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*(Oncorhynchus mykiss)*

\*

( / / : / / : )

± /

( / / ) ( % )

Kcal/Kg

( ) (p ≥ / )

( )

( )

/ (p ≥ / )

/ ( % )

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*(Oncorhynchus mykiss)*

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Protein sparing

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AOAC(1990)

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(Completely Randomized Design)

( ) (Lindo)

					⚡ (%)
/	/	/	/	/	
/	/	/	/	/	
/	/	/	/	/	
/	/	/	/	/	
/	/	/	/	/	
/	/	/	/	/	(NFE)*
/	/	/	/	/	(Kcal/Kg)

( + + + + )

\*

(%)								
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	
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(Pellet)

( )

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								(%)
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/	/	/	/	/	/	/	/	NFE
/	/	/	/	/	/	/	/	(Kcal/kg)

( )

± /

( \* \* )

( )

( )

(SGR)

(FCR)

( ) (HSI)

(CF)

(PER)

( )

pH

/ /

:

( )

/ /

$$\begin{aligned}
 ( ) &= \\
 (\text{FCR}) &= / \\
 (\text{SGR}) &= \{(\ln w_2 - \ln w_1) / \}^* \\
 (\text{PER}) &= ( ) / ( ) \\
 (\text{CF}) &= ( ) / (( ) ) \times \\
 &= \times \\
 / &= (\text{HSI}) \\
 W_1 &= \quad W_2 =
 \end{aligned}$$

(Two – Way ANOVA)  
SPSS  
Tukey

( $p \geq /$  )      ( $p \leq /$  )

\*

		↕(%) ↕
/ ± / a	/ ± / a	(g)
/ ± / a	/ ± / a	(g)
/ ± / a	/ ± / a	(FCR)
/ ± / a	/ ± / a	(SGR)
/ ± / a	/ ± / b	(PER)
/ ± / a	/ ± / a	(CF)
/ ± / a	/ ± / a	( )
± / a	± / a	

( $p \leq /$  )

, S.D±

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/  
,  
(p ≥ / )

\*

	/		/	↔
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	(g)
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	(g)
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	(FCR)
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	(SGR)
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	(PER)
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	(CF)
/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	/ ± / <sup>a</sup>	( )
± / <sup>a</sup>	± / <sup>a</sup>	± / <sup>a</sup>	± / <sup>a</sup>	

(p ≤ / ) , S.D± \*

(p ≥ / )  
( )

/	/	/ *	/	/	/	/	/	
/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	

(p ≤ / ) \*

( )

( $p \leq /$  )

\*

		$\rightarrow$ (%)
$/ \pm / a$	$/ \pm / a$	$\leftarrow$ (%)
$/ \pm / a$	$/ \pm / a$	
$/ \pm / a$	$/ \pm / a$	
$/ \pm / a$	$/ \pm / a$	
$/ \pm / a$	$/ \pm / a$	(Kcal/Kg)

( $p \leq /$  )

, S.D $\pm$

\*

\*

	$/$		$/$	$\rightarrow$
$/ \pm a$	$/ \pm / a$	$/ \pm / a$	$/ \pm / a$	$\leftarrow$ (%)
$/ \pm / a$	$/ \pm / a$	$/ \pm / a$	$/ \pm / a$	
$/ \pm / b$	$/ \pm / ab$	$/ \pm / ab$	$/ \pm / a$	
$/ \pm / a$	$/ \pm / b$	$/ \pm / c$	$/ \pm / a$	
a	a	a	$/ \pm / a$	(kcal/kg)

( $p \leq /$  )

, S. D $\pm$

\*

( )

( $p \geq /$  )

...

