

| VERSION 4

CAT.NUMBER: B1348/B1396

STORAGE: 2-8°C



# BIO-SHIELD

## GOAT COLOSTRUM

### **ELISA TEST | In vitro analysis**

for the detection of goat's IgG in milk



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



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

Bio-Shield Goat Colostrum, B1348/B1396, is an immunoassay method that detects the adulteration of milk with goat's IgG. 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.

- Sample preparation: dilution
- Test time (incubation time after samples and reagents preparation): 50min
- Standard Curve Range: 0 - 1.5 mg/ml
- Shelf life: 12 months
- Storage: 2-8°C

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## 1. Description

Bio-Shield Goat Colostrum is an ELISA test for the detection of caprine IgG in milk.

## 2. General Information

Early-lactation milk contains colostrum which provides immune protection and nurture the newborn. Colostrum has 50–100 times higher levels of whey proteins ( $\beta$ -lactoglobulin,  $\alpha$ -lactalbumin, immunoglobulins, lactoperoxidase (LPO), lactoferrin, proteinase inhibitors, albumin,  $\alpha$ 2-macroglobulin, and transferrin), vitamins, and minerals, and lower levels of lactose and casein than milk. These higher whey proteins/casein ratios, may affect the organoleptic properties of dairy products and result in technological problems during their production (e.g. precipitation on the surface of equipment during heat treatments). The manufacturing efficiency of cheese production is lower, because of the low casein levels and the high concentration of lactoferrin and LPO, and the nonspecific antimicrobial properties that alter the growth of bacteria playing a crucial role in fermentation and cheese maturation. Thus, adulteration of milk with raw colostrum is an illegitimate practice for the dairy industry. A milk sample containing more than 1-2 mg/mL caprine IgG, is considered to be adulterated with colostrum. This Elisa kit can be used to detect and quantify the presence of colostrum in milk. <sup>[1-4]</sup>

## 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 very specific antibodies against goat's IgG. The standard solutions and the solutions of the samples are added and if a specimen contains colostrum, the goat's IgG will bind with the immobilized antibodies. All of the other unbound ingredients will be removed by washing. Then, the detection solution is added (peroxidase-conjugated antibody against goat's IgG) and binds to goat's IgG. Any unbound detection solution will be removed by washing. A chromogen substrate is then 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 directly proportional to the concentration of goat's IgG that are present in the samples and the standard solutions.

## 4. Reagents Provided

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

| Reagents (Store at 2-8°C)   | Quantity for 48 wells      | Quantity for 96 wells      | State                                       | Vial cap color |
|---|----------------------------|----------------------------|---|----------------|
| Single-Break Strip Plate  | 48 wells                   | 96 wells                   | Ready to use (precoated)                    | -              |
| Sealing film  | 2 sheets                   | 2 sheets                   | Ready to use                                | -              |
| Standards 1-6 (0, 0.125, 0.25, 0.5, 0.75 and 1.5 $\mu$ g/mL goat's IgG in aqueous solution) (correspond to 0, 0.125, 0.25, 0.5, 0.75 and 1.5 mg/mL) | 6 glass vials (each 1.5ml) | 6 glass vials (each 1.5ml) | Ready to use                                | Black          |
| Goat Colostrum Detection Solution   | 1 plastic vial (6ml)       | 1 plastic vial (12ml)      | Ready to use                                | Green          |
| Wash Buffer   | 1 plastic vial (50ml)      | 2 plastic vials (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          |

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## 5. Materials required but not provided

- Vortex mixer and Microtiter plate reader fitted with 450 nm filter.
- 100 and 1000µl adjustable single channel micropipettes with disposable tips (a repetitive pipette of 100µl is preferable for the steps of Detection Solution, TMB and Stop Solution).
- 50 - 300µl multi-channel micropipette with disposable tips and reservoirs.
- Distilled water.

## 6. Storage Instructions

Store kit reagents between 2 and 8°C (35 - 46°F). Do not freeze any components provided. Reseal the unused strips of the microtiter plate in the bag together **with the desiccant bag** provided and store at 2 - 8°C. After use the 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 chromogen substrate 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 Stop Solution (15% H<sub>3</sub>PO<sub>4</sub>) 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 6 (St6).

## 9. Sample and reagents preparation

### 9.1 Reagents preparation

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 deionised water and pour the content again into the cylinder and fill to a final volume of 1000ml with distilled or deionised 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

The samples should be stored in a cool place. Stir well the milk samples before the dilution, dilute 1:1000 with Wash Buffer 1X working solution and agitate well the milk dilutions (vortex):

**10 µl** milk sample + **10 ml** Wash Buffer 1X

**CAUTION:** After receiving milk with the micropipette, give extra caution to the external side of the micropipette tip to reassure that it is clean. In case of the immersion of a large part of the tip in the milk sample, due to milk composition, there is certain amount of remaining milk externally of the tip. **This amount of milk leads to an error during sampling.** In order to avoid this, wipe the external side of micropipette tip with simple paper carefully after sampling and before milk dilution in Wash Buffer 1X.

## 10. Method Procedure

**10.1** Determine the desirable number of samples to be tested and prepare a number of tubes (10-15ml) respectively. Mark the tubes appropriately.

**10.2 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:** If the number of wells is more than 32 (four strips), a repetitive pipette or multichannel pipette is necessary.

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

|   | 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 | St6 | St6 |   |   |   |   |   |   |   |    |    |    |
| G |     |     |   |   |   |   |   |   |   |    |    |    |
| H |     |     |   |   |   |   |   |   |   |    |    |    |

**Example plate layout** (example for a 6 point standard curve)

**10.3** Bring all reagents to room temperature (19 - 24°C) before use. Remove the **standards** (Standard 1-6) and the **appropriate number of wells** into the holder of microwells for the standards and the samples to be worked in duplicate. Place the wells into the holder of microwells and immediately reseal the unused strips of the microtiter plate in the bag together with the desiccant bag provided.

