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THE EFFECT OF FEEDING WITH COMMERCIAL DRY FOOD AND BARLEY ON SOME BIOCHEMICAL PARAMETERS OF BLOOD OF FARM-RAISED COMMON CARP (*Cyprinus carpio*) IN POLY CULTURE METHOD

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ABSTRACT

The aim of this study was investigation of the impact of barley and commercial dry food feeding on Biochemical Parameters of cultured common carp (*Cyprinus carpio*). Juveniles were stocked at 1000/ha in poly-culture system for 8 months. Treatment 1st was fed with barley and treatment 2 with commercial dry food. The results revealed that the overall mean of total protein, cholesterol, triglycerides and glucose in barley treatment were 4.19±0.549, 253.56±141.303, 320.63±182.172, 49.75±15.356 mg/dl, respectively and in commercial dry food were 4.73±0.306, 302.06±52.488, 187.33±49.082, 64.78±18.164 mg/dl, respectively. Results showed that glucose levels, total protein and triglycerides in treatment were fed with commercial dry food, were significantly higher than the other treatment ($P<0.05$) .There was no significant difference between cholesterol levels of two treatments.

Keywords: Commercial Dry Food, Barley, Common Carp (*Cyprinus carpio*), Biochemical Parameters

INTRODUCTION

Common carp is considered as the first farm-raised fish of warm water and in most countries it is particularly important due to its economic benefits **[6]**. Nowadays, the main

contribution to the diet of common carp in producing centers is made up of grain. Grain is considered as the most important source of carbohydrates and also as the cheapest source of energy **[24]**. Grains contain remarkable amounts of carbohydrates but they cannot meet the protein needs of the fish in all growth stages due to their poor source of protein sources. One of the sources of protein supply in the diet is the application of commercial dry food which is today used mainly in proliferation and farming centers.

[16] reported the significant effects of different levels of protein and fat on blood biochemical parameters in the diet of young carp fish. Moreover, **[15]** reported that the replacement of animal protein with plant protein caused a significant ($p<0.05$) differences in the hematocrite, hemoglobin and total protein while significant differences were not found in WBCs, RBCs, cholesterol, triglyceride and albumin plasma($p>0.05$).

Biochemical indices of blood are important indices in species management **[2]**. Moreover, blood cognition parameters are valuable tools for assessing the health status of the fish **[11]** and are influenced by plenty of internal and external factors such as species and strain **[12]**, water temperature, reproductive cycle, metabolic rate **[1]**, age **[21]**, stress, photoperiods **[13]** and nutritional status **[21]**.Thus, these blood factors are very impressive in fish physiology. Consequently, through proper understanding of blood status of the fish it is possible to increase the efficiency of breeding and rearing this valuable fish. With regard to economic importance and commercial value of common carp and also the significant effect of blood factors on health status of the fish, this research aimed to study and compare the effect of feeding with commercial dry food and barley on blood factors of common carp.

MATERIAL AND METHODS

The experiment was performed in six pond (1 hectare) at farm which located around khorramshahr, Iran. In each pond were stocked 1000 juvenile common carp(15±10 gr), 1500 silver carp (*Hypophthalmichthys molitrix*) (30±10 gr), 400 grass carp (*Ctenopharyngodon idella*) (40±10 g), 250 big head (*Hypophthalmichthys nobilis)* (40±10 gr) and 100 *barbus grypus* (40± 10 gr) in poly culture system for 8 months, the supplemental feed used in the diet were barley containing 10% protein, 3.5% lipid and 6% fibre and commercial dry food containing 28-32% protein, 10-12% lipid and 5.5% fibre. The feed was supplied to the ponds twice a day (feed ration equivalent to 4% of actual biomass of common carp. Temperature,

dissolve oxygen (Do) and salinity were measured daily.

At the end of the experiment (8 months) ten fish from each treatment were anesthetized (with clove oil at 100 mg L^{-1}) and blood samples were obtained from caudal vein and transferred to sterile tubes (1-1.5 ml). The quantitative determination of plasma glucose and triglyceride were carried out using commercially available diagnostic kits (Pars Azmoon Co. Iran) by the glucose oxidase method. Glucose and triglyceride were measured photometrically according to a method modified based on the quantification of NADH after a glucose oxidation catalyzed by glucose dehydrogenase. Plasma total protein and cholesterol levels were determined with using commercial kits Sigma 337-B and Sigma 401-25P the method of Canli **[4]**.

All values are expressed as mean±SD For statistical analyses all data were analyzed with T-test (level 95%) by using SPSS 20.

