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(USJAS)

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES

(USJAS)

ISSN Print: 2521-8328

ISSN Online: 2523-6067



Volume: 06

Number: 02

June 2022

PUBLISHED BY:
OFFICE OF THE DEAN FACULTY OF NATURAL SCIENCES
& DEPARTMENT OF ZOOLOGY, UNIVERSITY OF SINDH,
JAMSHORO, SINDH, PAKISTAN

UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES



VOLUME 6

JUNE 2022

NUMBER 2

Quarterly publications

Dean, Faculty of Natural Sciences & Department of Zoology,
University of Sindh, Jamshoro, Sindh-Pakistan

ISSN (E): 2523-6067
ISSN (P): 2521-8328

Sindh University Press.



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With the increase in population, third world countries today are facing many problems, supply of sufficient food being one of them. In animal sciences we have to understand and preserve the vast diversity of species on our planet. Losing them would be a huge shame and almost a crime of humanity. We have caused a continuous trouble that leads to species extinction. Just because we are the “dominant” species on Earth, it doesn’t mean that we can do whatever we want without suffering consequences. We do not have to protect endangered species only, but we also have to protect species essential for the continuation of Earth’s life. Believe it or not, without animals, humans would die out pretty quickly. First of all, there would be no more meat. But we can’t all become vegetarians either if there are no insects to pollinate the plants. From animals, we can also learn about our anatomy and can understand the function of our bodies in a better way, which help us combat human diseases. In termination, animal’s science is an important field that applies to many real-world situations.

University of Sindh Journal of Animal Sciences (USJAS) will promote and involve the study of various disciplines in Zoological Sciences i-e Entomology, Endocrinology, Molecular biology, Parasitology, Wildlife management and Conservation, animal’s diversity and systematic etc. This journal will be ideal platform for anyone working in Animals Sciences. In addition, the published data to provide additional opportunity for access to advanced standing in existing tertiary level education programs. Researcher will be exposed to the main aspect of animal science including, safety management planning strategies, food and fiber, systematic of individual and making a means to preserve a rapidly declining global ecosystem.



MISSION

University of Sindh Journal of Animal Sciences (USJAS) will introduce a viable model of research linkages together with scholarly experience sharing and transferring of inspired evidence. It also promotes the latest emerging trends in zoological sciences along with provision of an awareness of the ethical aspects of animals. Besides its fundamental importance in maintaining the sustainable agricultural, protection and conservation of animals in country it will also educate the public about the need to protect and preserve the environment as a long-range goal for the welfare of future generations. The core focus of (USJAS) is concentrated on promoting and propagating novel and innovative research amongst the readers of this journal.

AIM OF JOURNAL

The primary aim of University of Sindh Journal of Animal Sciences (USJAS) is to gain hands on experience in order to acquire the knowledge necessary for the critical analysis of the results and make appropriate recommendations in all fields of Animal sciences. The aim of this journal is to encourage researchers, investigators and scientists to publish their research findings allowing wider dissemination of their intellectual knowledge, with the aim of applying those for the benefit of the society. The newly launched journal would cover full spectrum of the specialties in Animal's sciences. It would include original research articles, review articles, case reports, short commendation, and scientific findings from within specified domain areas of Zoology. The journal strictly follows the guidelines proposed by Higher Education Commission (HEC) Pakistan. The most important criterion for acceptance/rejection is originality of the material presented in the manuscript.



What is need for publishing this Journal?

