RESEARCH ABSTRACT

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SWINE HEALTH

Title: *Achieving safe introduction of naïve gilts into M. hyopneumoniae endemically infected herds: Protecting existing sows, exposing incoming gilts, and minimizing shedding to the offspring* -
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Abstract:
Mycoplasma hyopneumoniae (M. hyopneumoniae) is the causative agent of enzootic pneumonia, a respiratory condition prevalent in a high proportion of swine herds worldwide, including the US (reviewed by Maes et al., 2008; Thacker and Minion, 2012). Most commercial herds are endemically infected with M. hyopneumoniae and may not consider elimination of the pathogen as a viable option within their production systems. In those cases, which include a significant number of swine herds, appropriate management practices conducing to maintaining an endemic infection of *M. hyopneumoniae* are strictly necessary in order to keep uniformly exposed groups of pigs. In other words, keeping a stable reproductive herd is central to maintain the overall herd status. On the other hand, producers and veterinarians have quantified the economic impact of disease free production and the economic benefits of growing M. hyopneumoniae free pigs have been realized (Yeske 2015; Schwartz 2015). For those reasons *M. hyopneumoniae* elimination efforts have become a priority in the industry (Holst et al., 2015).
Sow-to-piglet transmission of *M. hyopneumoniae* constitutes a crucial epidemiological event in the life of the pig (Calsamiglia and Pijoan, 2000; Sibila et al., 2009). Piglets are born free of M. hyopneumoniae and may become exposed during the lactation period (Calsamiglia and Pijoan, 2000), at which end a variable proportion of piglets will be colonized (Fano et al., 2005; Villarreal et al., 2009). It has been previously demonstrated that the level of piglet colonization at weaning age in a given group is correlated with the severity of clinical disease at market age (Fano et al., 2007). Therefore, control measures directed to decrease M. hyopneumoniae prevalence at weaning seem to be necessary to potentially diminish problems associated with the clinical presentation.

Recently, several studies have focused on the identification of factors that affect the level of *M. hyopneumoniae* colonization at the end of the lactation period, at the environmental, herd and individual level. Results from several investigations suggest a strong influence of maternal shedding of M. hyopneumoniae during the lactation period in the colonization at weaning age with this pathogen (Nathues et al., 2013; Pieters et al., 2014).

Gilt and sow shedding of *M. hyopneumoniae* during lactation may be the result of several events occurred earlier in the life of the dam and/or the group of dams, which may include age at exposure and infection with *M. hyopneumoniae*, immune status, previous medications, herd biosecurity, and perhaps more importantly, acclimation processes and management practices used for introduction of negative replacement animals into endemically infected herds (Dalquist 2014).

In general, the purpose of acclimation processes is to manage the gilts in a way that they achieve a health status similar to that of the recipient herd, and therefore do not pose a risk to themselves, to the already established herd, or to the progeny of those newly introduced animals (Pieters and Fano, submitted). Management protocols have been developed for gilt acclimation to swine pathogens like PRRSV for example, which have proven to be effective to keep sow herd stability. However, management strategies for proper gilt acclimation to M. hyopneumoniae do not appear to be highly effective or well understood, thus sow herd destabilization occurs fairly frequently, which often translates into variable colonization at weaning age and severe clinical presentation in the finishing phase.

We believe that the establishment of herd immunity against *M. hyopneumoniae* in infected breeding herds will decrease the *M. hyopneumoniae* prevalence in the sows, which will decrease the likelihood of *M. hyopneumoniae* transmission to pre-weaning piglets. For the purpose of this investigation, we assume that the higher the number of sows/gilts immunized against *M. hyopneumoniae* the lower the pressure of infection of M. hyopneumoniae in the breeding herd and in pre-weaning piglet's populations. Considering that *M. hyopneumoniae* bacterins do not induce protective immunity against M. hyopneumoniae (Haesebrouck et al., 2004) there is a need to seek for alternative methods (i.e. exposing pigs with live *M. hyopneumoniae*) to induce protective immunity against subsequent *M. hyopneumoniae* infections.

In summary, assuring a stable sow herd as it relates to *M. hyopneumoniae* infection seems vital for effective control of downstream respiratory disease in endemic production systems. In addition, elimination programs for M. hyopneumoniae rely on an affective exposure to the pathogen at a given time point in order to mark the "zero" that is used to start herd closures for eradication. Thus, developing a practical protocol for safe and effective exposure to *M. hyopneumoniae* of incoming gilts is of paramount importance for disease control. To the best of our knowledge, there are no described strategies for effective gilt exposure to *M. hyopneumoniae* under field conditions. Therefore, the overall goal of this investigation is to develop a protocol for consistent, safe, and effective acclimation of M. hyopneumoniae negative gilts that can be used at the farm level.