

# BactoReal<sup>®</sup> Kit

## *Streptococcus suis*

### Manual

For use with the

- ABI PRISM<sup>®</sup> 7500 (Fast)
- Mx3005P<sup>®</sup>
- LightCycler<sup>®</sup> 480



For veterinary use only

**REF** DVEB06011, DVEB06013

$\Sigma$  100

**REF** DVEB06051, DVEB06053

$\Sigma$  50



**ingenetix GmbH**  
 Arsenalstraße 11  
 1030 Vienna, Austria  
 T +43(0)1 36 198 0 198  
 F +43(0)1 36 198 0 199  
 office@ingenetix.com  
 www.ingenetix.com

## Index

1. Product description .....	3
2. Pathogen information.....	3
3. Principle of real-time PCR .....	3
4. General Precautions .....	3
5. Contents of the Kit .....	4
5.1. BactoReal® Kit <i>Streptococcus suis</i> order no. DVEB06011 or DVEB06051 .....	4
5.2. BactoReal® Kit <i>Streptococcus suis</i> order no. DVEB06013 or DVEB06053 .....	4
6. Additionally required materials and devices .....	4
7. Preparation of real-time PCR.....	5
7.1. Pipetting scheme .....	5
7.2. Programming of the temperature profile .....	5
8. Interpretation of PCR-data .....	6
8.1. Signal in FAM channel: .....	6
8.2. No signal in FAM channel but signal of the IPC:.....	6
8.3. No signals in FAM channel and no signal with the IPC:.....	6
9. Troubleshooting .....	6
9.1. No <i>S. suis</i> specific signal with positive control:.....	6
9.2. No signal with the IPC and no <i>S. suis</i> specific signal with the sample: .....	6
9.3. <i>S. suis</i> specific signal with the negative control: .....	6
9.4. <i>S. suis</i> specific signal with the negative control of extraction (optional): .....	6
10. Specifications and performance evaluation.....	7
10.1. Analytical sensitivity, LOD and linearity .....	7
10.2. Analytical specificity .....	7
10.3. Kit performance.....	8

## Explanation of symbols



Batch code



Catalogue number



Contains sufficient for <n> tests



Use by



Manufactured by



Store at

## 1. Product description

BactoReal<sup>®</sup> Kit *Streptococcus suis* is a real-time PCR kit for detection of *S. suis* DNA. This test was developed for the ABI PRISM<sup>®</sup> 7500 (Fast) instrument (Thermo Fisher Scientific), LightCycler<sup>®</sup> 480 (Roche) and for Mx3005P<sup>®</sup> (Agilent), but is also suitable for other real-time PCR instruments. This test allows the rapid and sensitive detection of DNA of *S. suis* from samples purified from tissues (e.g. lung, tonsil, etc) (e.g. with the QIAamp DNA Mini Kit).

BactoReal<sup>®</sup> Kit *Streptococcus suis* detects the fibrinogen binding protein (fbpS) gene of *S. suis*. A probe-specific amplification-curve at 530 nm (FAM channel) indicates the amplification of *S. suis* specific DNA.

An internal positive control system (IPC) for detection in VIC/HEX channel, (554 nm, order no. DVEB06011 or DVEB06051) or Cy5 channel (667 nm; order no. DVEB06013 or DVEB06053) excludes false-negative interpretation of results due to inhibition of real-time PCR (see 8. Interpretation of PCR-data).

When using PCR-platforms not validated by ingenetix, an evaluation of the multiplex-PCR is recommended. Please be aware that some PCR-platforms have to be calibrated with the corresponding dye before performing multiplex-PCR.

BactoReal<sup>®</sup>, MycoReal, ParoReal and ViroReal<sup>®</sup> Kits are optimized to run under the same thermal cycling conditions. RNA and DNA material can be analysed in one run.

## 2. Pathogen information

*Streptococcus suis* (*S. suis*) is a Gram-positive, zoonotic bacterial pathogen of pigs and wild boars. It is associated with fever, sudden deaths, respiratory problems, pneumonia, meningitis and fertility problems in pig herds, representing a substantial economic burden for the pig industry. *Streptococcus suis* responds to ampicillin and amoxicillin treatment. Transmission from swine to human is possible, causing mostly bacterial meningitis.

