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Options for managing animal welfare on intensive pig farms confined by movement restrictions during an outbreak of foot and mouth disease

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ABSTRACT

An outbreak of foot and mouth disease in Australia would trigger a major disease control and eradication program that would include restriction of movement of live animals within defined disease control zones. Experiences from outbreaks in other countries show that restrictions that limit the ability to turn off stock can lead to animal welfare compromise on intensively managed farms that are not infected with the disease. Intensive pig farms are considered to be at high risk of developing welfare problems during a control program due to the imposed movement restrictions and limited space available to house growing pigs. This study was designed to investigate strategies that could be used to mitigate animal welfare problems on intensive pig farms during a simulated outbreak of foot and mouth disease in a livestock dense region of Australia. Three strategies for managing farms affected by animal welfare problems were assessed, including on-farm culling of grower and finisher pigs, on-farm culling of finisher pigs only, and permit-based movement of finisher pigs to slaughter at abattoir. Under traditional approaches of giving infected premises (IP) priority over culling of farms with welfare problems (WP), delays of up to 25 days were experienced prior to culling of WPs. Deployment of vaccination did little to reduce the delay to culling of WPs. These delays were sensitive to resources available for control, with reduced resources increasing the time until welfare problems were addressed. Assigning equal priority to all farms requiring culling regardless of status as IP or WP and culling each as they arose reduced the delay to culling of WPs to no more than 4 days without large increases in either the duration or the size of the outbreaks observed.

Abbreviations: ARP, at risk premises; CA, control area; DCP, dangerous contact premises; FMD, foot and mouth disease; IP, infected premises; RA, restricted area; SO, stamping out; SORV, stamping out combined with suppressive ring vaccination; WP, welfare premises; WS1, welfare strategy one, on-farm culling of grower and finisher pigs; WS2, welfare strategy two, on-farm culling of finisher pigs only; WS3, welfare strategy three, permit based movement of finisher pigs to abattoirs.

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1. Introduction

Animal welfare is a topic of increasing importance to a range of stakeholders including governments, veterinarians, the livestock industries and the broader community (Bayvel and Cross, 2010). All of these groups want assurance that animals are handled with consideration for their well-being and are not exposed to unnecessary suffering. This has led to the reassessment of established practices for the management of domestic animals, including production animals, to ensure that current and future practices are acceptable to all stakeholders (Bayvel and Cross, 2010; Thornber, 2010). In Australia, part of this assessment has included consideration of the possible animal welfare problems that could arise during an outbreak of exotic disease, due to the disease control measures imposed.

Foot and mouth disease (FMD) is exotic to Australia, but is considered one of the greatest threats to Australia's livestock industries due to its infectiousness and economic consequences (Buetre et al., 2013). Restrictions on the movement of live animals are part of the standard control and eradication program to be implemented in the event of an outbreak, and are documented in Australia's Veterinary Emergency Plan, AUSVETPLAN (Animal Health Australia, 2014a). The movement restrictions to be applied include a national livestock standstill of at least 72 h duration and the establishment of declared areas: restricted areas (RAs) initially comprising local government areas containing infected premises (IPs) and/or dangerous contact premises (DCPs) and contracting to 3 km radii around IPs and DCPs after completion of delimiting surveillance and control areas (CAs) initially comprising the entire infected state and contracting to small areas based on natural barriers and administrative boundaries or circular areas not less than 10 km radii after completion of delimiting surveillance. Movements of live animals are prohibited or tightly controlled within these zones, even from properties that are not known to be infected. For example, live animals are not allowed to move out of the RA under any circumstances. Movement from the CA directly to slaughter is possible under permit if a slaughter facility is present in the CA or RA (Animal Health Australia, 2014a). The movement restrictions implemented are summarised in Table 1.

Experiences during the outbreak of FMD in the United Kingdom in 2001, and the outbreak of classical swine fever in the Netherlands in 1997–98, demonstrate that movement restrictions, while highly effective for disease control purposes, can lead to unintended consequences for animal welfare on uninfected properties (Stegeman et al., 2000; Crispin et al., 2002; Laurence, 2002). The animal welfare problems experienced in the United Kingdom included overcrowding due to inability to market saleable animals, localised feed shortage due to inability to move stock between pastures, and stock left stranded in poor environments due to inability to move animals from winter grazing to the main farm (Crispin et al., 2002; Laurence, 2002). Whilst the latter two are not relevant to intensive industries where animals are housed indoors and fed processed feed, overcrowding could be anticipated on intensive enterprises that rely on regular marketing of stock.

In Australia, the intensive pig production industry typically operates with marginal space allowances so movement restrictions associated with an outbreak of FMD would rapidly lead to overcrowding (P. Mitchell, Australian Pork Limited, *pers. commun.*; East et al., 2014). Sequelae of overcrowding in pigs may include: fighting, competition for feed and cannibalism (Stegeman et al., 2000). Whilst there are on-farm measures that can reduce the impacts of overcrowding, such as feed restrictions to slow growth rate or cessation of breeding, such measures are unable to ameliorate the immediate animal welfare problems expected due to movement restrictions. Feed restrictions may result in nutritional issues and even create welfare problems due to increased aggression associated with competition for reduced fed.

In our previous study (Roche et al., 2014), we used a stochastic simulation model that describes FMD transmission between farms in a livestock dense region of Australia to determine what control strategies would be most effective in limiting the spread of disease and minimising the time till eradication of the outbreak. Our results suggested that using current estimates of human resource capacity for surveillance, IP operations and vaccination, outbreaks were effectively controlled under a stamping out strategy where all susceptible animals on IPs are culled. However, under more constrained resource allocations, ring vaccination was more likely to achieve eradication faster than stamping out or pre-emptive culling strategies.

This study was designed to investigate potential animal welfare management strategies that could be used to ameliorate animal welfare problems on affected pig farms. Strategies were compared based on their ability to deal with the welfare problems and for possible impact on

Table 1
Movement restrictions between restricted, control and outside areas during the response to an outbreak of foot and mouth disease in Australia.

Origin	Destination		
	Restricted area	Control area	Outside area
Restricted area	Prohibited except for disease free animals under permit for welfare reasons	Prohibited	Prohibited
Control area	Prohibited except for disease free animals under permit for immediate slaughter where only abattoir is in the RA	Prohibited except for disease free animals under permit for welfare reasons or for immediate slaughter	Prohibited
Outside area	Prohibited except for disease free animals under permit for immediate slaughter where only abattoir is in the RA	Prohibited except for disease free animals under permit for welfare reasons or for immediate slaughter	Allowed