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A BIO-ECONOMIC MODEL TO SIMULATE SCREW WORM FLY INCURSIONS IN AUSTRALIA

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ABSTRACT OF POSTER

Screw worm fly (SWF) represents the greatest exotic disease threat to Australia in terms of the risk of entry and potential production losses. A computer simulation model is described which predicts the effects of a potential SWF invasion in Australia. The model will be used as an aid in evaluating the likely benefits of various preparedness strategies, ranging from 'do nothing' to construction of a 'moth-balled' sterile insect technique (SIT) facility.

The modelling approach uses a hybrid simulation technique comprising two basic elements: a Geographical Information System to store, manipulate and display data, and a set of FORTRAN programs that model the biology and economics of SWF infestations. For modelling purposes, Australia is divided into 20 km by 20 km grid cells, with SWF spreading over time between cells.

For any given invasion scenario, the model addresses the biological aspects of an invasion, including establishment, the rate of spread and potential range as influenced by environment and hosts, and the likely outcomes of various strategies aimed at control or eradication. Also addressed is the economic impact of the invasion, including animal production losses and the cost of remedial strategies. The population dynamics of cattle and sheep, including the effects of SWF infestations, are simulated using simplified herd dynamics models based on the 'herd' in each grid cell. The eradication of SWF using SIT is modelled using the method of Knipling as a basis.

The model indicates that much of northeastern Australia provides an ideal environment for SWF, with infestations varying according to season and prevailing climatic conditions. Direct production losses in an endemic situation are predicted to be in the vicinity of $280 million per annum. Eradication of an invasion would be economically viable using SIT, with the most economical factory size being 200 or 250 million sterile flies per week.

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