### References:

Feng et al. 2014. *Streptococcus suis* infection: an emerging/reemerging challenge of bacterial infectious diseases? *Virulence* 15;5(4):477-97.

## 3. Principle of real-time PCR

A specific DNA sequence of the pathogen genome is amplified and the generated PCR-product is detected by an oligonucleotide-probe labelled with a fluorescent dye. This technology allows for a sequence-specific detection of PCR amplicates.

## 4. General Precautions

The user should always pay attention to the following:

- Always include a negative control per PCR-run (water instead of sample).
- Optional: for valid interpretation of results, a negative control should be included during DNA-extraction (for example extraction of water instead of sample material), in order to exclude false-positive results due to contamination with *S. suis* DNA during extraction.
- Be careful when handling the positive control.
- Store and extract positive material (specimens, controls and amplicons) separately from all other reagents and add it to the reaction mix in a spatially separated workspace.
- Periodically decontaminate benches and devices.
- Use sterile pipette tips with filters.
- Thaw all components thoroughly at room temperature before starting an assay. When thawed, mix the components and centrifuge briefly.
- For MSDS, see [www.ingenetix.com](http://www.ingenetix.com).

## 5. Contents of the Kit

### 5.1. BactoReal® Kit *Streptococcus suis* order no. DVEB06011 or DVEB06051

Labelling	Content	Amount		Storage
		DVEB06011	DVEB06051	
<i>Streptococcus suis</i> Assay Mix (green cap)	Primer and probe (FAM) for detection of <i>S. suis</i>	2 x 50 µl	1 x 50 µl	-20°C
CR-1 Assay Mix (yellow cap)	Primer, probe (VIC/HEX) and target for detection of IPC	2 x 50 µl	1 x 50 µl	-20°C
<i>Streptococcus suis</i> Positive Control (red cap)	Control-DNA (approx. 10,000 target copies/µl)	1 x 25 µl	1 x 25 µl	-20°C
DNA Reaction Mix (white cap) <sup>#</sup>	Reaction Mix	2 x 500 µl	1 x 500 µl	<b>-20°C until first use, then at +4°C</b>
Water (blue cap)	Water	1 x 1000 µl	1 x 1000 µl	-20°C to +4°C

<sup>#</sup>DNA Reaction Mix contains uracil-N glycosylase (UNG)

### 5.2. BactoReal® Kit *Streptococcus suis* order no. DVEB06013 or DVEB06053

Labelling	Content	Amount		Storage
		DVEB06013	DVEB06053	
<i>Streptococcus suis</i> Assay Mix (green cap)	Primer and probe (FAM) for detection of <i>S. suis</i>	2 x 50 µl	1 x 50 µl	-20°C
CR-3 Assay Mix (yellow cap)	Primer, probe (Cy5) and target for detection of IPC	2 x 50 µl	1 x 50 µl	-20°C
<i>Streptococcus suis</i> Positive Control (red cap)	Control-DNA (approx. 10,000 target copies/µl)	1 x 25 µl	1 x 25 µl	-20°C
DNA Reaction Mix (white cap) <sup>#</sup>	Reaction Mix	2 x 500 µl	1 x 500 µl	<b>-20°C until first use, then at +4°C</b>
Water (blue cap)	Water	1 x 1000 µl	1 x 1000 µl	-20°C to +4°C

<sup>#</sup>DNA Reaction Mix contains uracil-N glycosylase (UNG)

The components of BactoReal® Kit *Streptococcus suis* are stable until the expiry date stated on the label. Repeated thawing and freezing should be avoided. Please protect kit components from light.

## 6. Additionally required materials and devices

- Reagents and devices for DNA-extraction
- PCR-grade water
- Disposable powder-free gloves
- Pipettes (adjustable)
- Sterile pipette tips with filters
- Vortex mixer
- Desktop centrifuge with rotor for 2 ml reaction tubes
- Real-time PCR instrument which is able to detect and differentiate fluorescence in FAM and VIC/HEX or Cy5 channel
- Appropriate 96 well reaction plates or reaction tubes with corresponding (optical) closing material

## 7. Preparation of real-time PCR

Please make sure that at least one negative control (water, blue cap), as well as one positive control (red cap) and one extraction negative control (optional, recommended) are included per PCR run.

Ingenetix highly recommends performing PCR analyses in duplicates, which increases the probability of detection of the pathogen and facilitates interpretation of results.

