DN*Animal Ident* Chicken

IPC (LR)

Cat. No. 5422221010

Test kit for the qualitative detection of chicken DNA with IPC, 96 real-time PCR reactions with IPC

15 TECHNICAL SERVICE

If you have any questions or experience any difficulties regarding this kit or Eurofins GeneScan Technologies products in general, please do not hesitate to contact us. Eurofins GeneScan Technologies customers are a major source of information regarding advanced or specialised uses of our products. This information is helpful to other scientists as well as to the researchers at Eurofins GeneScan Technologies. We therefore encourage you to contact us if you have any suggestions about product performance or new applications and techniques. For technical assistance and more information please contact the Eurofins GeneScan Technologies Technical Service Department or your local distributor.

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Table of Contents:

Test kits, their components and instructions for use are subject to alterations. They are intended for research purposes only.

DN*Animal Ident* Chicken IPC (LR) Kit

Kit for the qualitative real-time PCR detection of chicken DNA in food and feed

1 INTRODUCTION

National regulations in most countries of the world require declaration of components of food and feed and a corresponding labelling.

Declaration of components of animal origin can be crucial i.e. for vegetarian or vegan food, food for religious communities, export and trade, as well as for feed (i.e. in the context of feeding restrictions).
The kits from the Eurofins GeneScan Technologies DN*Animal* kit line comprise several major advantages:

- High sensitivity (0.01% w/w in unprocessed samples)
- High specificity (primers and probe)
- Robust test methods
- Fast results
- No amplicon contamination risk

The DN*Animal Ident* Chicken IPC kit was designed for a general detection of chicken in DNA from food and feed matrices with internal positive control.

The test comprises the following steps:

1. DNA extraction (not included in this kit)
2. Real-time PCR detection of the target

Animal species can be analysed in most matrices, even in gelatine. The processing steps commonly used in food and feed production usually reduce the fragment length of the sample DNA, but DNA is not completely degraded and the base sequence of the fragments is not changed. However, extremely rigid (acid/heat) processing can degrade DNA in a way that amplification is impossible.

Specific DNA sequences are amplified by RT-PCR (Real-time Polymerase Chain Reaction) and detected with high specificity due to the Taqman™ probes.

The probe of the detection system in this kit uses FAM™ as reporter dye and the IPC (internal positive control) uses R6G™. Non-fluorescent quenchers are used for both probes.

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DN*Animal Ident*
Chicken IPC (LR)
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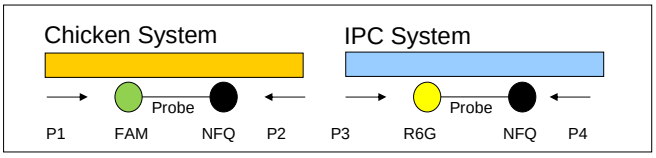
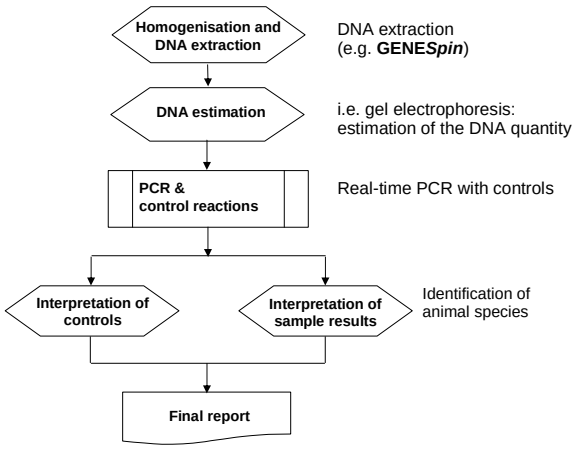
Cat. No 5422221010

The kit is validated for use on Agilent MX3005P/3000P, ABI7500/Fast, AriaMX, Bio-Rad CFX96 and Roche LC480.



FAM™ and R6G™ are the fluorescent reporter dyes attached to the 5' ends of the probes for the chicken target and for the IPC (internal positive control). Non-fluorescent quenchers are used for quenching.

2 TEST PROCEDURE – FLOWCHART



3 TIME SCHEDULE

Step	Hands-on time	Time involved
DNA-extraction	0.5 h	1.5 h
PCR-reaction	0.5 h	3.5 h
Total time	1.0 h	5.0 h

The hands-on time has been calculated for a single sample. When several samples are handled simultaneously, the time increases.

