



**AssayMax™**  
**Bovine Serum Albumin (BSA)**  
**ELISA Kit**

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Thank you for choosing Assaypro.

## Assay Summary

**Step 1.** Add 50  $\mu$ l of Standard or Sample per well.  
Incubate 2 hours.

**Step 2.** Wash, then add 50  $\mu$ l of Biotinylated Antibody per well.  
Incubate 1 hour.

**Step 3.** Wash, then add 50  $\mu$ l of SP Conjugate per well.  
Incubate 30 minutes.

**Step 4.** Wash, then add 50  $\mu$ l of Chromogen Substrate per well.  
Incubate 30 minutes.

**Step 5.** Add 50  $\mu$ l of Stop Solution per well.  
Read at 450 nm immediately.

## Symbol Key



Consult instructions for use.





# AssayMax™ Bovine Serum Albumin (BSA) ELISA Kit

Catalog No. EBA3201-1

*Sample insert for reference use only*

## Introduction

Albumin, the main protein in plasma, is a globular unglycosylated serum protein with a molecular weight of 65 kDa that is synthesized by the liver. The prealbumin contains 609 amino acids and is processed to 585 amino acids in the mature protein (1). It comprises three homologous domains that assemble to form a heart-shaped molecule. Each domain is a product of two subdomains that possess common structural motifs (2). Albumin regulates blood oncotic pressure or colloidal osmotic pressure and transports hydrophobic molecules, such as lipids, hormones, and toxins. It is also an important circulating antioxidant and possesses enzymatic properties (3). Serum albumin level has been linked in clinical practice to several diseases. Low albumin levels can suggest liver disease, kidney disease, inflammation, shock, and malnutrition (4-6). On the other hand, high albumin levels usually reflect dehydration (7).

## Principle of the Assay

The AssayMax™ Bovine Serum Albumin (BSA) ELISA (Enzyme-Linked Immunosorbent Assay) Kit is designed for detection of albumin in bovine **plasma, serum, cell culture, and cell lysate samples**. This assay employs a quantitative **sandwich enzyme immunoassay** technique that measures BSA in approximately 4 hours. A polyclonal antibody specific for BSA has been pre-coated onto a 96-well microplate with removable strips. Albumin in standards and samples is sandwiched by the immobilized antibody and a biotinylated polyclonal antibody specific for BSA, which is recognized by a streptavidin-peroxidase (SP) conjugate. All unbound material is washed away and a peroxidase enzyme substrate is added. The color development is stopped and the intensity of the color is measured.

## Caution and Warning

- This product is for **Research Use Only** and is not intended for use in diagnostic procedures.
- Prepare all reagents (diluent buffer, wash buffer, standard, biotinylated antibody, and SP conjugate), as instructed, prior to running the assay.

- Prepare all samples prior to running the assay. The dilution factors for the samples are suggested in this insert. However, the user should determine the optimal dilution factor.
- Spin down the SP conjugate vial and the biotinylated antibody vial before opening and using contents.
- Wash the microplate manually only. This will help avoid any contamination from other lab reagents that contain BSA.
- The Stop Solution is an acidic solution.
- The kit should not be used beyond the expiration date.

## Reagents

- **Bovine Serum Albumin Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a polyclonal antibody against BSA.
- **Sealing Tapes:** Each kit contains 3 precut, pressure sensitive sealing tapes that can be cut to fit the format of the individual assay.
- **Bovine Serum Albumin Standard:** BSA in a buffered protein base (3840 ng, lyophilized).
- **Biotinylated Bovine Serum Albumin Antibody (40x):** A 40-fold concentrated biotinylated polyclonal antibody against BSA (150  $\mu$ l).
- **FBA Diluent Concentrate (10x):** A 10-fold concentrated buffered protein base (30 ml).
- **Wash Buffer Concentrate (20x):** A 20-fold concentrated buffered surfactant (30 ml, 2 bottles).
- **SP Conjugate (100x):** A 100-fold concentrate (80  $\mu$ l).
- **Chromogen Substrate (1x):** A stabilized peroxidase chromogen substrate tetramethylbenzidine (7 ml).
- **Stop Solution (1x):** A 0.5 N hydrochloric acid solution to stop the chromogen substrate reaction (11 ml).

## Storage Condition

- Upon arrival, immediately store components of the kit at recommended temperatures up to the expiration date.
- Store SP Conjugate and Biotinylated Antibody at -20°C.
- Store Microplate, Diluent Concentrate (10x), Wash Buffer, Stop Solution, and Chromogen Substrate at 2-8°C.
- Unused microplate wells may be returned to the foil pouch with the desiccant packs and resealed. May be stored for up to 30 days in a vacuum desiccator.
- Store Standard at 2-8°C before reconstituting with Diluent and at -20°C after reconstituting with Diluent.

