VERSION N3
CAT.NUMBER: B2748/B2796

Bio-Shield ZON

ELISA TEST | In vitro analysis

for the quantitative detection of Zearalenone in grains, cereals and animal feed

ProGnosis Biotech S.A. is ISO 9001:2015 certified by TÜV Hellas (TÜV NORD).

Use only the current version of Product Data Sheet enclosed with the kit.

Bio-Shield ZON, B2748/B2796, is an immunoassay method that determines the Zearalenone, in grains, cereals and other commodities including animal feed. The ELISA kit contains all reagents required for the immunoassay method. The ELISA test is adequate for 48/96 definitions (standards are included). A spectrophotometer for microtiter ELISA plate is required.

Matrices:

Cereals: Alfalfa, Animal Feed, Barley, Biscuits, Bran sticks, Bread, Brown rice, Corn, Corn flakes, Corn flour, Corn gluten, Corn gluten meal, Cottonseed, DDGS, Oat bran, Oat flakes, Oats, Pasta, Pet food, Popcorn, Raw rye, Rice, Rye flour, Sesame, Silage, Sorghum, Soy beans, Wheat, Wheat bran, Wheat flour

Other: Cocoa, Coconut residue, Milk, Oil (Coconut oil, Corn oil, Kernel oil, Olive oil, Olive pomace oil, palm oil, Peanut oil, Sesame oil, Soybean oil, Sunflower oil), Roasted Chickpeas

- Sample preparation: extraction
- Test time (incubation time after samples and reagents preparation): 15min
- Standard curve range: 0 - 500ppb
- Shelf life: 12 months
- Storage: 2-8^{o}C

This is an electronic version, please verify always the last one included in the kit.

Specifications

- The LOD of the method is 10 ppb ZON.
- The LOQ of the method is 15 ppb ZON.
- The recovery of spiked extractions-matrices was 92.8% (CV = 6.8%).
- IC50 = 60 - 140 ppb
- Each standards duplicates mean CV ≤ 6%
- The cross-reaction of the anti-ZON antibody with Zearalenone, α-zearalenol, β-zearalenol, Zearalanone, α-zearalanol and β-zearalanol is 100, 83, 45, 98, 78 and 84% respectively.

1. Description

Bio-Shield ZON is an ELISA test for the detection of Zearalenone in grains, cereals and animal feed.

2. General Information

Zearalenone (ZON) is a member of the trichothecene mycotoxins produced by fungi of the Fusarium genus (F. graminearum). Grains including barley, wheat, oats, corn, rice and maize are frequently infected by this fungus. It is frequently implicated in reproductive disorders of farm animals and occasionally in hyperoestrogenic syndromes in humans. There is evidence that ZON and its metabolites possess oestrogenic activity in pigs, cattle and sheep. Moreover, ZON has also been shown to be hepatotoxic, haematotoxic, immunotoxic and genotoxic. Most controlling government agencies worldwide have regulations regarding the amount of ZON allowable in human and animal foodstuffs. Accurate and rapid determination of ZON presence in commodities is of paramount importance.

3. Principle of the Method

The quantitative test is based on the enzyme linked immunosorbent assay principles. The wells of the microtiter strips are coated with ZON specific antibodies. Toxins are extracted from a ground sample with methanol 70%. Zearalenone standards or samples and ZON-HRP conjugate (detection solution) are added into the coated wells. ZON-HRP conjugate binds to the binding sites of coated antibodies that are not already occupied by ZON of standards or samples. Any unbound ZON-HRP conjugate of detection solution is removed in a washing step. A chromogen substrate is added to the wells resulting in the progressive development of a blue colored complex with the detection antibody. The color development is then stopped by the addition of acid turning the resultant final product yellow. The measurement is made photometrically at 450 nm and the intensity of the produced colored complex is indirectly proportional to the concentration of ZON present in the samples and standards.

4. Reagents Provided

Bio-Shield ZON ELISA kit contains sufficient reagents and materials for 48/96 measurements (including standard tests).

