Using the biaxially oriented film process, polypropylene (PP)/ethylene-vinyl alcohol copolymer (EVOH) blends with an improved barrier property could be obtained by generating a laminar structure of the dispersed phase in the matrix phase. This laminar morphology, induced by biaxial orientation, was found to result in a significant increase in the oxygen barrier property of PP/EVOH (85/15) blends by about 10 times relative to the pure PP. In this study, compatibility in the PP/EVOH blend system was evaluated by investigating the influence of compatibilizer on the rheological, morphological, and mechanical properties of the blends. In addition, the effects of compatibilizer content, draw ratio, and draw temperature on the oxygen permeability and morphology of biaxially drawn blend films were also studied. It was revealed that an optimum amount of compatibilizer, maleic anhydride grafted PP, should be used to improve the barrier property of the PP/EVOH blends with a well-developed laminar structure. The draw ratio and draw temperature had a significant influence on the permeability of the blends. The