis Virus)	(●)						●							
Trueperella abortisuis												●		
Trueperella pyogenes												●		

*** Examination only possible from isolates; () Examination on request**

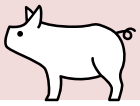
Suitable test materials for direct pathogen detection using PCR, bacteriology, histology and immunohistochemistry in pigs and ruminants

suitable material / alphabetical list of pathogens	Meninges / Liquor	Conjunctival swab	Blood / Milk[1]	Nasal swabs	BALF/ TBS	Bronchial swabs	Lung	Tonsills/ Lymphnode	Feces / (fecal swabs)	Small intestine	Caecum / Colon	Cervical swabs	Abortion (Fetus/Placenta)	Serosa swabs	Joint	others
Actinobacillus pleuropneumoniae					●		●	●								
Bordetella bronchiseptica				●	●	●	●									
Brachyspira species									●		●					
Brachyspira hyodysenteriae									●		●					
Campylobacter spec.									●	●						
Chlamydia		●										●	●			
Clostridioides difficile									●	●	●					
Clostridium perfringens									●	●						
Cystoisospora suis									●							swabs
Cryptosporidia									●	●	●					
Enterococcus durans									●	●						
Enterococcus hirae									●	●						
Enterococcus villorum									●	●						
Escherichia coli									●	●	●					Sepsis: kidney, CNS
Eperythrozoon (Mycoplasma) suis			●													
Erysipelothrix rhusiopathiae (Erysipelas)															●	kidney
Fusobacterium necophorum													●	●		abscess, claw swab
Glaesserella parasuis					●	●	●							●	●	
Influenza A Virus				●	●	●	●									
Lawsonia intracellularis (PIA)									●	●	●					
Leptospira (pathogenic Serovars)	●		●									●	●			kidney, liver, internal genital organs, body fluids, vitreous, aqueous humor, urine
Mesomycoplasma hyopneumoniae					●	●	●									

suitable material / alphabetical list of pathogens	Meninges / Liquor	Conjunctival swab	Blood / Milk[1]	Nasal swabs	BALF/ TBS	Bronchial swabs	Lung	Tonsills/ Lymphnode	Feces / (fecal swabs)	Small intestine	Caecum / Colon	Cervical swabs	Abortion (Fetus/Placenta)	Serosa swabs	Joint	others
Mesomycoplasma hyorhinis					●	●	●							●	●	
Metamycoplasma hyosynoviae															●	
Mesomycoplasma flocculare							●									
Pasteurella multocida				●	●	●	●									
Porcine Circovirus 2/3			●		●		●	●		●	●	●	●			
Porcine Coronavirus									●	●	●					
Porcine Parvovirus			●										●			
Porcine Epidemic Virus									●	●						
PRRSV			●	●	●	●	●						●			
Rotavirus Group A / C									●	●						
Salmonella									●	●	●					
Schaalia (Actinomyces) hyovaginalis												●	●			abscess
Staphylococcus aureus - MRSA	●		●[1]	●	●	●	●					●	●		●	abscess
Staphylococcus chromogenes																abscess, skin
Staphylococcus hyicus - toxin determination												●	●			abscess, skin
Streptococcus dysgalactiae	●		●[1]	●	●	●	●					●	●		●	abscess
Streptococcus suis	●				●	●	●							●	●	
Transmissible Gastroenteritis Virus									●	●						
Trueperella abortisuis												●	●			
Trueperella pyogenes							●					●	●		●	abscess

Multiplex PCR and combinations of different examination methods

suitable material / pathogens	**BALF/ TBS**	**Lung**	**Dry swab of Joints / Serosa**	**Feces**
Multiplex PCRs				
„Neumünster“ (*M. hyopneumoniae, M. hyorhinis*, swIAV, PCMV, PCV2, PRCV, PRRSV-1,-2)	●	●		
***„App / GPS* + vir“** (*App, Gps*)	●	●		
„Serositis“ *(Gps, M. hyorhinis)*			●	
“Arthritis” (*Gps, M. hyorhinis, M. hyosynoviae, Sc. suis*)			●	
Combinations of different examination methods				
„Outdoor Pigs - feces“ PCR + Parasitology (*Brachyspira* differentiation by PCR, *Laws. intracellularis* PCR, *Salmonella* Choleraesuis/ Typhimurium PCR; flotation)				●
„Saugferkeldurchfall/ suckling piglet diarrhoea“ Bact. culture + PCR +Parasitology (*E. coli, C. perfringens*, *Enterococcus*, Rota-/ Coronavirus; flotation)				●



ADV (Aujeszky's disease virus or pseudorabies virus (PRV), Suid herpesvirus 1) ELISA

App (*Actinobacillus pleuropneumoniae)* ApxIV Toxin ELISA (standard)

App ApxII toxin ELISA (for research purpose only)

App LPS mix ELISA

App serotyping / single App serotypes / groups

- **App** ELISA virulent plus screening:
  virulent serotypes (ST 1/9/11; 5a/b) plus ST 2 (dominant in EU)
- **App** ELISA full screening (12 serotypes)

- **App** ELISA serotypes 1/9/11
- **App** ELISA serotype 2
- **App** ELISA serotypes 3/6/8
- **App** ELISA serotypes 4/7
- **App** ELISA serotypes 5a/b
- **App** ELISA serotype 10
- **App** ELISA serotype 12

ASFV (African swine fever virus) ELISA
on request

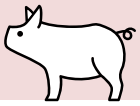
***Brucella* spec.** RBT

CSFV (Classical swine fever virus) ELISA

Erysipelothrix rhusiopathiae (Erysipelas) ELISA

***Glaesserella parasuis* (Gps)** ELISA

Influenza A Virus ELISA (serum) (standard)
Influenza A Virus ELISA (oral fluid, saliva)
Influenza A Virus HI
(current strains of relevant subtypes in Germany;
recommended for vaccinated sows)



Lawsonia intracellularis („PIA“) ELISA

Leptospira MAT
(Selected antigens of representative strains of different pathogenic serovars and serogroups)
Testing for individual strains or serovars is possible after consultation

Mesomycoplasma hyopneumoniae ELISA (standard)

Mesomycoplasma hyopneumoniae ELISA (alternative)

Mesomycoplasma hyorhinis ELISA

PCV2 (Porcine circovirus 2) IgM / IgG ELISA (standard)
PCV2 (Porcine circovirus 2) ELISA (alternative)

PPV (Porcine parvovirus) ELISA

PRRSV (Porcine reproductive and respiratory syndrome virus) ELISA (serum)

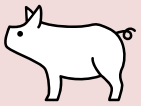
Salmonella ELISA
Export of results into the Qualiproof© database
(as part of the salmonella monitoring and reduction program for pig production by QS Qualität and Sicherheit GmbH, Bonn, these charges are collected and passed on to Qualitype AG, Dresden, Germany)

Sarcoptes scabiei var. suis (Scabies) ELISA

SVDV (Swine vesicular disease virus) ELISA
on request

TGEV (Transmissible gastroenteritis virus) ***/***
PRCV (Porcine respiratory coronavirus) ELISA
on request

SWINE
EXAMINATION FOR INTERNATIONAL TRADE

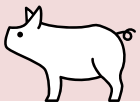


Price on request

Individually combined according to your specifications, e.g.:

African swine fever (ASFV)
Classical swine fever (CSFV, Hog Cholera)
Aujeszky‘s disease (ADV or PRV or SHV1)
Transmissible gastroenteritis (TGEV)
Swine vesicular disease (SVDV)
Brucellosis
PRRSV
and many more.

