Male sagebrush crickets, *Cyphoderris strepitans*, offer an unusual nuptial food gift to females during mating: females chew on the ends of the males’ fleshy hind wings and ingest hemolymph seeping from the wounds they inflict. Previous research has shown that once a male has mated, his probability of obtaining an additional copulation is reduced relative to that of a virgin male seeking to secure his first mating, a pattern known as the virgin-male mating advantage. One hypothesis to account for this pattern is that mated males experience an energetically costly immune response via wing wounding, and therefore may be unable to sustain the costly acoustical signaling activity required for the passive attraction of additional females. To distinguish between the effects of mounting a costly immune response and other costs of mating (i.e., producing a spermatophore), we mimicked the non-virgin status by injecting lipopolysaccharides (a non-living elicitor of several immune pathways) into virgin males. After they had been treated, males were released in the field and recaptured over the course of the breeding season to monitor their mating success. Sham-control virgin males spent more time calling (as assayed in a companion study by time-lapse video), and took significantly less time to secure matings than LPS-injected virgin males. Phenoloxidase activity, an important enzyme in several immune pathways, was also lower in non-virgin males compared to virgin males. These results suggest that copulatory wing wounding results in an immune response that constitutes a cost of reproduction. This cost constrains virgin male mating success in the field, which may act as a brake on the operation of sexual selection in this species.