The main challenge associated with the use of probiotics is ensuring their viability both on the shelf and during gastrointestinal transit. Microencapsulation is one of strategies used for protection of probiotics. We have previously successfully encapsulated probiotic bifidobacteria in poly(vinylpyrrolidone): poly(vinylacetate-co-crotonic acid) microparticles using supercritical CO\textsubscript{2} as solvent. The microparticles have shown to improve viability of probiotics in simulated gastrointestinal fluids. The current study aimed to characterize these microparticles, investigate their effect on shelf life stability of probiotics at elevated storage temperatures and in a traditional African maize-based fermented beverage, mageu. Scanning electron and confocal laser scanning microscopy, microtrac particle analyser, microplate fluorochrome assay and plate count techniques were used for analysis. Microparticles had an average particle size of 166 µm and 96 % encapsulation efficiency. Microencapsulation improved shelf life of bacteria at elevated temperature by 5 - 7 weeks for different strains. Minimal post-fermentation pH reduction was observed for beverage containing encapsulated probiotics. The microparticles improved probiotic viability under non-refrigerated temperatures and delayed browning of the probiotic powder. The results showed that microparticles encapsulating bifidobacteria would be appropriate for consumers without refrigerators. Mageu is a suitable alternative vehicle to dairy-based products for delivery of probiotics. This possibility extends accessibility of probiotics to consumers who do not take dairy products for various reasons.