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Kylt[®]

Kylt[®] E. coli Sta, Stb, LT

Real-Time PCR Detection

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Revision No.	Amendments
004	New Layout

A. General

- Kylt® E. coli Sta, Stb, LT kits are intended for the specific detection of target genes for *Escherichia coli* virulence factors Sta, Stb, LT. The kits are suitable for the analysis of samples from swine and ruminants. Kylt® E. coli Sta, Stb, LT is only to be used with pure colony material / isolates derived from cultural processes.
- The qualitative testing with Kylt® E. coli Sta, Stb, LT kits is based on a multiplex Real-Time PCR: In one reaction setting, the target genes for *E. coli* virulence factors Sta, Stb and LT as well as for the exogenous control (Internal Amplification Control (IAC)) are amplified in parallel by respective primer pairs in the Polymerase Chain Reaction (PCR). Amplified target gene fragments are detected via fluorescently labeled probes during the PCR reaction in real-time (Real-Time PCR). The probes specific for detection of amplified *E. coli* virulence factors Sta, Stb and LT and the exogenous control target genes are labeled with fluorescent dyes Cy5, TXR, FAM and HEX, respectively, and their emitted fluorescence is separately optically measured by the Real-Time PCR thermal cycler. By means of all four individual analyses in one reaction vessel per sample and the Negative Control and Positive Control per run the *E. coli* virulence factor Sta, Stb and LT-specific status of a sample can be evaluated in the end. This way, results can be achieved within a few hours after sample receipt.
- These kits were developed for use by trained laboratory personnel following standardized procedures. This Direction For Use must be followed strictly.

B. Reagents and Materials

- The following Kylt® E. coli Sta, Stb, LT kits are available and comprise the following reagents:

Reagent	Colour of Lid	100 Reactions	25 Reactions	Store at
		Article No 31706	Article No 31707	
Reaction-Mix	● green	4 x 450 µl	1 x 450 µl	≤ -18 °C
Positive Control	● red	4 x lyophilizate (final 50 µl each)	2 x lyophilizate (final 50 µl each)	≤ -18 °C
Negative Control	● blue	1 x 1 ml	1 x 1 ml	≤ -18 °C

- After receipt, the components are immediately stored at ≤ -18 °C. Avoid repeated freezing and thawing of all the reagents and keep them thawed as short as possible. If occasional processing of few samples only is expected you may prepare appropriate aliquots of reagents before storage at ≤ -18 °C. Prepare aliquots in such a way that freeze-thaw-cycles are reduced to a maximum of three. The Negative Control can alternatively be stored at +2°C to +8°C.
- Alternatively, it is possible to store the Reaction-Mix at +2°C to +8°C. For further information regarding the recommended storage temperature of the respective Reaction-Mix please see label on the tube.
- The components are to be used within the indicated shelf life (see box label). The components of different batches may not be mixed.
- Before its first use, rehydrate the Positive Control: add 50 µl of Negative Control per vial, briefly incubate at room temperature and mix thoroughly by repeated vortexing. It is recommended to generate aliquots of suitable volumes and store them at ≤ -18 °C.
- The Reaction-Mix needs to be stored protected from abundant light. Do not expose to direct (sun)light.

C. Equipment and Reagents not included

- This detection method can be used on all commercially available Real-Time PCR thermal cyclers that detect the emitted fluorescence of the fluorescent dyes FAM, HEX, Cy5 and TXR (emission 520, 550, 670 and 620 nm, respectively). Note that default normalization option against ROX (e.g. using ABI cyclers) must be deactivated.
- Apart from the disposables, the following further devices are needed and are not included in the Kylt® E. coli Sta, Stb, LT kits:
 - DNA preparation kit / protocol (e.g. Kylt® DNA Extraction-Mix II or Kylt® RNA / DNA Purification products)
 - Table top microcentrifuge
 - Vortex
 - Micropipettes covering volumes of 1 µl to 1000 µl
 - Centrifuge for PCR tubes or plates
- Accessory Kylt® products: see chapter F "Related and Accessory Products".
- We recommend the exclusive use of certified Nuclease-free disposables as well as powder-free protective gloves. Please wear gloves during the entire experimental procedure. Gloves need to be changed frequently, especially after spillage or suspected contaminations.

