The adjuvant effect of Gantrez®AN nanoparticles on oral vaccination of pigs and mice with F4 fimbriae is strongly influenced by polymer degradation.

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We analysed the adjuvant effect of Gantrez nanoparticles NP on oral immunisation of pigs and mice with F4 fimbriae. The animals were vaccinated with F4, F4 encapsulated in Gantrez NP, called gF4 NP, or F4 + empty Gantrez NP, called F4 + gNP, and intragastrically infected with F4+ ETEC.
In pigs, a clear F4 specific serum IgA and IgG response following vaccination could only be observed in the F4+g NP group. Also in mice, the strongest response could be seen in the F4 + g NP group. In contrast to the results in pigs however, encapsulation of F4 in NP reduced the response. An important difference between mice and pigs is that pigs have an intestinal F4 receptor, whereas mice don't have this receptor.
Taken together, in both mice and pigs, the best adjuvant effect was seen by adding empty NP to the fimbriae. These data suggested that functional groups at the surface of the NP are likely to play a significant role in the immunogenicity. To analyze if the adjuvant effect of the empty NP was sufficient to protect suckling pigs, the experiment was repeated 6 months later. However, the response in the F4 + g NP group was not improved compared to the F4 group. To explain the discrepancy between the studies, the polymer was characterized again and a second mice experiment was performed to analyze the influence of storage on the polymer properties.Changes in polymer weight and polymer weight distribution occurred. In addition, the adjuvant effect of empty NP on F4 in mice was lost. Nevertheless, this could be restored by crosslinking the NP more strongly.