### 7.1. Pipetting scheme

		Per sample
<b>Preparation of Master Mix</b> (mix well)	Water*	3.0 µl
	DNA Reaction Mix (2x)	10.0 µl
	Streptococcus suis Assay Mix	1.0 µl
	CR Assay Mix	1.0 µl
	<b>Total volume Master Mix</b>	<b>15.0 µl</b>
<b>Preparation of PCR assay</b>	Master mix	15.0 µl
	Sample*	5.0 µl
	<b>Total volume</b>	<b>20.0 µl</b>

\*1-8 µl of the sample can be used. When using a volume other than 5 µl, the volume of H<sub>2</sub>O has to be changed accordingly.

**Positive Control:** As positive control use 1 µl of the *S. suis* Positive Control + 4 µl H<sub>2</sub>O.

Optional: a 1:10 dilution of the positive control can be used and defined as second standard value (approx. 1000 target copies/µl).

### 7.2. Programming of the temperature profile

Please find further information on programming the real-time PCR instrument in the respective operator's manual. Please be aware that some PCR-platforms have to be calibrated with the corresponding dye before performing of a multiplex-PCR.

**Select dyes:** FAM-TAMRA for detection of *S. suis*

Cy5-NONE (CR-3 Assay Mix) or VIC-TAMRA (CR-1 Assay Mix) for detection of IPC

**Select reference dye (passive reference):** ROX

**Sample Volume:** 20 µl

**Temperature Profile:**

Program 1	Program 2	Program 3
Cycles: 1 Analysis: None	Cycles: 1 Analysis: None	Cycles: 45 Analysis: Quantification Acquisition at 60°
50°C 2 min*	95°C 20 sec	95°C 5 sec 60°C 1 min

For ABI PRISM® 7500:

Ramp speed: Without "fast cycling" parameter

For LightCycler® 480 instrument:

Detection format: 2 Color Hydrolysis Probe  
(dyes see above)

**\*Note:** If viral RNA should be also detected in the same PCR run, program 1 has to be prolonged to 15 min at 50°C. This temperature profile can be used for all BactoReal®, MycoReal®, ParoReal® and ViroReal® kits for the detection of DNA or RNA.

## 8. Interpretation of PCR-data

Examples for interpretation of positive reactions are shown in the amplification plots below.

**For a valid interpretation, the following criteria must be fulfilled:**

	<b>Ct/Cp (FAM channel) <i>Streptococcus suis</i> target</b>	<b>Ct/Cp IPC target</b>	<b>Interpretation</b>
Negative control	Negative	36.0 ± 2	Valid
Positive control (undiluted, 1 µl/PCR)	28.0-31.0	36.0 ± 2	Valid
Extraction negative control (optional)	Negative	36.0 ± 2	Valid
Negative sample	Negative	36.0 ± 2	Valid
Positive sample	Positive	Positive/Negative	Valid

**For analysis of PCR data please proceed as follows:**

For analysis of PCR results gained with BactoReal® Kit *Streptococcus suis* please select fluorescence display options FAM channel for the *S. suis* target and VIC/HEX channel (order no. DVEB06011, DVEB06051) or Cy5 channel (order no. DVEB06013, DVEB06053) for the internal positive control target (IPC). Samples with a positive Cp or Ct-value are considered positive. Please also check amplification-curves manually.

### 8.1. Signal in FAM channel:

→ DNA of *S. suis* was amplified. The sample has to be interpreted as positive.  
*S. suis* DNA can lead to a reduced or absent fluorescence signal of the IPC.

### 8.2. No signal in FAM channel but signal of the IPC:

→ No *S. suis* DNA is detectable in the sample. The sample has to be interpreted as negative.  
The positive signal of the IPC assay excludes a putative PCR inhibition.

### 8.3. No signals in FAM channel and no signal with the IPC:

→ No interpretation statement can be made.

Information about possible sources of error and their solution can be found in 9. Troubleshooting.

## 9. Troubleshooting

### 9.1. No *S. suis* specific signal with positive control:

- Incorrect programming of the temperature profile of the real-time PCR instrument.  
→ Compare the temperature profile with the protocol (see 7. Preparation of real-time PCR).
- Incorrect configuration of the PCR reaction.  
→ Check your work steps (see 7. Preparation of real-time PCR) and repeat the PCR, if necessary.

