Ira Gessel was the first to give a multivariate generating function involving the descent, major index, and inversion statistics over the symmetric group $S_n$ in his thesis and in a later paper with Garsia. Mendes and Remmel proved that the Garsia-Gessel formula could be proved by applying a certain ring homomorphism defined on the ring of symmetric functions in infinitely many variable to a simple symmetric function identities and gave analogues for the groups $B_n$ and $D_n$.

There are several natural ways to extend these formulas to groups of the form of the wreath product of $S_k$ with $S_n$, $S_k \wr S_n$ for any $k \geq 3$. We give results for generating functions of the above statistics on these groups, and we also describe other statistics than can be obtained by modifying the methods of Mendes and Remmel. (Received September 11, 2008)