

*Please use only the valid version of the package insert provided with the kit.*

## **1 INTENDED USE**

The Pig High-Sensitive CRP ELISA is a highly sensitive two-site enzyme-linked immunoassay (ELISA) for the quantitative determination of C-reactive protein (CRP) in pig biological samples.

For research use only.

## **2 INTRODUCTION**

Acute phase proteins are plasma proteins which increase in concentration following infection, inflammation or trauma. The first acute phase protein to be recognized was discovered in humans by Tillet and Frances in 1930. This CRP is so named because it is able to effect precipitation of somatic C-polysaccharide of *Streptococcus pneumoniae*. CRP is an alpha globulin protein with a mass of 110,000 to 140,000 daltons, and composed of five identical subunits, which are non-covalently assembled as a cyclic pentamer. It is synthesized in the liver and, in humans, is normally present as a trace constituent of serum at a level less than 0.3 mg/dL. The CRP levels in serum rise quickly following acute tissue damage within 24 to 48 hours. It also falls very rapidly once the stimulus is removed. It has been proposed that CRP aids in complement activation, influences phagocytic cell function, and augments cell-mediated cytotoxicity. Investigations over the past few years have shown that quantification of CRP in plasma or serum can provide valuable information in the detection, prognosis, and monitoring of disease not only in humans, but in companion animals and farm herds as well.

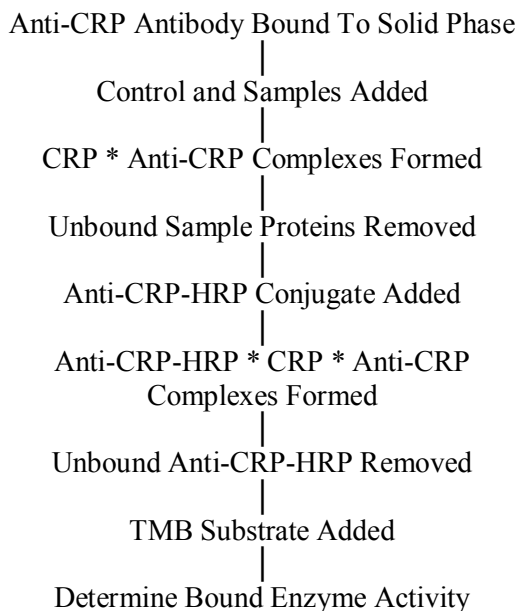
## **3 PRINCIPLE**

The principle of the double antibody sandwich ELISA is represented in Figure 1. In this assay the CRP present in the sample reacts with the anti-CRP antibody, which has been adsorbed to the surface of polystyrene microtiter wells. After the removal of unbound proteins by washing, anti-CRP antibody conjugated with horseradish peroxidase (HRP) is added. This HRP-conjugated antibody forms a complex with the previously bound CRP. Following another washing step, the enzyme bound to the immunosorbent is assayed by the addition of a chromogenic substrate, 3,3',5,5'-tetramethylbenzidine (TMB). The quantity of bound enzyme is proportional to the concentration of CRP in the sample tested; thus, the absorbance, at 450 nm, is a measure of the concentration of CRP in the test sample. The quantity of CRP in the test sample can be interpolated from the calibration curve constructed from the calibrators and corrected for sample dilution.

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**Figure 1.**



#### **4 COMPONENTS**

1. **Diluent Concentrate**  
One bottle containing 50 mL of a 5X concentrated diluent running buffer.
2. **Wash Solution Concentrate**  
One bottle containing 50 mL of a 20X concentrated wash solution.
3. **Enzyme-Antibody Conjugate Concentrate**  
One vial containing 150 µL of a 100X concentrated affinity-purified anti-pig CRP antibody conjugated with HRP in stabilizing buffer.
4. **TMB Substrate Solution**  
One vial containing 12 mL of TMB and hydrogen peroxide in citric acid buffer at pH 3.3.
5. **Stop Solution**  
One vial containing 12 mL of 0.3 M sulfuric acid. WARNING: Avoid contact with skin.
6. **Microtiter Plate**  
Twelve removable eight-well strips in well holder frame. Wells are coated with affinity-purified anti-pig CRP.
7. **Pig CRP Calibrator**  
One vial containing a lyophilized Pig CRP Calibrator.
8. **Positive Control**  
One vial containing 50 µL of serum with 0.1% sodium azide.  
See the Control Certificate for the concentration.

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Precision pipettes (2 µL to 200 µL)

Test tubes

Microplate washer/aspirator

Distilled or de-ionized H<sub>2</sub>O

Microplate reader

Assorted glassware for the preparation of reagents and buffer solutions

Timer

Vortex mixer

**6 PRECAUTIONS**

Read the instructions carefully before beginning the assay.

This kit is for research use only.

