This study was aimed to determine the effect of different killing methods (frozen, mechanical, and traditional) on the quality, safety, and shelf life of crayfish that are aerobically stored under chilled conditions. The population of microorganisms (i.e., total mesophilic aerobic bacteria (TMAB), total psychrophilic aerobic bacteria (TPAB), and Enterobacteriaceae) was increased regarding to storage time (?? < 0.05). Significant differences (?? > 0.05) were not observed in pH values during storage time. In contrast to this, total volatile basic nitrogen (TVB-N) values of the samples were increased significantly (?? < 0.05) during storage. Sensory results were highly correlated with the microbiological counts (?? = -0.92 for TMAB x odour; ?? = -0.95 for TPAB x odour; and ?? = -0.96 for Enterobacteriaceae x odour). Fifteen different fatty acids and 5 biogenic amines were detected for the determination of initial quality and safety of crayfish. In conclusion, frozen killed samples were found to be effective and laborsaving method as an alternative to traditional killing methods by...