Florfenicol (FF) ELISA Kit

Technical Manual

(ELISA)

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1 Principle and Application

This kit adopts the method of indirect competitive enzyme-linked immunoassay (ELISA) to detect Florfenicol (FF) in the sample such as aquatic tissue, livestock tissue, liver, eggs, honey, milk and feed. The kit is composed of Microtiter Plate coated with coupled antigens, HRP enzyme conjugates, antibodies, standards and other supporting reagents. During the detection, with adding standards or samples, the FF in the samples will compete with the coupled antigens to combine with anti-FF antibodies. After adding enzyme conjugates, take coloration with TMB substrates. Absorbance value of the samples is a negative correlation with FF content. Lastly, by comparing the obtained absorbance values with the standard curve, we can calculate the content of FF in the sample.

2 Technique Data

2.1 Kit Sensitivity: 0.15ppb (ng/mL)

2.2 Reactive Mode: 25°C, 30min ~ 15min

2.3 Detection Limits:

Sample	Detection Limits
Tissue, liver, honey, milk	0.075ppb
Feed, milk powder	0.15ppb
Eggs	0.075ppb

2.4 Cross-reaction Rate:

Florfenicol 100%

Thiamphenicol ..... ＜2.5%

Chloramphenicol ..... ＜0.1%

2.5 Sample Recovery Rate:

Sample	Recovery rate
Tissue, liver	85±20%
Honey	85±25%
Feed, milk	75±25%
Eggs, milk powder	70±25%

3 Composition of the Kit

Reagent	Specification
Microtiter Plate	8wells× 12strips
Standard: 0ppb, 0.15ppb, 0.45ppb, 1.35ppb, 4.05ppb,12.15ppb	1.0mL each
High Standard： 100ppb(red cap)	1×1.0mL
Antibody solution (blue cap)	1×5.5mL
HRP conjugate (red cap)	1×5.5mL
Substrate Reagent A (white cap)	1×6mL
Substrate Reagent B (black cap)	1×6mL
Stop Solution (yellow cap)	1×6mL
Concentrated Wash Buffer (20×)(white cap)	1×40mL
Concentrated Reconstitution Buffer (2×) (yellow cap)	1×50mL
Instruction	1
Adhesive Membrane	1
Sealed bag	1

4 Materials Required but Not Supplied

4.1 Equipment: microplate reader, printer, grinder (for homogenizing solid samples), nitrogen evaporator, vortex mixer (for shake and mix), centrifuge, graduated transfer pipette, and balance with a division value of 0.01 g, constant temperature device;

4.2 Micropipette: single-channel 20 to 200μL and 100 to 1000μL, and multi-channel 300μL;

4.3 Reagents: Ethyl acetate, n-hexane, acetonitrile, sodium nitroprusside, zinc sulfate.

5 Experimental preparation

Restore all reagents and samples to room temperature (adjust to around 25°C) for more than 30 min before use. This is a crucial step to ensure there is no precipitation in the reagents.

5.1 Notice Before Sample Processing:

Please note that the labware must be clean. Use disposable pipette tips to avoid contamination of interference results.

5.2 Solution preparation:

Solution 1: 0.36M Sodium Nitroprusside Solution (for milk and milk powder samples)

Dissolve 10.7g of sodium nitroprusside in deionized water, and dilute to a final volume of 100mL.

Solution 2: 1.04M Zinc Sulfate Solution (for milk and milk powder samples)

Dissolve 29.8g of zinc sulfate in deionized water, and dilute to a final volume of 100mL.

Solution 3: Acetonitrile-Water Solution

Mix acetonitrile and water in a volume ratio of 84:16.

Solution 4: Reconstitution Buffer

Dilute the Concentrated Reconstitution Buffer (2×) 2 times with deionized water (Reconstitution Buffer (2×): deionized water=1:1). It can be stored at 4 °C for one month.

Solution 5: Working Wash Buffer

Dilute the concentrated wash buffer (20×) by a factor of 20 (Concentrated wash buffer/Deionized water= 1: 19).

5.3 Sample pretreatment steps:

5.3.1 Tissue, liver treatment.

1) Weigh 3g ± 0.05g of homogenized sample into a 50mL centrifuge tube, add 6mL of ethyl acetate, and shake for 5 minutes. Centrifuge at 4000 rpm at room temperature for 10 minutes.

