TECHNICAL RESEARCH REPORT

RETENTION OF JEFO'S PROTEASE ACTIVITY AFTER EXTRUSION AS REFLECTED IN GROWTH AND DIGESTIBILITY OF NUTRIENTS IN TILAPIA AND SALMONIDS

Conducted by Jefo

BACKGROUND

This brief summary is a compilation of various trials conducted by Jefo with extruded feed to examine the effects of proteolytic Enzyme Complex on growth and apparent digestibility of crude protein, total carbohydrates and gross energy of Tilapia and three salmonid species. All diets were prepared through a high temperature extrusion process. The highest temperature and duration for the extruded Tilapia feed was 120°C for <1-min while for the salmonid feed, they were 120-130°C and 5-10 seconds, respectively.

TILAPIA - GROWTH
(OREOHROMIS AUREAUS X O. NILOTICUS)

METHOD

A trial was conducted with Tilapia (initial body weight - IBW of 1.7g) to investigate the effects of the addition of protease (Proteolytic Enzyme Complex-PEC). Two practical diets with 3 and 9% of fishmeal (FM) were prepared either by extrusion (120°C, <1 min) or by pelleting (60°C). The trial was conducted by Dr. X.-J. Leng of Shangahi Ocean University, China.

TREATMENTS

1) 3% FMPD (3% fishmeal-pelleted)
2) 3% FMPD + PEC (3% fishmeal-pelleted + Proteolytic Enzyme Complex)
3) 9% FMPD (9% fishmeal-pelleted)
4) 9% FMPD + PEC (3% fishmeal-pelleted + Proteolytic Enzyme Complex)
5) 3% FMED (3% fishmeal-extruded)
6) 3% FMED + PEC (3% fishmeal-extruded + Proteolytic Enzyme Complex)
7) 9% FMED (9% fishmeal- extruded)
8) 9% FMED + PEC (9% fishmeal- extruded + Proteolytic Enzyme Complex)

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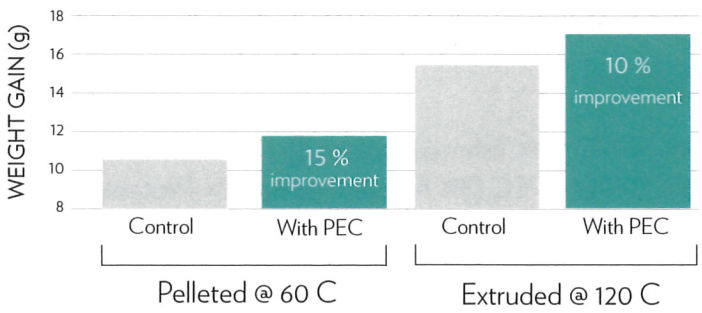
Table 1: Effects of Proteolytic Enzyme Complex on growth and feed coefficient of Tilapia in Experience 1

Groups	Initial body weight (g)	Final body weight (g)	WG %	FCR
3% FMPD	1.7	12.1[a]	613[a]	1.51[b]
3% FMPD + PEC	1.7	13.6[b]	703[b]	1.41[a]
9% FMPD	1.7	19.8[a]	1070[a]	1.22[b]
9% FMPD + PEC	1.7	21.1[b]	1141[b]	1.13[a]
3% FMED	1.7	17.2[a]	912[a]	1.44[a]
3% FMED + PEC	1.7	18.7[b]	1001[b]	1.37[a]
9% FMED	1.7	22.3[a]	1217[a]	1.08[a]
9% FMED + PEC	1.7	21.8[a]	1185[a]	1.12[a]

Means with different superscripts in the same column indicated significant difference (P<0,05)

Figure 1: Growth improvement of Tilapia fed either pelleted or extruded diets with or without the addition of Proteolytic Enzyme Complex (PEC)

