The main objective of the study was to determine the effects of different fermentation parameters on kefir quality. Kefir samples were produced using kefir grains or natural kefir starter culture, and fermentation was carried out under normal or modified atmosphere (10% CO$_2$) conditions. The microbiological (lactobacilli, lactococci, *Lactobacillus acidophilus*, *Bifidobacterium* spp., and yeasts), chemical (pH, lactic acid, total solids, protein, ethanol, exopolysaccharide contents), rheological, and sensory properties of kefir samples were investigated during a 21-d storage period. The use of different fermentation parameters or the choice of grain versus natural kefir starter culture did not significantly affect the content of microorganisms. Lactobacilli, lactococci, and yeast contents of kefir samples varied between 9.21 and 9.28, 9.23 and 9.29, and 4.71 and 5.53 log cfu/mL, respectively, on d 1 of storage. Contents of *L. acidophilus* and *Bifidobacterium* spp. were between 5.78 and 6.43 and between 3.19 and 6.14 log cfu/mL, respectively, during 21 d of storage. During the storage period, pH, lactic acid (%), total solids (%), protein (%), acetaldehyde, and ethanol contents of kefir samples ranged from 4.29 to 4.53, from 0.81 to 0.95%, from 7.81 to 8.21%, from 3.09 to 3.48%, from 3.8 to 23.6 mg/L, and from 76.5 to 5,147 mg/L, respectively. The exopolysaccharide contents of the samples decreased during 21 d of cold storage; the samples fermented under modified atmosphere had relatively higher exopolysaccharide contents, indicating higher potential therapeutic properties. The kefir samples exhibited non-Newtonian pseudoplastic flow behavior according to the power law model. According to the sensory results, kefir produced from natural kefir starter culture under CO$_2$ atmosphere had the highest overall evaluation score at d 1.