EFFECT OF SUPPLEMENTING DIFFERENT DIETARY LEVELS OF ANTIBIOTIC (TYLOSIN20%) ON THE APPARENT DIGESTIBILITY COEFFICIENT (ADC) AND APPARENT PROTEIN AND FAT DIGESTIBILITY (APD), (AFD) OF COMMON CARP (*Cyprinus carpio* L.)

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ABSTRACT

The present experiment was carried out to study the effect of supplementing different dietary levels of antibiotic (Tylosin 20%) on the Apparent Digestibility Coefficient (ADC) and Apparent Protein and Fat Digestibility (APD), (AFD) of common carp (*Cyprinus carpio* L.). Fish were fed with a laboratorial manufactured diet with protein content of 31.04%, energy 1437 calories/kg, and of antibiotic Tylosin 20% added at different levels content 0, 20, 60, 100 mg/kg B.W. The statistical results of ADC showed significant differences ($p<0.05$) among all experimental treatments. T2 (83.05%) differed significantly from other treatments followed by treatment T1(81.82%), T4 (79.59%) and T3 (70.59%). The results of APD showed no significant differences ($p>0.05$) among all experimental treatments, where the highest value was recorded in T2 (93.25%) followed by T1,T3 and T4.The obtained results also showed significant differences among AFD of T3 (91.13%) and there were no significant difference among other treatments.

INTRODUCTION

Antibiotics are a group of natural or synthetic compounds that destroy bacteria (bactericidal) or inhibit their growth (bacteriostatic). They are sufficiently nontoxic to the host, and they are used as chemotherapeutic agents in the treatment of infectious diseases of humans,animals and plants (9). Tylosin is an antibiotic of the macrolide class developed for veterinary use. It is made naturally by the bacterium *Streptomyces fradiae* and acts to inhibit bacterial protein synthesis by inhibiting the 50S ribosome, a cellular structure only certain bacteria have and use to synthesis internal proteins (5). Tylosin is a mixture of four macrolide antibiotics, The main component of the mixture is Tylosin A (> 80%),Tylosin B (Desmycosin), tylosin C (Macrocin) and tylosin D (Relomycin). All four components contribute to the potency of tylosin, which should not be less than 900 IU/mg, calculated with reference to the dried substance (10). Tylosin is also used to treat bovine respiratory and swine dysentery diseases. Tylosin is also registered for use as a growth promoter for a variety of terrestrial in some countries such as poultry, pigs and cattle in addition to aquatic animals which are grown for human consumption (16). Tylosin is licensed for use as a broad spectrum antibiotic for injectable or oral use in treatment of respiratory tract and skin infections in livestock. Spectrum of activity similar to that of Erythromycin but more active than Erythromycin against certain Mycoplasmas(23).

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Chromic oxide is used as an inert marker to measure apparent digestibility of feed in terrestrial animals (24),in aquatic animals, in fish (2) and in shrimp (6). The primary steps required to measure chromic oxide content in a sample are oxidation of the inert and insoluble trivalent chromic oxide to its water-soluble hexavalent before quantitative determination (7). Several methods have been published for oxidation of chromic oxide and its subsequent measurement in feed and feces. The present experiment was carried out to study the effect of supplementing different dietary levels of antibiotic (Tylosin20 %) on the Apparent Digestibility Coefficient (ADC) & Apparent Protein and Fat Digestibility (APD) , (AFD)of common carp (*Cyprinus carpio* L.).

