Assessment and quantification of Post-weaning Multi-systemic Wasting Syndrome (PMWS) severity at farm level.

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Introduction
Post-weaning Multi-systemic Wasting Syndrome (PMWS) causes major economic losses in the English pig industry (1). Severity of clinical signs and economic impact vary considerably between affected farms. Appropriate diagnosis and determination of PMWS severity on the farm are crucial for informing decision about control measures. The present study aimed to define and quantify severity levels of PMWS observed on farms using a novel approach based on morbidity, mortality and presence of porcine circovirus type 2 (PCV2).

Materials and Methods
In 2008-2009, 147 pig farms across England and not vaccinating against PCV2 were enrolled in a cross-sectional study, and retrospective data on PMWS morbidity and production indicators were collected. Classical data collection methods were combined with tools used in participatory epidemiology. In addition, on each farm serum samples from 20 pigs of four different age groups were collected and tested for PCV2 antigen and antibodies against other important pathogens (2). After correcting for misclassification, factor analysis was used to generate a small number of factor variables representing biological meaningful aspects of variation among morbidity variables and these were then together with relevant risk factors variables subjected to principal component analysis to derive an algorithm for PMWS severity.

Results
Evidence of PCV2 presence was found on all farms enrolled in the study. Factor analysis performed on morbidity data resulted in two factors: Morbidity Factor 1 (MF1) representing mainly weaner and grower morbidity, and Morbidity Factor 2 (MF2) which mainly reflect variation in finisher morbidity. Principal component analysis was performed on the identified morbidity factors, all production variables and laboratory results. This resulted in the extraction of one component representing variation in MF1, post-weaning mortality and percentage of PCV2 PCR positive animals. The extracted component accounted for 60% of the total variance of these three variables. The distribution of the resulting values for each variable is shown in Figure 1. The scores from the resulting component were normalised within a value range from 0 to 10. Cut-offs values were identified and farms were classified into: non or slightly affected farms (24%) with a score <4, highly affected farms (23%) with a score >6.5 and, the majority of the farms (53%), considered to be moderately affected farms with middle scores (4 – 6.5).

Discussion
The factor analysis indicated a clustered pattern of PMWS morbidity, with farms either having high morbidity in weaners/growers or mainly in finishers. The principal component measures PMWS severity on the farms and establishes weaners and growers as the main age groups affected by the disease. The distribution in the three severity categories is believed to reflect the situation of PMWS in the English pig population before the onset of PCV2 vaccination and will be used in further research to investigate risk factors associated with different PMWS severity levels and to measure PCV2 vaccination efficacy at each of these. The outcomes will then inform economic models for the development of cost-effective disease control measures for PMWS.

References
1. Armstrong et al. (2004) IPVS, Germany
2. Wieland et al. (2008), The Pig journal, in press for vol.23