
(Oncorhynchus mykiss)

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(/ / : // :)

± /

(Oncorhynchus mykiss)

...

Morais *et al.*,)

.(2007

Tidwell and Allen)

.(2002

Cahu *et al.*,)

.(Cahu *et al.*, 2003)

.(2009

Kanazawa *et al.*, 1985a,b ; Tocher *et*)

Coutteau *et al.*,) (al., 2003

Buchet *et al.*,) (1997

2000 ; Cahu *et al.*, 2003; Gisbert *et al.*, 2005 ;
(Morais *et al.*, 2007; Hamza *et al.*, 2008

et al., 2000)

(Koven *et al.*, 1993)

(Fontage

.(Cahu *et al.*, 2003)

Izquierdo *et al.*, 2000 ;)

(Wold *et al.*, 2007

()

.(Geurden *et al.*, 2006)

Archive of SID

...

.(Kanazawa *et al.*, 1981)

(Tocher *et al.*, 2008)

(Dabrowski *et al.*, 2007)

(mg/l) ± /
pH= / / (mg/l) /
/ (mg/l)

)
(
(Merck BDH
()

Archive of SID

± /

(1995) AOAC

HERAEUS

D-63450 Hanau

INSTRUMENTS

...

()

(Kjeltec

Analyzer Unit 2300)

/
Soxtec) FOSS

(2050

(SGR) (FCR)
(CF) (WG%)

$$= (FCR)^1$$

() / ()

(AOSC, 1997)

$$\times () / = (CF)^2$$

$$\text{Ln} \quad \text{Ln} = (SGR)^3$$

\times / (

$$] = (WG)^4$$

\times () / [() ()

$$) = (\text{Survival})$$

\times (/

(Metcalf *et al.*, 1966)

BF₃ %

(Izquierdo *et al.*, 2002)

Varian (GC)

SGM 120m×0/25mm)

i.d., film thickness 0/25mm) BPX70

FID

¹ Food conversion ratio (FCR)

² Condition factor (CF)

³ Specific growth rate (SGR)

⁴ weight gain (WG)

(Supel Co. Fame Mix, USA)

...

()						
/	/	/	/	/	/	Σ SFA
/	/	/	/	/	/	Σ MUFA
/	/	/	/	/	/	C18:2n-6
/	/	/	/	/	/	EPA
/	/	/	/	/	/	DHA
/	/	/	/	/	/	EPA+DHA
/	/	/	/	/	/	DHA/EPA
/	/	/	/	/	/	Σ HUFA
/	/	/	/	/	/	Σ PUFA
/	/	/	/	/	/	Σ N6
/	/	/	/	/	/	Σ N3
/	/	/	/	/	/	N3/N6
:HUFA			:PUFA		:MUFA	:SFA
	(C : n)			:DHA (C : n)		:EPA

SPSS
 One-way-ANOVA
 Duncan
 /
 Leven

(p > /)

(p < /)

(p > /)

(p < /)

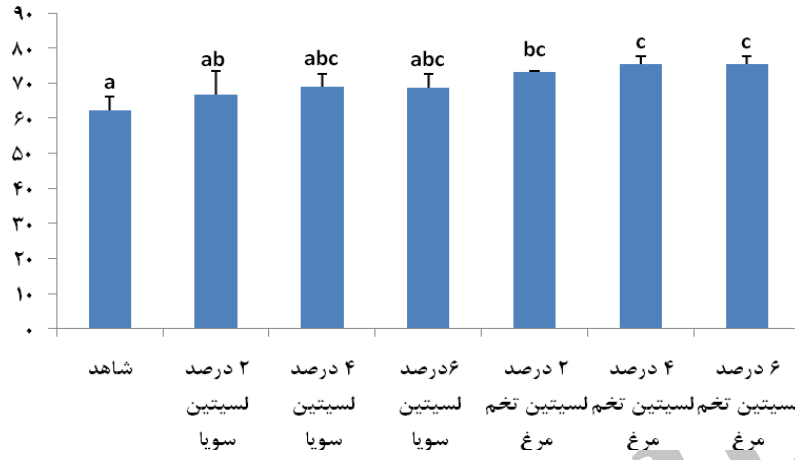
(p > /)

