



**BI**  
Biological Industries  
Partners of Excellence



## CERTIFICATE OF ANALYSIS

|                     |                                                 |                                     |                       |
|---------------------|-------------------------------------------------|-------------------------------------|-----------------------|
| <b>Product:</b>     | <b>EUROPEAN GRADE FOETAL BOVINE SERUM (H.I)</b> | <b>Origin:</b>                      | <b>BRAZIL</b>         |
| <b>Catalog no:</b>  | <b>04-127-1</b>                                 | <b>Raw material certificate no:</b> | <b>00232/3155/12</b>  |
| <b>Lot number:</b>  | <b>716779</b>                                   | <b>Dated:</b>                       | <b>AUGUST 3, 2012</b> |
| <b>Expiry date:</b> | <b>SEPTEMBER 30, 2017</b>                       | <b>Storage temperature:</b>         | <b>-20°C</b>          |

Triple 0.1 micron filtered

For In Vitro Diagnostic use (not for human or animal therapeutic use)

We certify that all lots of Biological Industries' Foetal Bovine Serum are produced from raw materials originating in countries completely free of both BSE and FMD diseases.

Note: Since our sera are not pre-aged before filtration, turbidity or flocculent debris may develop upon thawing or storage of the serum. This condition does not adversely affect performance characteristics of the serum.

| Reference | Test                                  | Specification     | Result   | Units   |
|-----------|---------------------------------------|-------------------|----------|---------|
| 1.        | Alanine Transaminase (ALT)            | Check & Record    | 7        | u/L     |
| 2.        | Albumin                               | 1.8 – 3.0         | 2.1      | g/dL    |
| 3.        | Alkaline Phosphatase                  | Check & Record    | 420      | u/L     |
| 4.        | Aspartate Aminotransferase (AST)      | Check & Record    | 41       | u/L     |
| 5.        | Bilirubin- total                      | Check & Record    | 0.2      | mg/dL   |
| 6.        | Bilirubin- direct                     | Check & Record    | 0.2      | mg/dL   |
| 7.        | Blood Urea Nitrogen (BUN)             | Check & Record    | 42       | mg/dL   |
| 8.        | Calcium                               | Check & Record    | 13.7     | mg/dL   |
| 9.        | Chloride                              | Check & Record    | 100      | MMol/L  |
| 10.       | Cholesterol                           | Check & Record    | 36       | mg/dL   |
| 11.       | Creatinine                            | Check & Record    | 3.1      | mg/dL   |
| 12.       | Creatinine Kinase (CK)                | Check & Record    | 835      | u/L     |
| 13.       | Electrophoretic Pattern               | Normal            | Normal   |         |
| 14.       | Endotoxin testing                     | Check & Record    | 2.81     | EU/mL   |
| 15.       | Gamma-Glutamyl Transferase (GGT)      | Check & Record    | 7        | u/L     |
| 16.       | Glucose                               | Check & Record    | 86       | mg/dL   |
| 17.       | Hemoglobin                            | 0-25              | 14.5     | mg/dL   |
| 18.       | High Density Lipoproteins (HDL)       | Check & Record    | 12       | mg/dL   |
| 19.       | IgG                                   | Not more than 500 | 81       | mg/L    |
| 20.       | Lactate Dehydrogenase                 | Check & Record    | 688      | u/L     |
| 21.       | Low Density Lipoproteins (LDL)        | Check & Record    | 10       | mg/dL   |
| 22.       | Mycoplasma testing                    | Negative          | Negative |         |
| 23.       | Osmolality                            | 270-345           | 308      | mOsm/kg |
| 24.       | Performance testing: Growth assay     | >80%              | Pass     |         |
| 25.       | Performance testing: Hybridoma growth | >80%              | Pass     |         |
| 26.       | Performance testing: Plating assay    | >80%              | Pass     |         |
| 27.       | pH                                    | 7.0-8.0           | 7.1      |         |
| 28.       | Phosphorous (inorganic)               | Check & Record    | 9.5      | mg/dL   |
| 29.       | Potassium                             | Check & Record    | 12       | MMOL/L  |
| 30.       | Sodium                                | Check & Record    | 136      | MMOL/L  |
| 31.       | Sterility testing                     | Negative          | Negative |         |
| 32.       | Total protein                         | 3.0-5.0           | 3.8      | g/dL    |
| 33.       | Triglycerides (TG)                    | Check & Record    | 62       | mg/dL   |
| 34.       | Uric acid                             | Check & Record    | 1.8      | mg/dL   |
| 35.       | VT- Bovine Viral Diarrhea (BVD)       | Negative          | Tested   |         |
| 36.       | VT- Parainfluenza Type 3 (PI-3)       | Negative          | Tested   |         |
| 37.       | VT- Bovine Rhinotracheitis (IBR)      | Negative          | Tested   |         |