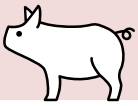
SWINE
SEROLOGICAL SCREENINGS
Material: Serum or blood without anticoagulants



RESPIRATORY PATHOGENS

Respiratory tract screening “Ahlem”
Actinobacillus pleuropneumoniae
Mesomycoplasma hyopneumoniae
PRRSV
Influenza A Virus (ELISA) or (HI)

Respiratory tract screening “Glässer”
Actinobacillus pleuropneumoniae
Glaesserella parasuis
PRRSV
Influenza A Virus (ELISA) or (HI)



REPRODUCTIVE PATHOGENS

Reproductive tract screening “Ery + Parvo”

Erysipelothrix rhusiopathiae (Erysipelas)
Leptospira (pathogenic serovars)
PPV
PRRSV

Reproductive tract screening “Melle”

PCV2 IgM / IgG
PRRSV
Leptospira
Influenza A Virus (ELISA) or (HI)

Screening „Sow Vaccination“

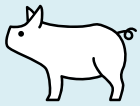
PCV2 (IgM/ IgG)
PRRSV
PPV
Influenza A Virus HI

Health Check “Swine”

Actinobacillus pleuropneumoniae
Erysipelothrix rhusiopathiae (Erysipelas)
Leptospira (pathogenic serovars)
Mesomycoplasma hyopneumoniae
PPV
PRRSV
Influenza A Virus (ELISA) or (HI)

Screening „Outdoor Pigs“ - blood

Erysipelothrix rhusiopathiae (Erysipelas)
Leptospira (pathogenic serovars)
PRRSV
Influenza A Virus (ELISA)



App *(Actinobacillus pleuropneumoniae)* apxIV PCR
Material: BALF, TBS, lung, tonsil

App capsule typing by multiplex PCR (cps mPCR)
molecular „serotyping“ of *App* isolates
Material: only fresh BALF, TBS, lung, tonsil or fresh samples on FTA-Cards

Brachyspira hyodysenteriae realtime PCR
Material: feces, rectal swabs, large intestine

Brachyspira pilosicoli PCR
Material: feces, rectal swabs, large intestine

Brachyspira **spec**. PCR
Detection of *Brachyspira* spec., *B. pilosicoli*, *B. hampsonii*, *B. intermedia, B. innocens, B. suanatina* and *B. murdochii*
Material: feces, rectal swabs, large intestine

Brachyspira differentiation PCR
Detection of *Brachyspira* spec., *B. pilosicoli, B. hampsonii*, *B. intermedia, B. innocens, B. suanatina* and *B. murdochii* by PCR incl. *Brachyspira hyodysenteriae* by realtime PCR
Material: feces, rectal swabs, large intestine

Campylobacter differentiation PCR
Detection of *Campylobacter* spec.*, C. coli* and *C. jejuni*
Material: feces, rectal swabs, small intestine

Chlamydia PCR
Material: Genital swabs, conjunctival swabs, placenta, fetal liver, lung, spleen, genital organs

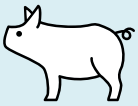
Clostridioides **(*Clostridium) difficile*** multiplex PCR
Detection of genes coding for toxin B and the binary toxin B
Material: feces, rectal swabs

Clostridium perfringens multiplex PCR
Detection of types A and C
Material: feces, rectal swabs

Cystoisospora suis PCR°
Material: feces, rectal swabs, environmental samples

Escherichia coli **„Virulence-Associated Factors“** multiplex PCR
Detection of virulence associated factor genes (fimbriae, adhesins, toxins and other factors)
Material: feces, rectal swabs

Escherichia coli **„EDEC“** multiplex PCR
Detection of EDEC- associated genes (shigatoxine 2e, F18-fimbriae), Identification of the pathotype of edema disease
Material: feces, rectal swabs



Glaesserella parasuis (gps) multiplex PCR
Detection incl. potential marker genes of virulence
Material: BALF, TBS, lung

Influenza A virus (swIAV) realtime PCR
Material: Nasal swabs (BALF, TBS, oral fluid/saliva), lung

Influenza A virus (swIAV) realtime multiplex PCR for subtyping of European swine influenza A virus
Material: Nasal swabs (BALF, TBS, oral fluid/saliva), lung

Influenza A virus (swIAV) Sequencing° (by external lab) of a PCR product (HA gene of influenza A virus) incl. comparison and alignment to a reference strain
PCR
Sequencing and alignment
total

Allocation of sequence files

Lawsonia intracellularis realtime PCR
Material: feces, rectal swabs, small intestine

Lawsonia intracellularis quantitative PCR (only individual samples)
Material: feces, rectal swabs, small intestine

Leptospira realtime PCR
Detection including the differentiation of pathogenic *Leptospira* (subclades P1 and P2)
Material: Genital swabs, urine, sperm, kidney, fetal tissues (kidney, liver, lung), placenta, genital organs (for *L. Bratislava)*

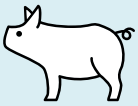
Mesomycoplasma (Mycoplasma) hyopneumoniae realtime PCR
Material: BALF, TBS, nasal swabs, bronchus swabs, lung

Mesomycoplasma (Mycoplasma) hyorhinis PCR
Material: BALF, TBS, nasal swabs, lung, bronchus swab

Metamycoplasma (Mycoplasma) hyosynoviae PCR
Material: synovial fluid, joint capsule, joint swab

Eperythrozoon (Mycoplasma) suis („eperythrozoonosis“) PCR
Material: blood (up to 5 samples may be pooled), (spleen, lung)

Pasteurella multocida **Toxin (PMT)** PCR
Detection of *toxA*-gen
Material: nasal swabs, (up to 5 samples may be pooled), bacterial isolates



PCV2/3 (Porcine circovirus 2 and 3) realtime PCR
Material: BALF, TBS, blood, oral fluid/ saliva, tonsil, lymph node
(up to 5 samples may be pooled)

PCV2 quantitative PCR **(only individual samples!)**
Material: BALF, TBS, blood, oral fluid/ saliva, tonsil, lymph node

PCV2 Sequencing° (by external lab) of PCR product (orf2)
incl. comparison of identity and alignment to the reference strain of the respective genotypes (type PCV2 a-h)
PCR
Sequencing and alignment
total

Allocation of sequence files

PPV (Porcine parvovirus) PCR
Material: abortion material, fetal lung

PPV Sequencing° (by external lab) of a PPV1 PCR product (VP2)
incl. comparison of identity and alignment to a reference strain
PCR
Sequencing and alignment
total

Allocation of sequence files (per data set)

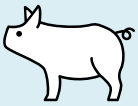
PRRSV realtime multiplex PCR
differentiation of European and North American genotype or rather species PRRSV-1 and PRRSV-2
Material: BALF, TBS, blood, oral fluid/ saliva, sperm (intermittent excretion), lung, tonsil, placenta (up to 5 blood samples may be pooled)

PRRSV Sequencing° (by external lab) of PCR product
incl. comparison of identity and alignment to the reference strain of the respective species (type 1 (EU): strain Lelystad or type 2 (NA): VR 2332 = Ingelvac PRRS MLV (BI)) and vaccine strains registered in Germany
PCR
Sequencing and alignment
total

Alignment to further strains / sequences (per strain/ sequence)
Allocation of sequence files (per strain/sequence)

Rotavirus group A and C realtime PCR
Material: feces, rectal swabs, small intestine

