Sorghum is more resistant to drought than other cereals. It may gain more importance world-wide due to the global warming and climate change. Growth of sorghum in Brazil has been increased to $2200 \times 10^3$ MT in 2011. In Taiwan, sorghum distilled liquor is a signature commodity highly demanded by China. From just one distiller, a daily waste of 300 MT sorghum distillery residue (SDR) needs disposal. The aim of this study was to find a total solution for SDR to reduce waste and create value. The proximate composition of SDR consists of 20-30% crude protein, 6% crude fat and 60-66% carbohydrates including crude fiber. Ethanol extract of SDR (SDRE) significantly prolonged the lag phase of \textit{in vitro} human LDL oxidation and \textit{in vivo} LDL oxidation and plasma total antioxidant capacity using tilapia as an animal model. Trolox was used as a positive control. SDRE inhibited 15-lipoxygenase \textit{in vitro} with an IC$_{50}$ of 6.77 $\mu$g/mL, while that of the positive control NDGA was 0.07±0.01 $\mu$g/mL. The DPPH scavenging effect of SDRE yielded an IC$_{50}$ of 3.01±0.36 mg/mL in contrast to that of Trolox being 0.038±0.008 mg/mL. Tilapia fed on feed containing SDR reduced mortality rate during water temperature drop to 12±1 °C. The bioactive compounds identified from SDR included phenolic acids (gallic acid, 3,4-dihydroxy acid, $\rho$-hydroxybenzoic acid, caffeic acid); diazein, tannins, phytosterols, and policosanols.