

# ViroReal<sup>®</sup> Kit Bovine Herpesvirus 1

## Manual

For use with the

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



For veterinary use only

**REF** DVEV02911, DVEV02913

$\Sigma$  100

**REF** DVEV02951, DVEV02953

$\Sigma$  50



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## Explanation of symbols



Batch code



Catalogue number



Contains sufficient for <n> tests



Use by



Manufactured by



Store at

## 1. Product description

ViroReal® Kit Bovine Herpesvirus 1 is a real-time PCR kit for detection of bovine herpesvirus 1 (BHV-1) DNA. This test was developed for the ABI PRISM® 7500 (Fast) instrument (Thermo Fisher Scientific), LightCycler® 480 (Roche) and for Mx3005P® (Agilent), but is also suitable for other real-time PCR instruments. This test allows the rapid and sensitive detection of DNA of BHV-1 from samples purified from tissues and swabs (e.g. with the QIAamp DNA Mini Kit).

ViroReal® Kit Bovine Herpesvirus 1 detects the UL27 gene of BHV-1. A probe-specific amplification-curve at 530 nm (FAM channel) indicates the amplification of BHV-1 specific DNA.

An internal positive control system (IPC) for detection in VIC/HEX channel, (554 nm, order no. DVEV02911 or DVEV02951) or Cy5 channel (667 nm; order no. DVEV02913 or DVEV02953) 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®, MycoReal, ParoReal and ViroReal® Kits are optimized to run under the same thermal cycling conditions. RNA and DNA material can be analysed in one run.

## 2. Pathogen information

Bovine herpesvirus 1 (BHV-1) is a DNA virus of the family *Herpesviridae*, subfamily *Alphaherpesvirinae*. BHV-1 can cause both clinical and subclinical infections in cattle, including infectious bovine rhinotracheitis (IBR), infectious pustular vulvovaginitis (IBV) and infectious balanoposthitis (IBP). BHV-1 causes a lifelong latent infection in the trigeminal or sacral ganglia. Animals with a latent BHV-1 infection may serve as a source of infection for susceptible animals. BHV-1 is transmitted mainly through respiratory, ocular or genital secretions.

### References:

Muylkens B, Thiry J, Kirten P, Schynts F, Thiry E. 2007. Bovine herpesvirus 1 infection and infectious bovine rhinotracheitis. *Vet. Res.* 38:181-209.

## 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 BHV-1 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. ViroReal® Kit Bovine Herpesvirus 1 order no. DVEV02911 or DVEV02951

Labelling	Content	Amount		Storage
		DVEV02911	DVEV02951	
BHV-1 Assay Mix (green cap)	Primer and probe (FAM) for detection of BHV-1	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
BHV-1 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. ViroReal® Kit Bovine Herpesvirus 1 order no. DVEV02913 or DVEV02953

Labelling	Content	Amount		Storage
		DVEV02913	DVEV02953	
BHV-1 Assay Mix (green cap)	Primer and probe (FAM) for detection of BHV-1	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
BHV-1 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 ViroReal® Kit Bovine Herpesvirus 1 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

		<b>Per sample</b>
<b>Preparation of Master Mix</b> (mix well)	Water*	3.0 µl
	DNA Reaction Mix (2x)	10.0 µl
	BHV-1 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 BHV-1 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 multiplex-PCR.

**Select dyes:** FAM-TAMRA for detection of BHV-1

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:**

<b>Program 1</b>	<b>Program 2</b>	<b>Program 3</b>
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:**

	Ct/Cp (FAM channel) BHV-1 target	Ct/Cp IPC target	Interpretation
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 ViroReal® Kit Bovine Herpesvirus 1 please select fluorescence display options FAM channel for the BHV-1 target and VIC/HEX channel (order no. DVEV02911, DVEV02951) or Cy5 channel (order no. DVEV02913, DVEV02953) 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 BHV-1 was amplified. The sample has to be interpreted as positive.  
BHV-1 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 BHV-1 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 BHV-1 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 BHV-1 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. BHV-1 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. BHV-1 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.

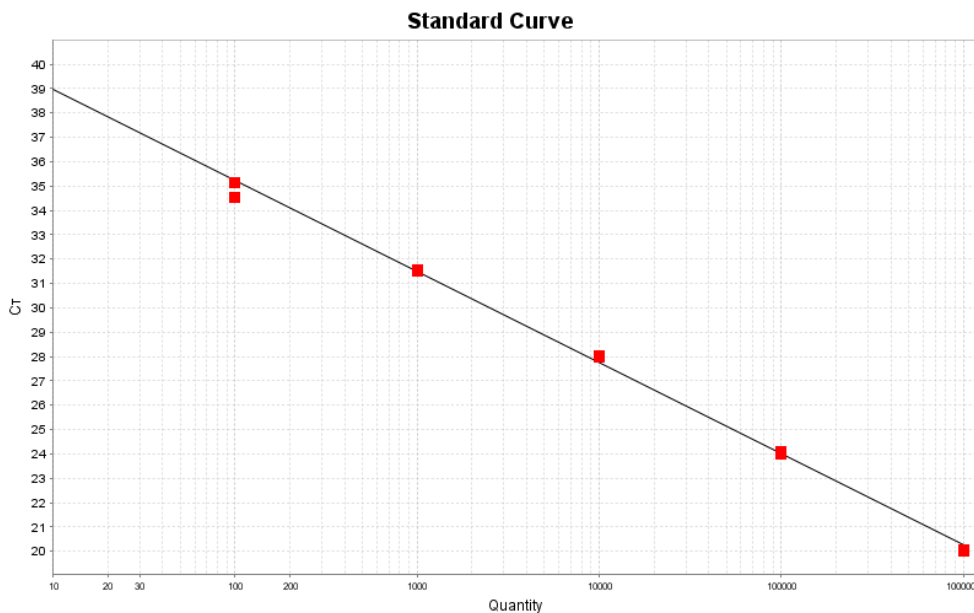
## 10. Specifications and performance evaluation

ViroReal® Kit Bovine Herpesvirus 1 was evaluated with the ABI PRISM® 7500 (Fast) instrument (Thermo Fisher Scientific). For further validation data please contact ingenetix GmbH.