2) Transfer 4mL of the upper layer to a container and evaporate to dryness under nitrogen or air at 50°C-60°C.

3) Dissolve the dried residue in 1mL of n-hexane, mix thoroughly, then add 1mL of reconstitution buffer (Solution 4), shake for 2 minutes, and centrifuge at 4000 rpm at room temperature for 10 minutes

4) Discard the upper organic phase and take 50μL of the lower aqueous phase for analysis.

Dilution times of the sample:0.5 Detection limits:0.075ppb

5.3.2 Honey treatment.

1) Weigh 2g ± 0.05g of honey into a centrifuge tube, dissolve it with 4mL of deionized water, then add 4mL of ethyl acetate, and shake for 2 minutes. Centrifuge at 4000 rpm at room temperature for 10 minute.

2) Transfer 2mL of the upper layer to a container and evaporate to dryness under nitrogen or air at 50°C-60°C.

3) Dissolve the dried residue in 0.5mL of reconstitution buffer (Solution 4), and mix thoroughly.

4) Take 50μL for analysis.

Dilution times of the sample:0.5 Detection limits: 0.075ppb

5.3.3 Egg treatment.

1) Weigh 2g ± 0.05g of homogenized sample into a centrifuge tube, add 8mL of ethyl acetate, and shake for 2 minutes. Centrifuge at 4000 rpm at room temperature for 10 minutes

2) Transfer 4mL of the upper layer to a container and evaporate to dryness under nitrogen or air at 50°C-60°C.

3) Dissolve the dried residue in 2mL of n-hexane, then add 0.5mL of reconstitution buffer (Solution 4). Mix thoroughly and shake for 2 minutes. Centrifuge at 4000 rpm at room temperature for 5 minutes.

4) Remove the upper organic phase, and take 50μL of the lower aqueous phase for analysis.

Dilution times of the sample:0.5 Detection limits: 0.075ppb

5.3.4 Milk treatment.

1) Centrifuge the milk sample at 4000 rpm for 10 minutes at room temperature. Remove the upper layer of fat and transfer 5mL of defatted milk to a 50mL centrifuge tube. Add 250μL of sodium nitroprusside solution (Solution 1) and shake for 30 seconds. Then add 250μL of zinc sulfate solution (Solution 2) and shake for another 30 seconds. Centrifuge at 4000 rpm for 10 minutes.

2) Transfer 2.2mL of the upper layer liquid (equivalent to 2mL of fresh milk) to another centrifuge tube. Add 4mL of ethyl acetate, shake for 2 minutes, and centrifuge at 4000 rpm for 10 minutes.

3) Take 2mL of the upper layer liquid and evaporate to dryness under nitrogen or air at 50°C-60°C.

4) Dissolve the dried residue in 0.5mL of reconstitution buffer (Solution 4) and mix thoroughly.

5) Take 50μL for analysis.

Dilution times of the sample:0.5 Detection limits: 0.075ppb

5.3.5 Milk powder treatment.

1) Weigh 2g±0.05g of powdered milk into a 50mL centrifuge tube. Dissolve it in 10mL of deionized water. Add 1mL of sodium nitroprusside solution (Solution 1) and 1mL of zinc sulfate solution (Solution 2). Shake the mixture well and centrifuge at 4000 rpm for 10 minutes at room temperature.

2) Transfer 3.6mL of the upper layer liquid (equivalent to 0.6g of powdered milk) to another centrifuge tube. Add 6mL of ethyl acetate, shake for 5 minutes, and centrifuge at 4000 rpm for 10 minutes at room temperature.

3) Take 4mL of the upper layer liquid and evaporate to dryness under nitrogen or air at 50°C-60°C.

4) Dissolve the dried residue in 0.4mL of reconstitution buffer (Solution 4) and mix thoroughly.

5) Take 50μL for analysis.

Dilution times of the sample:1 Detection limits: 0.15ppb

5.3.6 Feed treatment.

1) Weigh 2g ± 0.05g of homogenized feed into a 50mL centrifuge tube. Add 8mL of ethyl acetate, shake for 5 minutes, and centrifuge at 4000 rpm for 10 minutes at room temperature.

2) Take out 4mL of the upper layer liquid and dry it under nitrogen or air at 50°C-60°C.

3) Dissolve the dried residue in 1mL of n-hexane, then add 1mL of reconstitution buffer (Solution 4). Shake for 30 seconds and centrifuge at 4000 rpm for 5 minutes at room temperature.

