



## EFFECT OF DIFFERENT ADDITION LEVELS OF DIETARY BROKEN RICE ON SOME LIVER ENZYMES AND HEPATOSOMATIC INDEX OF COMMON CARP (*CYPRINUS CARPIO*)

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### Abstract

This study was conducted at Animal Production Department, College of Agricultural Engineering Sciences, University of Baghdad, Al-Jadiriya. From September to November 2018. Twelve glass aquaria with dimensions of 40 cm × 30cm × 30 cm were occupied by 60 common carp fish (18±1 gm mean weight) randomly distributed into six treatments with replicates (5 individuals/replicate). Fish fed 3 % of body weight with six laboratorial made diets (1.5mm diameter) supplemented with different percentages of broken rice (0, 15, 30, 45, 60 and 75%) with a crude protein ranged 21.15 % - 25.40 % and 47.28 % - 61.09 % carbohydrates. Results showed that treatment 5 (60 broken rice) had highest values of AST (305.00 U/L) and ALT (270.00 U/L) and did not differ significantly with T6 in Hepatosomatic index value (2.16 %). The study concluded that extra- requirements of carbohydrates to common carp would show negative liver performance and fish health.

**Key words :** Hepatosomatic index, carbohydrate, liver enzymes, carp

### Introduction

The increasing in world population combined with increasing in sea and freshwater food were the main reasons to elevate the world demand (Abimorad and Carneiro, 2007). In fish farming business availability quality and sustainable feed is the major contributor of cost, where about 60 – 80 of the production cost of fish is for feed (Houlihan and Boujard, 2001). One way that can be done to overcome these problems is by utilizing local feed raw material such as broken rice. Carbohydrates are the less cost among fish diet ingredients that have direct effect on growth efficiency and fish healthy (Wilson, 1994; Lovell, 2002). Tian *et al.* (2012) reported that Herbivorous and Omnivorous have ability to digest high levels of carbohydrates more than 30%. However increasing carbohydrates in fish diets more than requirement lead to disease condition (Kumar *et al.*, 2005). Liver is consider main organ of digestion system (Vikramjit, 2012). And Enzymes are a protein stimulator of bio-interactions. Any reduction or increasing in the enzymes of the liver such as Aspartate amino transferase ( AST ) or Alanine amino transferase (ALT) indicate that some damages would be happened in the liver cells (Jeney *et al.*, 2002). Ebeid *et al.* (2005) reported that increase concentrations of ALT or/and AST in fish blood serum may be due to weather physiological, nutritional or disease conditions. The aim of this study was to investigate the effects of addition different levels of broken rice on the blood serum enzymes of common carp (*Cyprinus Carpio*).

### Materials and Methods

This study was conducted in the Fish Laboratory of the Faculty of Agricultural Engineering Sciences, University of Baghdad, 60 common carp fish were used, for 90 days. The fish were distributed into 12 glass aquaria with dimensions of 40 cm × 30 cm × 30 cm, each aquarium basin contained 30 liters. Fish were adapted for 15 days and fed 3% of body weight on six diets contained six levels of broken rice (0, 15, 30, 45, 60 and 75%) as carbohydrate source for 90 days, liver enzymes were measured and Hepatosomatic Index was calculated.

#### Measurement of Liver Enzymes

Blood samples were taken from experimental fish by heart puncture method. Blood serum was isolated and centrifuged at 3000 round/min. for 15 minutes and then placed for biochemical measurements of Aspartate amino transferase (AST) and Alanine amino transferase (ALT ) using a Plus Reflotron device

#### Calculation of Hepatosomatic Index (HIS)

The values of Hepatosomatic index were calculated by using the formula

$$\text{Hepatosomatic index \%} = (\text{Wet weight of the liver} \div \text{Wet body weight}) \times 100$$

**Table 1 :** Ingredients composition of the reference diet

	T1	T2	T3	T4	T5	T6
fish meal	15	15	15	17	21	24
Soybean	20	21	22	21	15	-----
Wheat bran	15	15	15	8	1	-----
Corn yellow	44	28	12	3	1	-----
Broken rice	0	15	30	45	60	75
Wheat flour	1	1	1	1	1	-----
Fish oil	2	2	2	2	0.5	0.5
V/M Premix	2	2	2	2	0.5	0.5
salt	1	1	1	1	-----	-----