MATERIALS AND METHODS

Fish were transported from local fish farm located at south of Baghdad, Iraq to fish laboratory at College of Agriculture, University of Baghdad. Antibiotic tylosin 20% brought from local market (manufacturd by Alfasan company for vetrinary drugs/ Holand),were respectively added (0,20,60, 100 mg/kg body weight of fish) as T1,T2, T3 and T4 respectively. Aquaria were supplied with air pumps and 1/4 of their water has been changed daily. Temperature and pH of aquaria water were measured during the experiment period. Fish were set randomly in 8 glass aquaria (capacity 72L) filled with dechlorinated tap-water at 4 individuals per aquarium. Initial mean weight of fish was 23.62±0.125gm, acclimated for 2 weeks to the experimental diet which contained 31.04% protein and 4.71% at ether extract 3% body weight of fish (Table.1).Chromic oxide Cr2O3 was added at 1% to silo components of the diets of the experiment and manufactured in the form of pellet and fed to fish at same percentage of feeding for 7 days (1/11-7/11/2015) after the period of acclimate. Wastes of fish (faeces) were collected from each treatment separately by siphoning methods (25). Wastes of the transaction were dried and stored in frozen (-20°C) while conducting chemical analyzes, and conducted the expense of standard curve to measure the concentration of Chromium Oxide Cr2O3 on according to the modalities adopted by each of the Furnakwa and Tsukahara(13) as follows :Weight 50 - 100 mg of the test model then wrapped model weighted filter paper and transferred to the digestion flask(kjeldahl flask) 100ml size. Adding 5 ml of concentrated nitric acid in a way that allows to remove suspended particles inside the flask or on its aspects. The flask heated above heater has holes in the asbestos board to allow more heat to be close to the flask. Sample further digested even obtained a white precipitate (about 20 minutes). The black particles appear stuck in the neck of the flask or part, wash-mediated move the flask during heating under 180°C.Turn off the heater and cooling the flask, then adding 3 ml of percholoric acid to the digestion mixture , green color appears .Reheating digestion flask, green color turns to yellow and then to orange or red color. Reverse shift occurs frequently in color if the flask refund immediately after the change in color from green to yellow due to incomlete oxidation of integrated in the content. and preferably increase the period of digestion for additional 10 minutes after turning color. Slow cooling and add 50 ml of distilled water. Leave flask for few minutes to precipitate the inorganic materials. Cools at room temperature and complete volumetric flask to 100 ml of distilled water. Move solution carefully and slowly from the volumetric flask to measure tube colors and read the absorbance at wavelength350nm Calculation the concentrate of chromium oxide in samples (faeces) were applied by using

Furnkawa and Tsukahara (13) equation: (Y = 0.2089 X + 0.0032 = mg/100 ml).Y represents the obsorbance at a wavelength 350 nm, X represents chromium oxide content in the model.

Apparent Digestibility Coefficient (ADC)

$$100 - \left(100 \times \frac{Cr_2O_3\% \text{ in food}}{Cr_2O_3\% \text{ in feces}}\right)\% \quad (4)$$

Apparent Protein Digestibility (APD) %

$$100 - \left(100 \times \frac{Cr_2O_3\% \text{ in food}}{Cr_2O_3\% \text{ in feces}} \times \frac{\text{protein in the feces\%}}{\text{protein in food\%}}\right) \quad (18)$$

Apparent Fat Digestibility (AFD)%

$$100 - \left(100 \times \frac{Cr_2O_3\% \text{ in food}}{Cr_2O_3\% \text{ in feces}} \times \frac{\text{fat in the feces\%}}{\text{fat in food\%}}\right) \quad (18)$$

Experiment run under Completely Randomized Design (CRD), data were statistically analyzed and mean significant differences compared at 0.05 probability (8).

Table 1: The composition of the basal diet.

	T1	T2	T3	T4
	20	20	20	20
	40	40	40	40
	19	19	19	19
	20	20	20	20
	1	1	1	1
	0mg	20mg	60mg	100mg

* premix of Minerals and vitamins produced by Supravit Jordan (each g containing Vitamin A 7000 IU, Vitamin D3 1300 IU, Vitamin E 0.8 mg, vitamin K3 1.75 mg, vitamin B1 0.45 mg, vitamin B2 0.45 mg, Vitamin B6 0.22 mg, vitamin B12, 0.007 mg, nicotinic acid, 5.2 mg, 0.045 mg folic acid, manganese sulfate 0.0035 mg, zinc sulfate 0.001 mg, iron sulfate 0.001 mg copper sulfate 0.003 mg).

RESULTS & DISCUSSION

Digestibility Experiment has been studied being an important physiological representation for theoretical and practical and they are the basis for understanding the occurrence of disease and normal life of fish, especially when using different levels of the antibiotic such as tylosin 20% in the diets, which may leave marks on the physiology of fish, and reflects directly on the digestion parameters .Water temperatures ranged between24.5C°- 25.75C° (means± S.E=25. 13±0.6C°) and the pH ranged between7.9-8.2 (means± S.E=8.05±0.15) during the experiment. These values were within normal levels of common carp living (11). The statistical results of ADC showed significant differences ($p<0.05$) among all experimental treatments,T2 (83.05%) differed significantly from other treatments followed by treatment T1(81.82%), T4 (79.59%) and T3(70.59%).Statistically, the results of APD showed no significant differences ($p>0.05$) among all experimental treatments, whereas the highest value was recorded in T2 (93.25%) followed by T1,T3 and T4. Also table 2 showed no significant differences among AFD of T1, T2 and T4 but T3 (91.13%) was differ significantly from the other treatments, which showed no significant differences. Beneficial microorganisms that secrete some enzymes decompose food constituent elements of the diet, and is working to increase digestibility and absorption coefficient as Fritts and Waldroup, (12) suggested. Richard *et al*. (20)

cited That fat is function on the secretion of the Cholesestokenen hormone which is transmitted mediated by blood to activates the secretion of bile, which affects the emulsification of fat through increasesing surfaces area exposed to digestive enzymes and thus contributes significantly to the increase fat digestibility of the diet.

