Cattle producers' economic incentives for preventing bovine brucellosis under uncertainty
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Cattle in the Greater Yellowstone Ecosystem (GYE) of the United States occasionally contract bovine brucellosis from free-ranging elk and bison. Cattle producers use a variety of prevention activities to reduce their herds' brucellosis risk, such as fencing haystacks, administering adult booster vaccination, and spaying heifers. Their prevention decisions are complicated, however, by uncertainty about their herd's baseline risk, and the cost and effectiveness of prevention activities. Our study reduces uncertainty by estimating the cost of various brucellosis prevention activities for cow/calf/yearling producers in the GYE, and the minimum level of effectiveness each prevention activity must achieve to justify investment by a risk-neutral producer. These 'breakeven levels of effectiveness' are estimated for various levels of baseline risk and government policies. When economic loss to brucellosis is $40,181 (assuming a policy of compensated depopulation), a producer whose herd faces a 1% probability of contracting brucellosis can justify investing in few prevention activities. Only when economic loss rises to $134,818 (under a policy of uncompensated quarantine) can a risk-neutral producer whose herd faces a 1% baseline risk justify activities such as adult booster vaccination. As baseline risk increases to 5%, spaying heifers needs to reduce a herd's baseline risk by only 52% to justify implementation, assuming the herd faces a policy of uncompensated quarantine. Producers can use breakeven levels of effectiveness to narrow down the list of brucellosis prevention activities worth considering, and determine which activities are most likely to generate positive expected net benefits. Policymakers and animal health experts can use our results to target their cost-share agreements more effectively. Epidemiologists can use our results to determine on which prevention activities to focus future research to generate the most useful information for stakeholders.