D. Control Reactions

- The Positive Control allows for control of the specificity and efficiency of the reagents and the reaction itself, including the performance of the Real-Time PCR and of the Real-Time PCR thermal cycler.
- The Negative Control allows for exclusion of contaminations. The sample testing is only valid if both, Positive and Negative Controls, are used and verified for validity in every Real-Time PCR run.
- The Internal Amplification Control is included in the Reaction-Mix in a defined copy number; it is co-amplified (channel HEX) with every single reaction to detect possible inhibitory effects of the DNA preparation on the Real-Time PCR itself and thus to verify true-negative results.

E. Protocol *(see also „Protocol At A Glance“ at the end of this Direction For Use)*

- The overall protocol of the analysis consists of the following main workflow:
 1. Sample Preparation
 2. DNA Preparation
 3. Reaction Setup and Amplification (Real-Time PCR)
 4. Data Analysis – Validity and Qualitative Result
- We recommend proceeding through the protocol without interruption to avoid potential degradation of the processed samples and reagents. If necessary, you may store the final DNA preparation at ≤ -18 °C until further processing. Avoid repeated freezing and thawing of the DNA preparations.

1. Sample Preparation

- Material derived from cultural processes, i.e. colony material, is directly transferred into respective tubes for Kylt® DNA Extraction (please refer to 2 "DNA Preparation"), such as conical screw cap tube; therefore a little amount of a single colony is picked with a sterile loop wire or sterile pipette tip and transferred to the tube.

2. DNA Preparation

a) Kylt® DNA Extraction (requires Kylt® DNA Extraction-Mix II)

- For detailed information, please refer to the Direction For Use of Kylt® DNA Extraction-Mix II.

b) Kylt® RNA/DNA Purification products

- The pure isolates may be processed with Kylt® RNA/DNA Purification products (please refer to chapter F "Related Products").
- For detailed information on the DNA preparation process, please refer to the respective Direction For Use.

c) Alternative methods

- The pure isolates may be processed with appropriate DNA preparation kits or appropriate in-house methods.
- For detailed information on the DNA preparation process, please refer to the Direction For Use or Standard Operating Procedure of the specific kit or in-house method, respectively.

3. Reaction Setup and Amplification (Real-Time PCR)

- Before each use, briefly vortex and spin down the Reaction-Mix and Negative Control.
- To determine the total number of reactions needed, count the number of samples and add two more for the Negative Control and the Positive Control.
- The Reaction-Mix is ready-to-use, add 16 µl to each of the PCR tubes or plate wells (“cavities”).
- Keep exposure of the Reaction-Mix to (sun)light as short as possible and return it back to appropriate storage temperature right after application. Avoid the formation of bubbles when pipetting samples and controls.
- Add 4 µl of the Negative Control to the corresponding cavity and seal it individually, if possible.
- Add 4 µl of each DNA preparation to the corresponding cavities and seal them individually, if possible.
- To minimize risk of potential cross-contaminations, 4 µl of the Positive Control are added to the corresponding cavity after all previous samples and control reactions are set up. Before each use, briefly vortex and spin down the rehydrated Positive Control (see also chapter B “Reagents and Materials”).
- If not already done, finally seal the cavities. It is recommended to briefly spin them down before the start of the Real-Time PCR run.
- Place the cavities in the Real-Time PCR thermal cycler and run the test with Kylt® Profile II as given below.