Table 2: The effect of supplementing different dietary levels of antibiotic (Tylosine 20%) on the Apparent Digestibility Coefficient (ADC) & Apparent Protein and Fat Digestibility (APD), (AFD).

Items %	T1 0mg	T2 20mg	T3 60mg	T4 100mg
ADC	81.82±0b	83.05±0a	70.59±0d	79.59±0c
APD	92.80±0.50a	93.25±0.36a	92.54±1.5a	91.86±0.6a
AFD	94.49±0.29a	94.46±0.4a	91.13±0.3b	93.80±0.5a

*Means with the same letters in the same row were not significantly different ($p<0.05$)

This may due to an increased portability of digestion helped to perpetuate the microbial balance in the gut and increase the metabolism of food, and increase the growth and immune response (1). Antibiotic Tylosin20% acts to inhibit bacterial protein synthesis by inhibiting the 50S ribosome of pathogenic microorganisms. Eradicating this metabolic drain allows more efficient use of nutrients for food production.In addition to provide an opportunity for normal microflora to resist the colonization by pathogenic microbes, a phenomenon known as competitive exclusion. Most believe the resident flora suppresses colonization by secreting antimicrobial compounds such as organic acids, by direct stimulation of the immune system, and by competing for nutrients and attachment to the mucosal surfaces (21,17). The normal microflora stimulate development of intestinal host defenses, including the mucus layer, the epithelial monolayer and the lamina propria, with its system of immune cells that underlie the epithelium (19,17). The mucus layer segregates both normal and pathogenic microbes away from the animal tissues,and the epithelium provides a barrier to enter into the animal tissues when the mucus layer has been crossed. The underlying network of immune cells provides antibodies, cytotoxic and helper T cells, and phagocytic cells. These immune cells combat not only pathogenic bacteria and their toxins but also the overgrowth of inappropriate attachment by the normal microflora. Evidence here is from studies of germ-free animals, which exhibit delayed lymphocyte and other immune cell development in the lamina propria and far fewer Immunoglobulin A producing cells when compared to conventionally reared animals (14, 3,22). IgA is an antibody that plays a critical role in mucosal immunity (19). Indeed, the majority of evidence supports the notion that the intestinal immune system develops in parallel with the development of the normal microflora. Therefore it should be noted, while the microflora induced development of the intestinal immune system may be The key to the long-term health of the animal (15).

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تأثير اضافه مستويات تغذوية مختلفة من المضاد الحيوي (تايلوسين 20%) في معامل الهضم الظاهري ومعامل هضم البروتين والدهن لأسماك الكارب الشائع (*Cyprinus carpio* L.)

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الملخص

اجريت هذه التجربة لدراسة تأثير اضافة مستويات تغذوية مختلفة من المضاد الحيوي (تايلوسين 20%) على معامل الهضم الظاهري ومعامل هضم البروتين والدهن لأسماك الكارب الشائع (*Cyprinus carpio* L.). تم تغذية اسماك التجربة بعليقه مختبريه ذات محتوى بروتيني 31.4% وطاقه 1437 كيلو كالوري، ومضاد حيوي (تايلوسين 20%) اضيف بنسبه 100,60,20,0 ملغم/كغم من وزن الجسم. اظهرت نتائج التحليل الاحصائي لمعامل الهضم الظاهري (ADC) وجود فروقات معنوية ($p<0.05$) بين جميع معاملات التجربة، حيث بلغت المعاملة الثانية T2 (83.05%) متبوعة بالمعاملة الاولى T1 (81.82%)، الرابعة T4 (79.59%) والثالثة T3 (70.59%). اما نتائج التحليل الاحصائي لمعامل هضم البروتين (APD) اظهرت عدم وجود فروقات معنوية ($p>0.05$) بين جميع معاملات التجربة حيث سجلت المعاملة الثانية T2 اعلى قيمة (93.25%) تلتها المعاملة الاولى، الثالثة والرابعة، بينما سجلت نتائج التحليل الاحصائي لمعامل هضم الدهن (AFD) تفوق المعاملة الثالثة T3 (91.13%) معنوياً ($p<0.05$) بينما لم تسجل اي فروقات معنوية بين باقي معاملات التجربة.

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