MAXFERM

FUNGAL FERMENTATION PRODUCT
FOR NON-RUMINANTS

EFFECTS OF MAXFERM ON GROWTH PERFORMANCE AND GUT INTEGRITY IN JUVENILE ATLANTIC SALMON (*SALMO SALAR*)

Source: Matís (Iceland), 2023.

MAXFERM is a dried fungal fermentation product produced by fermentation of a plant substrate with fungi to increase nutrient digestibility and animal performance. MAXFERM contains residual enzymatic activity to degrade non-starch polysaccharides (NSP) and to release other nutrients bound to the fiber matrix. In addition, MAXFERM contains functional components that strengthen gut integrity.

In two exp., the effect of MAXFERM on growth performance (exp. 1) and immune function (exp. 2) in Atlantic salmon (*Salmo salar*) were assessed. In exp. 1, Atlantic salmon (initial body weight 235g) were fed a soy protein concentrate, fish meal, wheat gluten-based diet including no MAXFERM (Control), 500 ppm or 1,000 ppm MAXFERM for 56-d. The salmon was housed in 12 tanks with 12 animals per tank. In exp. 2, Atlantic salmon were fed a diet containing 20% soybean meal to challenge the animals. The basal diet (Control) was based on soybean meal, soy protein concentrate, fish meal and wheat gluten meal. The test diets were supplemented with 500 ppm and 1,000 ppm MAXFERM. Blood samples of the dorsal aorta of one salmon per tank were taken before the challenge and after 14-d of challenging the fish. Blood samples were analyzed by RT-qPCR by the Frauenhofer IMTE, Lübeck, Germany.

For exp. 1, the specific growth rate over the 56-d trial was numerically greater for 500 ppm MAXFERM compared to the control and 1,000 ppm MAXFERM (Fig. 1). The feed conversion ratio was numerically lower for 500 ppm MAXFERM compared to 1,000 ppm MAXFERM and the control.

Fig. 1. Specific growth rate (56-d trial) and feed conversion ratio of Atlantic salmon fed experimental diets (n=4).