Reagents (Store at 2-8ºC)	Quantity for 48 wells	Quantity for 96 wells	State	Vial cap color
Single-Break Strip Plate	48 wells	96 wells	Ready to use (precoated)	-
Dilution Microwells	48 wells	96 wells	Ready to use (green color)	-
Sealing film	2 sheets	2 sheets	Ready to use	-
Standards 1-5 (0, 1, 3, 8 and 20ppb of ZON in organic solution) (correspond to 0, 25, 75, 200 and 500ppb)	5 plastic vials (each 1.5ml)	5 plastic vials (each 1.5ml)	Ready to use	Brown
ZON Detection Solution	1 plastic vial (12ml)	2 plastic vials (each 12ml)	Ready to use	Green
Wash Buffer	1 plastic vial (50ml)	1 plastic vial (50ml)	20X Concentrate (dilute in distilled water)	White
TMB Substrate	1 plastic vial (6ml)	1 plastic vial (12ml)	Ready to use	Brown
Stop Solution	1 plastic vial (6ml)	1 plastic vial (12ml)	Ready to use	White

5. Materials required but not provided

- A grinder sufficient to render sample to particle size of fine instant coffee
- Balance with 0 - 50 g measuring capability and Graduated cylinder - 100 mL
- Methanol (70 mL reagent grade per sample) and Distilled or deionized water
- Filter Paper Whatman #1 or equivalent, Filter Funnel and Miscellaneous laboratory plastic or glass tubes 50 - 125 mL
- Vortex mixer and Microtiter plate reader fi ted with 450 nm filter
- 100, 200 and 1000 µL adjustable single channel micropipettes with disposable tips (a repetitive pipette of 100µL is acceptable for the steps of TMB and Stop Solution)
- 50 - 300 µL multi-channel micropipette with disposable tips and reservoirs

6. Storage Instructions

Store kit reagents between 2 and 8°C (35 - 46°F). Do not freeze any components provided. Reseal immediately the unused strips of the microtiter plate in the bag together **with the desiccant bag** provided and store at 2 - 8°C. After use remaining reagents should be returned to cold storage (2 - 8° C). Expiry of the kit and reagents is stated on the labels respectively and no quality guarantee is accepted after the expiration date. The expiry of the kit components can only be guaranteed if the components are stored properly as well as if the reagent is not contaminated by the first handling, in case of repeated use of one component. Because of the colorless TMB Substrate and standards 1-7 light sensitivity, avoid the exposure to direct light. Do not interchange individual reagents between kits of different lot numbers.

7. Safety and Precautions for use

- Avoid any skin contact with ZON standards, Stop Solution (8% H_3PO_4) and TMB (toxic). **Use gloves.** In case of contact, wash thoroughly with water.
- All reagents should be warmed in room temperature before use and covered when not in use. **Use a clean disposable plastic pipette tip for each reagent, in order to avoid cross contamination. When pipetting reagents, maintain a consistent order of addition from well-to-well. This will ensure equal incubation times for all wells.**
- Use a clean plastic container to prepare the wash buffer and all residual washing liquid must be drained from the wells by efficient aspiration or by decantation followed by tapping the plate forcefully on absorbent paper. Never insert absorbent paper into the well. Read the absorbance within 60 minutes after completion of the assay.

8. Indication of corruption of kit reagents

- The bluish coloration of the chromogen substrate before the ELISA test.
- A value of less than 0.7 absorbance units (ABS 450nm) for the Standard 1 (St1).

9. Sample and reagents preparation

9.1 Reagents preparation

- Prepare the Extraction Solution (70% Methanol) by adding 30ml of distilled or deionized water to 70ml of methanol (reagent grade) for each sample to be tested.
- Dilute the 20X solution concentrate 20 fold with distilled water to give a **1X** working solution.

Preparation of Wash Buffer 1X: In case of the occurrence of crystals in the Wash Buffer, the warming by gentle dismantling (using hands) of the crystals is needed. Pour entire content of the solution concentrate (50ml) into a clean 1000ml graduated cylinder, rinse the vial with distilled or deionized water and pour the content again into the cylinder and fill to a final volume of 1000ml with distilled or deionized water. Mix gently to avoid foaming, transferring the final solution from cylinder to a clean bottle and back two times. The clean bottle with **1X Wash Buffer** working solution can be left out of the refrigerator during the method procedure and subsequent be stored 2 - 8°C for one month.