RESULTS

The highest rate of glucose, total protein, and cholesterol was observed in the treatment fed with commercial dry food, and the highest rate of triglyceride was observed in the treatment fed with barley. Among the studied biochemical compounds, cholesterol, triglyceride, glucose, and total protein respectively made up the highest to lowest amount in blood serum of carp fish that were experimented. The rate of glucose in blood serum of the carp fish fed with barley was 49.75 ± 15.356 mg/dl and for those fed with commercial dry food it was 64.78±18.164 **(Figure 1)**. Total protein in blood serum of carp fish fed with barley and commercial dry food was 4.19± 0.549 and 4.73± 0.306 mg/dl respectively **(Figure 2)** and the rate of triglyceride in blood serum of carp fish fed with barley and commercial dry food was 320.63 ± 182.172 and 187.33 ± 49.082 mg/dl respectively **(Figure 4)**. After the end of farming period there was a significant difference between the treatments ($p<0.05$), but there was no significant difference **(Figure 3)** between the rate of cholesterol in blood serum of the carp fish fed with barley (253.56 ± 141.303 mg/dl) and commercial dry food (302.06 ±52.488 mg/dl).

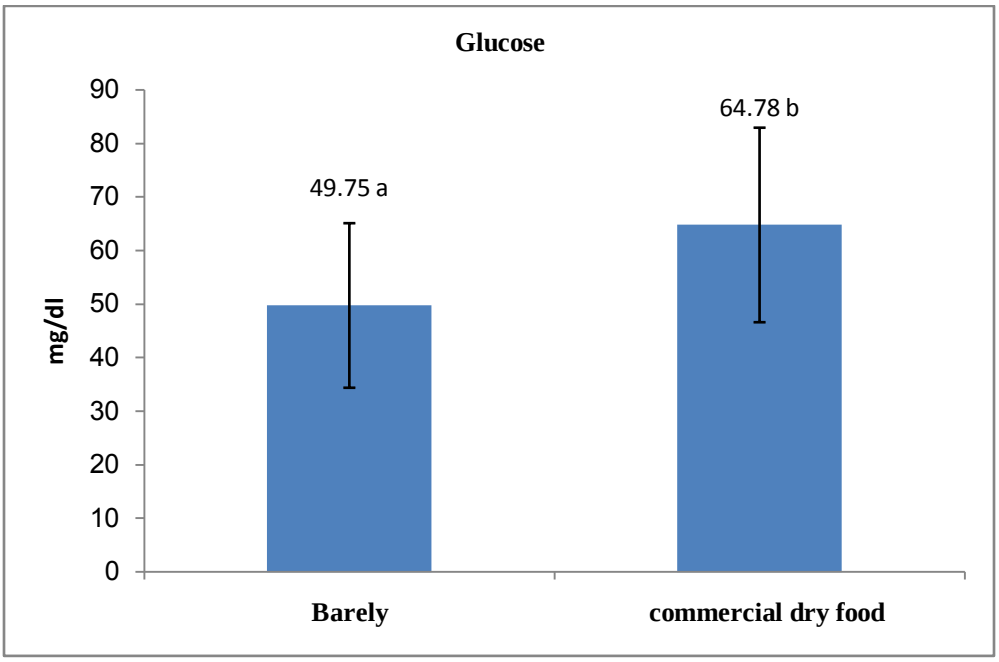

Figure 1: Effect of Diet on Glucose Concentrations. Values are Expressed as Means ± SD

