Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 2, 2021, Pages. 352 - 358
Received 20 January 2021; Accepted 08 February 2021.

The Effect of Adding Dried Alfalfa Powder to the Diet on Some Growth Parameters of Common Carp (*Cyprinuscarpio* L.)

Dhellal M.Halbos, Maryam J. Mohammed and Abbas S. Alhamadani
Animal Production Department, College of Agriculture, Al-Muthanna University, Iraq

Abstract:
This study was conducted to determine the effect of adding dried alfalfa powder to the diets of common carp (*Cyprinuscarpio* L.) on some growth parameters and reared in floating cages. The experiment consisted of three treatments, **T1:**the first control (0% alfalfa powder).**T2:**the second treatment (5% alfalfa powder) and **T3:**the third treatment (10% alfalfa powder). A total of six 4 m^3 galvanized floating iron cages were used for the experiment.The current study showed that the best growth indicators were achieved in the treatments in which the dried alfalfa powder was added to the diet. Conclude that the addition of diluted alfalfa powder to the diets of common carp gives the highest rates in growth parameters.

Keywords: dried alfalfa powder, growth parameters, common carp (*Cyprinuscarpio* L.).

Introduction :
Fish was one of the most important sources of animal protein, about 17% of the animal protein consumed worldwide, animal protein in fish contains all the essential amino acids, in addition to essential vitamins, fats and minerals, made the protein in fish be easy to digest, of high quality, and very important for a health, because it contains a high percentage of unsaturated fats, help protect against the risk of heart disease (FAW, 2016).Because of the increase in fish breeding projects and the increase in feed prices, forced many animal breeders to find alternative feeds to feed the animal, the condition of preserving the nutritional value and efficient production performance (Qusay*et al*., 2013).One of the most important and oldest leguminous crops that were considered as animal fodder is the alfalfa crop, contains high nutritional value (Bakr*et al*., 2001).Al Burges *et al*. (1998) stated that the alfalfa crop is an economic crop, it contains a high percentage of phosphorous, due to the presence of the enzyme phytase in the alfalfa crop at high levels, which leads to the absence of the need to add phosphorus, which reduces the economic cost of the diet.The alfalfa powder has the advantage of containing the amino acid L.canavanine, which was a virus suppressor, cause many skin diseases, amino acid has high anti-bacterial activity and reduces the incidence of infections (al Digiovanhi*et al*., 1999).Naji and Aziz (1999) stated that the alfalfa powder increases the percentage of digestion and absorption, because it contains a high percentage of fiber, reduce the speed of passage of food inside the gut.Alfalfa powder contains a large amount of vitamins (A, E, and C), in addition to the presence of many anti-oxidant yeasts. Thus, the alfalfa powder works to provide adequate and necessary protection for liver cells from damage and cell membranes (Sparks and Surai, 2001).Vuyst (1994) stated that alfalfa powder helps to achieve competitive contrast and exclusion, because it contains

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 2, 2021, Pages. 352 - 358
Received 20 January 2021; Accepted 08 February 2021.

complex sugars, thus, sufficient energy can be obtained, by the end products of the non-starchy carbohydrate fermentation process.
The curent study aims to determine effect the addition of dried alfalfa powder on some growth parameters of common carp (*Cyprinuscarpio* L.).

Materials and Methods:
The current study was conducted in the Euphrates River at Samawah City,Al-Muthanna Governorate. of 6 floating cageswith dimensions of 2 m long x 2 m wide x 1 m highwere used.The cage area was located on the left side of the river (Al-Bandar area), which was 6 km away from SamawahCity center.The mesh hatch size (20 mm) was fixed to the sides of the cages. Mechanical feeders made of galvanized iron were used to feed fish in floating cages. A total of 120 common carp, 20-22 g weight were brought from the Rumaitha hatchery, the fish were distributed into six cages, 20 fish per cage, with two replicates for each treatment.Some daily work was done, cleaning the sides around the cages from the waste and dirt washed away by the river water during the continuous flow, follow up the movement of fish and ensure the safety of nets and not exposed to rupture. The treatments were follow:
T1:the first control (0% alfalfa powder).**T2:**the second treatment (5% alfalfa powder) and **T3:**the third treatment (10% alfalfa powder).
Weights were measured by extracting a number of fish not less than 50% of the basic number inside each cage, weights were measured every 30 days.Environmental measurements were taken weekly from water temperature, pH, dissolved oxygen concentration and salinity.The experiment lasted for (3) months, from 1/10/2020 until 1/1/2021.
A Completely Random Design (CRD) was used in the experiment, the data were analyzed statistically using the SPSS statistical program and the mean of the coefficients were compared using the Duncan multiple range test (1955).

