FMD control strategies

SIR, – Keeling and colleagues (*VR*, May 20, 2006, vol 158, pp 707-708), in response to our letter on the modelling of ring vaccination in future outbreaks of foot-and-mouth disease (FMD) (*VR*, May 20, 2006, vol 158, pp 706-707), reiterate their view that contiguous culling can be beneficial in reducing both the number of farms losing livestock and the total number of livestock lost, and justify this on the basis that the models that they and their colleagues constructed are robust. They fail, however, to address the extensive post hoc evidence that compulsory contiguous culling was as unnecessary as it was ineffective (Honhold and others 2004a, b, Taylor and others 2004, Thrusfield and others 2005a, b), or the significant flaws inherent in the models' construction (Donaldson and others 2001, Taylor 2003, Kitching and others 2006), which are repeated in the ring vaccination model of Tildesley and others (2006).

The facts speak for themselves. The 2001 FMD epidemic in the UK is remembered for the massive scale of slaughter, involving 10,400 farms and at least 6·5 million livestock, although fewer than 1500 of 2030 'infected premises' (IPs) were confirmed as being infected on laboratory results. Leaving aside the 3 km cull, a separate though significant issue in itself, almost 70 per cent of farms classified as dangerous contacts (DCs) were culled on the prediction from mathematical models that they were at risk of becoming infected. While it is perfectly reasonable to assume that they were at risk, there was every reason to believe that effective surveillance and a properly applied 'stamping out' policy would substantially reduce and control that risk (Donaldson and others 2001).

We have already cited field evidence from Cumbria that isolation and veterinary assessment of DCs was an effective approach, with the disease being controlled and eradicated from that county without the application of compulsory contiguous culling or vaccination, at a slaughter rate of 1·07 DC premises per IP. Further analysis of the efficacy of the conventional control methodology employed suggests that, had the same principles been applied nationally, the epidemic would quite possibly have been halted at a very maximum of 1600 IPs and 1700 DCs. Taking account of welfare culls, this suggests that the use of novel culling policies (the automatic compulsory contiguous cull and the 3 km cull) resulted in the unnecessary involvement of over 7200 premises (69 per cent of all premises affected), the unnecessary slaughter of at least 3·35 million animals (52 per cent of all recorded slaughters), and an excess cost of at least £1700 million (62 per cent of the declared net cost to the UK taxpayer).

It is disappointing that the body of work cited by Keeling and colleagues as evidence for the beneficial effects of automatic compulsory contiguous culling comprises almost entirely mathematical modelling papers, by their own definition approximations to reality. Using established scientific criteria (Davies 1973), models can only ever be theories – not facts. We would also suggest that some caution is needed in interpreting certain recommendations of the cited official inquiries (Anderson 2002, Royal Society 2002), both of which were published long in advance of any systematic analysis of the epidemic.

We would point out that one of the papers cited (Morris and others 2001) reported the use of InterSpread, a highly developed spatial simulation model (Sanson and others 1994). This indicated that a high level of pre-emptive culling was not required, and that control and eradication of the 2001 epidemic would likely be achieved at a pre-emptive slaughter rate of between 1 and 1·3 surrounding farms per infected farm, a considerably lower rate of slaughter than that arising from the application of a compulsory contiguous cull policy, though still somewhat higher than that actually found necessary in Cumbria.

The potential use of FMD vaccination under UK conditions is indeed a very complex issue, though current DEFRA policy does not appear to have been particularly science-based or thoroughly thought through. A great deal of recent activity, much of it involving a large number of separate stakeholder groups, seems to have been engaged in seeking administrative solutions to the wide range of practical difficulties likely to ensue, though it is arguable that such issues should have received fuller attention during policy development. The use of a flawed model to justify or support the existing policy does not seem to be entirely appropriate or useful at this stage.

On the specific point of vaccinal protection, the ring vaccination model of Tildesley and others (2006) simulates the vaccination of cattle with an assumed efficacy of 90 per cent. This level of protection is achieved in young healthy cattle under experimental conditions, where vaccination precedes challenge by several weeks, but it still does not prevent infection of some animals (Golde and others 2005, Cox and others 2006). However, reducing the time between vaccination and challenge, as is likely to occur in the field, results in subclinical infection and shedding of virus by the vaccinates (Donaldson and Kitching 1989, Golde and others 2005). Comparable efficacy studies have not been carried out in high-yield dairy herds, in young calves or in pregnant cattle and, in the field, vaccination of dairy herds already harbouring infection has proved ineffective (Hutber and others 1998). There are, therefore, many issues to be addressed before ring vaccination could, or should, be offered as the first line of defence in conjunction with selective culling.

We welcome the recognition 'that at the level of individual farms veterinary judgement is always more reliable than mathematical models'. We trust that this may herald a return to a more reasoned approach to infectious animal disease control based on solid science and sound veterinary epidemiological principles. There now seems to be no reason why DEFRA should not abandon wider culling policies (compulsory contiguous, 'firebreak' and area culling) and the enabling legislation (Animal Health Act 2002), revert to the tried and tested conventional control methodology as the cornerstone of FMD control, and refine future policy by learning the practical lessons of 2001 and embracing the potential advantages offered by modern diagnostic technologies and data handling systems.

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