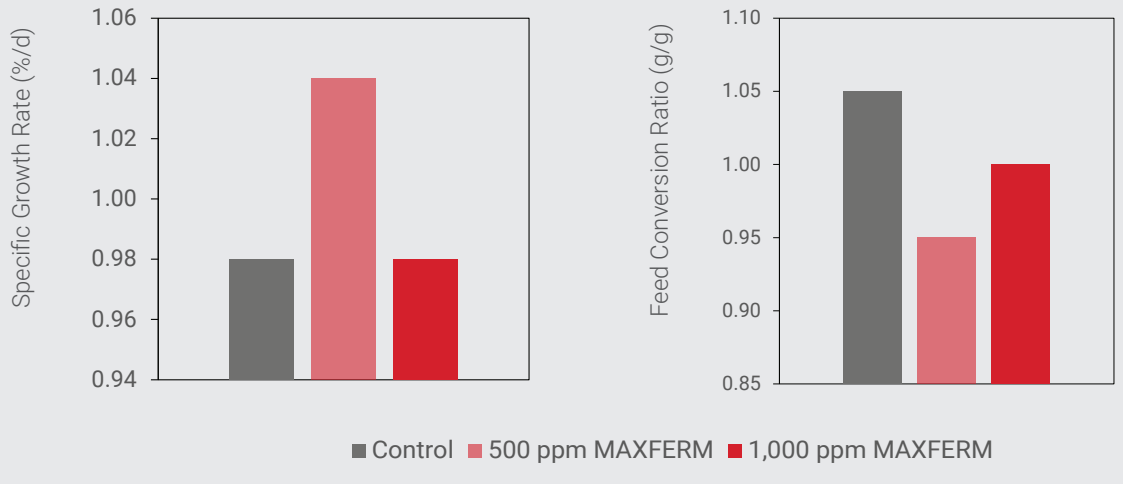
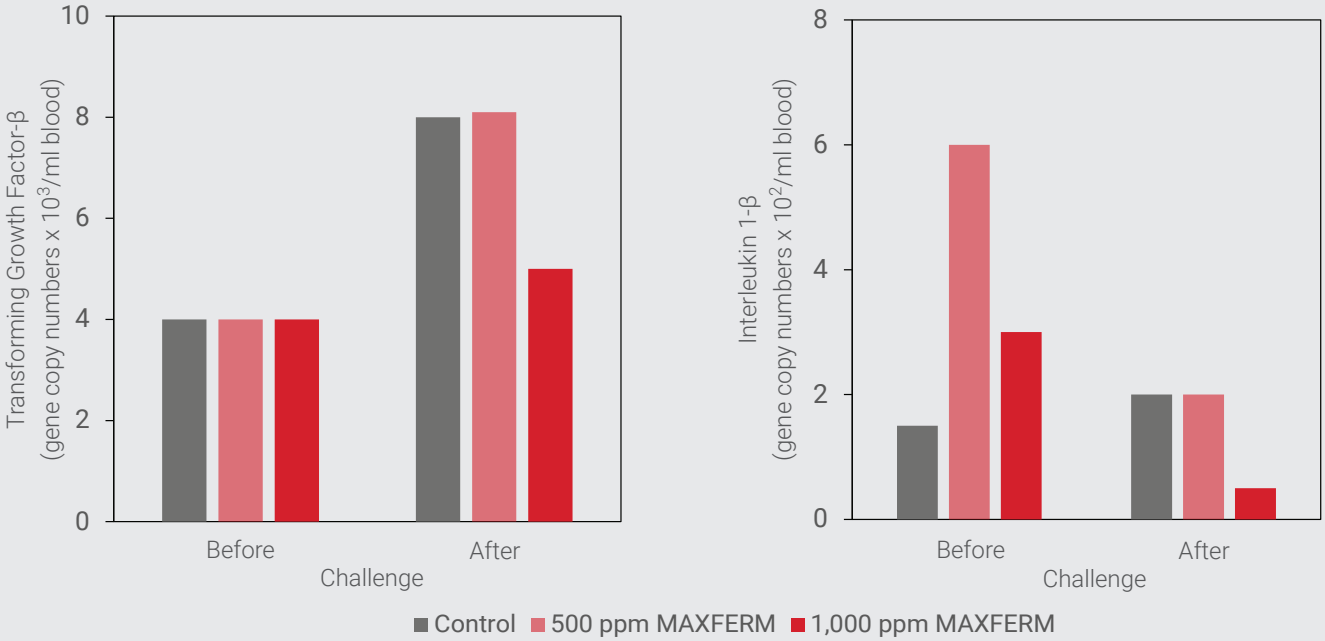


Fig. 2. Gene copy numbers of Transforming growth factor-β (TGF-β) and Interleukin 1-β (IL 1-β) in blood samples of Atlantic salmon fed experimental diets (n=4; preliminary results; data presented as median).



In exp. 2, gene copy numbers of Transforming growth factor-β (TGF-β) for all treatment groups were numerically greater after the challenge than before the challenge. The gene copy numbers of TGF-β were numerically lower for 1,000 ppm MAXFERM compared to 500 ppm MAXFERM and the control after the challenge. The cytokine TGF-β is upregulated during inflammation. Considering the lower gene copy number for TGF-β for the 1,000 ppm MAXFERM treatment group, it can be assumed that MAXFERM reduced the inflammatory reaction of the soybean meal challenge. The gene copy numbers of interleukin 1-β (IL 1-β) were numerically lower for 500 ppm and 1,000 ppm MAXFERM after the challenge than before the challenge. In addition, the gene copy numbers of IL 1-β were lower for 1,000 ppm MAXFERM than 500 ppm and the control after the challenge. The cytokine IL 1-β is a inflammatory marker and one of the first cytokines released after acute inflammation. Detecting IL 1-β is an indicator that the soybean meal challenge model caused an inflammation, and that the inflammatory reaction was still ongoing after 14-d. The lower number of gene copies for IL 1-β for the 1,000 ppm MAXFERM treatment group indicates that MAXFERM reduced the inflammatory reaction in Atlantic salmon.

In conclusion, MAXFERM reduced the inflammatory reaction after a challenge with soybean meal indicating the support of gut integrity in Atlantic salmon. Diets supplemented with MAXFERM offer a unique opportunity to increase the amount of soybean meal in the diet of salmon lowering feed costs without reducing growth performance.