/	/	/	/	/	
/	/	/	/ *	/ *	
/	/	/	/ *	/	

(p ≤ / ) \*

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/

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( )

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			↖
/ ± / a	/ ± / a	/ ± / a	
/ ± / a	/ ± / a	/ ± / a	

(p ≤ / ) , S.D± \*

			↖
/ ± / a	/ ± / a	/ ± / a	/
/ ± / b	/ ± / a	/ ± / a	
/ ± / c	/ ± / a	/ ± / a	/
/ ± / d	/ ± / a	/ ± / a	

(p ≤ / ) , S.D± \*



/	/	/	
/	/ *	/	
/	/ *	/	

( $p \leq /$ )

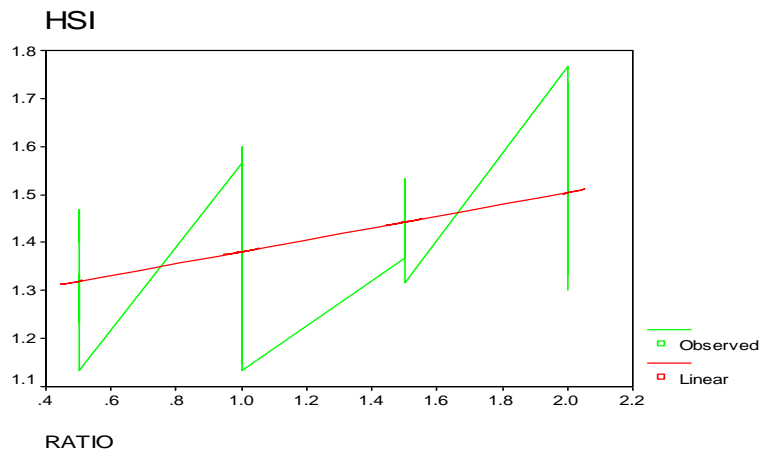
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(R)

( $p \leq /$ )

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( )



(HSI)

(Ratio)

( )

( )

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( )

(Gross Energy)  
(Digestible Energy)

KCal/100g

/ /

protein

sparing

)  
/ /

( )  
(

(p ≥ / (

( : / ) /

( : / ) /

( : )

(Gelatinized Starch)  
(Crude Carbohydrate)

( / : ) /

( : )

( )

/ : / / : / / : /

( )

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(p ≥ / )  
( )

(p ≥ / )

( )

( )

Lipogenes

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*Oncorhynchus mykiss*

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## Effects of dietary Carbohydrate to lipid ratios at two levels of Protein on Growth Performance, body composition and Hepatosomatic index of Rainbow trout (*Oncorhynchus mykiss*)

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### Abstract

Effects of carbohydrate to lipid ratio at two different protein levels on the activity, growth, chemical composition of the body and the Hepatosomatic index of rainbow trout (*Oncorhynchus mykiss*) were investigated in this trial. For this purpose, fishes with the average weight of  $60 \pm 0/55$ g were used. The fishes grew in 1,000-L tanks filled up to 500 L of water for a period of 60 days. The experiment was conducted as a  $2 \times 2$  factorial at two protein levels (40% and 45%) and four carbohydrates to lipid ratios (0.5, 1, 1.5 and 2). The experiments were carried out randomly in triplicate. The food quota was almost fixed and equal to 4,000 kcal/kg. The food to be daily consumed by the fishes was determined as 2% of the biomass in each tank and the fishes were fed twice a day. The weight of the biomass was measured every 14 days though biometry and growth indexes were calculated. Results showed that the increase in the protein content produces almost no significant difference among the treatments in terms of growth indexes ( $p \geq 0.05$ ), and this increase did not improve growth indexes (weight gain, SGR, and PER). The FCR and price index were also better at the lower protein content (40%). On the other hand, an increase in the carbohydrate to lipid ratio (increase in carbohydrate and decrease in lipid) showed no significant difference among the treatments in terms of growth indexes ( $p \geq 0.05$ ) but the growth improved at the ration of 0.5 in general. Results of this research shows the most favorable conditions for growth exist at lower protein content (40%) when the carbohydrate to lipid ratio is 0.5 without any negative effects on the liver.

**Key words:** *Oncorhynchus mykiss*, Nutrition, protein, carbohydrate/lipid ratio, growth performance, body composition, Hepatosomatic index

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