This paper proposes a hybrid permanent-magnet memory motor. Using finite element method, the utility of AlNiCo and ferrite as low-coercive-force (LCF) magnets in the motor is comparatively analyzed. The results demonstrate that the positive magnetization of the ferrite magnets is difficult, while the field-variation range with the AlNiCo magnets is not sufficient, and the motor-power density and the positive magnetization characteristic of the LCF magnets cannot be improved simultaneously. On the other hand, the q-axis current may cause irreversible demagnetization in the LCF magnets, especially in the AlNiCo magnets. To solve the problems, an improved rotor topology with magnetic barriers is designed and considering that the demagnetization curve of ferrite magnets is mostly linear, ferrite magnets are used as the LCF magnets in the improved motor. Performance of the improved motor is analyzed and compared with that of the original configuration. Simulation results show that the positive magnetization characteristic of the ferrite magnets is significantly improved and the irreversible demagnetization in the ferrite magnets is avoided under load conditions. A prototype is fabricated and tested, verifying the analysis results.