



Butirex C4 improves the intestinal tract structure in Nile Tilapia (*O. niloticus*)

(Brasil, 2018)

This trial aimed to verify the effect of two different Na-butyrate sources: unprotected and protected (BUTIREX C4) at different concentrations in Nile tilapia. The present report is the second part of the study. Briefly, in the first part with Butirex C4 were improved the effects on zootechnical, hematological and disease resistance parameters. In this part of the study, the effects in the structure of the intestinal tract were evaluated.

Method and Material:

The trial was carried out by Aquaculture Department of the University of Santa Catarina (Brazil), 2018. A total of 2,250 post-larvae (13 mm size and 18 mg weight) were randomly distributed in 15 tanks of 100 l each, until 28 days of age. Diets were based on NRC (2011) of *O. niloticus* juveniles.

At 28 days of experiment, 5 fish from each experimental unit were euthanized and fragments of intestine were collected

from two regions to measure the villi histomorphometric parameters of anterior and posterior intestinal tract.

Results:

Fish fed diet with 0.5% Butirex C4 for 28 days had a longer villi length, villi perimeter and villi area of the anterior intestinal region. Control and NaBut 0.25% groups had a lower value in villi width (Table 1). And goblet cells per villi in this region was similar between treatments.

Treatments	Inclusion
Control Group	
Not protected	0.25%
Na-butyrate	0.5%
Protected	0.25%
Butirex C4	0.5%

Table 1: Histomorphometric parameters of anterior intestinal tract of Nile tilapia at 28 days.

Parameter anterior intestinal tract	Control	NaBut 0.25%	NaBut 0.5%	Butirex C4 0.25%	Butirex C4 0.5%
Villi length (μm)	118.41 ab	89.71 b	152.46 ab	171.2 ab	177.15 a
Villi width (μm)	58.53 b	40.14 b	71.97 a	74.51 a	85.98 a
Villi Perimeter ($10^3 \mu\text{m}$)	6.15 ab	4.16 b	6.61 ab	8.25 a	9.14 a
Villi Area ($10^3 \mu\text{m}$)	235.29 ab	96.78 b	325.34 ab	377.24 ab	414.68 a
Goblet cells/villi	3.35	2.82	2.62	3.65	3.34

*Different letters in the line indicate significant difference ($P < 0.05$).

BUTIREX C4 with specific protection increases the availability of butyrate at intestinal level to promote the intestinal villi development

In posterior intestinal region, animal fed with Butirex C4 at 0.5% showed greater villi length and villi perimeter compared with Control or Pure 0.25% (Table 2). Higher villi area was observed in animals fed with Butirex C4 at 0.25%. Pure 0.25% and Buffer 0.25% obtained numerically higher value of goblet cells per villi.

Table 2: Histomorphometric parameters of posterior intestinal tract of Nile tilapia at 28 days.

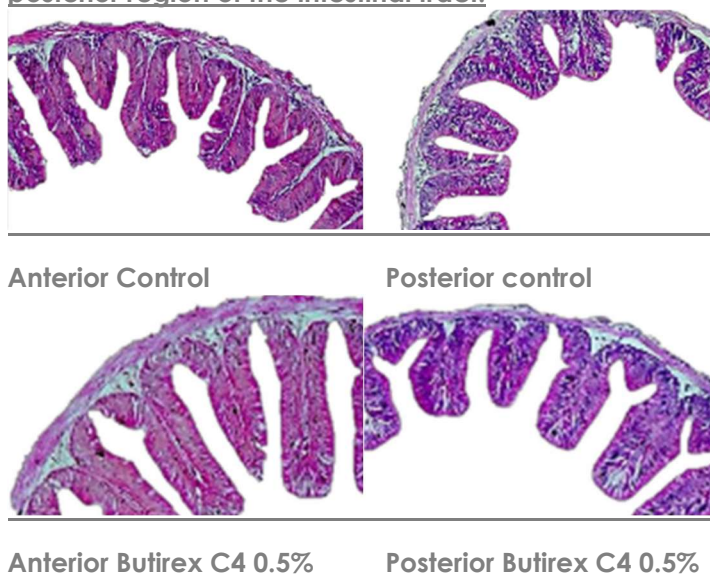
Parameter posterior intestinal tract	Control	NaBut 0.25%	NaBut 0.5%	Butirex C4 0.25%	Butirex C4 0.5%
Villi length (μm)	81.26 b	81.05 b	95.91 ab	92.19 ab	99.94 a
Villi width (μm)	55.26	53.63	50.05	57.66	48.02
Villi Perimeter ($10^3 \mu\text{m}$)	2.94 b	3.19 b	4.18 ab	3.84 ab	5.02 a
Villi Area ($10^3 \mu\text{m}$)	92.35 ab	96.36 b	114.31 ab	152.77 a	128.09 ab
Goblet cells/villi	8.73	10.6	4.81	10.72	7.21

*Different letters in the line indicate significant difference ($P < 0.05$).

Results: Protected Butirex C4 at 2.5-5 kg/Mt showed an improvement for all the histomorphology parameters of villi in the anterior and posterior region of the intestine; Butirex C4 showed a more effective release at the upper part of the intestine.

The aspect of the anterior and posterior region of the Control and Butirex 0.5% groups are shown in Figure 1. Control group presented inferior development of villi as compared with protected Butirex C4 form. The better development of anterior and posterior villi was observed with 0.5% of Butirex C4, it may indicate how a good initial protection and easy release at upper intestine is critical to optimize the mode of action of butyrate.

Figure 1. Qualitative evaluation of the anterior and posterior region of the intestinal tract.



Conclusions:

Protected form of sodium butyrate “Butirex C4” in the diet of Nile tilapia improves the health and development of the intestine from 2.5 to 5 kg/mt feed

The effects of Butirex C4 improved economical performance, survival and the prevention of diseases, according with the first part of the study