## Other Supplies Required

- Microplate reader capable of measuring absorbance at 450 nm
- Pipettes (1-20  $\mu\text{l}$ , 20-200  $\mu\text{l}$ , 200-1000  $\mu\text{l}$ , and multiple channel)
- Deionized or distilled reagent grade water

## Sample Collection, Preparation, and Storage

- **Plasma:** Collect plasma using one-tenth volume of 0.1 M sodium citrate as an anticoagulant. Centrifuge samples at 3000 x g for 10 minutes and collect plasma. A 600000-fold sample dilution is suggested into FBA Diluent; however, user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Serum:** Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 3000 x g for 10 minutes and remove serum. A 600000-fold sample dilution is suggested into FBA Diluent; however, user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Cell Culture Supernatant:** Centrifuge cell culture media at 1500 rpm for 10 minutes at 4°C to remove debris and collect supernatant. If necessary, dilute samples into FBA Diluent; user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -80°C. Avoid repeated freeze-thaw cycles.
- **Cell Lysate:** Rinse cell with cold PBS and then scrape the cell into a tube with 5 ml of cold PBS and 0.5 M EDTA. Centrifuge suspension at 1500 rpm for 10 minutes at 4°C and aspirate supernatant. Resuspend pellet in ice-cold Lysis Buffer (PBS, 1% Triton X-100, protease inhibitor cocktail). For every  $1 \times 10^6$  cells, add approximately 100  $\mu\text{l}$  of ice-cold Lysis Buffer. Incubate on ice for 60 minutes. Centrifuge at 13000 rpm for 30 minutes at 4°C and collect supernatant. If necessary, dilute samples into FBA Diluent; user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -80°C. Avoid repeated freeze-thaw cycles.

*Applicable samples may also include biofluids, cell culture, and tissue homogenates. If necessary, user should determine optimal dilution factor depending on application needs.*

***Refer to Dilution Guidelines for further instruction.***

<b>Guidelines for Dilutions of 100-fold or Greater</b> <i>(for reference only; please follow the insert for specific dilution suggested)</i>	
<b>100x</b>	<b>10000x</b>
A) 4 µl sample : 396 µl buffer (100x) = 100-fold dilution  <i>Assuming the needed volume is less than or equal to 400 µl.</i>	A) 4 µl sample : 396 µl buffer (100x) B) 4 µl of A : 396 µl buffer (100x) = 10000-fold dilution  <i>Assuming the needed volume is less than or equal to 400 µl.</i>
<b>1000x</b>	<b>100000x</b>
A) 4 µl sample : 396 µl buffer (100x) B) 24 µl of A : 216 µl buffer (10x) = 1000-fold dilution  <i>Assuming the needed volume is less than or equal to 240 µl.</i>	A) 4 µl sample : 396 µl buffer (100x) B) 4 µl of A : 396 µl buffer (100x) C) 24 µl of B : 216 µl buffer (10x) = 100000-fold dilution  <i>Assuming the needed volume is less than or equal to 240 µl.</i>

## Reagent Preparation

- Freshly dilute all reagents and bring all reagents to room temperature before use.
- FBA Diluent Concentrate (10x):** Dilute the FBA Diluent Concentrate 10-fold with reagent grade water to produce a 1x solution. When diluting the concentrate, make sure to rinse the bottle thoroughly to extract any precipitates left in the bottle. Mix the 1x solution gently until the crystals have completely dissolved. Store for up to 30 days at 2-8°C.
- Bovine Serum Albumin Standard:** Reconstitute the Bovine Serum Albumin Standard (3840 ng) with 1.2 ml of FBA Diluent to generate a 3200 ng/ml standard stock solution. Allow the vial to sit for 10 minutes with gentle agitation prior to making dilutions. Prepare duplicate or triplicate standard points by serially diluting from the standard stock solution (3200 ng/ml) 4-fold with FBA Diluent to produce 800, 200, 50, 12.5, and 3.125 ng/ml solutions. FBA Diluent serves as the zero standard (0 ng/ml). Any remaining stock solution should be stored at -20°C and used within 30 days. Avoid repeated freeze-thaw cycles.