### 9.2. No signal with the IPC and no *S. suis* specific signal with the sample:

- The PCR reaction was inhibited. No interpretation can be made.  
→ Make sure that you use a recommended method for DNA isolation and stick closely to the manufacturer's instructions.  
→ If no operating mistakes during extractions can be retraced, it is recommended to repeat the PCR with lower amounts of DNA-eluate (1/5 or 1/10 of sample volume + the adequate volume of H<sub>2</sub>O).
- Incorrect PCR conditions.  
→ Check the PCR conditions and repeat the PCR, if necessary.

### 9.3. *S. suis* specific signal with the negative control:

- A contamination occurred during preparation of the PCR.  
→ Repeat the PCR with new reagents in replicates.  
→ Strictly pipette the positive controls at last.  
→ Make sure that work space and instruments are decontaminated at regular intervals.

### 9.4. *S. suis* specific signal with the negative control of extraction (optional):

- A contamination occurred during extraction.  
→ Repeat the extraction and PCR using new reagents.  
→ Make sure that work space and instruments are decontaminated at regular intervals.

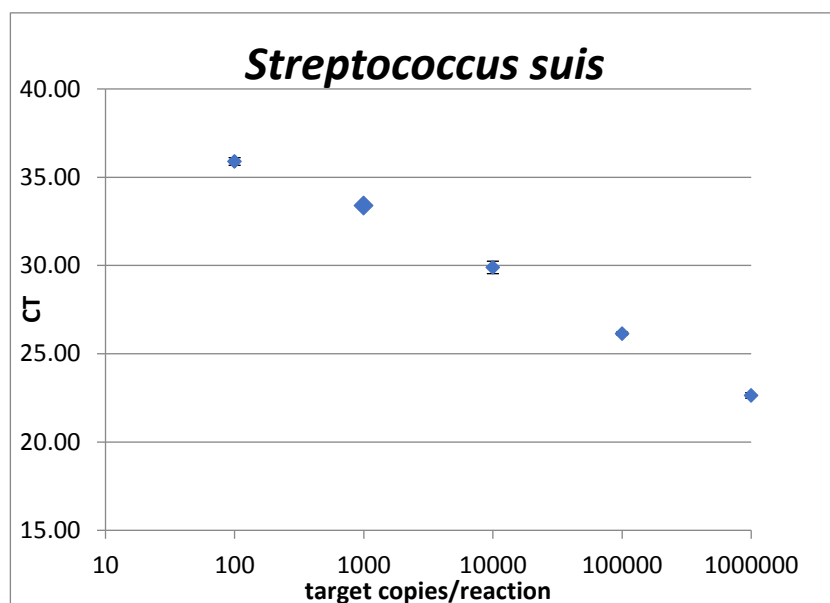
## 10. Specifications and performance evaluation

BactoReal® Kit *Streptococcus suis* was evaluated with the ABI PRISM® 7500 (Fast) instrument. For further validation data please contact ingenetix GmbH.

### 10.1. Analytical sensitivity, LOD and linearity

BactoReal® Kit *Streptococcus suis* was tested with a 10-fold dilution series of a plasmid containing a fragment of *Streptococcus suis* DNA. At least one target copy/PCR reaction could be detected. The limit of detection (LoD95 = smallest number of copies of target DNA which can be detected in 95% of cases) is 25 target copies/reaction and was determined by several replicates around the detection limit.

The assay shows **linearity** over the range of 100 to 1,000,000 target copies/reaction with a slope of -3.4 and a  $R_2$  of > 0.998 as shown in Figure 1.