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$/ \pm / ab$	$/ \pm / bc$	$/ \pm / c$	$/ \pm / ab$	$/ \pm / ab$	$/ \pm / a$	$/ \pm / a$
$/ \pm / ab$	$/ \pm / bc$	$/ \pm / c$	$/ \pm / ab$	$/ \pm / ab$	$/ \pm / a$	$/ \pm / a$
(SGR)						
$/ \pm / ab$	$/ \pm / ab$	$/ \pm / a$	$/ \pm / c$	$/ \pm / abc$	$/ \pm / abc$	$/ \pm / bc$
(FCR)						
$/ \pm / ab$	$/ \pm / bc$	$/ \pm / c$	$/ \pm / ab$	$/ \pm / ab$	$/ \pm / a$	$/ \pm / a$
$/ \pm /$	$/ \pm /$	$/ \pm /$	$/ \pm /$	$/ \pm /$	$/ \pm /$	$/ \pm / n.s$
$/ \pm / b$	$/ \pm / a$	$/ \pm / a$	$/ \pm / a$	$/ \pm / a$	$/ \pm / a$	$/ \pm / a$
$(p < /)$			$(\pm n=)$			



(n=) = .

(Kanazawa *et al.*,)

(1985b)

(Gisbert *et al.*, 2005)

(Geurden *et al.*, 1995,1997)

(Kanazawa *et al.*,1981)

(Izquierdo *et al.*, 2000;)

(Wold *et al.*, 2007)

(*Cyprinus carpio*)

(*Scophthalmus maximus*)

(*Plecoglossus altivelus*)

(Dabrowski *et al.*, 2007; Abedian *et al.*, 2011)

n

n

n

(Olsen *et al.*, 1999)

n

n

-

de vono

(Tocher *et al.*, 2008)

(Caballero *et al.*,)

HUFA (2003)
 HUFA
 HUFA
 Sargent *et al.*,) HUFA n-
 (Tago *et al.*, 1999) HUFA n- (1999)
 DHA
 DHA
 (Gisbert *et al.*, 2005)
 : n) (HUFA) HUFA n-
 (EPA, C : n) (ARA, C
 (Cahu *et al.*, 2003) A
 Tocher *et al.*,)
 (2008 *Penaeus*) (*Plecoglossus altivelis*)
 Kanazawa *et al.*, 1981, 1985) (*japonicus*)
 (a,b
 HUFA
 ()
 (Ishikawa, 2007)
 HUFA
 Kanazawa *et al.*, 1981;
 (Geurden *et al.*, 1995)
 (*Plecoglossus altivelis*)
 (*Cyprinus carpio*) Knife jaw

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The Effect of Soybean and Egg Lecithin on the Growth, Survival and Resistance to Anoxia Stress in Rainbow trout (*Oncorhynchus mykiss*) Alevin

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Abstract

This study was conducted to evaluate the effect of different lecithin sources and their levels on growth performance and resistance to anoxia stress of rainbow trout (*Oncorhynchus mykiss*) alevin with initial weight of 120 ± 4.08 g for 40 days. Soybean and egg lecithin at 2, 4 and 6 % levels were added to the diets. Seven treatments by three replications were used in this experiment. Therefore, 165 alevin were used per each 90 L tank. Alevin were fed to visual satiation at six meals per day for 40 days. At the end of experiment, alevins were fed by 2% egg lecithin had significantly higher ($p < 0.05$) growth performance compared to control group. Growth parameters in soybean lecithin groups were not significantly different compared to control group. Alevins were fed by 6 % egg lecithin had significantly higher survival rate than other treatments and control group. Also alevins were fed by all levels of egg lecithin had significantly higher resistance to anoxia stress compared to control group. The result of this experiment showed that egg lecithin induced to significantly affect on the growth performance and resistance to anoxia stress. The optimal dietary level of egg lecithin for this size is 2 % of diet.

Keywords: Soybean lecithin, Egg lecithin, Alevin, Growth, Stress, Rainbow trout

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