Standard Point	Dilution	[BSA] (ng/ml)
P1	1 part Standard (3200 ng/ml)	3200
P2	1 part P1 + 3 parts FBA Diluent	800
P3	1 part P2 + 3 parts FBA Diluent	200
P4	1 part P3 + 3 parts FBA Diluent	50
P5	1 part P4 + 3 parts FBA Diluent	12.5
P6	1 part P5 + 3 parts FBA Diluent	3.125
P7	FBA Diluent	0.0



- **Biotinylated Bovine Serum Albumin Antibody (40x):** Spin down the antibody briefly and dilute the desired amount of the antibody 40-fold with FBA Diluent to produce a 1x solution. The undiluted antibody should be stored at -20°C.
- **Wash Buffer Concentrate (20x):** Dilute the Wash Buffer Concentrate 20-fold with reagent grade water to produce a 1x solution. When diluting the concentrate, make sure to rinse the bottle thoroughly to extract any precipitates left in the bottle. Mix the 1x solution gently until the crystals have completely dissolved.
- **SP Conjugate (100x):** Spin down the SP Conjugate briefly and dilute the desired amount of the conjugate 100-fold with FBA Diluent to produce a 1x solution. The undiluted conjugate should be stored at -20°C.

## Assay Procedure

- Prepare all reagents, standard solutions, and samples as instructed. Bring all reagents to room temperature before use. The assay is performed at room temperature (20-25°C).
- Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccants inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- Add 50 µl of Bovine Serum Albumin Standard or sample to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 2 hours. Start the timer after the last addition.
- Wash the microplate manually. Invert the plate and decant the contents; hit 4-5 times on absorbent material to completely remove the liquid. Wash five times with 200 µl of Wash Buffer per well. Invert the plate each time and decant the contents; hit 4-5 times on absorbent material to completely remove the liquid.
- Add 50 µl of Biotinylated Bovine Serum Albumin Antibody to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 1 hour.
- Wash the microplate as described above.
- Add 50 µl of SP Conjugate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash the microplate as described above.
- Add 50 µl of Chromogen Substrate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Incubate in ambient light for 30 minutes or until the optimal blue color density develops.

- Add 50  $\mu$ l of Stop Solution to each well. The color will change from blue to yellow. Gently tap plate to ensure thorough mixing. Break any bubbles that may have formed.
- Read the absorbance on a microplate reader at a wavelength of 450 nm **immediately**. If wavelength correction is available, subtract readings at 570 nm from those at 450 nm to correct optical imperfections. Otherwise, read the plate at 450 nm only. Please note that some unstable black particles may be generated at high concentration points after stopping the reaction for about 10 minutes, which will reduce the readings.

## Data Analysis

- Calculate the mean value of the duplicate or triplicate readings for each standard and sample.
- To generate a standard curve, plot the graph using the standard concentrations on the x-axis and the corresponding mean 450 nm absorbance (OD) on the y-axis. The best fit line can be determined by regression analysis using log-log or four-parameter logistic curve fit.
- Determine the unknown sample concentration from the Standard Curve and multiply the value by the dilution factor.

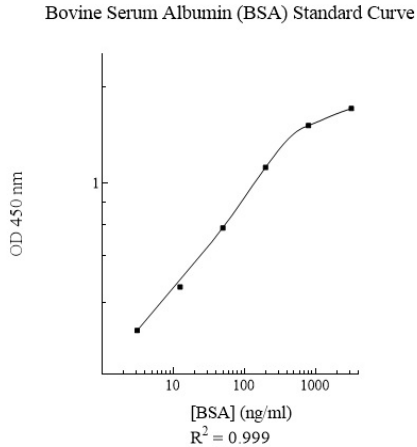
## Typical Data

- The typical data is provided for reference only. Individual laboratory means may vary from the values listed. Variations between laboratories may be caused by technique differences.

Standard Point	ng/ml	OD	Average OD
P1	3200	2.176 2.278	2.227
P2	800	1.828 1.886	1.857
P3	200	1.222 1.152	1.187
P4	50	0.612 0.630	0.621
P5	12.5	0.323 0.337	0.330
P6	3.125	0.204 0.210	0.207
P7	0.0	0.166 0.162	0.164
<b>Sample: Pooled Normal Fetal Bovine Serum (60000x)</b>		0.739 0.749	0.744

## Standard Curve

- The curve is provided for illustration only. A standard curve should be generated each time the assay is performed.



## Performance Characteristics

- The minimum detectable dose of BSA as calculated by 2SD from the mean of a zero standard was established to be 2.5 ng/ml.
- Intra-assay precision was determined by testing three fetal bovine serum samples twenty times in one assay.
- Inter-assay precision was determined by testing three fetal bovine serum samples in twenty assays.