SWINE
PCR TESTS
directly from sample material

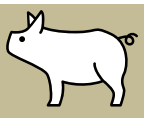


***Salmonella* Choleraesuis Typhimurium** PCR
detection of *Salmonella* and differentiation of serovars Choleraesuis and Typhimurium after cultural enrichment
Material: feces, rectal swabs, large intestine; isolates from bacterial culture

Porcine corona virus PCR:
TGEV (Transmissible gastroenteritis virus) & **PEDV** (Porcine epidemic diarrhoea virus) PCR
Material: feces, rectal swabs, small intestine

Streptococcus suis *(Sc. suis)* PCR
Material: synovial fluid, joint swab, joint capsule, meningeal swab, serosa

SWINE
Combinations of different examination methods/ Diagnostic Profiles



Combinations of different examination methods

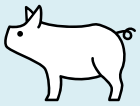
Screening „Outdoor Pigs“ - feces
Material: only with feces samples, no swabs
Brachyspira differentiation PCR
Lawsonia intracellularis realtime PCR
Salmonella Choleraesuis Typhimurium PCR
Detection of parasites (flotation)

Diagnostic profil „Suckling piglet diarrhoea“
Material: only with feces samples, no swabs
Rota-/Coronavirus PCR
Bacterial culture for *E. coli, Enterococcus* and *C. perfringens*
Detection of parasites (flotation)
with add. bacterial culture for *C. difficile*

Optional, if positive:

Typing *E. coli* (multiplex PCR for detection of 21 virulence associated factors)
Typing *C. perfringens* (multiplex PCR & Immunoblot)
Identifying *Enterococcus* (PCR)

Resistance testing (Agar diffusion))
Resistance testing (Microdilution)
Resistance testing (Microdilution anaerobes)



RESPIRATORY DISEASES

PCR Screening „Respiration“ (Material: BALF, lung)
Actinobacillus pleuropneumoniae
Mesomycoplasma hyopneumoniae
Influenza A Virus
PRRSV (realtime PCR with differentiation PRRSV 1 (EU) and 2 (NA))

PCR Screening „Respiration plus “ (Material: BALF, lung)
Actinobacillus pleuropneumoniae
Mesomycoplasma hyopneumoniae
Influenza A Virus
PRRSV (realtime PCR with differentiation PRRSV 1 (EU) and 2 (NA))
PCV2/3

PCR Screening „Bakum“ (Material: BALF, lung)
Mesomycoplasma hyopneumoniae
Influenza A Virus
PCV2/3
PRRSV (realtime PCR with differentiation PRRSV 1 (EU) and 2 (NA))

PCR Screening „Dessau“ (Material: BALF, lung)
Actinobacillus pleuropneumoniae
Mesomycoplasma hyopneumoniae
PRRSV (realtime PCR with differentiation PRRSV 1 (EU) and 2 (NA))
PCV2/3

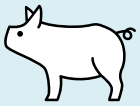
REPRODUCTIVE DISEASES

PCR Screening „Reproduction“
(Material: Pool of fetal lung, thymus, heart, kidney, placenta/ liver, genital swab)
Chlamydia
Leptospira (pathogenic)
PCV2/3
PPV
PRRSV (realtime PCR with differentiation PRRSV 1 (EU) and 2 (NA))

DIARRHOEA

PCR Screening „Dysentery / Ileitis“
(Material: feces, small and large intestine)
Brachyspira hyodysenteriae
Lawsonia intracellularis

SWINE
PCR SCREENINGS
directly from sample material



PCR Screening „Enteritis“ (Material: feces, small and large intestine)
Brachyspira hyodysenteriae
Lawsonia intracellularis
Salmonella serovars Choleraesuis and Typhimurium

PCR Screening „Rota- / Coronavirus“ (Material: feces, small intestine)
Rotavirus group A and C
TGEV (Transmissible Gastroenteritis Virus)
PEDV (Porcine Epidemic Diarrhoea Virus)

PCR Screening* „Suckling piglet diarrhoea“ (Material: feces, small intestine)
E.coli incl.typing “virulence associated factors“
Clostridium perfringens incl. detection of types A and C
Cystoisospora suis°
Rotavirus A/C

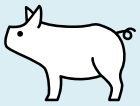
PCR Screening* „Suckling piglet diarrhoea plus“ (Material: feces, small intestine)
E.coli incl.typing “virulence associated factors“
Clostridium perfringens incl. detection of types A and C
Cystoisospora suis°
Rotavirus A/C
TGEV/PEDV)

PCR Screening* „Finisher“ (Material: feces, small and large intestine)
E.coli incl.typing “virulence associated factors“
Brachyspira hyodysenteriae
Lawsonia intracellularis
Salmonella serovars Choleraesuis and Typhimurium

PCR Screening* „Finisher plus“ (Material: feces, small and large intestine)
E.coli incl.typing “virulence associated factors“
Brachyspira hyodysenteriae
Lawsonia intracellularis
Salmonella serovars Choleraesuis and Typhimurium
Rotavirus A/C
TGEV/PEDV

***Please note:**

In the PCR screenings “Suckling piglet diarrhoea” and “Finisher” there is no pathogen cultivation, a resistance test and the preservation of isolates are not possible without further cultural examination!



PCR Screening „Oral Fluids“ for Herd Check
(Material: oral fluid)
Mesomycoplasma (Mycoplasma) hyopneumoniae
Mesomycoplasma (Mycoplasma) hyorhinis
Influenza A Virus
PCMV
PCV2
PRCV
PRRSV 1 and 2 (EU/NA)
PPV
PEDV
Rotavirus A/C
Brachyspira hyodysenteriae
Lawsonia intracellularis

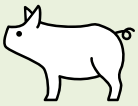
MULTIPLEX PCR - SWINE

Multiplex PCR „Neumünster“ (Material: BALF, TBS, lung)
Mesomycoplasma hyopneumoniae (incl. confirming PCR)
Mesomycoplasma hyorhinis
Influenza A Virus
PCMV
PCV2
PRCV
PRRSV 1 and 2 (EU/NA)

Multiplex PCR *„APP / GPS (HPS) + vir“* (Material: BALF, TBS, lung)
Actinobacillus pleuropneumoniae
Glaesserella parasuis + potential virulence factor

Multiplex PCR „Serositis“ (Material: dry swabs from serosa)
Glaesserella parasuis + potential virulence factor
Mesomycoplasma hyorhinis

Multiplex-PCR "Arthritis" (Material: joint swabs, joint capsule)
Glaesserella parasuis
Mesomycoplasma hyorhinis
Metamycoplasma hyosynoviae
Streptococcus suis



Examination by bacteriological culture, basic

Examination by bacteriological culture for respiratory pathogens
(incl. necessary selective culture media)

Examination by bacteriological culture incl. anaerobes
using enrichment and selective culture media

Examination by bacteriological culture for *Brachyspira*
using selective culture media

Examination by culture only for *Salmonella* according
DIN EN ISO 6579 1 using enrichment and selective culture media

Examination by bacteriological culture incl. *Salmonella* according
DIN EN ISO 6579 1 using enrichment and selective culture media

Examination by culture for *E. coli*, *C. perfringens* and *Salmonella*
according DIN EN ISO 6579 1:2017 using enrichment and selective culture media

Examination by bacteriological culture incl. *Mycoplasma*
using enrichment and selective culture media
Note: special transport medium is available on request

Additional selective culture medium

Please note that the identification of pathogenic bacteria species may incur further costs for diagnostic verification, e.g. for species identification by PCR or 16S rRNA typing (PCR and sequencing° (by external lab) including sequence analysis).

microbiological disinfection check°
Total bacterial count and viable count *E. coli, C. perfringens* and mold fungi
Note: pre-register one week in advance, please