4 COMPONENTS OF THE KIT

The kit contains all components to run control and specific reactions for a total of 96 PCR reactions.

Important Note: Store all following components at -20°C. Never store materials for DNA extraction together with samples or amplicons. Never use them in areas where PCR products (amplicons) may be present.

2x **MasterMix QL RT IPC (LR) GSE-P-08.031, Chicken,** 1 ml composed of

- 650 µL BasicMix QL RT (NR) GSE-P-26.1 l EFGi 2x (NR) 1.5 U
- 390 µL OligoMix QL RT IPC (LR) GSE-P-08.031 Chicken

Mix prior to use!

2 x **Positive control DNA**: **Genomic DNA Chicken** (50 µL, 10 copies/µL)

1x **DNA stabilisation buffer**, 150 µL (for NTCs)

5 PREPARATION OF THE KIT'S REAGENTS

Store the kit at –20°C until opened for the first time. Thaw reagents just before use, mix them by vortexing and centrifuge briefly before use.
Just thaw as many BasicMix and OligoMix vials as necessary. Frequent freezing and thawing might cause inactivation of the reagents. If smaller volumes are needed, prepare aliquots of reagents at first use.
Refer to the reagent label for specific instructions regarding the correct storage.

6 MATERIAL AND EQUIPMENT NOT INCLUDED IN THE KIT

– water, DNase-free
– Vortex
– Micropipettes (variable 1-1000 µL) and filter tips
– PCR optical tubes or plates 0.2 ml and optical caps or seals
– RT-PCR Thermocycler (Agilent MX3005P/3000P, ABI7500/Fast, Roche LC480)

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7 SAMPLE PREPARATION

7.1 DNA extraction

The extraction of DNA from the sample is a crucial step, and in order to guarantee optimal quantity and purity, an appropriate method has to be chosen for each sample matrix. For most products, the DNA can be extracted with a kit from our DNA*Extractor* kit line or with our GENE*Spin* kit.
Absolute DNA amount and purity (meaning: free of PCR inhibiting substances) affect overall sensitivity of the analysis. Low DNA amount subjected to analysis results in poor LOD with regard to the specific test sample. Insufficiently pure DNA displaying inhibitory effects may even make testing impossible.
It is recommended to use the sample DNA undiluted. In case of inhibition, the concentration of DNA should be adjusted to approx. 20-40 ng/µL prior to the setup of the reactions. DNA amount can be determined prior to analysis by one of the following methods:
- Real-time PCR monitor run (preferred method)
- Fluorimetric or spectrophotometric or other physical measurements, e.g. gel electrophoresis may be applied.

Especially the spectrophotometric methods can suffer significant errors due to interfering DNA impurities or partial DNA denaturation/degradation.
For samples known with regard to extraction yield and purity, DNA measurement may be omitted.

Each sample should be treated in duplicate.

It is recommended to perform an extraction control for each set of samples extracted simultaneously, i.e. a complete DNA extraction without sample material, which should subsequently undergo PCR analysis.

8 PCR

8.1 Special precautions during PCR analysis

PCR is an exponential reaction. Detection of single target DNA copies is possible. The extreme sensitivity requires special precautions for handling and equipment. A successful amplification leads to several billion amplicons in the reaction tube. Each of them might lead to a false positive result when contaminating sample material or PCR, e.g. by spreading in aerosols.
Most important rules to avoid false-positive results are:

a) Separate the different procedures spatially. Use separate rooms for sample preparation, amplification and analysis of amplicons and dedicate separate equipment and materials for each procedure. Mixing of PCR components should be done in a separate room, best on a clean bench. Keep all working steps separate from rooms where gel electrophoresis of amplicons is performed.
b) Use filter tips for micropipettes.
c) Wear disposable powder-free gloves.
d) Never store kits and materials for DNA extraction together with samples or amplicons.
e) Always perform extraction controls and PCR controls (NTCs).

8.2 Preparation of MasterMix

Calculate the number of reactions and amount of equivalent MasterMix volume before thawing and mixing the reagents and starting the practical work.
The MasterMix is made of pre-made reagents ready for direct use after mixing of the two components.