- **9.2 Samples preparation**

9.2.1 Ground samples

1. The sample must be collected according to established sampling techniques. Grind a representative sample to the particle size of fine instant coffee (50% passes through a 20 mesh screen).
2. Weigh out a 20 g ground portion of the sample and add 100 mL of the Extraction Solvent (70% methanol) and mix in a blender for a minimum of 2 minutes. **The ratio of sample to extraction solvent is 1:5 (w/v).**
3. Allow the particulate matter to settle, filter 5 - 10 mL of the extract through a Whatman #1 filter paper (or equivalent), collect the filtrate and dilute 5 times with 70% methanol (example: 1 mL filtrate + 4 mL 70% methanol). **The ratio of sample to 70% methanol is 1:25 (w/v).**
4. Use 100 µL of each final diluted filtrate directly in the immunoassay.

NOTE 1: The extracted sample should have pH value of 6.2 - 7.5. If the pH is less than 6.2, it should be neutralized using NaOH.

NOTE 2: In case the user make an additional dilution 1:1 of filtrate with 70% methanol the range of quantification becomes 0 - 1000ppb. So, use also 100µl of each diluted filtrate directly in the immunoassay and multiply the final ZON ppm result x 2.

9.2.2 Milk Samples

After centrifugation at 3000xg at 4°C for 10 min, remove the upper fat layer, dilute the defatted milk sample 5 times with 70% methanol (**1ml of milk + 4ml of 70% methanol**) and vortex. Use 100µl of each diluted milk sample directly in the immunoassay and divide the final ZON ppb result by 5. The LOD is 2ppb and the LOQ is 3ppb.

9.2.3 Oil Samples

1. Transfer 100ml of extraction solvent to a container and add 20ml of the sample. The ratio of sample to extraction solvent is 1:5 (v/v).
2. Mix in a blender for a minimum of 10 minutes.
3. Centrifuge a portion of the mixture at 3,000 g for 10 min and collect the upper layer (methanol).
4. Use 100µl directly in the immunoassay.
5. Divide the final ZON ppb result by 5.

10. Method Procedure

10.1 Assay Design: Determine the number of microwell strips required to test the desired number of samples plus appropriate number of wells needed for standards. Considering that each sample and standard can be tested in single or in duplicate, create a layout.

NOTE: Do not use more than 48 wells (six strips) in a single experiment.

CAUTION: Use the standards positions as the **Example plate** layout below **NECESSARY** and note positions of samples that can be set to all remaining empty wells of layout.

	1	2	3	4	5	6	7	8	9	10	11	12
A	St1	St1										
B	St2	St2										
C	St3	St3										
D	St4	St4										
E	St5	St5										
F												
G												
H												

Example plate layout (example for a 5 point standard curve)

10.2 Bring all reagents to room temperature (19 - 24°C) before use. Remove the standards (**Standard 1-5**) and place two Dilution Microwells (green) in a microwell holder for each Standard and Sample to be tested in duplicate. Place an equal number of Antibody Coated Microtiter Wells in another microwell holder. Immediately reseal the unused strips of the microtiter plate in the bag together with the desiccant bag provided. The samples should be stored in a cool place.

10.3 Add **200µl** of **ZON Detection Solution** to each Dilution Well.

10.4 Using new pipette tip for each, add **100µl** of each Standard (**Standard 1 - 5**) and prepared sample in duplicate (see Chapter 9) to appropriate Dilution Well containing the **ZON Detection Solution**. Mix by priming pipetting at least 5 times.

10.5 Using a multichannel pipette, transfer **100µl** of contents from each Dilution Microwell to a corresponding Antibody Coated Microtiter Well. Incubate at room temperature for **10 minutes**.

