To facilitate quantitative risk assessment in the meat production chain, there is a need for culture-independent quantification methods. The aim of this study was to evaluate the use of flotation, a non-destructive sample preparation method based on traditional buoyant density centrifugation, for culture-independent quantification of intact Salmonella in pig carcass gauze swabs (100 cm²) prior to quantitative PCR (qPCR). A novel approach was investigated, excluding the homogenization step prior to flotation, to improve the detection limit and speed up the quantification procedure. The buoyant density of two Salmonella strains in different growth conditions was determined to be 1.065 – 1.092 g/ml. Based on these data, an optimal discontinuous flotation with three different density layers, ~1.200, 1.102 and 1.055 g/ml, was designed for extracting intact Salmonella cells from pig carcass swabs. The method allowed accurate quantification from $4.4 \times 10^2$ to at least $2.2 \times 10^7$ CFU Salmonella per swab sample using qPCR (without preceding DNA extraction) or selective plating on xylose lysine deoxycholate agar. Samples with 50 CFU could be detected occasionally but fell outside the linear range of the standard curve. The swab samples showed a broad biological diversity; for seven samples not inoculated with Salmonella, the microbial background flora (BGF) was determined to $5.0 \pm 2.2$ log CFU/ml sample withdrawn after flotation. It was determined that the proceeding PCR step was inhibited by BGF concentrations of $\geq 6.1 \times 10^8$ CFU/swab sample, but not by concentrations $\leq 6.1 \times 10^6$ CFU/swab sample. By using the gauze swabs directly in the flotation procedure, the homogenization step normally used for preparation of food-related samples could be excluded, which simplified the culture independent quantification method considerably.