Please be aware that the NTCs and positive controls (C+) are indispensable for the evaluation of the test and must be included in every run.

PCR is performed in a volume of 25 µL in 0.2 mL reaction tubes/plates according to the RT-PCR cycler instructions.

20 µL MasterMix for low ROX (LR) cyclers consist of 12.5 µL BasicMix + 7.5 µL OligoMix per reaction.

The following reactions are required for a RT-PCR run with 1, 8, 23 or 46 samples (incl. extraction controls). Add approx. 5% of volume as pipetting error compensation or use complete tubes.

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DNA*Animal Ident*
Chicken IPC (LR)
Test kit for qualitative detection of chicken DNA

Cat. No 5422221010

Samples	1	8	23	46
NTCs	2	2	2	2
Pos. controls	2	2	2	2
Samples (duplicate)	2	16	46	92
Total no. reactions	**6**	**20**	**50**	**96**
Total MM volume	**120 µL**	**400 µL**	**1 mL**	**2 mL**
BasicMix	75 µL	250 µL	625 µL or 1 tube	1250 µL or 2 tubes
OligoMix	45 µL	150 µL	375 µL or 1 tube	750 µL or 2 tubes

1. Thaw only the volumes of BasicMix and OligoMix needed for analysis. Shake thoroughly.
2. Remove the required volumes and mix in a fresh tube. Freeze the rest.
3. Mix thoroughly.
4. The composed MasterMix can be stored up to 4 h in the refrigerator, but must not be used longer.

8.3 PCR Setup

Every run requires two no template controls (NTC) and two positive controls (C+). It is highly recommended to test the samples in duplicate.

1. Label all PCR reaction tubes.
2. Add 20 µL of the composed MasterMix to the wells.
3. Add 5 µL of stabilisation buffer to NTC wells.
4. Add 5 µL of control (chicken) DNA to positive control wells.
5. Add 5 µL of sample DNA to test reaction wells.

8.4 Programming of the cycler

Before starting the practical work, program the plate document und the cycling conditions.
For description of the instrument programming please refer to the user manual of the respective instrument and software version and see our application notes for your cycler model on our website www.eurofins.com/kits.

8.5Plate template

For the plate template, you may use our templates (send an e-mail mentioning your cycler model to kits@eurofins.com to receive a copy) or program your own template with the settings below.

The PCR conditions are as follows:

Thermal Cycler Times and Temperatures		
1 HOLD	**CYCLE (45 repeats)**	
enzyme act.	*denaturation*	*ann. & extension*
10 min at 95°C	**15 sec at 95°C**	**90 sec at 60°C**
no data collection	no data coll.	data collection

For other thermocyclers than the mentioned ones, it may be necessary to optimise the PCR parameters.

If you intend to use the Eurofins GeneScan Technologies evaluation sheet, please use the detector/assay names given below:

Stratagene Mx3005P (3000P)

System	**Assay**	**Filter**
Chicken	8031a	FAM™/SYBR® Green I
IPC	8031i	HEX™
Reference	ROX	ROX™

The fluorescence signals are scanned in the following order of filters: (1) ROX, (2) FAM, (3) HEX.
The filter set gain settings for ROX, FAM, HEX are: 1x.

ABI 7500 (7500 Fast)

System	**Detector**	**Reporter**	**Quencher**
Chicken	8031a	FAM™	NONE
IPC	8031i	VIC™	NONE

Passive Reference: ROX
PCR is performed in the “Standard 7500” run mode.

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DN*Animal Ident*
Chicken IPC (LR)
Test kit for qualitative detection of chicken DNA

Cat. No 5422221010

Agilent AriaMX:

System	**Target Name**	**Dye**
Chicken	8031a	FAM™
IPC	8031i	HEX™
Reference	ROX	ROX™

Bio-Rad CFX96 Touch:
FAM signal is collected using the FAM detector
R6G signal is collected using the VIC detector
A reference dye is not used

LightCycler480:
Detection Format: Multi Color Hydrolyses Probe

System	**Filter**
Chicken	FAM (483-533)
IPC	VIC/HEX/Yellow555 (523-568)

Passive Reference: not required. Ramp rate is set to 4.4 for heating and 2.2 for cooling.

On LC480, Color Compensation must be performed before the first test is run. Please use the Eurofins Color Compensation kit with cat. no. 5427200201.