**A. HERMAN**  
Quality Control Department

December 10, 2012

Date:

### Quality Control Tests: - Certified FBS

1. **Alanine Transaminase (ALT)** Lactate dehydrogenase/NADH, colorimetric determination at 340nm.
2. **Albumin Bromocresol Green (BCG)** Gustafsson JEC. Improved specificity of serum albumin determination and estimation of "acute phase reactants" by use of the bromocresol green reaction, *Clin Chem* 1977; 22: 616
3. **Alkaline Phosphatase** Para-nitrophenyl phosphate. Bowers GN, McComb RB. A continuous spectrophotometric method for measuring the activity of serum alkaline phosphatase. *Clin Chem* 1966;12 (2): 70-89 Tietz NW, Burtis CA, Duncan P, et al; A reference method for measurement of alkaline phosphatase activity in human serum. *Clin Chem* 1983; 29 (5): 751-756
4. **Aspartate aminotransferase (AST)** Malate dehydrogenase/NADH, colorimetric determination at 340nm.
5. **Bilirubin- total** Sodium nitrite/ biliverdin. Colorimetric determination.
6. **Bilirubin- direct** Diazo reaction based on the reaction of bilirubin with a diazotized sulfanilic acid, Burtis CA, Ashwood ER, editors. *Tietz Textbook of Clinical Chemistry*, 3<sup>rd</sup> ed. Philadelphia, PA: WB Saunders: 1999: 1136.
7. **Blood urea nitrogen (BUN)** Urease hydrolysis to ammonia and carbon dioxide. Colorimetric determination. Talke H, Schubert GE. *Klinische Wochenschrift* 1965; 43: 174
8. **Calcium Arsenazo III dye**. Tietz NW, editor. *Fundamentals of clinical chemistry*. Philadelphia PA: WB Saunders: 1970: 638
9. **Chloride Ion** selective electrode.
10. **Cholesterol Enzymatic** (cholesterol esterase/oxidase/peroxidase). Allain CC, Poon LS, Chan CS, et al, Enzymatic determination of total serum cholesterol. *Clin Chem* 1974; 20 (4): 470-475. Roeschlau P, Berni E, Gruber WA. Enzymatic determination of total cholesterol in serum. *Z Klin Chem Klin Biochem* 1974; 12: 226
11. **Creatinine Alkaline Picrate**. Reflectance spectrophotometry at 500nm. Fabiny DL, Ertlinghausen G. Automated reaction-rate method for determination of serum creatinine with the centrifichem, *Clin Chem* 1971; 17: 696-700; Soldin S, Henderson L, Hill G. The effect of bilirubin and ketones on reaction rate methods for the measurement of creatinine, *Clin Biochem* 1978; 82-6
12. **Creatinine kinase (CK)** Enzymatic reaction: N-acetyl-L-cysteine as an enzyme reactivator. The rate of formation of NADPH is measured by reflectance spectrophotometry at 340nm and is proportional to the activity of CK in the sample.
13. **Electrophoretic Pattern Cellulose Acetate**
14. **Endotoxin testing** Guideline on Validation of the Limulus Amebocyte Lysate test as an End Product Endotoxin Test for Human and Animal Parenterals Drugs, Biological Products and Medical Devices- U.S. Department of Health and Human Services, FDA, December 1987
15. **Gamma-Glutamyl Transferase (GGT)** L-Gamma-glutamyl-3-carboxy-4-nitroanilide substrate/glycylglycine Theodorsen L, Stromme JH, Gamma-Glutamyl-3-carboxy-14-nitroanilide: the substrate of choice for routine determinations of GGT activity in serum, *Clin Chem Acta* 1976; 72: 205
16. **Glucose Hexokinase/Glucose-6-phosphate dehydrogenase**. Colorimetric determination.
17. **Hemoglobin Average absorbance value**. Fleming AF, Woolf AJ. *Clin Chem* 1965; 12: 67