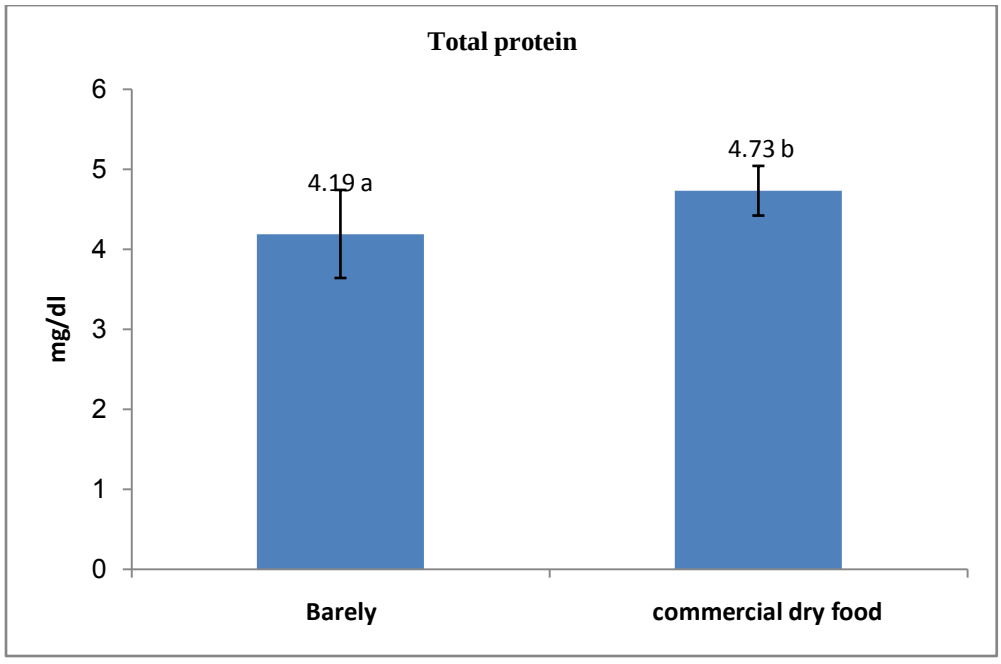

Figure 2: Effect of Diet on Total Protein Concentrations. Values are Expressed as Means ± SD

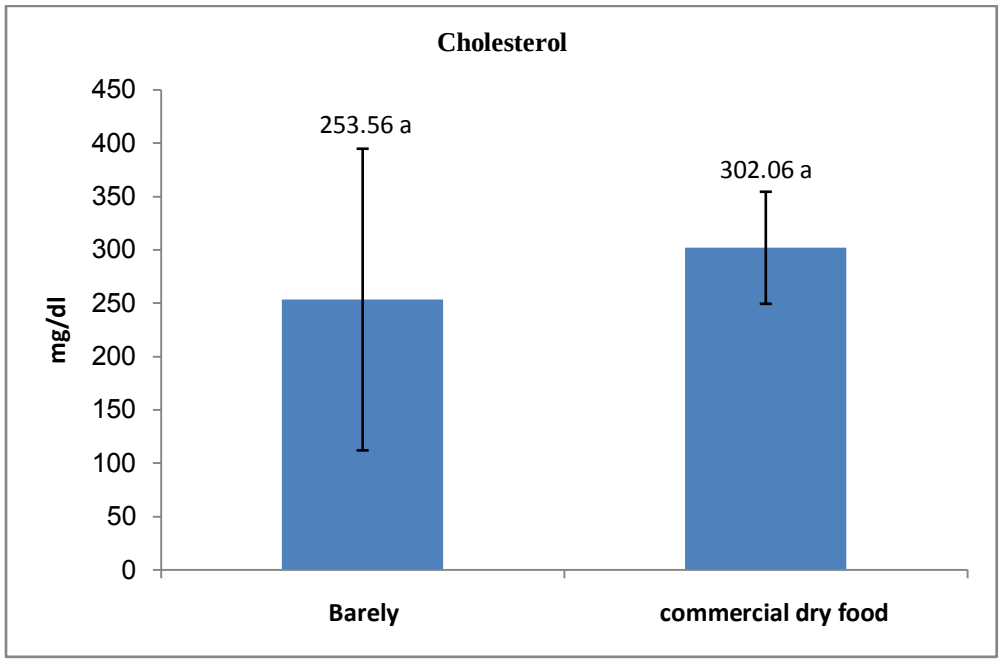

Figure 3: Effect of Diet on Cholestrol Concentrations. Values are Expressed as Means ± SD

