Reviewer's report

Title: Emergency vaccination of rabies under limited resources - combating or containing?

Version: 2 Date: 20 December 2004

Reviewer: Graham C Smith

Reviewer's report:

General
This is an interesting paper which compares a ring and circle approach to emergency vaccination of wildlife rabies. The ring strategy appears to have been considered because of the UK approach to emergency rabies control. However, the UK control could include culling within the central portion, and this difference is not brought out clearly in the paper (e.g. first line of the conclusion). Nevertheless, this is an important paper. I was hoping to see a figure giving the risk of rabies breakout with radius of control. I think you have these results, and the additional figure would be very beneficial to contingency planners.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)
None.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)
My reading of the paper was marred by the poor English. I have made suggested changes below where this corrects the meaning, but the authors should seek further help. There were rather a lot of figures, but I could see little to delete.

Page 2.
Methods. Change lines 4-6 to read: We detailed individual-based fox groups to follow up the effect of vaccination at a fine grain. Thus, regional bait distribution orients to standard schemes of oral immunisation programs and locally baits are assigned to individual foxes.
Results line 9. Change “rewarding” to “better”.
Conclusion. Delete last sentence.

Page 3.
Line 37. Change “The uncertainty we are left, is the potential breakout” to “The risk we are left with, is the risk of potential breakout”.

Page 4.
Methods section, Line 6. Change “The rationales of rabies dynamics between the fox family groups as well as the individual dispersal of juveniles after maturity are completely carried forward from the basic model” to “The subroutines (?) for rabies dynamics between the fox family groups as well as the individual dispersal of juveniles after maturity are unchanged from the basic model”.

Page 5.
Basic fox population model.
Reference to juvenile mortality does not agree with Table 1.
Reproduction. You seem to assume that a cell with one fox will produce a litter. In fact it would, on average produce only half a litter, as it has a 50% change of being male ? In the text you refer to standard deviation in litter size “Table 1 refers to variance !
Dispersal paragraph. Sentence 3 “Per time-step an equal number of cells are selected randomly until all have performed.” is not clear. Is movement direction chosen from 8
squares of 360 degrees. Clarify here. Have you checked the this 50% deviation in path results in a smooth 2-dimensional distribution?

Page 6.

The section on rabies transmission is not clear. Can infected cubs infect all other susceptible foxes within the cell? Does each infected animal have the ability to infect only one neighbour in each cell? This is what is implied by the text, but not by Table 1. Please clarify.

Page 9.

Last paragraph before discussion. Move to discussion.

Page 10.

Second paragraph. I had a lot of suggestions here. I would suggest the following:

We compared two spatial strategies for local emergency vaccination to control a rabies outbreak. One refers to the immediate control of infection with a smaller treated area. The alternative was theorised to overcome the drawback of a spatially limited strategy by providing equal resources in a ring around the affected area which contains the infection at the price of more cases in the center. The simulation of the two spatial strategies revealed the true dynamics of the models. The ring strategy in general does not outperform the circle strategy. The predicted advantage of the ring strategy can only be found in the short term (Fig. 6a). Therefore we defined mixed strategies and searched the most rewarding point in time to switch between the ring strategy, which was better in the short term, and the circle strategy, which was better in the long term (Fig. 10). [insert last paragraph from results, but delete the last sentence]

Consequently, in the field we cannot benefit from the alternative baiting scheme and hence have to focus contingency planning on a compact control area around the detected outbreak. After testing the respective models, we can reject a-priori any pure vaccination field trial that attempts to distribute vaccine baits with a ring-like strategy.

Figure Legends:

Fig. 2. You refer here to cell size as 0.8 * 0.8 km, but elsewhere as a cell size of 1km2.

Fig 6. Last sentence is not clear. The vertical lines indicate the point in time when rabies has been eradicated in 50% respective 80% of all repetitions: Eradication is only achieved with circle strategy.

Fig. 7. Not sure figure &c is necessary, as it does not add anything.

Fig. 7 and Fig. 8 â€“ change in figure to campaign? Also it is not clear how figure 7 and 8 are to be interpreted, as they appear to contradict each other.

Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of importance in its field

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: No

Declaration of competing interests:

I declare that I have no competing interests™