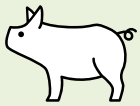
microbiological disinfection check°
only total bacterial count
Note: pre-register one week in advance, please

Most suitable sample materials for cultural detection of bacterial pathogens of:

Arthritis	swab from joint capsule or joint cartilage, joint capsule,(synovia)
Respiratory infections	lung, lung and bronchial swab, bronchoalveolar lavage fluid (BALF)
Dermatitis	skin, deep skin scrapings
Endometritis	cervical swab
Enteritis, Diarrhoea	feces, fecal swab, rectal swab, small and large intestine
Meningitis	meningeal swab, CSF (liquor)
Rhinitis	nasal swab
Sepsis	kidney, spleen
Serositis	serosal swab

Note: **swabs <u>with</u> medium** are most suitable for cultural examination

SWINE
BACTERIOLOGY

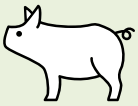


Identification of bacteria isolated at IVD as part of the cultural examination

Species identification by PCR of:
Actinobacillus pleuropneumoniae
Bordetella bronchiseptica
Clostridioides difficile
Enterococcus durans
Enterococcus hirae
Erysipelothrix rhusiopathiae (Erysipelas)
Fusobacterium necrophorum
Glaesserella parasuis
Mesomycoplasma flocculare
Mesomycoplasma hyopneumoniae
Mesomycoplasma hyorhinis
Metamycoplasma hyosynoviae
Pasteurella multocida
Schaalia (Actinomyces) hyovaginalis
Staphylococcus chromogenes
Staphylococcus hyicus
Streptococcus dysgalactiae
Streptococcus suis
Trueperella abortisuis

16S rRNA sequencing° (for identification of any bacterial species)
ITS sequencing° (for identification of further mycological species)

Cultural biochemical or serological differentiation



Resistance / Susceptibility testing of bacterial isolates
Agar diffusion test
Microdilution technique
(determination of the minimal inhibitory concentrations (MICs))
Microdilution technique anaerobes

Custodial storage of bacterial isolates/ Mycoplasma

Delivery of characterised bacterial field isolates
e.g. *Mycoplasma*, *Glaesserella parasuis* et al.

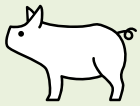
Identification / differentiation of submitted bacterial isolates
by PCR

Actinobacillus pleuropneumoniae
Bordetella bronchiseptica
Clostridioides difficile
Erysipelothrix rhusiopathiae (Erysipelas)
Fusobacterium necrophorum
Glaesserella parasuis
Mesomycoplasma flocculare
Mesomycoplasma hyopneumoniae
Mesomycoplasma hyorhinis
Metamycoplasma hyosynoviae
Pasteurella multocida
Schaalia (Actinomyces) hyovaginalis
Staphylococcus chromogenes
Streptococcus dysgalactiae
Streptococcus suis
Trueperella abortisuis

Additional subculture for submitted bacterial isolates
for further analysis

16S rRNA sequencing° (for identification of any bacterial species)

ITS sequencing° (for identification of further mycological species)



Typing of bacterial isolates/
Detection &typing of preserved nucleid acid from suitable samples

Actinobacillus pleuropneumoniae PCR
Apx toxin typing

Actinobacillus pleuropneumoniae multiplex PCR
Determination of the serotype

Clostridioides* (*Clostridium) difficile PCR
Detection of the genes coding for toxin A and B and the binary toxins A and B

Clostridium perfringens
Determination of types A to F with/without ß2 toxin gene/enterotoxin gene by PCR and detection of α and ß2 toxin production by immunoblot

only: PCR

Enterococcus (E.) hirae, E. durans, E. villorum multiplex PCR
Detection and differentiation of *E. hirae, E. durans and/ or E. villorum*

E. coli **"Virulence-Associated Factors"** multiplex PCR
Detection of virulence-associated factor genes (fimbriae, adhesins, toxins, and other factors) incl. Edema Disease

Glaesserella parasuis / Gps **Typing by PCR**
Serotyping by multiplex PCR Assay (serotypes 1-15) and Pathotyping (vtaA-LS-PCR)
only: Determination of the ***Gps*** **serotype** by multiplex PCR Assay (serotypes 1-15)
only: **Pathotyping** of ***Gps*** (prognosis of the possible virulence potential) by vtaA-LS-PCR

Pasteurella multocida **toxin** PCR
Detection of the *toxA* gene

Pasteurella multocida **capsule typing** multiplex PCR
Detection of capsular type A, B, D, E and F as well as haemorrhagic septicaemic (HS) capsular type B

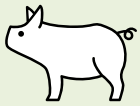
Salmonella **Serotyping** (according to the Kauffmann-White scheme)
Classification into serogroups A-E and F-67 by agglutination

Salmonella **Choleraesuis Typhimurium** multiplex PCR
Detection of *Salmonella* and differentiation of serovar Choleraesuis and Typhimurium

Differentiation of *Salmonella* spp. vaccine and field strains
Differentiation of the vaccine strains from Salmoporc

Staphylococcus aureus, methicillin resistant **s. MRSA**

SWINE
BACTERIOLOGY



Staphylococcus hyicus multiplex PCR
Detection of exfoliative toxin genes A-D and shetA

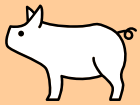
Streptococcus suis multiplex PCR
Determination of capsular type (cps 1, 2, 4, 7 or 9) and virulence-associated factor genes

Detection of resistance markers in bacterial isolates

mcr-1 gene (colistin resistance) PCR
Detection of mcr-1 gene, which confers resistance to colistin

MRSA Methicillin resistant *Staphylococcus aureus*
Detection of mecA gene by PCR and of expression of penicillin-binding protein 2 (PBP2) by agglutination

SWINE
PARASITOLOGY°



Detection of parasite stages in feces Sedimentation Flotation
Helminth eggs, protozoan oocysts and cysts
Material: at least 10 g feces

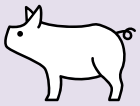
Cryptosporidia Staining according to Heine
Semi-quantitative direct detection of *Cryptosporidium* oocysts
Material: 2-5 g feces (if possible, fresh and cooled, but not frozen!) or fecal smear

Cystoisospora suis PCR°
Material: feces, environmental samples

Detection of skin parasites:

Mites Microscopy, KOH procedure
Sarcoptes (Scabies), Demodex (Demodicosis)
Material: deep skin scrapings

Lice *(Haematopinus suis)*
Microscopy
Material: 3 transparent adhesive film strips per animal on microscope slides, combings and skin material

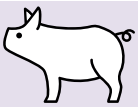


NECROPSY of animals up to 59 kg bodyweight including disposal costs
Animal carcasses are disposed of in accordance with the Animal Carcass Disposal Act according to the tariffs applicable in Lower Saxony, Germany.

Fetus and piglet (up to 5 kg) incl. placenta
Young pig (5 - 15 kg)
Young pig (16 - 29 kg)
Pig (30 - 59 kg)

Removal of specimen from aborted fetuses

per sample



Histological examination (standard staining)
with report
Special stainings (Ziehl-Neelsen, Gram, etc.)

