The aim of this study was to assess the potential of using multiple data sources currently available in Denmark for monitoring swine diseases. The study included farms that, based on serology, changed from “negative” to “positive” status for Porcine Reproductive and Respiratory Syndrome (PRRS), enzootic pneumonia (Mycoplasma hyopneumonia), and porcine pleuropneumonia (Actinobacillus pleuropneumoniae) between January 2014 and September 2017. These corresponded to 45 swine farms working as individual operation units (i.e., their disease status is independent from other farms) and 81 farms that were part of joint operation units (i.e., 2 or more farms considered to be an epidemiological unit, having swine and personnel are transferred among them, that have the same disease status). Additionally, a total of 95 farms with a negative status for these three diseases during the study period were also included in the study. Changes in mortality data, antimicrobial consumption, and vaccine use at herd level were monitored using Shewhart control charts prior to, during, and after these farms were found positive for the three diseases. The analysis was run separately for the different age groups–weaners (up to 30 kg), sows and finishers herds–within each farm. Briefly, the highest percentage of herds generating alarms was generated up to 3 months before they changed their disease status based on mortality (30%) and 1 month after based on antimicrobial use for respiratory diseases (100%). Porcine pleuropneumonia showed to be the disease with the highest impact on these data at herd level; alarms based on the three data streams were generated in the same month that herds changed their status to porcine pleuropneumonia-positive, as well as the following months. Alarms based on vaccine use generally occurred within the same month or after changes in disease status. False alarms were found in 2% (median value) of the herds for the different age groups based on mortality and antimicrobial use for respiratory diseases in healthy farms. Monitoring changes in mortality data, antimicrobial consumption, and vaccine use showed changes (i.e., warnings) at herd level prior to confirmation from diagnostic tests.