The Ehrhart quasipolynomial of a rational polytope $P$ encodes the number of integer lattice points in dilates of $P$, and the $h^*$-polynomial of $P$ is the numerator of the accompanying generating function. We provide two decomposition formulas for the $h^*$-polynomial of a rational polytope. The first decomposition generalizes a theorem of Betke and McMullen for lattice polytopes. We use our rational Betke–McMullen formula to provide a novel proof of Stanley’s Monotonicity Theorem for the $h^*$-polynomial of a rational polytope. The second decomposition generalizes a result of Stapledon, which we use to provide rational extensions of the Stanley and Hibi inequalities satisfied by the coefficients of the $h^*$-polynomial for lattice polytopes. Lastly, we apply our results to rational polytopes containing the origin whose duals are lattice polytopes. (Received September 03, 2020)