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No vaccine exists for the UK's current strain of foot-and-mouth - but protection is possible in four days

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LONDON There is no vaccine specific to the PanAsia strain of O-variety foot-and-mouth disease causing the current disaster in the UK, according to the person at the sharp end of providing vaccines to control the outbreak.

In an interview, Paul Barnett, Manager of the International Vaccine Bank for Foot-and-Mouth Disease(IVB), Institute for Animal Health, said "The PanAsia strain has been about since 1990, when it was first isolated in India. We haven't got a vaccine for it that quickly, it's just that an existing vaccine - strain O Manisa - appears to be suitable, according to serology, to use against this virus."

"You should also distinguish conventional and emergency vaccines," Barnett said. "We can give emergency vaccines a higher potency, generally by increasing antigen payload."

The trouble with conventional foot-and-mouth disease (FMD) vaccines is that although they protect animals from clinical symptoms, they don't necessarily prevent animals from becoming infected and therefore being carriers of the virus, says Barnett. Conventional vaccines can also take as long as two weeks to raise protective immunity following administration and normally require boosts.

But there is experimental evidence that the higher potency vaccines "can induce protective immunity within four days of immunization." It is not known, however, how quickly an emergency O Manisa vaccine will produce immunity, especially against O PanAsia.

In general, emergency vaccines may also reduce local virus replication, to an extent that improves as the time gap widens between vaccination and virus challenge. "Such vaccines therefore could have impact on reducing the spread of disease through transmission," says Barnett. There is also some evidence that higher potency vaccines can stimulate longer duration of immunity, reducing the need to revaccinate shortly after primary immunization, he says.

The current vaccine is based on chemically inactivated FMD virus, adjuvanted with either aluminium hydroxide/saponin or mineral oil. The strains available at the IVB are O Manisa, O Lausanne, A22 Iraq, A24 Cruzeiro, A15 Thailand, C1 Oberbayern and Asia India. According to Barnett, "they all have to achieve a potency of 10 PD50 - that is, if the vaccine were diluted 10-fold and administered it would still protect 50% of the vaccinates - to be accepted into the bank." The vaccines undergo "stringent testing procedures, particularly in respect of innocuity and safety and have been shown to be free of infectious particles."

But there is always room for improvement, says Barnett, and the key targets include: abolishing local virus replication, and thus the status of 'carrier' in vaccinated animals, to give so-called sterile immunity; improving the duration of immunity to reduce the need for subsequent boosts; improving the shelf-life of the final product; and designing vaccines with a wide antigenic spectrum.

Research is under way on novel adjuvants and on the use of expression systems to produce non-infectious 'empty' virus particles, which are similarly immunogenic but don't need high containment facilities to produce the final product. Another important target is to find ways to stimulate mucosal immunity, Barnett says.

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