### 10.1. Analytical sensitivity and linearity

ViroReal® Kit Bovine Herpesvirus 1 was tested with a 10-fold dilution series of a plasmid containing a fragment of BHV-1 DNA. At least 10 target copies/PCR reaction could be detected.

The assay shows **linearity** over the range of 100 to 1,000,000 target copies/reaction with a slope of -3.7 and a  $R_2$  of > 0.998 as shown in Figure 1.



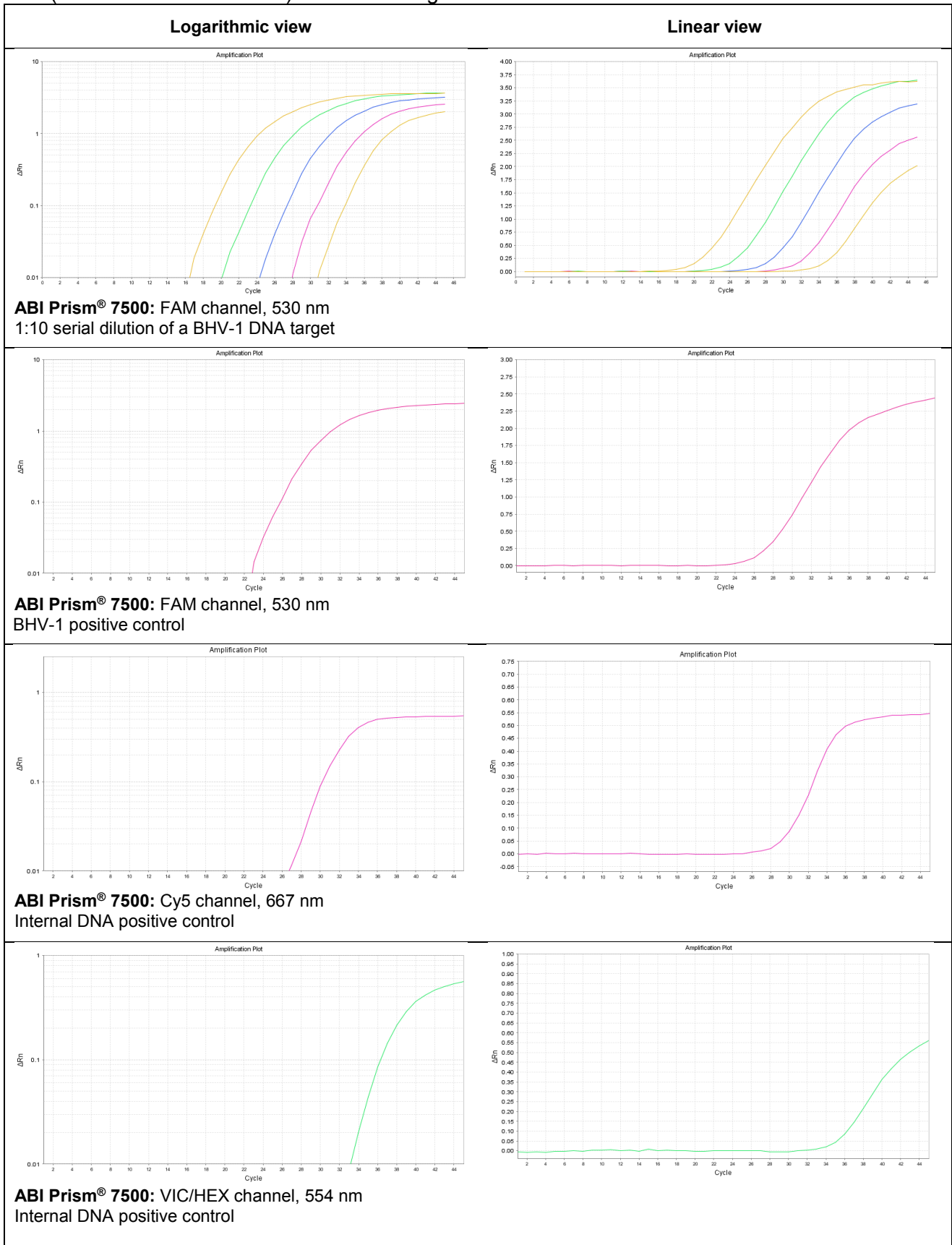
**Figure 1** Ten-fold dilution series of a BHV-1 DNA standard plotted against CT

### 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 also validated the detection of so far known BHV-1 strains.

### 10.3. Kit performance

Performance of ViroReal® Kit Bovine Herpesvirus 1 with an Applied Biosystems® 7500 Fast Real-time PCR System (Thermo Fisher Scientific) is shown in Figure 2.



**Figure 2** Performance of ViroReal® Kit Bovine Herpesvirus 1