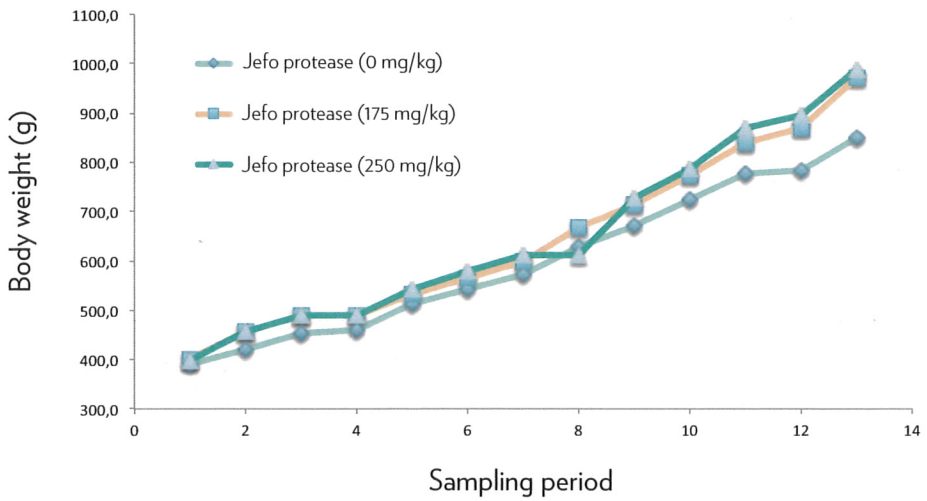


RAINBOW TROUT - GROWTH

METHOD

A growth trial was conducted with rainbow trout fed a commercial feed with the addition of three levels of Proteolytic Enzyme Complex (PEC) (0, 175 and 250 g ton^{-1}, diets 1, 2 and 3, respectively). The commercial feed was prepared by extrusion where maximum temperature was between 120 and 130°C for 5-10 seconds. The growth trial was conducted in Chile. **The growth of Rainbow Trout fed a commercial diet with the addition of 175 g ton^{-1} PEC (diet 2) or 250 g ton^{-1} PEC (diet 2) was significantly higher than those fed the control diet (diet 1) (Figure 2).**

Figure 2. Growth improvement of rainbow trout fed extruded commercial diets with or without the addition of Proteolytic Enzyme Complex (PEC)



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THREE SALMONID SPECIES - DIGESTIBILITY

METHOD

Three digestibility trials were conducted separately with three salmonid species, Coho Salmon (*Oncorhynchus kisutch*), Atlantic salmon (*Salmo salar*) and Rainbow Trout (*O. mykiss*). Two diets of about 45% CP (with the protease enzyme supplemented at 175 mg/kg and without any supplementation) were prepared with 35% fishmeal, soybean meal (14%) and corn gluten meal (15%) as major protein source. Both diets were prepared following an extrusion process at the highest temperatures of 120-130oC for <30 seconds. The trials were conducted at the Universidad Catolica de Temuco, Temuco, Chile. Fish fed diets with the Jefo protease showed significantly higher ADC of crude protein (Figure 3.1), total carbohydrates (3.2) and gross energy (3.3) than those fed the control diets. **The apparent digestibility (ADC, %) of crude protein, total carbohydrate and gross energy improved significantly for all three species (Figures 3-1,2, and 3).**

Figure 3-1: Apparent digestibility of crude protein (ADC-CP) in three salmonid species fed (35%) fishmeal diets with and without the addition of Proteolytic Enzyme Complex

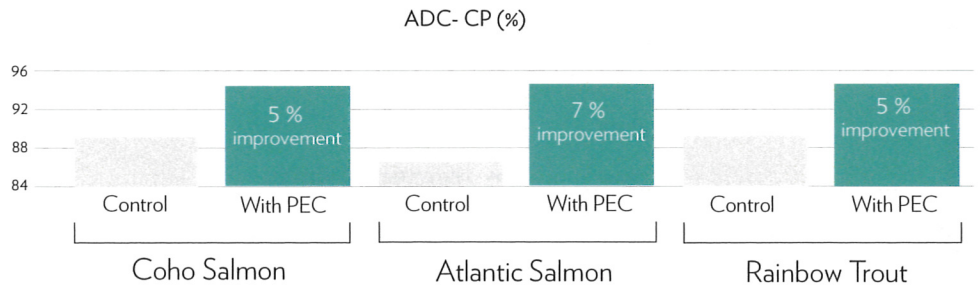

Figure 3-2: Apparent digestibility of total carbohydrates (ADC-CHO) in three salmonid species fed (35%) fishmeal diets with and without the addition of Proteolytic Enzyme Complex

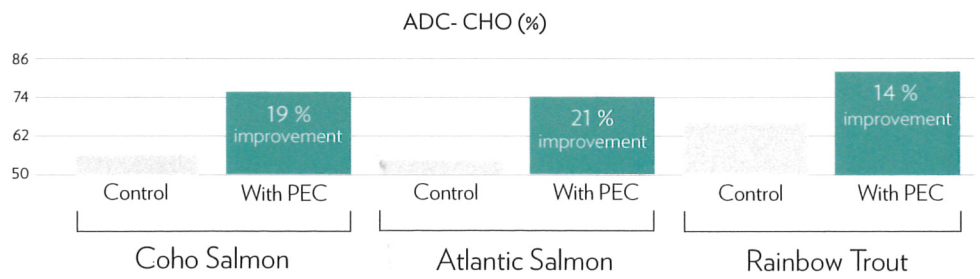

Figure 3-3: Apparent digestibility of dietary gross energy (ADC-energy) in three salmonid species fed (35%) fishmeal diets with and without the addition of Proteolytic Enzyme Complex