IMMUNHISTOLOGY

Actinobacillus pleuropneumoniae IHC
Material: Lung, formalin fixed

Influenza A Virus IHC
Material: Lung (cranioventral parts mit bronchus), formalin fixed

Lawsonia intracellularis IHC
Material: Ileum, formalin fixed

Mesomycoplasma (Mycoplasma) hyopneumoniae IHC
Material: Lung (cranioventral parts mit bronchus), formalin fixed

PCV2 IHC
Material: Lymph node, lung, kidney, spleen, GI-tract, formalin fixed

Rotavirus group A IHC
Material: small intestine, formalin fixed

Information for sampling technique
Tissue samples for histological and immunohistological examinations should be sent in at least **10 times the volume** of 4 or 10% fixed formalin and should not be thicker than **1 cm** in at least one dimension to ensure a sufficiently rapid penetration with the fixing solution.

A cover letter with a clinical preliminary report is essential for the interpretation of the histological findings and the limitation of the deducible etiological differential diagnoses.

Immunohistological examinations for the specific detection of certain pathogens in the tissue are only useful, if a previous histological examination revealed morphological changes, which justify the suspicion of infection with the pathogen in question. Is the meaning, which role a pathogen has played in a specific disease process, not of interest but just the question, whether or not an animal was infected with the pathogen, a PCR analysis of unfixed tissue is preferable due to its higher sensitivity.

Test methods offered for various pathogen detections in ruminants

	Indirect Pathogen Detection (Antibodies)						Direct Pathogen Detection							
Test methods / alphabetical list of pathogens	**ELISA**	**Serotyp. ELISA**	**CFT**	**HI**	**MAT**	**RBT**	**PCR**	**qPCR**	**Differentiation**	**Typing**	**Sequencing**	**Bact. Culture**	**Parasitology**	**IHC**
Bovine Coronavirus							●							
Brucella, *Brucella abortus*			●			●								
Campylobacter spec.							●							
Chlamydia							●							
Clostridium perfringens										●*		●		
Corynebacterium pseudotuberculosis	●											●		
Coxiella burnetii	(●)													
Cryptosporidia													●	
Escherichia coli										●*		●		
Erysipelothrix rhusiopathiae (Erysipelas)												●		
Fusobacterium necrophorum												●		
Histophilus somni							●					●		
Fasciola, Dicrocoelium (Ruminants)													●	
Leptospira (pathogenic Serovars)					●		●		●					
Mannheimia haemolytica							●					●		
Mycobacterium avium ssp. paratuberculosis	(●)						●							
Mycoplasmopsis bovis	(●)						●					●		
Mycoplasmopsis bovirhinis												●		
Mesomycoplasma ovipneumoniae												●		
Neospora caninum	●													
Parasite stages in feces, skin parasites (mites, lice)													●	
Pasteurella multocida										●*		●		
Rotavirus Group A							●							●

	Indirect Pathogen Detection (Antibodies)						Direct Pathogen Detection							
Test methods / alphabetical list of pathogens	**ELISA**	**Serotyp. ELISA**	**CFT**	**HI**	**MAT**	**RBT**	**PCR**	**qPCR**	**Differentiation**	**Typing**	**Sequencing**	**Bact. Culture**	**Parasitology**	**IHC**
Rotavirus Group C							●							
Staphylococcus aureus - MRSA										●*		●		
Staphylococcus chromogenes												●		
Streptococcus dysgalactiae												●		
Streptococcus parauberis												●		
Streptococcus uberis												●		
Trueperella pyogenes												●		

* **Examination only possible from isolates () examination on request**

Suitable test materials for direct pathogen detection using PCR, bacteriology, histology and immunohistochemistry in ruminants

suitable material / alphabetical list of pathogens	Meninges / Liquor	Conjunctival swab	Blood / Milk[1]	Nasal swabs	BALF/ TBS	Bronchial swabs	Lung	Tonsills/ Lymphnode	Feces / (fecal swabs)	Small intestine	Caecum / Colon	Cervical swabs	Abortion (Fetus/Placenta)	Joint	Others
Campylobacter spec.									●	●					
Chlamydia		●										●	●		
Clostridiodes difficile							●			●		●			
Clostridium perfringens									●	●	●				
bovine Corona Virus				●	●	●	●		●	●	●				
Cryptosporidia									●	●	●				
Endoparasites									●	●	●				
Escherichia coli									●	●	●				
Erysipelothrix rhusiopathiae (Erysipelas)														●	Kidney
Fusobacterium necrophorum												●			Abscess
Histophilus somni	●			●	●	●	●								
Fasciola, Dicrocoelium									●	●	●				
Leptospira (pathogenic Serovars)												●	●		
Mannheimia haemolytica				●	●	●	●								
Mycoplasmopsis bovis			●[1]	●	●	●	●							●	
Mycoplasmopsis bovirhinis				●	●	●	●								
Mesomycoplasma ovipneumoniae				●	●	●	●								
Pasteurella multocida				●	●	●	●								
Rotavirus Group A / C									●	●					
Salmonella									●	●	●				
Staphylococcus aureus (MRSA)	●		●[1]	●	●	●	●					●	●	●	
Staphylococcus chromogenes			●[1]												
Streptococcus dysgalactiae			●[1]									●	●		
Streptococcus parauberis			●[1]												

suitable material / alphabetical list of pathogens	Meninges / Liquor	Conjunctival swab	Blood / Milk[1]	Nasal swabs	BALF/ TBS	Bronchial swabs	Lung	Tonsills/ Lymphnode	Feces / (fecal swabs)	Small intestine	Caecum / Colon	Cervical swabs	Abortion (Fetus/Placenta)	Joint	Others
Streptococcus uberis			●[1]									●			
Trueperella pyogenes			●[1]	●	●	●	●					●		●	Abscess

Multiplex PCRs Ruminants / Combinations of different examination methods

Cattle

suitable material / pathogen	Feces	Small intestine
"Diarrhoea of Calves" Bact. culture + PCR + Parasitology (*E. coli, C. perfringens*, Rota-/ Coronavirus; flotation, Cryptosporidia special staining)	●	●

suitable material / pathogen	Nasal swab	BALF/ TBS	Bronchial swabs	Lung
"Ruminant Respiratory Pathogens" (*M. bovis, H. somni, P. multocida, M. haemolytica,* bovine Coronavirus, BRSV, PI3)	●	●	●	●

SHEEP AND GOAT

SEROLOGICAL TESTS (Antibody detection)

Material: serum or blood without anticoagulants

Brucella spec. RBT

Corynebacterium pseudotuberculosis ELISA

Coxiella burnetii (Q-Fever) ELISA
Material: blood serum, milk (individual and tank milk samples)
on request

Erysipelothrix rhusiopathiae (Erysipelas) SLA

Leptospira MAT
(Selected antigens of representative strains of different pathogenic serovars and serogroups)

Testing for individual strains or serovars is possible after consultation

SHEEP AND GOAT

PCR TESTs (Antigen detection)

Leptospira realtime PCR
Detection including the differentiation of pathogenic *Leptospira* (subclades P1 and P2)
Material: Genital swabs, urine, sperm, kidney, fetal tissues (kidney, liver, lung), placenta, genital organs (for *L. Bratislava)*

Mycobacterium avium **subsp.** ***paratuberculosis*** PCR
Material: feces, fecal swabs, milk, mesenterial lymph node, small intestine

SHEEP AND GOAT

HISTOLOGY UND IMMUNHISTOLOGY

Histological examination (standard staining)

Special stainings (Ziehl-Neelsen, Gram, etc.)

Necropsy of small ruminants is not possible due to animal health legislation regulations.