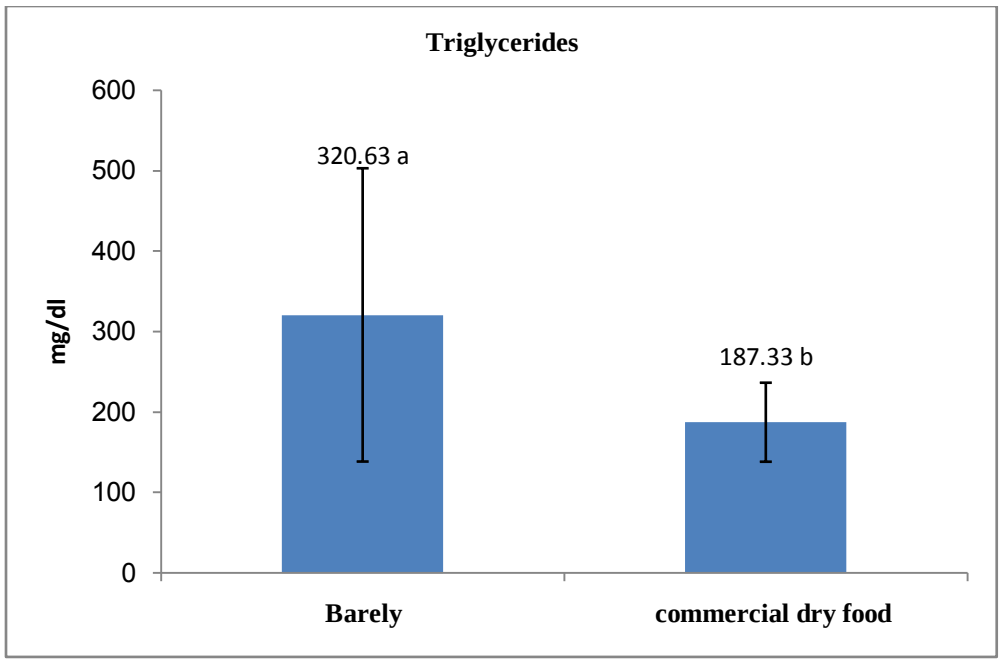

Figure 4: Effect of diet on Triglycerid Concentrations. Values are Expressed as Means ±SD

DISCUSSION

The fish are usually exposed to stressors in farming environment which will lead to primary and secondary physiological responses **[3, 23]**. Nutritional status can affect the fish health and the ways to deal with stress **[9]**. Blood as a readily available fluid tissue is one of the most important fluids of the body whose combinations are fluctuating and changing under the influence of different physiological states **[2]**. Blood parameters are used as physiological indicators of stress in internal and external environment changes of the fish **[5]**. Paying attention to physiological characteristics of the fish plays an Important role in farming them, and since blood is one of the most vital parts of animals body **[7]**, knowing the blood status of the fish particularly knowing the effect of nutrition on blood parameters can be impressive in developing fish farming and breeding objectives.

Glucose is a blood factor which is affected by nutrition more than other factors **[17]**. In this study as observed in **Figures 1** the rate of glucose in the commercial dry food treatment was significantly higher than that of barley treatment. Plasma glucose levels increase as the dietary protein increases. Glucose is a kind of carbohydrate which has a key role in animals' energy and is able to change into mechanical energy **[14]**. The rate of plasma glucose depends on intestinal absorption, hepatic production, and received glucose **[8]**, the rate of glucose has been reported to be 68.21 mg/l in common carp **[10]**. The differences between these amounts could be associated with the kind of species, rate and type of nutrition, ecological conditions, environmental stress, and some other unknown factors **[20]**.

Total protein concentration in plasma compared to the base area is used as a clinical index for assessing the rate of health, stress, and physical status of aquatic organisms **[18]**. The rate of plasma protein is the most important part of diet metabolism **[18]**. In the present study, the rate of plasma protein in the treatment fed with commercial dry food was significantly higher than the barley treatment. The rate of total protein in blood plasma of silver and common carps studied by **[22]** was stated to be 3.1 and 4.25 mg/dl and he declared that there was a relationship between protein levels and the rate of pollution.

The rate of cholesterol in common carp (*Cyprinus carpio*) studied by **[10]** was reported to be 131.86 ± 15.12 mg/dl. In addition, they proved that unlike triglyceride, the type of nutrition had no significant effect on cholesterol. **[16]** expresses in a report that foods with high amount of fat could increse

triglyceride levels in carp fish which indicated that triglyceride was affected by nutrition. In 1992, **[18]** showed in a research that blood parameters were affected by the kind of food. Furthermore, he stated that the interactive effects of protein and fat on plasma triglyceride might contribute to high rate of triglyceride in the fish fed by such diets. In a research conducted in 2012, **[16]** showed that unballanced metabolism of triglyceride in young carp fish wsa probably due to high rate of fat and protein in their diets.

CONCLUSION

According to this research, it could be concluded that feeding carp fish with barley and commercial dry food could make significant difference in levels of glucose, total protein, and triglyceride .Considering the daily growth of population, limited resources, and relatively few studies conducted on biochemical parameters of blood serum and metabolites and ions of aquantic beings blood, expanding aquaculture industry more and more requires more comprehensive studies on these topics.

REFERENCES

[1] Aras M, Bayir A, Sirkecioglul AN, Polat H and Bayir M, Seasonal variation in serum lipids, lipoproteins and some haematological parameters of chub (*Leuciscus cephalus*), Italian J. Animal Sci., 7, 2008, 439-448.

[2] Ballarin L, Dalloro M, Bertotto D, Libertini A, Francescon A and Barbaro A, Haematological parameters in umbrina cirrosa(Teleostei, Sciaenidae): a comparison between diploid and triploid specimens, Comparative biochemistry and physiology, 138, 2004, 45-51.

