The aim of the present study was to investigate parasite induced immune responses in pigs co-infected with Trichuris suis and Oesophagostomum dentatum as compared to mono-species infected pigs. T. suis is known to elicit a strong immune response leading to rapid expulsion, and a strong antagonistic effect on O. dentatum populations has been observed in co-infected pigs. Forty-eight helminth naïve pigs were allocated into 4 groups in a 2-factorial design. Two groups were trickle inoculated with either 10 T. suis eggs/kg/day (Group T) or 20 O. dentatum L3/kg/day (Group O). Group OT was infected with same levels of both T. suis and O. dentatum (Group OT) and Group C remained uninfected. In each group, six pigs were necropsied after 35 days and the remaining pigs after 71 days. Parasite E/S-antigen specific serum antibodies were quantified by an in-direct ELISA. qPCR was used to measure the expression of immune function related genes in the mucosa of proximal colon and the draining lymph node. Highly significant interactions were identified for O. dentatum specific IgG1 (p < 0.0001) and IgG2 (p < 0.0006) antibodies with a remarkable 2-fold higher antibody response in group OT pigs as compared to group O. These findings indicated that T. suis enhanced the antibody response against O. dentatum in Group OT. The gene expression data confirmed a strong Type 2 response to T. suis (e.g. marked increase in IL-13, ARG1 and CCL11) and clearly weaker in amplitude and/or delayed onset response to O. dentatum in the single infected group. Interactions were found between the two nematodes with regard to several cytokines, e.g. the increase in IL-13 observed in Group T was absent in Group OT (p = 0.06, proximal colon mucosa, 35 and 71 p.i.). Some of these immune response-related interactions may support, or even partially explain, the observed interactions between the two worm populations in co-infected pigs.