Examination by bacteriological culture, basic

Examination by bacteriological culture incl. anaerobes
using enrichment and selective culture media

Examination by bacteriological culture only *Salmonella* according DIN EN ISO 6579 1 using enrichment and selective culture media

Examination by bacteriological culture incl. *Salmonella* according DIN EN ISO 6579 1 using enrichment and selective culture media

Examination by bacteriological culture: *E.coli, Cl. perfringens* and *Salmonella* according DIN EN ISO 6579 1 using enrichment and selective culture media

Examination by bacteriological culture incl. *Mycoplasma*
using enrichment and selective culture media
Note: special transport medium is available on request

Additional selective culture medium

Please note that the identification of pathogenic bacteria species may incur further costs for diagnostic verification, e.g. for species identification by PCR or 16S rRNA typing (PCR and sequencing° (by external lab) including sequence analysis).

Most suitable sample materials for cultural detection of bacterial pathogens of:

Arthritis	swab from joint capsule or joint cartilage, joint capsule,(synovia)
Respiratory infections	lung, lung and bronchial swab, bronchoalveolar lavage fluid (BALF)
Dermatitis	skin, deep skin scrapings
Endometritis	cervical swab
Enteritis, Diarrhoea	feces, fecal swab, rectal swab, small and large intestine
Meningitis	meningeal swab, CSF (liquor)
Rhinitis	nasal swab
Sepsis	kidney, spleen
Serositis	serosal swab

Note: **swabs <u>with</u> medium** are most suitable for cultural examination

Identification of bacteria isolated at IVD as part of the cultural examination

Identification of species by PCR:
Clostridioides difficile
Fusobacterium necrophorum
Histophilus somni
Mannheimia haemolytica
Mycoplasmopsis (Mycoplasma) bovirhinis
Mesomycoplasma (Mycoplasma) ovipneumoniae
Pasteurella multocida
Streptococcus parauberis
Streptococcus uberis

16S rRNA sequencing° (for identification of any bacterial species)

ITS sequencing° (for identification of further mycological species)
Cultural biochemical or serological differentiation

Resistance / Susceptibility testing of bacterial isolates
Agar diffusion test
Microdilution technique
(determination of the minimal inhibitory concentrations (MICs)
Microdilution technique anaerobes

Custodial storage of bacterial isolates / mycoplasma

Delivery of characterised bacterial field isolates
e. g. *Corynebacterium pseudotuberculosis, Mycoplasma, Mannheimia, Pasteurella* and others

microbiological disinfection check°
Total bacterial count and viable count *E. coli, C. perfringens* and mold fungi
Note: pre-register one week in advance, please

microbiological disinfection check°
only total bacterial count
Note: pre-register one week in advance, please

Identification / differentiation of submitted bacterial isolates
by PCR

Clostridioides difficile
Fusobacterium necrophorum
Histophilus somni
Mannheimia haemolytica
Mycoplasmopsis (Mycoplasma) bovirhinis
Mesomycoplasma (Mycoplasma) ovipneumoniae
Pasteurella multocida
Streptococcus parauberis
Streptococcus uberis

Additional subculture for submitted bacterial isolates
for further analysis

16S rRNA sequencing° (for identification of any bacterial species)

ITS sequencing° (for identification of further mycological species)

Typing of bacterial isolates

Clostridium perfringens
Determination of types A to F with/without ß2 toxin gene/enterotoxin gene by PCR and detection of α and ß2 toxin production by immunoblot
only by PCR

***Escherichia coli* "Virulence associated Factors"** PCR
Detection of virulence-associated factor genes (fimbriae, adhesins, toxins, and other factors)

MRSA Methicillin resistant *Staphylococcus aureus*
Detection of mecA gene by PCR and of expression of penicillin-binding protein 2 (PBP2) by agglutination

***Pasteurella multocida* capsule typing PCR**
Detection of capsular type A, B, D, E and F as well as haemorrhagic septicaemic (HS) capsular type B

***Salmonella* Serotyping** (according to the Kauffmann-White scheme)
Classification into serogroups A-E and F-67 by agglutination

Staphylococcus aureus, methicillin resistant **s. MRSA**

PARASITOLOGY°

Detection of parasite stages in feces Sedimentation and flotation
Helminth eggs, protozoan oocysts and cysts
Material: at least 10 g feces

Nematode larvae Baermann-Wetzel migration technique
of lung worms *(Dictyocaulus filaria)* and Protostrongylidae
Material: at least 10 g feces

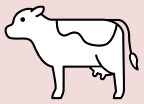
Cryptosporidia Staining according to Heine
Semi-quantitative direct detection of *Cryptosporidium* oocysts
Material: 2-5 g feces (if possible, fresh and cooled, but not frozen!) or fecal smear

Liver and rumen fluke eggs *(Fasciola, Dicrocoelium)* sedimentation
Detection of eggs
Material: at least 10 g feces

Detection of skin parasites:

Mites Microscopy, KOH procedure
Sarcoptes, *Chorioptes*, *Psoroptes* mange, etc.
Material: deep skin scrapings

***Mallophaga*, lice** Microscopy
Material: 3 transparent adhesive film strips per animal on microscope slides, combings and skin material



***Brucella* spec.** RBT

Coxiella burnetii (Q fever) ELISA
on request

Erysipelothrix rhusiopathiae (Erysipelas) SLA

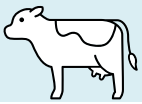
Leptospira MAT
Selected antigens of representative strains of different pathogenic serovars and serogroups
Testing for individual strains or serovars is possible after consultation

Mycobacterium avium* subsp. *paratuberculosis ELISA
on request

Mycoplasmopsis (Mycoplasma) bovis ELISA
on request

CATTLE

PCR TESTS (Antigen detection)



Bovine Coronavirus realtime PCR
Material: feces, rectal swabs, small intestine

Campylobacter differentiation PCR
Detection of *Campylobacter* spec.*, C. coli* and *C. jejuni*
Material: feces, rectal swabs, small intestine

Chlamydia realtime PCR
Material: Genital swabs, conjunctival swabs, placenta, fetal liver, lung, spleen, genital organs

Clostridioides* (*Clostridium) difficile multiplex PCR
Detection of genes coding for toxin B and the binary toxin B
Material: feces, rectal swabs

Leptospira realtime PCR
Detection incl. differentiation of pathogenic *Leptospira*
(subclades P1 and P2)
Material: Genital swabs, urine, sperm, kidney, fetal tissues (kidney, liver, lung), placenta, genital organs

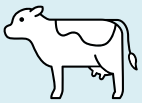
Mycobacterium avium* subsp. *paratuberculosis PCR
Material: feces, rectal swabs, milk, mesenterial lymph nodes, small intestine

Mycoplasmopsis (Mycoplasma) bovis PCR
Material: synovia, milk, (sperm, BALF, lung)

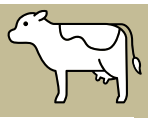
Rotavirus Group A and C realtime PCR
Material: feces, rectal swabs, small intestine

CATTLE

MULTIPLEX PCR TESTS (Antigen detection)



Multiplex-PCR „Respiratory pathogens Cattle”
Material: Nasal swabs, BALF, TBS, Tracheal swabs, lung
Mycoplasmopsis (Mycoplasma) bovis
Histophilus somni
Pasteurella multocida
Mannheimia haemolytica
Bovine Coronavirus
BRSV
PI3 Virus



Mycobacterium avium* subsp. *paratuberculosis ELISA and PCR

Material: Milk on request

Mycoplasmopsis bovis ELISA and PCR

Material: Milk on request

Screening „Diarrhoea calf“

Material: feces, rectal swabs, small/large intestine

Rotavirus Group A and C PCR

Bovine Coronavirus PCR

Detection of Parasites (Flotation)

Cryptosporidia special staining

Bacteriological culture for *E. coli* and *C. perfringens*

Optional, if positive:

typing *E. coli* (Multiplex-PCR for detection of 21 virulence associated factors)

typing *C. perfringens* (Multiplex PCR & Immunoblot)

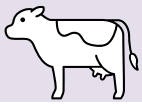
Resistance / Susceptibility testing of bacterial isolates

Agar diffusion test

Microdilution technique

(determination of the minimal inhibitory concentrations (MICs))

Microdilution technique anaerobes



Histological examination (standard staining)

Special stainings (Ziehl-Neelsen, Gram, etc.)