[3] Barton BA, stress in fishes a diversity of responses with particular reference to changes in circulating corticosteroids, Intergrative and Comparative Biol., 42, 2002, 517-525.

[4] Canli M, Effects of mercury, chromium and nickel on glycogen reserves and protein levels in tissues of *Cyprinus carpio*, J. Zool., 20, 1996, 161-168.

[5] Cataldi PDM and Mandich SC, Serum parameters of Adriatic sturgeon Acipenser naccarii (Pisces: Acipenseriformes): effects of temperature and stress, Comparative Biochemistry and physiology part A: Molecular & Integrative Physiol., 121, 1998, 351-354.

[6] Geri GBM, Poli M, Gualtieri P, Lupi and Parisi, Body traits and chemical

composition of muscle in the common carp(*Cyprinus carpio*) as influenced by age and rearing environment, Aquaculture, 129, 1995, 329-333.

[7] Grant FJVE, Serge ID, Carl BS, Schneider, RP, Schneidr, MSF, Early identification of sex cultured white sturgeon (*Acipenser transmontanus)*, Using plasma steroid levels, Aquaculture, 232, 2004, 581-590.

[8] Haschek WM, Walling MA and Rousseaux C, Fundamental of toxicologic pathology, Academic press, New York, 2010, 686.

[9] Hemer GI, Hjeltnes B, Aksnes A and Waagb R, Effect of gelatinized wheat and maize in diets for large Atlantic salmon (salmo salar L.) on glycogen retention, plasma glucose and fish health, Aquaculture Nutri., 2, 1996, 33-39.

[10] Hoseini, S.M., Ghelichpour, M, Effects of pre-sampling fasting on serum characteristics of common carp (*Cyprinus carpio* L.), Int. J. Aquatic Biol., 1, 2013, 6-13.

[11] Jwad LA, Al-Mukhtar MA and Ahmed HK, The relationship between haematocrit and some biological parameters of Indian shad, *Tenulosa ilisha* (family clupeidae), Animal Biodiversity Cons, 27, 2004, 47-52.

[12] Langston AL, Hoare R, Stefansson M, Fitzgerald R, Wergeland H and Mulcahy M, The effect of temperature on non-specific defence parameters of three strains of juvenile Atlantic halibut (*Hippoglossus hippoglossus*), Fish and Shellfish Immunology., 12, 2002, 61-76.

[13] Leonardi MO and Klempau AE, Artificial photoperiod influence on the immune system of juvenile rainbow trout (*oncorhynchus mykiss*) in the southern hemisphere, Aquaculture, 221, 2003, 581-591.

[14] Lucas A, Physical concepts of bioenergetics, In: bioenergetics of aquatics of aquatic animals, Lucas A (Ed), Taylor & Francis, France, 1996, 34-52.

[15] Moradi N,Imanpoor M, Taghizadeh V, Hematological and biochemical changes induced by replacing fish meal with plant protein in the *Cyprinus carpio* Linnaeus, Global Veterinaria, 11 (2), 2013, 233-237.

[16] Noori A N, Amar YJA, Effect of different dietry protein and fats on some biochemical blood parameters in common carp fingerlings (*cyprinus*

carpio L) reared in float cages, Asian J. Experience Biological Sci., 4, 2013, 293-296.

[17] Ologhobo AD, Nutritive values of some tropical Legumes for Poultry, J. Appl. Animal Res., 2, 1992, 93-104.

[18] Reddy PS and Bhagyalakshmi A, Changes in oxidative metabilosm in selected tissues of the crab (Scylla serrata) in respons to cadmium toxicity, Ecotoxicol. Environ. Saf., 29, 1994, 255-264.

[19] Riche M, Analysis of refractometry for determining total plasma protein in hybrid striped bass (Morone chrysops × M. saxatilis) at various salinities, Aquaculture, 264, 2007, 279-284.

[20] Sano T, Haematological studies of the culture fishes in japan 3, Changes in blood constituents with growth of rainbow trout, J. Tokyo University of fish, 46, 1969, 78-87.

[21] Svetina A, Matasin Z, Tofant A, Vucemilo M, Fijan N, Haematology and some blood chemical parameters of young carp till the age of three years, Act. Vet. Hung, 50, 2002, 495-467.

[22] Tanti P, Patriche N, Magdalena T, Cyprinids total blood proteins determination, Zootechnics Biotechnologii, 42, 2009, 95-101.

[23] Wedemeyer GA, Physiology of fish in intensive culture systems, Chapman & Hall, New York, 1996, 232.

[24] Wilson RP**,** Utilization of dietary carbohydrate by fish, Aquaculture, 124, 1994, 67-80.