Save the created file/document.

The following plate document shows the distribution of reactions for a run. If you intend to use the Eurofins GeneScan Technologies evaluation sheet, please use the setup (adapted to the number of samples required) below.

	1	2	3	4	5	6	7	8	9	10	11	12
A	NTC	NTC	C+	C+	1a	1b	2a	2b	3a	3b	4a	4b
B	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a	10b
C	11a	11b	12a	12b	13a	13b	14a	14b	15a	15b	16a	16b
D	17a	17b	18a	18b	19a	19b	20a	20b	21a	21b	22a	22b
E	23a	23b	24a	24b	25a	25b	26a	26b	27a	27b	28a	28b
F	29a	29b	30a	30b	31a	31b	32a	32b	33a	33b	34a	34b
G	35a	35b	36a	36b	37a	37b	38a	38b	39a	39b	40a	40b
H	41a	41b	42a	42b	43a	43b	44a	44b	45a	45b	46a	46b

Plate layout for 46 samples.

NTC = no template control; C+ = positive control; a and b = sample duplicates

9 RESULTS

9.1 Evaluation

Refer to your cycler´s manual for details. An evaluation (Excel™) sheet can be requested at kits@eurofins.de.

Threshold: The threshold should be placed in the region of exponential amplification across all of the amplification plots. This region is depicted in the log view of the amplification plots as the portion of the plot, which is linear. The threshold line should neither be placed in the plateau phase nor in the initial linear phase of amplification. Thresholds are typically in the range 0.03 – 0.1.
AriaMX: Auto calculated threshold with default background based threshold settings can be used:
Cycle range: 5 thru 9
Sigma multiplier: 10

Baseline:
ABI 7500: manual, 3-15, or automatic baseline
MX3005P/3000P: adaptive
AriaMX: auto baseline correction can be used
Bio-Rad CFX96: Baseline Subtracted Curve Fit, Auto calculated

9.2 Interpretation of Results

Export Ct values to the Excel™ sheet provided (please request to kits@eurofins.de), or create an own evaluation sheet following the parameters below, where you will find an overview of the algorithms applied for scoring of the results in our Excel™ Evaluation Sheet.

Definitions

Ct Cut-offs	Chicken: Mean Ct (C+) +8 IPC: Mean CT (NTC) +3
dRn Limits	Chicken: Mean dRn (C+) x 0.2 IPC: Mean dRn (NTC) x 0.33
Outliers	Maximum acceptable outliers (C+): 0 Maximum acceptable outliers (NTC): 0

Inhibition control, scoring of IPC

Ct and dRn	Results
Ct_{IPC} sample ≤ Ct_{IPC} Cut-off **and** dRn_{IPC} sample ≥ dRn_{IPC} Limit	Sample valid
Ct_{IPC} sample > Ct_{IPC} Cut-off **or** dRn_{IPC} sample < dRn_{IPC} Limit	Sample invalid
No Ct_{IPC}	Sample invalid
Ct_{IPC} sample < Mean Ct_{IPC} NTC -3	Sample invalid

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DN*Animal Ident*
Chicken IPC (LR)
Test kit for qualitative detection of chicken DNA

Cat. No 5422221010

Test reaction (chicken)

Ct	dRn	Results
Ct sample ≤ Ct Cut-off	dRn sample ≥ dRn Limit	positive
Ct sample ≤ Ct Cut-off	dRn sample < dRn Limit	Check amplification!
Ct sample > Ct Cut-off	dRn sample ≥ dRn Limit	positive
Ct sample > Ct Cut-off	dRn sample < dRn Limit	negative
Ct sample < Mean Ct (C+) –5	dR(n) sample ≥ dR(n) Limit	Check amplification!
No Ct	-	Negative
***Note*:** In case of “Check amplification!” the amplification plots must be checked visually for presence of a sigmoid PCR amplification signal.		

Final result from combination of inhibition control and test reaction

IPC	Chicken test	Final result
Sample valid	Reaction positive	Positive
Sample valid	Reaction negative	Negative
Sample invalid	Reaction positive	Positive
Sample invalid	Reaction negative	Inhibited

Evaluation of the IPC
Calculate the MEAN Ct Value from NTC. Refer to data from IPC-detector. To calculate the Ct cut-off, add 3 Ct, to calculate the 2nd Ct cut-off, subtract 3 Ct.
Calculate the MEAN dRn Value from NTC. Refer to data from IPC-detector. The dRn cut-off f is 33% of the MEAN dRn.