Table 1. The components of the diet for the three treatments of the experiment.

Item	T1	T2	T3
Fish meal (protein concentrate)	20	20	20
Soybean meal	20	16	14
dried alfalfa powder	-	5	10
Maize	10	9	11
Wheat bran	15	15	15
Barley	35	35	30
Total	100	100	100
Chemical Analysis			
Protein (%)	29	27.23	26.25
Fat (%)	2.89	3.43	4.07
Ash (%)	7.98	7.74	7.36
Fiber (%)	4.81	6.06	7.11
Humidity (%)	7.97	8.06	8.34
Carbohydrate (%)	47.35	47.48	46.17
Total energy (kilocalorie/ Kg)	398.52	394.22	392.73

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 2, 2021, Pages. 352 - 358
Received 20 January 2021; Accepted 08 February 2021.

Calculated energy as reported by Philiposeet *al*. (2013), as follows:

Total energy amount =% protein x 5.56% carbohydrates x 4.45 +% fat x 9.2

Study growth parameters:
The total weight gain, feed conversion factor and feed conversion efficiency were calculated as reported by Philipose**et al**. (2013).

Weight gain (g / fish) = Average final weight - Average starting weight.

Feed conversion factor (g / fish)= amount of food consumed / wet weight gain

Feed conversion efficiency (%)= wet weight gain (g/ fish) / amount of food consumed (g)x 100.

Relative growth rate based on Keremah and Ockiya-Alfred (2013)

Relative growth rate = average final weight (g / fish) - average initial weight (g / fish) / average initial weight (g / fish).

Protein utilization efficiency = fish wet weight gain (g) / protein intake (g)

Environmental measurements of water

1. Water temperature:
The temperatures were recorded daily at midday with a mercury thermometer from 0-50 ° C locally origin.

2. Evaluate the salinity concentration of the water:
Samples were taken from inside each tank on a weekly basis, then the tests were performed in one of the laboratories of the Soil Department, College of Agriculture, Al-Muthanna University, byEC. Meter device, the Italian company (Hanna).

3.The dissolved oxygen concentration value:
Weekly oxygen concentration readings were taken from inside the glass basins to find out the oxygen concentration inside each basin, using oxy-meter device produced by the English company Jenway, the oxygen concentration values (mg / liter) are calculated.

4. pH values:
Brought water samples from each cage every week, to conduct the tests in one of the laboratories of the Soil Department, College of Agriculture, Al-Muthanna University, by E.C. Meter device from the Italian company (Hanna) with calibration from time to time.

Results and discussion

Environmental measurements of water
During the experiment period, the water temperature ranged from 27.46_18.47 ° C (Table 2).This degree was considered within the permissible limits in fish farming (Peteri, 2006), while

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 2, 2021, Pages. 352 - 358
Received 20 January 2021; Accepted 08 February 2021.

the values of dissolved oxygen in water were recorded from 10.67-8.22 mg / liter and are within the appropriate limits.It was observed that the inverse relationship between temperature and dissolved oxygen percentage, because of the reduced ability to retain oxygen molecules by the water at high temperatures (Abdel-Hamid, 2009). The pH values ranged from 8.29-7.14, the pH values inside the floating cages recorded in the current study were within the permissible limits in fish farming (Al-Salman, 1990). Table (2) showed that the salinity values were within the permissible limit in fish farming, and it ranged from 1.9-6.6 g / L.

Table 2. Temperature averages, pH values, dissolved oxygen concentration and salinity for floating cage waters (Euphrates River).

Year	Month	Temperature C °	Dissolved oxygen mg / L	pH	Salinity g / L
2020	October	27.46	8.22	7.14	1.90
2020	November	22.99	9.11	8.00	1.80
2020	December	18.47	10.67	8.29	1.60

Study growth parameters:

Table 3. showed that there were no significant differences in the rates of the initial weights for the different treatments of the experiment. Whereas, the results recorded significant differences ($P \geq 0.05$) in the mean of the final weights of the experiment treatments, as the third treatmentsignificantlyoutperformed the rest of the treatments, recorded an average final weight of 136.00 g / fish, was followed by the second treatment, which recorded an average final weight of 107.3 g / fish, and it significantly outperformed the first control treatment, 77.16 g / fish.