Great care has been taken to ensure the quality and reliability of this product. However, it is possible that in certain cases, unusual results may be obtained due to high levels of interfering factors.

Preservatives

Positive Control contains 0.1% sodium azide.

No additives or preservatives are necessary to maintain the integrity of the specimen. Avoid azide contamination.

Azide and thimerosal at concentrations higher than 0.1% inhibit the enzyme reaction.

Other precautions:

Do not interchange kit components from different lots.

Do not use kit components beyond the expiration date.

Protect reagents from direct sunlight.

Do not pipette by mouth.

Do not eat, drink, smoke or apply cosmetics where reagents are used.

Avoid all contact with the reagents by using gloves.

Stop solution contains diluted sulfuric acid. Irritation to eyes and skin is possible. Flush with water after contact.

**As of 28 Aug. 2010 rm (Vers. 1.1)****For Veterinary Use Only****7 REAGENT PREPARATION****1. Diluent Concentrate**

The Diluent solution supplied is a 5X concentrate and must be diluted 1:5 with distilled or de-ionized water.

**2. Wash Solution Concentrate**

The Wash Solution supplied is a 20X concentrate and must be diluted 1:20 with distilled or de-ionized water. Crystal formation in the concentrate is not uncommon when storage temperatures are low. Warming of the concentrate to 30-35°C before dilution can dissolve crystals.

**3. Enzyme-Antibody Conjugate Concentrate**

The Enzyme-Antibody Conjugate supplied is a 100X concentrate and must be diluted 1:100.

The required amount of working conjugate solution for each microtiter plate is prepared by adding 100 µL Enzyme-Antibody Conjugate to 9.9 mL of 1X Diluent. Mix uniformly, but gently. Avoid foaming.

**4. TMB Substrate Solution**

Ready to use as supplied.

**5. Stop Solution**

Ready to use as supplied.

**6. Microtiter Plate**

Ready to use as supplied. Unseal microtiter pouch and remove plate from pouch. Remove all strips and wells that will not be used in the assay and place back in pouch and re-seal along with desiccant.

**7. Pig CRP Calibrator**

Add 1.0 mL of distilled or de-ionized water to the lyophilized Pig CRP Calibrator and mix gently until dissolved.

The calibrator is now at a concentration of 1.64 µg/mL (the reconstituted calibrator should be aliquoted and frozen if future use is intended).

Pig CRP Calibrators need to be prepared immediately prior to use (see chart below). Mix well between each step. Avoid foaming.

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Calibrator	Concentration (ng/mL)	Calibrator Volume added to 1X Diluent	Volume of 1X Diluent
6	200	97 µL Pig CRP Calibrator	699 µL
5	100	0,25 mL Calibrator 6	0,25 mL
4	50	0,25 mL Calibrator 5	0,25 mL
3	25	0,25 mL Calibrator 4	0,25 mL
2	12,5	0,25 mL Calibrator 3	0,25 mL
1	6,25	0,25 mL Calibrator 2	0,25 mL
0	0		0,50 mL

8. Positive Control

The concentration and recommended dilution are provided on the control certificate. Before use, briefly centrifuge the Positive Control to allow all of the liquid to collect in the bottom of the vial.

**8 STORAGE AND STABILITY**

1. Complete Kit

The expiration date for the kit is stated on the outer label. The recommended storage temperature is 4°C. **Note: See long term storage recommendations below for the Pig CRP Calibrator and Positive Control.**

2. Diluent

The 5X Diluent Concentrate is stable until the expiration date.

The 1X working solution is stable for at least one week from the date of preparation.

Both solutions should be stored at 4°C.

3. Wash Solution

The 20X Wash Solution Concentrate is stable until the expiration date.

The 1X working solution is stable for at least one week from the date of preparation.

Both solutions can be stored at room temperature (RT, 16-25°C) or at 4°C.

4. Enzyme-Antibody Conjugate

Undiluted anti-CRP-HRP conjugate should be stored at 4°C and diluted immediately prior to use.

The working conjugate solution is stable for up to 8 hours.

5. TMB Substrate Solution

The TMB Substrate Solution should be stored at 4°C and is stable until the expiration date.

6. Stop Solution

The Stop Solution should be stored at 4°C and is stable until the expiration date.

7. Microtiter Plate

Anti-Pig CRP coated wells are stable until the expiration date, and should be stored at 4°C in the sealed foil pouch with desiccant pack.

8. Pig CRP Calibrator

The lyophilized Pig CRP Calibrator should be stored at 4°C or frozen until reconstituted.

The reconstituted calibrator should be aliquoted and stored frozen. Avoid multiple freeze/thaw cycles.

The working calibrator solutions should be prepared immediately prior to use and are stable for up to 8 hours.

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9. Positive Control

For storage longer than 7 days keep frozen until the expiration date.