Evaluation of chicken specific test
Calculate the MEAN Ct Value from positive control. To calculate the Ct cut-off, add 8 Ct. Calculate the MEAN dRn value from positive control. The dRN cut-off is 20% of the MEAN dRn.

9.3 Ambiguous results

If independently extracted DNAs show deviations in the results for “A” and “B”, this may be due to sample material non-homogeneity or to non-uniformities in the DNA-extraction efficiency. Repeat DNA extraction and homogenise sample more thoroughly. If the ambiguous result persists, it is most likely due to a concentration close to the LOD.

10 LIMIT OF DETECTION

The relative limit of detection has been validated at 0.01% of chicken DNA in other species (DNA w/w).
The absolute detection limit of the method is 10 DNA copies per reaction.
The limit of detection for the analysis of individual samples depends on several factors: the presence of PCR-inhibiting substances, the capability of the DNA extraction method to remove these inhibitors and the degree of DNA damage, and thus strongly on the type of sample and the DNA extraction procedure.
Quantification is not possible with this kit.

11 PRODUCT USE LIMITATIONS

The GeneScan Technologies DN*Animal* Kit is developed, designed, and sold for research purposes only. It is not to be used for diagnostic purposes or analysis of food and feed unless expressly cleared for that purpose by the appropriate regulatory authorities in the country of use. All due care and attention should be exercised in the handling of many of the materials described in this text.

12 PRODUCT WARRANTIES AND SATISFACTION GUARANTEE

Eurofins GeneScan Technologies GmbH (“GeneScan”) warrants the products manufactured by it will be free of defects in materials and workmanship when used in accordance with the applicable instructions and before the expiration date marked on the product packaging under the storage conditions, recommended in the instructions and/or on the package. Application protocols published by GeneScan are intended to be only guidelines for the buyers of the products. Each buyer is expected to validate the applicability of each application protocol to his individual application. GeneScan makes no other warranty, expressed or implied. There is no warranty of merchantability or fitness for a particular purpose.

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DN*Animal Ident*
Chicken IPC (LR)
Test kit for qualitative detection of chicken DNA

Cat. No 5422221010

GeneScan’s sole obligation with the respect to the foregoing warranties shall be, at its option, to either replace or to refund the purchase price of the product(s) or part thereof that proves defective in materials or workmanship within the warranty period, provided the customer notifies GeneScan promptly of any such defect. GeneScan shall not be liable for any direct, indirect or consequential damages resulting from economic loss or property damages sustained by buyer or any customer from the use of the product(s). A copy of Eurofins GeneScan GmbH terms and conditions can be obtained on request and is provided in our price lists.

13 IMPORTANT NOTES

- The TaqMan processes are covered by patents issued to Hoffmann-La Roche AG and Applied Biosystems Inc., which are applicable in certain countries. Eurofins GeneScan Technologies does not encourage or support the unauthorized or unlicensed use of these processes. Use of this kit is recommended for persons that either have a license or are not required to obtain a license.
- Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are not to be considered unprotected by law.

14 TROUBLESHOOTING

Result	Possible mistakes/reasons	Possible verification and measures
No PCR signals from samples	Inhibition of PCR by inhibitory substances. Inhibition by too much DNA.	Clean DNA further* or dilute DNA solution. Check DNA concentration/dilution.
No PCR signals from positive controls	Wrong PCR program.	Check and correct PCR program.
No amplification, neither from control DNA nor from sample DNA	MasterMix not properly prepared Wrong PCR program.	Prepare fresh MasterMix, repeat PCR. Check program.
Positive PCR result for NTC	Contamination with DNA/amplicons during PCR setup.	Optimise your precautions. Check your solutions. Decontaminate your equipment. Repeat the PCR.
Positive PCR result for extraction control	Contamination with sample material/DNA/ amplicons/ during DNA extraction or PCR setup.	Check your solutions. Repeat extraction and PCR.

* Repeat extraction of DNA from the sample. Repeat washing with 75 % ethanol three times. If necessary, clean DNA further e.g. with our DNA Cleaning Columns (cat. no. 5224700310).