Kylt® Profile II				
Step No	Description	Temperature	Duration	
1	Activation of Polymerase	95 °C	10 min	
2	Denaturation	95 °C	15 sec	} 42 cycles
3	Annealing & Extension	60 °C	1 min	
4	Fluorescence Detection	channels Cy5, TXR, FAM and HEX		

- Kylt® Profile II allows for combined run of this and most other Kylt® qPCR detection methods.
- Alternatively, the Kylt® Profile I given below can be applied. Kylt® Profile I allows for combined run of this and most other Kylt® qPCR detection methods as well as Kylt® RT-qPCR detection products that need Reverse Transcription, such as those for detection of viral RNA.

Kylt® Profile I				
Step No	Description	Temperature	Duration	
1	Reverse Transcription	50 °C	10 min	
2	Activation of Polymerase	95 °C	1 min	
3	Denaturation	95 °C	10 sec	} 42 cycles
4	Annealing & Extension	60 °C	1 min	
5	Fluorescence Detection	channels Cy5, TXR, FAM and HEX		

- In the event of a combined Real-Time (RT)-PCR run, make sure all necessary channels are detected.
- Please follow the specified instructions of your Real-Time PCR thermal cycler as recommended by the manufacturer.

[4. Data Analysis – Validity and Qualitative Result](#)

General

- The amplification data can be processed automatically using the specific software tool of your Real-Time PCR thermal cycler. Alternatively, the threshold can be set manually considering the following directions: The threshold should cross the TXR-, Cy5-, FAM- and the HEX-curves in the linear increase of their slope (log scaling of the y-axis). By setting the threshold, the crossing points with the TXR-, Cy5-, FAM- and HEX-curves determine the respective cycle threshold (Ct), which is negatively correlated with the initial concentration of copies of the target genes in the Real-Time PCR reaction.
- Only curves with the typical exponential amplification, meaning the curve of the raw data shows a flat baseline at the beginning, followed by a clear (exponential) slope in fluorescence and possibly reaching a plateau-phase (y-axis in log scaling), should be regarded as positive.
- The actual test analysis starts with the validity check of the entire Real-Time PCR run. Afterwards, by means of the Internal Control the validity of each sample reaction and its true test result can be verified according to the Ct-value of the Internal Control channel (HEX). Finally, the *E. coli* Sta, Stb and LT-specific status of each sample is analyzed (Cy5, TXR, FAM).

Test Evaluation

- The **Real-Time PCR test run** is only **valid** if the TXR-, Cy5- and FAM-curves of the Negative Control are negative (Ct > 30), the HEX-curve of the Negative Control is positive and the TXR-, Cy5- and FAM-curves of the Positive Control are positive. For a valid test the TXR-, Cy5- and FAM-Ct-values of the Positive Control have to be > 15 and ≤ 30 and the HEX-Ct-value of the Negative Control has to be ≤ 40.

Target	Channel	Signal					
Internal Control	HEX	positive	positive / negative	positive / negative	positive / negative	positive / negative	negative
Sta	Cy5	negative	positive	negative	negative	positive	negative
Stb	TXR	negative	negative	positive	negative	positive	negative
LT	FAM	negative	negative	negative	positive	positive	negative
The sample is Sta		negative	positive	negative	negative	positive	
The sample is Stb		negative	negative	positive	negative	positive	inhibited
The sample is LT		negative	negative	negative	positive	positive	