10.6 Remove the sealing film and wash the plate as follows: Aspirate the liquid from each well into the sink and tap the holder of microwells upside down strongly (four times in a row) on an absorbent paper to insure the complete removal of liquid from the wells. Dispense **300µl** of **Wash Buffer 1X** (see 9.1) into each well with wash bottle or multichannel micropipette using the proper reagent reservoir and shaking the plate manually for a few seconds. Repeat this process for another three times **(total 4 times). CAUTION:** It is important to not allow microwells to dry between working steps.

10.7 Aspirate the liquid as described above and add **100µl** per well of **TMB Substrate** (pour 1ml per 8 wells in a reservoir). Cover the microwells with the sealing film, shaking the plate manually for a few seconds and incubate in the dark at room temperature for **5 minutes.**

10.8 Remove the sealing film and add **100µl** per well of the **Stop Solution** to each well (pour 1ml per 8 wells in a reservoir). Mix gently by shaking again the plate manually.

10.9 **Measure the absorbance at 450nm.** Read the absorbance value of each well (within 60 minutes after the step 10.8) on a spectrophotometer using 450 nm as the primary wavelength and optionally 620nm as the reference wave length (610nm to 650nm is acceptable).

11. Data Analysis

- **Automatically**

An assigned software, the **Prognosis-Data-Reader,** is available for free (contact: info@prognosis-biotech.com) download in order to evaluate the Bio-Shield ZON ELISA kit. The evaluation is carried out by a simple transfer of data values after the measurement.

- **Manually**

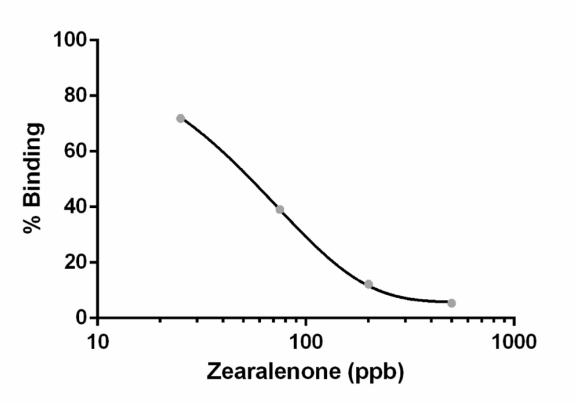
Calculate the average absorbance values for each set of duplicate standards and samples.

$$\frac{\text{Standard or sample absorbance}}{\text{Standard 1 absorbance}} \times 100 = \%\ \text{Binding}$$

Ideally duplicates should be within 10% of the mean. Use the following calculation:

The standard 1 is equal to 100% and the absorbance values are quoted in percentages. The concentration of ZON (ppb) in each sample is determined by extrapolating OD values against concentrations of ZON in standard solutions using a two phase exponential decay standard curve with logarithmic X axis.

12. Example of Standard Curve (0 - 500ppb)



13. Performance Evaluation

13.1 Reference Materials

Several reference materials are being used for the evaluation of each product of ProGnosis Biotech S.A. in the context of Quality Control performed by Quality Control Department. Please request a validation report, including the results, at info@prognosis-biotech.com.

13.2 Proficiency Tests

All products participate frequently in Proficiency Tests. For more information, visit the individual product page in our website: **www.prognosis-biotech.com**

14. Method Summary

Total procedure time (after samples and reagents preparation): 15min.

Mix 200µl of the Detection Solution with 100µl of the samples and standards in the Dilution Microwells

⇩

Transfer 100µl from each well of the Dilution Microwells into the Antibody Coated Microwells

⇩

Incubate 10min at room temperature

⇩

Wash four times

⇩

Add 100 µl of TMB Substrate

⇩

Let the color develop for 5min in the dark at room temperature

⇩

Add 100 µl Stop Solution

⇩

Read Absorbance at 450 nm within 60 min

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Other: Cocoa, Coconut residue, Milk, Oil (Coconut oil, Corn oil, Kernel oil, Olive oil, Olive pomace oil, palm oil, Peanut oil, Sesame oil, Soybean oil, Sunflower oil), Roasted Chickpeas

- Sample preparation: extraction
- Test time (incubation time after samples and reagents preparation): 15min
- Standard curve range: 0 - 500ppb
- Shelf life: 12 months
- Storage: 2-8°C

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