**10.4** Add **100 µl** per well of each standard (**Standard 1 - 6**) or prepared sample (see 9.2) in duplicate. Cover the microwells with the sealing film, shake the microplate manually for 30 seconds and incubate at room temperature for **30min**.

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**10.5** 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 10.2) 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.

**10.6** Aspirate the liquid as described above and add **100µl of Goat Colostrum Detection Solution** to each well. If the number of wells is more than 32 (four strips), a repetitive pipette or multichannel pipette is necessary (pour 1 ml of Detection Solution in a reservoir per 8 wells). Cover the microwells with the sealing film, shake the plate manually for a 30 seconds and incubate at room temperature for **10min**.

**10.7** Remove the sealing film and wash the plate as the wash **step 10.5**.

**10.8** Aspirate the liquid as described above and add **100 µl** 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 **10min**.

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

**10.10 Measure the absorbance at 450 nm.** Read the absorbance value of each well (immediately after the step 10.9 on a spectrophotometer using 450 nm as the primary wavelength and optionally 620 nm as the reference wave length (610 nm to 650 nm 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 Goat Colostrum ELISA kit. The evaluation is carried out by a simple transfer of data values after the measurement.

### • Manually

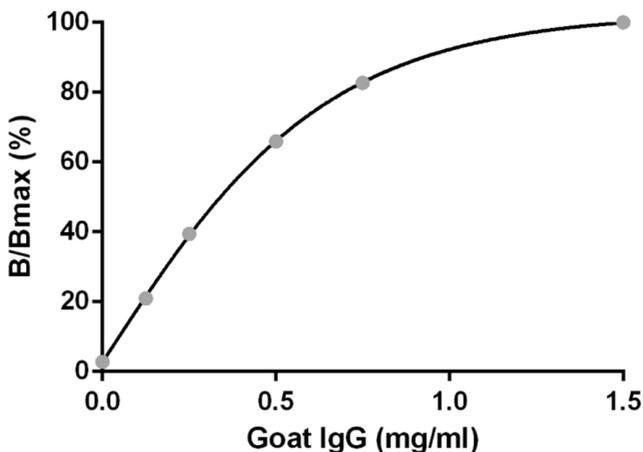
Calculate the average absorbance values for each set of duplicate standards and samples. Ideally duplicates should be within 10% of the mean. Use the following calculation:

$$\frac{\text{Standard or sample absorbance}}{\text{Standard 6 absorbance}} \times 100 = \% \text{ Binding}$$

The concentration of Goat IgG (mg/mL) in each sample is determined by extrapolating OD values against concentrations of Goat IgG in standard solutions using a fifth order polynomial standard curve.

**NOTE:** In case there are samples with IgG's concentration >1.5 mg/mL, it is recommended to dilute them 1:1 with Wash Buffer 1X. After analysis, the results should be multiplied by a factor of 2.

## 12. Example of Standard Curve (0 - 1.5 mg/mL )



## 13. Immunoassay Specification

### 13.1 General Specification

- B/Bmax 0.5 mg/mL (%) = 50 - 80
- Each standards duplicates mean CV  $\leq$  6%
- Coefficient of Variation (CV) of result at 0.6 mg/mL = 6.13% (n=16)

### 13.2 LOD - LOQ - Recovery

- The LOD of the method is 0.1 mg/mL.
- The LOQ of the method is 0.125 mg/mL.
- The recovery of the method is 100%.

### 13.3 Specificity

| Immunoglobulins | Cross Reactivity of the antibody (%) |
|-----------------|--------------------------------------|
| Goat IgG        | 100                                  |
| Sheep IgG       | <0.01                                |
| Bovine IgG      | <0.01                                |

## References

- [1]. Leveux, D., Morgan, F., Geneix, N., Masle, I., & Bouvier, F. (2002). "Caprine immunoglobulin G,  $\beta$ -lactoglobulin,  $\alpha$ -lactalbumin and serum albumin in colostrum and milk during the early post partum period," *Journal of Dairy Research*, **69** (3), 391-399
- [2]. Conesa, C., Lavilla, M., Sánchez, L., Pérez, M.D., Mata, L., Razquín, P & Calvo, M. (2005). "Determination of IgG levels in bovine bulk milk samples from different regions of Spain," *Eur Food Res Technol*, **220**, 222-225
- [3]. Korhonen, H., Marnila, P., & Gill, H. (2000). "Milk immunoglobulins and complement factors" *British Journal of Nutrition*, **84** (S1), 75-80
- [4]. Ruiz-Valdepeñas Montiel, V., Povedano, E., Benedé, S., Mata, L., Galán-Malo, P, Gamella, M., Reviejo, A.J., Campuzano, S., & Pingarrón, J.M. (2019). "Disposable Amperometric Immunosensor for the Detection of Adulteration in Milk through Single or Multiplexed Determination of Bovine, Ovine, or Caprine Immunoglobulins G," *Analytical Chemistry*, **91** (17), 11266-11274

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#### 14. Method Summary

Total procedure time (after samples and reagents preparation): 50 min.

**Add 100  $\mu$ l of each standard and sample in microplate and incubate 30 min at room temperature**



**Wash four times**



**Add 100  $\mu$ l of ready-to-use Detection Solution and incubate 10 min at room temperature**



**Wash four times**



**Add 100  $\mu$ l of ready-to-use TMB and let the color develop for 10 min in the dark at room temperature**



**Add 100  $\mu$ l Stop Solution and read absorbance at 450 nm within 60 min**



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