The zoonotic transmission of hepatitis E virus (HEV) is of special concern. High HEV seroprevalences can be found in European pig and wild boar populations. The aims of the first study of this thesis were to obtain prevalence data on HEV infection in swine in Belgium and to compare Belgian human HEV sequences with those obtained from swine. In total, 420 serum samples of fattening pigs aged were used for virological studies and 420 serum samples of lactating sows for serological testing. The presence of HEV-specific antibodies was demonstrated by ELISA. An individual seroprevalence of 73% was found in Belgium. The risk of zoonotic transmission of the infection was approached by comparing viral sequences identified during this study in pigs and humans in Belgium. Four out of 420 pig sera were detected positive for HEV RNA and belonged to genotype 3, subtype f. Out of the 9 human HEV positive sera studied, 8 belonged to genotype 3 and 1 to genotype 1. These results indicate the possible zoonotic potential of HEV in Belgium.

In Belgium, the wild boar population is in constant increase with a population size estimated to be more than 25000 heads in 2012 in the Walloon Region (16903 km²). The red and roe deer bag statistics were respectively 5300 and 14 400 in 2012 in the same area. In Belgium, four-fifths of the forests are in the Walloon Region which contains also a high density of human population. The aims of the second study of this work were to obtain prevalence data on HEV infection in wild fauna in Belgium and to compare Belgian human and swine HEV sequences with those obtained from wild boars and cervids. Sampling of sera and livers of wild boars was made during the hunting season 2010-2011. A total of 383 sera from wild boars were selected for serology. For the virological study, 69 sera and 61 livers from young wild boars were used. Sampling of sera and livers from cervids was also made by the Walloon wildlife surveillance network during the hunting season 2012; 189 and 235 sera of respectively red deer and roe deer were collected for serological analysis. For the virological analyses, 84 and 68 sera as well as 29 and 27 livers from respectively red and roe deer were sampled. A seroprevalence of 34% was found in wild boars, of 1% in red deer and 3% in roe deer. In wild
boars, 4 out of 69 sera and 4 out of 61 livers were detected as positive for HEV RNA. All sequences obtained from sera belonged to HEV-3 (f and c). HEV RNA was detected in 1 out of 29 livers from 109 red deer, it belonged to genotype 3f. Using a multivariate logistic regression, a significant effect of age was observed: young animals were less seropositive. Wild boar can be considered as a host reservoir of the virus in Belgium.

Direct zoonotic transmission to human beings has been documented several times from wild boar, deer and pigs infected with HEV. The aim of the third study was first to investigate the early consequences of pig infection with a wild boar HEV strain (WbHEV) inoculated by intravenous route and second to observe the infection pattern of a WbHEV strain, a WbHEV strain previously passed in swine, and a SwHEV strain after oral inoculation. After intravenous inoculation, HEV RNA was detected in serum, bile, liver, spleen, duodenum, jejunum, colon, lung, gastro-hepatic lymph nodes and faeces in all group 1 piglets. After oral inoculation, HEV RNA was detected in serum, bile, liver, gastro-hepatic lymph nodes and faeces in groups 3, 4 and 5. Most of HEV inoculated pigs became seropositive at day 15 post-inoculation and one Sw-WbHEV inoculated pig became seropositive at day 12. In both experiments, HEV inoculated pigs showed infiltration of lymphocytes, plasmocytes, eosinophils in the portal areas, interlobular septa and sinusoids.

In conclusion, pigs and wild boars can be considered as reservoir hosts for HEV. However, contrarily to the apparent epidemiological role of cervids in other countries, the low seroprevalence data obtained in Belgium suggest they are accidental hosts. The results of experimental infections reinforce the putative role of wild boars in the transmission of HEV in pigs. These points should be considered when assessing the risk of human infection with HEV.

**Publications part of the thesis:**