**Figure 1** Ten-fold dilution series of a *Streptococcus suis* DNA standard plotted against CT

### 10.2. Analytical specificity

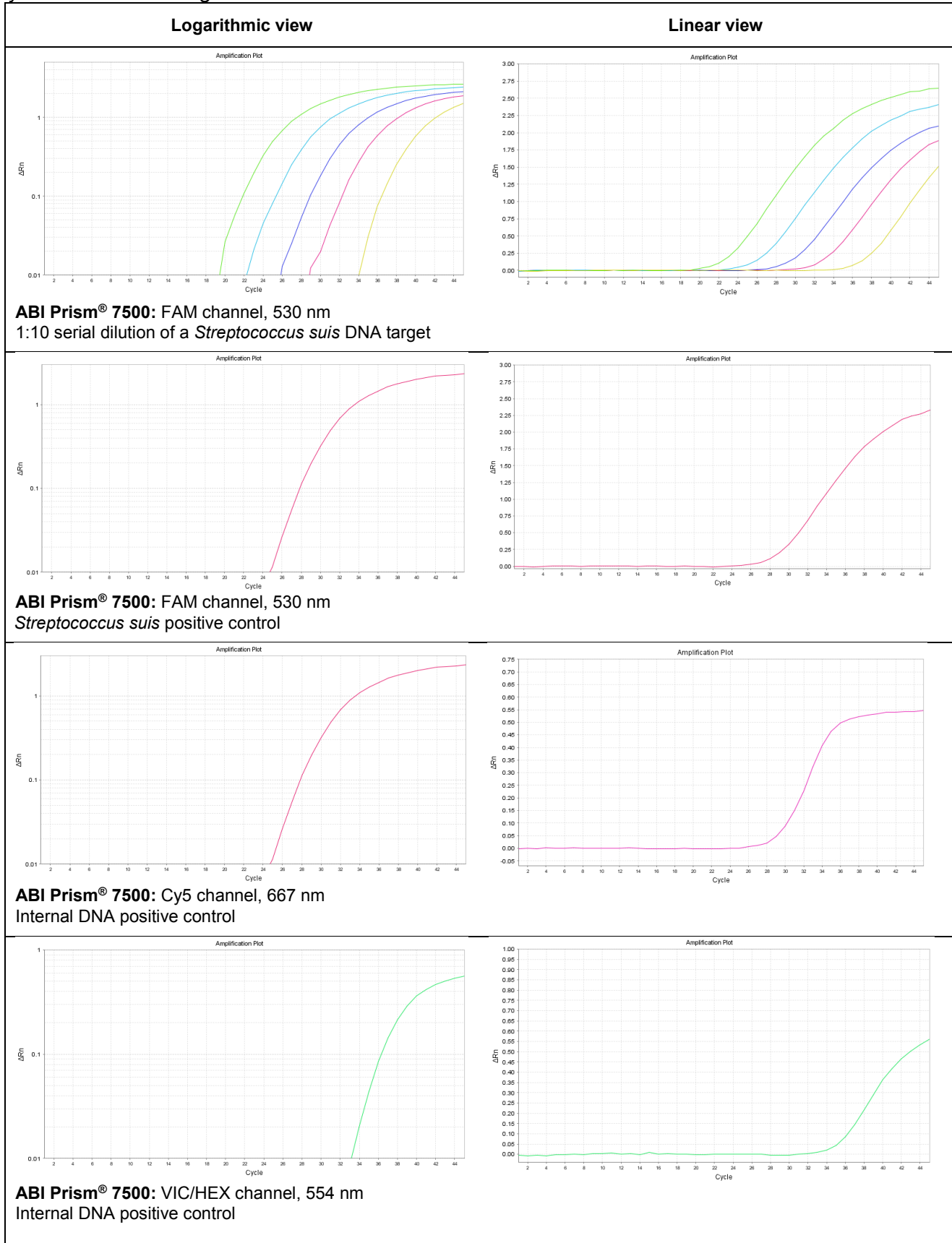
The specificity is ensured by the selection of highly specific primers and probes. The primers and probes were checked for possible homologies to currently published sequences by sequence comparison analyses. This validated the detection of so far known *S. suis* strains and ensured the detection of the most prevalent serotypes 1, 1/2, 2, 3, 4, 7, 9 and 14.

BactoReal® Kit *Streptococcus suis* was tested positively on one *S. suis* isolate. Furthermore, it was tested on isolates of *A. viridans* (n=1), *Enterococcus faecium* (n=1), *Corynebacterium* sp. (n=1), *Enterococcus* sp. (n=1), *Streptococcus agalactiae* (n=1), *Streptococcus bovis* (n=1), *Streptococcus dysgalactiae* (n=4), *Streptococcus uberis* (n=6) and *Streptococcus* sp. (n=3). No cross reactions were observed. Furthermore, nine *S. suis* positive field samples were correctly analysed.



### 10.3. Kit performance

Performance of BactoReal® Kit *Streptococcus suis* with an Applied Biosystems® 7500 Fast Real-time PCR System is shown in Figure 2.



**Figure 2** Performance of BactoReal® Kit *Streptococcus suis*