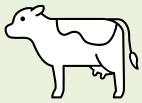
Information for sampling technique

Tissue samples for histological and immunohistological examinations should be sent in at least **10 times the volume** of 4 or 10% fixed formalin and should not be thicker than **1 cm** in at least one dimension to ensure a sufficiently rapid penetration with the fixing solution.

A cover letter with a clinical preliminary report is essential for the interpretation of the histological findings and the limitation of the deducible etiological differential diagnoses.

Immunohistological examinations for the specific detection of certain pathogens in the tissue are only useful, if a previous histological examination revealed morphological changes, which justify the suspicion of infection with the pathogen in question. Is the meaning, which a pathogen has played in a specific disease process, not of interest, but just the question, whether or not an animal was infected with the pathogen, a PCR analysis of unfixed tissue is preferable, due to its higher sensitivity.

Necropsy of ruminants is not possible due to animal health legislation regulations.



Examination by bacteriological culture, basic

Examination by bacteriological culture incl. anaerobes
using enrichment and selective culture media

Examination by bacteriological culture only *Salmonella* according DIN EN ISO 6579 1 using enrichment and selective culture media
Note: This is no official examination according to the federal regulations against Salmonellosis in Cattle (RindSalmV)

Examination by bacteriological culture incl. *Salmonella* according DIN EN ISO 6579 1 using enrichment and selective culture media
Note: This is no official examination according to the federal regulations against Salmonellosis in Cattle (RindSalmV)

Examination by bacteriological culture: *E.coli, Cl. perfringens* and *Salmonella* according DIN EN ISO 6579 1 using enrichment and selective culture media
Note: This is no official examination according to the federal regulations against Salmonellosis in Cattle (RindSalmV)

Examination by bacteriological culture incl. *Mycoplasma*
using selective culture media and enrichment culture
Note: special transport medium can be made available

Additional selective culture medium

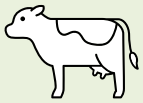
Examination by bacteriological culture on milk (single milking)
incl. yeast and molds by using selective cultural media

Please note that the identification of pathogenic bacteria species may incur further costs for diagnostic verification, e.g. for species identification by PCR or 16S rRNA typing (PCR and sequencing° (by external lab) including sequence analysis).

Most suitable sample material for cultural detection of bacterial pathogens of:

Arthritis	swab from joint capsule or joint cartilage, (synovia)
Respiratory infections	lung, lung and bronchial swab, bronchoalveolar lavage fluid (BALF)
Endometritis	cervical swab
Enteritis, Diarrhoea	feces, fecal swab, rectal swab, small and large intestine
Meningitis	meningeal swab, CSF (liquor)
Rhinitis	nasal swab
Sepsis	kidney, spleen

Note: **swabs <u>with</u> medium** are the most suitable for cultural examination.



Identification of bacteria isolated at IVD as part of the cultural examination

Identification of species by PCR:
Clostridioides difficile
Fusobacterium necrophorum
Histophilus somni
Mannheimia haemolytica
Mycoplasmopsis (Mycoplasma) bovis
Mycoplasmopsis (Mycoplasma) bovirhinis
Pasteurella multocida
Staphylococcus chromogenes
Streptococcus parauberis
Streptococcus uberis

16S rRNA sequencing° (for identification of any bacterial species)
ITS sequencing° (for identification of further mycolocical species)
Cultural biochemical or serological differentiation

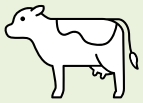
Resistance / Susceptibility testing of bacterial isolates
Agar diffusion test
Microdilution technique
(determination of the minimal inhibitory concentrations (MICs))
Microdilution technique anaerobes

Custodial storage of bacterial isolates / mycoplasma

Delivery of characterised bacterial field isolates
e. g. *Mycoplasma, Mannheimia, Pasteurella* and others

microbiological disinfection check°
Total bacterial count and viable count *E. coli, C. perfringens* and mold fungi
Note: pre-register one week in advance, please

microbiological disinfection check°
onlv total bacterial count
Note: pre-register one week in advance, please



Identification / differentiation of submitted bacterial isolates
by PCR
Clostridioides difficile
Fusobacterium necrophorum
Histophilus somni
Mannheimia haemolytica
Mycoplasmopsis (Mycoplasma) bovis
Mycoplasmopsis (Mycoplasma) bovirhinis
Pasteurella multocida
Staphylococcus chromogenes
Streptococcus parauberis
Streptococcus uberis

Additional subculture for submitted bacterial isolates
for further analysis

Identification of further bacterial species by 16S rRNA typing°
ITS sequencing° (for identification of further mycolocical species)

Typing of bacterial isolates

Clostridioides* (*Clostridium) difficile multiplex PCR
Detection of the genes coding for toxin A and B and the
binary toxins A and B

Clostridium perfringens
Determination of types A to F with/without ß2 toxin gene/enterotoxin gene
by PCR and detection of α and ß2 toxin production by immunoblot
only by PCR

***Escherichia coli* "Virulence associated factors"** multiplex PCR
Detection of virulence-associated factor genes (fimbriae, adhesins,
toxins, and other factors)

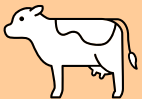
MRSA Methicillin resistant *Staphylococcus aureus*
Detection of mecA gene by PCR and of expression of penicillin-binding
protein 2 (PBP2) by agglutination

***Pasteurella multocida* capsule typing** PCR
Detection of capsular type A, B, D, E and F as well as haemorrhagic
septicaemic (HS) capsular type B

***Salmonella* Serotyping** (according to the Kauffmann-White scheme)
Classification into serogroups A-E and F-67 by agglutination

Staphylococcus aureus. Methicillin resistant **s. MRSA**

PARASITOLOGY°



Detection of parasite stages in feces Sedimentation Flotation
Helminth eggs, protozoan oocysts and cysts
Material: at least 10 g feces

Nematode larvae Baermann-Wetzel migration technique
of lung worms *(Dictyocaulus filaria)* and *Protostrongylidae*
Material: at least 10 g feces

Cryptosporidia Staining according to Heine
Semi-quantitative direct detection of *Cryptosporidium* oocysts
Material: 2-5 g feces (if possible, fresh and cooled, but not frozen!) or fecal smear

Liver and rumen fluke eggs *(Fasciola, Dicrocoelium)*
Detection of eggs by sedimentation
Material: at least 10 g feces

Detection of skin parasites:

Mites Microscopy, KOH procedure
Sarcoptes, Chorioptes, Psoroptes mange, etc.
Material: deep skin scrapings

***Mallophaga*, lice** Microscopy

Material: 3 transparent adhesive film strips per animal on microscope slides, combings and skin material

Avian Metapneumovirus° PCR
Subtypes A and B
Material: Pharyngeal swabs, lung, air sac/ bronchus swab

Histomonas meleagridis° PCR
Material: feces, cloacal swabs, caecum

Infectious Bronchitis Virus (IBV)° PCR
Material: Pharyngeal swabs, lung, bronchus swab