Sample	Intra-Assay Precision			Inter-Assay Precision		
	1	2	3	1	2	3
n	20	20	20	20	20	20
CV (%)	5.4%	4.6%	6.3%	10.8%	9.2%	10.3%
Average CV (%)	5.4%			10.1%		

## Recovery

Standard Added Value	12.5 – 800 ng/ml
Recovery %	92 – 110%
<b>Average Recovery %</b>	<b>98%</b>

## Linearity

- Fetal bovine serum samples were serially diluted to test for linearity.

Average Percentage of Expected Value (%)	
Sample Dilution	Fetal Bovine Serum
300000x	96%
600000x	92%
1200000x	110%

## Cross-Reactivity

Species	Cross-Reactivity (%)
Canine	None
Human	None
Monkey	None
Mouse	None
Rat	None
Swine	None
Rabbit	None

## Troubleshooting

Issue	Causes	Course of Action
Low Precision	Use of improper components	<ul style="list-style-type: none"> <li>Check the expiration date listed before use.</li> <li>Do not interchange components from different lots.</li> </ul>
	Improper wash step	<ul style="list-style-type: none"> <li>Check that the correct wash buffer is being used.</li> <li>Check that all wells are empty after aspiration.</li> <li>Check for proper pipetting technique.</li> </ul>
	Splashing of reagents while loading wells	<ul style="list-style-type: none"> <li>Pipette properly in a controlled and careful manner.</li> </ul>
	Inconsistent volumes loaded into wells	<ul style="list-style-type: none"> <li>Pipette properly in a controlled and careful manner.</li> <li>Check pipette calibration.</li> <li>Check pipette for proper performance.</li> </ul>
	Insufficient mixing of reagent dilutions	<ul style="list-style-type: none"> <li>Thoroughly agitate the lyophilized components after reconstitution.</li> <li>Thoroughly mix dilutions.</li> </ul>
	Improperly sealed microplate	<ul style="list-style-type: none"> <li>Check the microplate pouch for proper sealing.</li> <li>Check that the microplate pouch has no punctures.</li> <li>Check that three desiccants are inside the microplate pouch prior to sealing.</li> </ul>

<b>Unexpectedly Low or High Signal Intensity</b>	Microplate was left unattended between steps	<ul style="list-style-type: none"> <li>Each step of the procedure should be performed uninterrupted.</li> </ul>
	Omission of step	<ul style="list-style-type: none"> <li>Consult the provided procedure for complete list of steps.</li> </ul>
	Steps performed in incorrect order	<ul style="list-style-type: none"> <li>Consult the provided procedure for the correct order.</li> </ul>
	Insufficient amount of reagents added to wells	<ul style="list-style-type: none"> <li>Check pipette calibration.</li> <li>Check pipette for proper performance.</li> </ul>
	Wash step was skipped	<ul style="list-style-type: none"> <li>Consult the provided procedure for all wash steps.</li> </ul>
	Improper wash buffer	<ul style="list-style-type: none"> <li>Check that the correct wash buffer is being used.</li> </ul>
	Improper reagent preparation	<ul style="list-style-type: none"> <li>Consult reagent preparation section for the correct dilutions of all reagents.</li> </ul>
	Insufficient or prolonged incubation periods	<ul style="list-style-type: none"> <li>Consult the provided procedure for correct incubation time.</li> </ul>
<b>Deficient Standard Curve Fit</b>	Non-optimal sample dilution	<ul style="list-style-type: none"> <li>Sandwich ELISA: If samples generate OD values higher than the highest standard point (P1), dilute samples further and repeat the assay.</li> <li>Competitive ELISA: If samples generate OD values lower than the highest standard point (P1), dilute samples further and repeat the assay.</li> <li>User should determine the optimal dilution factor for samples.</li> </ul>
	Contamination of reagents	<ul style="list-style-type: none"> <li>A new tip must be used for each addition of different samples or reagents during the assay procedure.</li> </ul>
	Contents of wells evaporate	<ul style="list-style-type: none"> <li>Verify that the sealing film is firmly in place before placing the assay in the incubator or at room temperature.</li> </ul>
	Improper pipetting	<ul style="list-style-type: none"> <li>Pipette properly in a controlled and careful manner.</li> <li>Check pipette calibration.</li> <li>Check pipette for proper performance.</li> </ul>
	Insufficient mixing of reagent dilutions	<ul style="list-style-type: none"> <li>Thoroughly agitate the lyophilized components after reconstitution.</li> <li>Thoroughly mix dilutions.</li> </ul>

## References

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