The aim of this work was to separate the components of the bovine serum by adsorption on a column packed with a new synthesized and noncommercial hydroxyapatite (HA). The separation was performed on a glass column of 16 mm diameter x 65 mm length, connected to a peristaltic pump. A volume of 10 mL of whey, centrifuged (12000 g for 10 min) and filtrated (0.45 µm membrane) previously, was pumped to the column at a flow rate of 0.5 mL/min. Sequential elution was performed using 30 mL of sodium phosphate buffers: 10 mM, pH 5.0 (1), 400 mM, pH 5.0 (2), 10 mM, pH 6.0 (3), 400 mM, pH 6.0 (4) and 400 mM, pH 7.0 (5). After the elution with each buffer, samples of 2 mL were collected to quantify the total protein content in each fraction by Bradford method, in triplicate. The buffer (1) promoted the elution of 97% lactose (analyzed using the DNS method) and the retention of 96.0% of total proteins on HA. The buffer (2) induced the elution of 42.6% of total whey proteins, major α-lactalbumin (observed by SDS-PAGE electrophoresis); the buffer (4) promoted the elution of 46.5% total proteins, predominantly β-lactoglobulin (SDS-PAGE electrophoresis); the buffer (5) carried out to a loss of 6.8% of total protein. Therefore, 89.1% of total whey proteins were recovered by using this simple and alternative method. Acknowledgements to FAPEMIG, CAPES and CNPq by financial support.