Storage less than 7 days can be at 4°C. Avoid multiple freeze/thaw cycles.

## 9 INDICATIONS OF INSTABILITY

If the test is performing correctly, the results observed with the calibrator solutions should be within 20% of the expected values.

## 10 SPECIMEN COLLECTION AND HANDLING

Blood should be collected by venipuncture and the serum separated from the cells, after clot formation, by centrifugation.

For plasma samples, blood should be collected into a container with an anticoagulant and then centrifuged. Care should be taken to minimize hemolysis, excessive hemolysis can impact your results.

Assay immediately or aliquot and store samples at -20°C. Avoid repeated freezing/thawing.

For any sample that might contain pathogens, care must be taken to prevent contact with open wounds. No additives or preservatives are necessary to maintain the integrity of the specimen. Avoid azide contamination.

## 11 ASSAY PROTOCOL

### 11.1 Dilution of Samples

Due to the high sensitive nature of the assay each sample should be diluted before use for a normal assay. For a single step determination a dilution of 1:2,000 is appropriate for most serum/plasma samples. For absolute quantification of samples that yield results outside the range of the calibration curve, a lesser or greater dilution might be required. If unsure of sample level, a serial dilution with one or two representative samples before running the entire plate is highly recommended.

To prepare a 1:2,000 dilution of sample, transfer 5 µL of sample to 495 µL of 1X Diluent.

This gives you a 1:100 dilution. Mix thoroughly.

Next, dilute the 1:100 samples by transferring 20 µL to 380 µL of 1X Diluent.

You now have a 1:2,000 dilution of your sample. Mix thoroughly at each stage.

**Dilute samples immediately prior to use, use within 2 hours after dilution.**

### 11.2 Procedure

Bring all reagents to RT before use.

1. Pipette 100 µL of
  - Calibrator 0 (0.0 ng/mL) in duplicate
  - Calibrator 1 (6.25 ng/mL) in duplicate
  - Calibrator 2 (12.5 ng/mL) in duplicate
  - Calibrator 3 (25 ng/mL) in duplicate
  - Calibrator 4 (50 ng/mL) in duplicate
  - Calibrator 5 (100 ng/mL) in duplicate
  - Calibrator 6 (200 ng/mL) in duplicate

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2. Pipette 100  $\mu$ L of diluted Positive Control in duplicate.
3. Pipette 100  $\mu$ L of diluted sample (in duplicate) into pre-designated wells.
4. Incubate the Microtiter Plate at 22°C (RT) for thirty ( $30 \pm 2$ ) minutes. Keep plate covered and level during incubation.
5. Following incubation, aspirate the contents of the wells.
6. Completely fill each well with appropriately diluted Wash Solution and aspirate. Repeat three times, for a total of four washes. If washing manually: completely fill wells with wash buffer, invert the plate then pour/shake out the contents in a waste container. Following this by sharply striking the wells on absorbent paper to remove residual buffer. Repeat 3 times for a total of four washes.
7. Pipette 100  $\mu$ L of appropriately diluted Enzyme-Antibody Conjugate to each well. Incubate at 22°C (RT) for thirty ( $30 \pm 2$ ) minutes. Keep plate covered in the dark and level during incubation.
8. Wash and blot the wells as described in Steps 5 and 6.
9. Pipette 100  $\mu$ L of TMB Substrate Solution into each well.
10. Incubate in the dark at RT for precisely ten (10) minutes.
11. After ten minutes, add 100  $\mu$ L of Stop Solution to each well.
12. Determine the absorbance at 450 nm of the contents of each well. Zero the plate reader to air.

The absorbance of the final reaction mixture can be measured up to 2 hours after the addition of the Stop Solution. However, good laboratory practice dictates that the measurement be made as soon as possible.

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1. Subtract the average background value from the test values for each sample.
2. Using the results observed for the calibrators construct a calibration curve. The appropriate curve fit is that of a four-parameter logistics curve, although a second order polynomial (quadratic) or other curve fits may also be used.
3. Interpolate test sample values from calibration curve. Correct for sample dilution factor to arrive at CRP concentration in original sample.

**13 PERFORMANCE CHARACTERISTICS**

In accord with good laboratory practice, the assays for specific CRP require meticulous quality control. Each laboratory should use routine quality control procedures to establish inter- and intra-assay precision and performance characteristics.

**14 LIMITATION OF THE PROCEDURE**

1. Reliable and reproducible results will be obtained when the assay procedure is carried out with a complete understanding of the information contained in the package insert instructions and with adherence to good laboratory practice.
2. Factors that might affect the performance of the assay include proper instrument function, cleanliness of glassware, quality of distilled or de-ionized water, and accuracy of reagent and sample pipetting, washing technique, incubation time or temperature.