**Table 2 :** Proximate composition (% dry matter basis) of the test diets

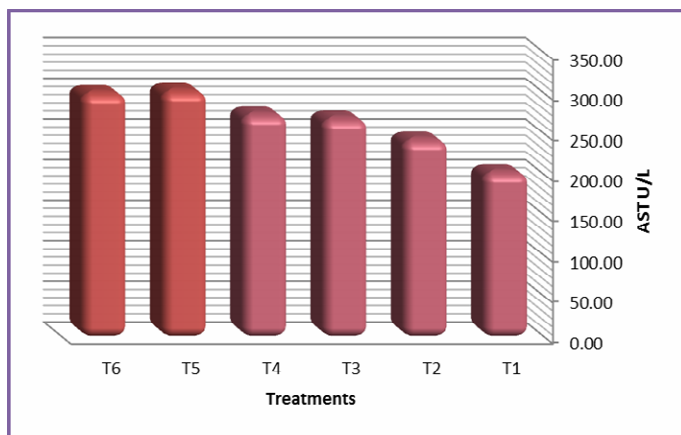
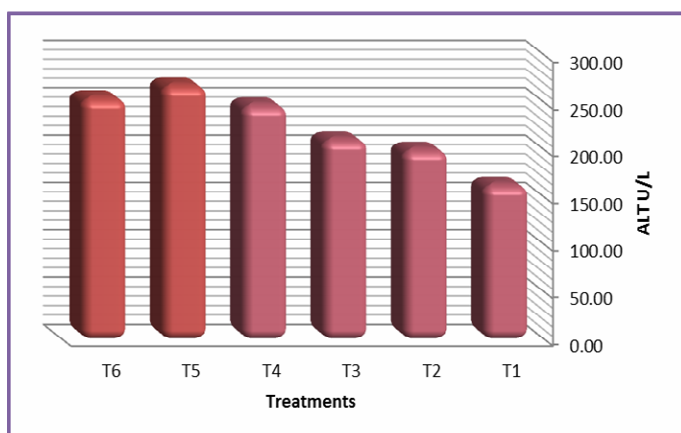
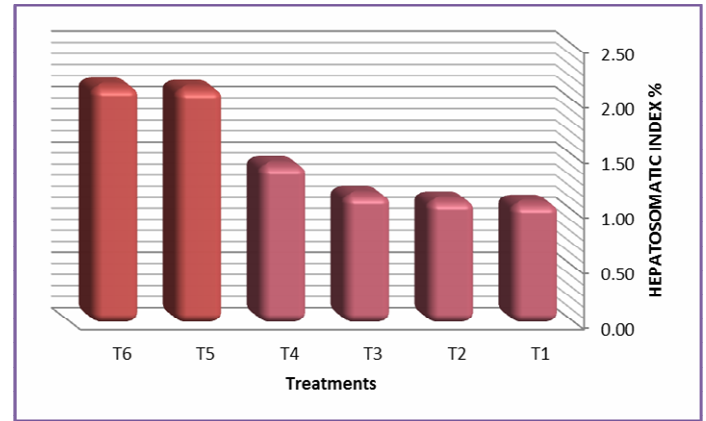
	T1	T2	T3	T4	T5	T6
Crude protein	25.40	25.33	25.23	25.07	24.22	21.15
Lipid	6.15	5.63	5.11	4.30	3.15	3.01
Ash	8.41	8.16	8.08	7.91	7.64	6.23
Crude fiber	7.34	6.95	6.28	5.41	4.32	4.00
Total Carbohydrate	47.28	48.66	50.13	52.21	55.85	61.09

## Results

AST enzyme of blood serum of fish fed different levels broken rice showed a significant difference among all treatments where T5 and T6 had the highest values (305.00 and 302.50 U/L respectively) whereas T1 showed the lowest (205.00 U/L) without any significant difference with T2 (Fig. 1). AST of T3 and T4 were not differed significantly between them but differed from T5, T6, T2 and T1.

Figure 2 showed that significant difference (P 0.05) in ALT enzyme between all treatments, T5 was the highest (270U/L) while the lowest value also recorded in T1 (165 U/L)

Results of statistical analysis of Hepatosomatic index showed significant differences between all treatments (Fig. 3). No significant differences between T5 and T6 (2.15 and 2.16 % respectively), followed by T4 (1.45%) which differ from T1, T2, T3. T2 and T3 were equal while T1 was lowest value (1.10%).

**Fig. 1 :** AST enzyme in common carp fish serum fed at different levels of broken rice**Fig. 2 :** ALT enzyme in common carp fish serum fed at different levels of broken rice**Fig. 3:** Hepatosomatic index of common carp fish fed at different levels of broken rice

## Discussion

It observed from the results that AST was high but it was within the normal range While ALT enzyme was higher than normal values Which referred by Das *et al.* ( 2004 ). Liver enzymes AST and ALT are an important indicator of liver function activity and the extent of damage that may occurs when it rises above normal value (Liu *et al.*, 2010).

Kumar *et al.* (2005) reported that increase the ratio of dietary digestible carbohydrate in the diet can affect the secretion of blood serum enzymes AST and ALT. the current study the reasons of high liver enzymes (AST and ALT) may be attributed to the high level of carbohydrates in the diets of common carp . Which led to deposition of large amounts of stored glycogen in the liver. The results of Hepatosomatic index showed high synchronization with the increase in dietary carbohydrate ratios in, Which may damage liver cells.

Hemer *et al.* (2002). Dorcas and Solomon, (2014) reported that any may occur Increase AST and ALT serum enzymes due to damage in liver cells.

Increase in the Hepatosomatic index in the treatments which contain high levels of carbohydrates may be attributed to deposition glycogen in the liver of fish that resulted from degrade and digestion the carbohydrates in large amount which lead to increase liver weight. There is no significant different between control, T2 and T3 which refer to the ratio of carbohydrate in T1, T2 and T3 within the requirement needs of the carp fish (NRC, 2011). Increased levels of broken rice lead to increased Hepatosomatic index due to deposition of glycogen in the fish liver resulting from the decomposition and digestion of carbohydrates leads to increased oil as evident in T5 and T6. Fu (2005) reported that increase liver size due to metabolizable carbohydrate that not use for energy but deposition as a glycogen in the liver. As well as, using high levels of starch in the diet lead to rise up Hepatosomatic index (HIS)) in eel (*Anguilla anguilla*) and trout (*Oncorhynchus mykiss*) Suarez *et al.*, 2002) and African catfish (*Clarias gariepinus*) (Ali and Jauncey, 2004) and

Atlantic halibut (*Hippoglossus hippoglossus*) (Hatlen *et al.*, 2005).

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