- A **sample is negative for *E. coli* Sta, Stb and LT** if its HEX-curve is positive (Ct ≤ 40), but its TXR-, Cy5- and FAM-curves are negative (Ct > 30).
- A **sample is positive for *E. coli* Sta** if its Cy5-curve is positive (Ct ≤ 30), independent of the HEX-curve.
- A **sample is positive for *E. coli* Stb** if its TXR-curve is positive (Ct ≤ 30), independent of the HEX-curve.
- A **sample is positive for *E. coli* LT** if its FAM-curve is positive (Ct ≤ 30), independent of the HEX-curve.
- A **sample is inhibited** if neither the TXR-, Cy5- and FAM-curves nor the HEX-curve are positive.
- For the Kylt® *E. coli* Sta, Stb, LT Real-Time PCR Detection Kit cut-off values have to be set for the Sta, Stb and LT specific channels. Only results of Ct-value below Ct 30 for the specific channels FAM, Cy5 and TXR are to be considered as valid and positive.
- The Ct cut-off has no impact on the sensitivity because the sample material for the Kylt® *E. coli* Sta, Stb, LT Real-Time PCR Detection Kit is colony material derived from cultural processes and therefore gives strong positive signals.
- **Recommendation:** In the case of an inhibited sample the test may be repeated with a dilution of the DNA preparation at e.g. 1:10 (9 volumes Negative Control + 1 volume DNA Extract or eluted DNA). The Negative Control is used as the diluting agent. Preferably, the entire DNA preparation process is repeated: in case of inhibited DNA Extracts derived from Kylt® DNA Extraction-Mix II, the original sample or the DNA Extract can be utilized for DNA preparation using appropriate alternative systems, such as Kylt® RNA/DNA Purification.
- Convenient and reliable sample data entry, Real-Time PCR start, final qualitative analysis and documentation can be conducted with the Kylt® Software, please inquire.

F. Related and Accessory Products

Product	Article No	Reactions	Description
Kylt® DNA Extraction-Mix II	31398	100	Simplified and economic DNA extraction
Kylt® RNA / DNA Purification	31314 / 31315	250 / 50	Combined RNA and DNA purification from veterinary samples
Kylt® RNA / DNA Purification HTP	31826	4x96	Combined, magnetic beads-based purification of RNA and DNA from veterinary samples, suitable for automated high throughput processing
Kylt® E. coli	31316 / 31317	100 / 25	Detection of <i>Escherichia coli</i>

Production:

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Development, manufacturing and distribution of Kylt® *In-Vitro* Diagnostica is certified according to ISO 9001:2015.

Kylt® is a registered trademark.

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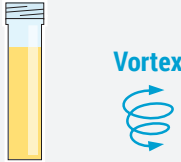


PROTOCOL AT A GLANCE

Real-Time PCR Setup

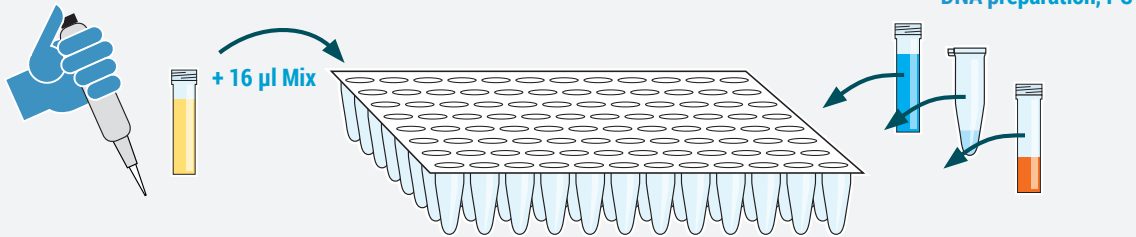
1

Pulse-vortex and spin down



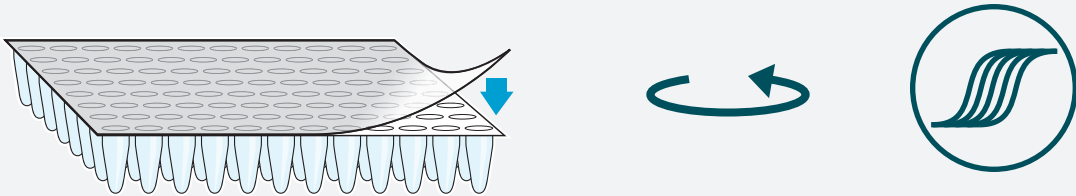
2

Dispense Reaction-Mix and add 4 µl NC, RNA preparation, PC



3

Seal cavities, spin down (recommended), and start cycler



4

Analysis