18. **High Density Lipoproteins (HDL)** Enzymatic reaction: Cholesterol esterase-cholesterol oxidase-peroxidase-chromogen. Warnick GR, Nauck M, Rifai N, Evaluation of methods for measurement of HDL-Cholesterol: from ultracentrifugation to homogeneous assays, *Clin Chem* 2001, 47 (9): 1579-1596
19. **IgG Radial Immunodiffusion method**, Mancini et al, *Immunochimistry*, vol 2, Page 255-262, 1965
20. **Lactate dehydrogenase** Pyruvate to lactate, NADH oxidation measured by reflectance spectrophotometry at 340nm. Recommendation of the German Society for Clinical Chemistry, *Z. Klin Chem Klin Biochem* 1970; 8: 658, 1972;10: 182
21. **Low Density Lipoproteins (LDL)** LDL= Cholesterol - HDL - Triglycerides/5
22. **Mycoplasma testing** Detection of mycoplasma contamination of bovine serum by the large volume method, ASTM: E 1536-00
23. **Osmolality** Freeze-point depression assay.
24. **Performance testing: Growth assay** Biological Industries specifications. Cell line used: human diploid lung fibroblast cells (MRC-5), ATCC CCL-171. Biological Industries growth promotion assay measures the ability of each FBS lot to support proliferation of fastidious human diploid fibroblasts through multiple subcultures.
25. **Performance testing: Hybridoma growth** Biological Industries specifications. Cell line used: Sp2/0-Ag14 myeloma-derived hybridoma. Hybridoma growth test analyzes the ability of each FBS lot to support growth of hybridoma cells.
26. **Performance testing: Plating assay** Biological Industries specifications. Cell line used: African green monkey kidney cells (Vero), ATCC CRL-81. Analysis of cellular attachment and proliferation of Vero cells.
27. **pH** Potentiometric determination.
28. **Phosphorous (Inorganic)** Phosphomolybdate: inorganic phosphate reacts with ammonium molybdate to form a heteropolyacid complex.
29. **Potassium Ion** selective electrode.
30. **Sodium Ion** selective electrode.
31. **Sterility testing** Current edition of USP.
32. **Total protein** Biuret method. Biuret method for the determination of total protein in serum and exudates, *Fundamentals of Clinical Chemistry* 1976: 302-304
33. **Triglycerides Enzymatic assay** (Glycerol Phosphate Oxidase). Fossati P, Prencipe L. Serum triglycerides determined colorimetrically with an enzyme that produces hydrogen peroxide, *Clin Chem* 1982; 28: 2077-2080; McGowan MW, Artiss JD, Strandberg OR, et al, A peroxidase-coupled method for the colorimetric determination of serum triglycerides, *Clin Chem* 1983; 29: 538-542
34. **Uric acid** Uricase/Allantoin. Trivedi R, Berta E, Rebar L. Enzymatic uric acid determination at 500nm by Trinder method, *Clin Chem* 1976; 22: 1223; Kabasakalian P, Kalliney S, Westcott A. Determination of uric acid in serum, with use of uricase and tribromophenol-aminoantipyrene chromogen. *Clin Chem* 1973; 19: 522.
35. **VT-Bluetongue Virus (BTV)** Virus testing is performed according to the Code of Federal Regulations (CFR), Title 9, Part 113.53 (c) [113.46, 113.47].
36. **VT- Bovine Viral Diarrhea (BVD)** Virus testing is performed according to the Code of Federal Regulations (CFR), Title 9, Part 113.53 (c) [113.46, 113.47].
37. **VT- Parainfluenza Type 3 (PI-3)** Virus testing is performed according to the Code of Federal Regulations (CFR), Title 9, Part 113.53 (c) [113.46, 113.47].
38. **VT- Bovine Rhinotracheitis (IBR)** Virus testing is performed according to the Code of Federal Regulations (CFR), Title 9, Part 113.53 (c) [113.46, 113.47].