The results of the current study indicated that the highest final weights averages were achieved in the third and second treatments, while the first treatment achieved the lowest rates of final weight, it was noted through the results of the final weight of the current study. The treatments in which the dried alfalfa powder was added achieved the highest final weights, the higher the percentage of addition of the alfalfa powder, the greater the mean of the final weights. The reason for this is due to the high percentage of fiber in the alfalfa powder, which works to slow down food for a longer time in the gut, helps to digest and absorb more food, leads to high weight gain, which gives a high final weight (Naji, 1999).

Table 3. Effect of dried alfalfa powder on the initial and final weights (mean± standard error).

Traits	**Treatments**			**Sig.**
	T1	**T2**	**T3**	
Initial weights	20.14±1.34	21.18±1.4	22.11±1.3	N.S
Final weights	77.16±3.2 c	107.3±4.2 b	136.00±3.13 a	0.05

T1: the first control (0% alfalfa powder). **T2:** the second treatment (5% alfalfa powder) and **T3:** the third treatment (10% alfalfa powder). N.S; Non-significant. Different letters in the same line indicate significant differences below the 0.05 probability level.

Table 4. show that there were significant differences ($P \geq 0.05$) in the total weight increase of the three treatment. The third treatment recorded the highest rate of total weight gain, as it reached 113.89 g / fish, which significantly outperformed all experiment treatments. The second treatment recorded an average total weight gain of 86.12 g / fish, which significantly

outperformed the first treatment, which recorded a total weight gain rate of 57.02 g / fish.The results of the total weight gain rates were identical to the results of the final live weighted averages, as reflection of the final live weight. Therefore, the treatment with higher final weights outperformed the overall weight gain rate.The results of the current study were in agreement with Al-Amiri (2011), a significant superiority was found for the overall weight gain of the laying hens when fed at high levels of alfalfa powder.

The results of the current study of the relative growth characteristic were consistent with the characteristic of the final weight average, because the relative growth characteristic rates depend on the average final weights of the treatments. Table (4) confirmed the presence of significant differences between the three experimental treatments of the relative growth characteristic, as the three transactions recorded a relative growth rate of 283.11, 406.61 and 515.10, respectively.

The results indicated that the relative growth characteristic was superior to the treatments in which the alfalfa powder process was carried out, as a result of the high rates of weight increases that these treatments obtained, which came as a result of the qualities that the alfalfa powder has in that it contains a high proportion of protein and fat and the quantities of minerals and elements it contains. The alfalfa powder has provided the fish with the necessary nutrients necessary for growth and weight gain, for this reason, superior results were obtained in all growth parameters of the current study. The results of the current study agreed with (Al-Fayyad, 1989).

The results of the current study of the food conversion rate trait, (Table 4) confirmed a significant differences between the three treatments, as it recorded a food conversion rate of 4.52, 3.62 and 3.21, respectively. The results of the nutritional conversion rate trait were consistent with the results of other traits, to confirm the superiority of the treatments in which the alfalfa powder was added. The results of the present study agreed with Khaldoun and Mahbouba (2007), who observed the superiority of the rate of nutritional conversion as the level of alfalfa powder in the animal's diet increased.

Table (4) showed that there were significant differences between the three parameters for the efficiency of food conversion, as the treatments recorded a food transfer efficiency of 22.09, 27.58 and 31.11, respectively. The results confirmed the superiority of the feed conversion efficiency of the second and third treatments over the first control treatment. The results of the food conversion efficiency characteristic were identical to the results of the food conversion rate characteristic, to confirm the superiority of the treatments in which the process of adding the alfalfa meal was done.

The results of the current study, (Table 4) for the characteristic of protein efficiency ratio, showed that there are significant differences ($P \geq 0.05$) between the three treatments, as the efficiency of the protein was recorded at 0.76, 1.18 and 1.01, respectively.These results came to confirm the superiority of protein efficiency ratio in treatments that contained different percentages of alfalfa powder. Whereas, the first control treatment recorded the lowest rates for this trait, which did not contain alfalfa powder in its diet. The increase in protein efficiency ratio was achieved by the second and third treatments. It was considered a positive reflection of the clear and tangible superiority achieved by these transactions in other growth parameters, such as weight gain and relative growth rates, as the weight gain has a direct relationship with the efficiency of the protein (Al-Bahadli, 2011).

Table 4. Effect of dried alfalfa powder on some growth parameter (mean± standard error).