4) Remove the upper organic phase and take 50μL of the lower aqueous phase for analysis.

Dilution times of the sample:1 Detection limits: 0.15ppb

6 ELISA procedure

Place all reagents and samples to room temperature (adjust to around 25°C) for 30min. Gently shake the reagent bottles before use.

Take out the frame of the microplate along with the required number of wells. Then place the unused microplate wells into the sealed bag with the desiccant provided. Store the remaining kit in the refrigerator at 2-8°C.

Step 1: Number: Number the wells in sequence corresponding to the samples and standard, make 2-well parallel trials for each sample and standard, and record their locations.

Step 2: Incubation: Add 50μL of standard or sample into each numbered well, then add 50μL of HRP conjugate per well. Next, add 50μL of antibody solution into each well. Finally, cover the Microtiter Plate with the adhesive membrane, shake gently by hand (or use a microplate shaker) for 5s and incubate for 30 min at 25°C in the dark.

Step 3: Washing: Uncover the adhesive membrane carefully, discard liquid in the wells, pipette 350μL of Working Wash Buffer (Solution 5) to every well, let stand for 30 seconds then drain, repeat 5 times. Invert the plate and tap it against a thick absorbent paper (or lint-free cloth), with a soft towel placed underneath. (Bubbles that are not removed after tapping dry can be punctured with a clean pipette tip).

Step 4: Color: Add 50μL of Substrate Reagent A to each well. Then add 50μL of Substrate Reagent B per well. Shake gently by hand (or use a microplate shaker) for 5s, and allow to react for 15min at 25°C in the dark. (The reaction can be extended appropriately if the blue color is too pale.)

Step 5: Stop the reaction: Pipette 50μL of Stop Solution to each well, and shake gently by hand (or use a microplate shaker). The reaction would be stopped.

Step 6: Calculate: Determine the Optical Density (OD value; absorbance value) at 450nm (Reference wavelength 630nm) with a microplate reader. Finish this step within 10min after stop the reaction.

7 Interpretation of result

7.1 Calculate the percentage of absorbance value

$$\text{Percentage of absorbance value}(\%) = \frac{A}{A0} \times 100\%$$

A—the average OD value of the sample or standard;

A0—the average OD value of the 0ppb standard.

It is used to calculate the percentage absorbance of a standard or sample.

7.2 Draw the standard curve and calculate

Take absorbance percentage (A/A0) of standards as Y-axis and the corresponding log of standards concentration (ppb) as X-axis.

Draw the standard semi-log curves with X-axis and Y-axis.

Take absorbance percentage of samples substitute into standard curve, then can get the corresponding concentration from standard curve. **Last, the resulting concentration values multiplied by the corresponding dilution times is the actual concentration of FF of samples.**

If professional analysis software of the kit is used for calculation, it is more convenient for accurate and rapid analysis of a large number of samples.

8 Attention

8.1 Before test, the reagents and samples should be balanced to room temperature (25°C). If below 25°C, it will lead to all the standard OD value on the low side.

8.2 In the washing process, dry wells may result in non-linear standard curves and undesirable reproducibility. Therefore, proceed to the next step immediately after washing.

8.3 Please mix the contents within the wells uniformly and wash the plate thoroughly. The reproducibility is largely determined by consistency of washing step.

8.4 During the incubation, cover microplates with adhesive membrane to avoid light.

8.5 Do not use kits that are overdue. Do not mix reagents with those from other lots.

8.6 Substrate Reagent A/B is colorless. If not, please discard.

8.7 If absorbance value of 0ppb is below 0.5（A450nm< 0.5 ）, it means that the reagent may be metamorphic.

8.8 Stop solution is corrosives, please avoid contact with skin.

8.9 As the OD values of the standard curve may vary according to the conditions of actual assay performance (e.g. operator, pipetting technique, washing technique or temperature effects), the operator should establish a standard curve for each test.

8.10 For the mentioned sample, fast and efficient extraction methods are included in the kit description. Please consult technical support for the applicability if other sample need to be tested.

8.11 The kit is used for rapid screening of actual samples. If the test result is positive, the instrument method such as HPLC, LC/MS can be used for quantitative confirmation.

9 Storage conditions

The kit shall be stored at 2-8 °C. Avoid freezing.

Shelf Life: 12 months. The date of manufacture is presented in the label of the box.