Marek Disease Virus (MD)° PCR
Material: feces, cloacal swabs, feather follicles, liver, spleen, kidney, ovar, tumor tissue

***Mycoplasma*°** PCR
Mycoplasmoides (Mycoplasma) gallisepticum and
Mycoplasmopsis (Mycoplasma) synoviae
Material: Pharyngeal swabs, lung, air sac/ bronchus swab

Salmonella species realtime PCR after cultural enrichment
Material: feces, cloacal swabs, feather follicles, liver, spleen, kidney, ovar, tumor tissue, sock swabs, environmental swabs, bacterial isolates
on request

***Salmonella*-Enteritidis-Typhimurium** realtime multiplex PCR
Detection of *Salmonella* and identification of serovar Enteritidis and Typhimurium
Material: feces, cloacal swabs, feather follicles, liver, spleen, kidney, ovar, tumor tissue, sock swabs, environmental swabs, bacterial isolates
on request

Examination by bacteriological culture, basic

Examination by bacteriological culture incl. anaerobes
using enrichment and selective culture media

Examination by bacteriological culture incl. *Salmonella* of feces
according to DIN EN ISO 6579-1 using enrichment and selective culture media

Examination by bacteriological culture ONLY for *Salmonella* of feces and Sock swabs
according to DIN EN ISO 6579-1 using enrichment and selective culture media

***Salmonella* Serotyping** (according to the Kauffmann-White scheme)
Classification into serogroups A-E and F-67 by agglutination

***Salmonella* Serotyping of TOP5 Serovars** (according to the Kauffmann-White- Le-Minor scheme)
Detection S. Enteritidis, S. Typhimurium, S. Infantis, S. Virchow, S. Hadar by agglutination

Differentiation of *Salmonella* spp. vaccine and field strains
Differentiation of the vaccine strains of Cevac Salmovac

Examination by bacteriological culture incl. *Yersinia pseudotuberculosis*
using selective culture media - on request

Examination by bacteriological culture incl. *Mycoplasma*
using selective culture media and enrichment culture

Additional selective culture medium

Please note that the identification of pathogenic bacteria species may incur further costs for diagnostic verification, e.g. for species identification by PCR or 16S rRNA typing (PCR and sequencing° (by external lab) including sequence analysis).

Identification of further bacterial species by 16S rRNA sequencing°
ITS sequencing° (for identification of further mycolocical species)

Cultural biochemic and serologic differentiation

Custodial storage of bacterial isolates / mycoplasma

microbiological disinfection check°
Total bacterial count and viable count *E. coli, C. perfringens* and mold fungi
Note: pre-register one week in advance, please

microbiological disinfection check°
onlv total bacterial count
Note: pre-register one week in advance, please

Resistance / Susceptibility testing of bacterial isolates

Microdilution technique (determination of the minimal inhibitory concentrations (MICs))

Microdilution technique anaerobes

More diagnostic using selective media are possible on request:

- *Mycobacteria*
- skin fungi
- differentiation between *Aspergillus flavus* and *A. niger*

Identification of bacterial isolates (prices incl. culture)

Avibacterium gallinarum / paragallinarum
Bordetella avium
Clostridium colinum
Clostridium perfringens
Enterococcus cecorum
Enterococcus faecalis
Enterococcus hirae
Erysipelothrix rhusiopathiae (Erysipelas Erreger)
Escherichia coli
Gallibacterium anatis
Mycoplasmoides (Mycoplasma) gallisepticum and
Mycoplasmopsis (Mycoplasma) synoviae
Ornithobacterium rhinotracheale (ORT)
Pasteurella multocida
Riemerella anatipestifer
Salmonella species
Staphylococcus aureus. MRSA diagnostic is possible s. MRSA
Streptococcus zooepidemicus. and further *Streptococci*
Yersinia pseudotuberculosis

Price in € per sample

Most suitable sample materials for cultural detection of bacterial pathogens of:

Arthritis	Swabs of joint capsule or cartilage, (synovia)
Respiratory infections	Lung, air sac, lung/bronchus swabs, pharyngeal swabs
Skin lesions	dermal swabs, abscess content or swabs from abscesses
Inflammation of ovary duct	cloacal swabs
Enteritis, diarrhoea	feces, cloacal swabs, rectal swabs, small /large intestine
Meningitis	meningeal swabs, CSF (Liquor)
Sepsis	kidney, spleen
Serositis	serosal swabs

Note: **swabs <u>with</u> medium** are the most suitable for cultural examination.

POULTRY
BACTERIOLOGY

Typing of bacterial isolates

Clostridium perfringens
Determination of types A to F with/without ß2 toxin gene/enterotoxin gene by PCR and detection of α and ß2 toxin production by immunoblot
nur PCR

MRSA Methicillin resistant *Staphylococcus aureus*
Detection of the mecA-Gen by PCR and expression of the Penicillin binding Protein 2 (PBP2) by agglutination

Pasteurella multocida capsule typing PCR
Detection of capsular type A, B, D, E and F as well as haemorrhagic septicaemic (HS) capsular type B

Additional subculture of submitted bacterial isolates
for further analysis

POULTRY
PARASITOLOGY°

Information concerning the parasitological examination of feces:
For the parasitological examination fresh fecal samples or pool samples from 3 consecutive days are most useful.

Detection of parasite stages in feces
Helminth eggs, protozoan oocysts and cysts
incl. *Eimeria* spp., *Ascaridia galli*, *Capillaria contorta, C. annulate, C. obsignata, C. caudinflata,Syngamus trachea, Heterakis gallinarum, Davainea proglottina, Railletina echinobothridia* etc.

Sedimentation-Flotation (qualitative, semi-quantitative)
Material: at least 10 g feces, sock swabs

Modified McMaster procedure (quantitative)
Determination of eggs/ oocyst per gram feces
threshold: 50 EPG/OPG
Material: at least 10 g feces, sock swabs

Mites

***Dermanyssus gallinae* (Poultry Red Mites), Air sac mites**
Makroskopy, Mikroskopy
Material: carcasses

Scaly leg mites *(Knemidocoptes mutans)* Mikroskopy, KOH-method
Material: skin from altered legs

Feather mites, Fleas, ***Mallophagida*, Lice** Mikroskopy
Material: 3 transparent adhesive film strips per animal on microscope slides, skin material, carcasses

POULTRY
PATHOLOGY

NECROPSY
incl. final disposal of animal carcasses
per animal

HISTOLOGY

Histological examination
per sample

Information for sampling technique

Tissue samples for histological examinations should be sent in at least **10 times the volume** of 4 or 10% fixed formalin and should not be thicker than **1 cm** in at least one dimension to ensure a sufficiently rapid penetration with the fixing solution.

A cover letter with a clinical preliminary report is essential for the interpretation of the histological findings and the limitation of the deducible etiological differential diagnoses.

LIST OF ABBREVIATIONS

BALF	broncho-alveolar lavage fluid
CNS	central nervous system
CSF	cerebrospinal fluid, *Liquor cerebrospinalis*
EDTA	ethylene diamine tetraacetic acid sodium salt
ELISA	enzyme-linked imunsorbent assay
HI	hemagglutination inhibition test
IFAT	immunofluorescence antibody test
IHA	indirect hemagglutination assay
IHC	immunohistochemistry
CFT	complement fixation test
MAT	microscopic agglutination test
PCR	polymerase chain reaction
qPCR	quantitative polymerase chain reaction
RBT	Rose Bengal test
rtPCR	realtime polymerase chain reaction
SLA	serum agglutination test
TBS	tracheobronchial secretion

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