Growth parameter	Treatments			Sig.
	T1	T2	T3	
Weight gain (g / fish)	57.02±2.85c	86.12±2.43b	113.89±3.95a	0.05
Relative growth rate% (RGR)	283.11±9.4c	406.61±8.5b	515.10±7.3a	0.05
Feed conversion rate (FCR)	4.52±0.25c	3.62±0.20b	3.21±0.23a	0.05
Food conversion efficiency% (FCE)	22.09±1.36c	27.58±1.85b	31.11±2.35a	0.05
Protein Efficiency Ratio	0.76±0.03c	1.01±0.08b	1.18±0.21a	0.05

T1: the first control (0% alfalfa powder). **T2:** the second treatment (5% alfalfa powder) and **T3:** the third treatment (10% alfalfa powder).Different letters in the same line indicate significant differences below the 0.05 probability level.

References

1. **Abdul Hamid, A.M. (2009).** Scientific foundations for fish production and care. Egyptian Universities Publishing House, Mansoura, Arab Republic of Egypt. 644
2. **Al-Amiri, M.M.S. (2011).** The effect of adding dried algae powder to laying hens' diets on some specific characteristics of eggs at advanced ages. University of Karbala Scientific Journal, Volume 9 - Second Issue.
3. **Al-Bahadli, R.H.T. (2011).** culture of different densities of common carp (*CyprinusCarpio*), in floating cages in the marshes of Maysan Governorate. Master Thesis, University of Baghdad, College of Agriculture: 59 pages.
4. **Al-Fayyadh, H.A. and S.A.Naji (1989).** Poultry technology. 1st edition, Directorate of Higher Education Press, Baghdad, Iraq.
5. **Al-Salman, M.H.M. (1990).** Basics of fish farming and production. House of wisdom for printing and publishing. Mosul: 392 pages.
6. **Bakr, R.H., A.M. Al-Jubouri, H.H.Khadr (2001).** The effect of sodium chloride on the growth and components of Medicago sativa. Iraqi Journal of Agricultural Sciences. Volume 32 Issue 2: 92-106.
7. **Burgess,R., R. Straub,R. Gkoegle,S. Austin-phili and E.T. Bengha-Amasino .(1998).** Production of industrial enzymes in transgenicAlfalfa. Biological system engineering university of Wisconsin-madison.
8. **Digiovanhi,G.D.,L.S. Watrud,R.J. Seidler, F.Wedmer (1999).** Composition of parental and transgenic alfalfarhizosphere bacteria communities using biology GN.Finger printing and entro bacterial Ecology, 37:129-131.
9. **FAO .(2016).** The State of World Fisheries and Aquaculture. Contributingto food security and nutrition for all. Rome, 200 pp.

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 2, 2021, Pages. 352 - 358
Received 20 January 2021; Accepted 08 February 2021.

10. **Keremah, R.I. and J.F. Alfred-Ockiya (2013).** Effects of dietarprotein level on growth andbody composition of Mudfish*Heterobranchuslongifilis*fingerlings. AfricanJournal of Biotechnology,12(9): 971-975.
11. **Khaldoun M.A. and A.M. Mahbooba (2007).** The effect of feeding white leathery chickens with different levels of dried alfalfa powder on some physiological traits and acquired illiterate immunity of hatched chicks at higher temperatures, Iraqi Journal of Poultry Science, 2 (2) 143-153.
12. **Naji, S.A. and H.K. Aziz(1999).** Manual of Laying Hens. Arab Federation for Food Industries. Heba Office for Printing and Publishing. Baghdad. First edition.
13. **Peteri, A. (2006).** Inland water Resources and aquacultureservice (FIRI)Cultured aquatic species informationprogram (*Cyprinus carpi*).
14. **Philipose, K.K., S.R.K. Sharma, J. Loka, D. Divu, N. Sadhu andDube (2013).** Culture of Asian Sea bream (*Latascalcarifer*),Blochin open sea floating net cages off karwar,South India.Indian Journal Fish,60(1): 67-70.
15. **Qusay, Z.S., E. Abdel Hamid, H.A. Suleiman and Y.I.Hamad (2013).** Study the effect of replacement ratios of sesame industry waste on production performance and some body measurements for Awassi lambs. Basra Journal of Agricultural Sciences 15 (2): 1-15.
16. **Surai,P.F. and N.H. Sparks (2001).** Comparative evaluation of the effectof two maternal dietson fatty acids .Vitamin E andcarotenoids in thechickembryo .British poultry Sci.,42: 252-259.
17. **Vuyst, L.D. and E.J. Vandamme (1994)** Bacteriocins of lactic acid bacteriamicrobiologygenetics and applications .1st ed .Blackie Academic and professional,UK.