The University of Sindh Journal of Animal Sciences (USJAS) with modernized and cost effectiveness will light the tools for numerous directions and problems related to improve identification of pest species, conservation of wild animals, diversity of animals including animal breeding, environmental impact of animal, agriculture, diseases, nutrition and animal products. When animals grow well and stay healthy, farmers can produce more meat, milk or eggs for our consumption. They check meat quality or screen milk for pathogens. Advances in food safety keep humans healthy and increase the world's supply of nutritious food. Beside this, articles regarding entomological science contribute to the betterment of humanity by detecting the role of insects in the spread of disease and discovering ways of protecting food and fiber crops, and livestock from being damaged. Journal provides the way how beneficial insects contribute to the well-being of humans, animals, and plants. This journal will also defend and assess the application of well proven research activities in natural science particularly, Zoology, Physiology, Fresh Water Biology & Fisheries, Biochemistry and Biotechnology of host universities; neighboring and sister universities which are performing research activities on any area of animal's sciences. They have necessity of proper platform for their research exposure around the country as well as in world.



Who will contribute?

Articles published in (USJAS) masses of all age and income groups. Moreover, this journal will make substantial contribution to the researchers and students of Zoology, Entomology, Pest Management, Plant Protection, Agriculture Sciences and Medical Sciences; further, wild life department and extension wings will also be benefited. The objectives set at promotion of research, the food and fiber crops, livestock, animal's diversity, diseases, obesity and to establish breeding programs, nutrition programs and help preserve exotic wildlife. Beside this, Parasitological section gives the reader a broad, in-depth coverage of medically important parasites. Such coverage is essential to give students the awareness and understanding necessary for proper diagnosis, treatment, and prevention of the parasitic infections. This journal will be valuable in skill enhancement, and knowledge refreshment of the working staff of academia and research.

The Specific Thematic Areas are under:

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- ✓ New descriptions of taxa, if they are accomplished with proper diagnoses, keys and/or revision of at least at species group level.
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University of Sindh Journal of Animal Sciences (USJAS) is published quarterly i.e., 4 times a year: March, June, September and December, by the Office of Dean Faculty of Natural Sciences and Department of Zoology, University of Sindh, Jamshoro.

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Printed at: Sindh University Press.

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ESTIMATION OF MANGANESE CONCENTRATION IN *PUNTIUS TETRAZONA* (TIGER BARB) FROM MULTAN

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ARTICLE INFORMATION

Article History:

Received: 23rd April 2022

Accepted: 28th August 2022

Published online: 27th June 2022

Author's contribution

All authors contribute equally.

Key words:

Heavy metals, atomic absorption, Morphometry, *Puntius tetrazona*, Condition factor.

ABSTRACT

Heavy metals are the most significant contaminants in aquatic ecosystems. The majority of heavy metals tend to concentrate in tissues as well as other organs of the fish's body after drinking polluted water, resulting in fish poisoning. These metals can interfere with reproduction and growth, as well as damage the immune system and cause pathogenic repercussions. Water in Multan city may be polluted with several heavy metals. The usage of this water given to the aquarium may have an effect on the growth and weight of the Tiger barb (*Puntius tetrazona*). The effect of heavy metal (Manganese) on this fish has not been determined in the Multan city region. Fish samples were gathered from the Multan city region. Each sample of fish (*Puntius tetrazona*) had passed through Morphometric procedure then calculated the wet and dry weight of each sample. All samples were dried in microwave oven and were grinded to powder. After grinding, samples were subjected to ash formation by Muffle furnace. Then ash of each sample was dissolved in 1% HNO₃ to form solution. Then elemental analysis was determined by Atomic Absorption Spectrum. Presence of Manganese was confirmed and its effects were determined on *Puntius tetrazona* by different statistical techniques.

1. INTRODUCTION

From the past 45 years, aquaculture has been the fastest food production sector provides half of fish eaten by humans all around the world. Fish, crabs and mollusks are all used in aquaculture to provide food.

The meat of fish is considered as useful source of protein for good human health. In survey of 2009, the meat of fish account for 16.6% of the population of world intake of protein of animals as well as 6.5% of all protein consumed. To meet the demand of protein from fish and other aquaculture for economic development, it is needed to enhance the factor contributing to aquaculture (Farkas, *et al.*, 2003).

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The both developing and developed countries are facing problems related water pollution. Water pollution may affect the fish physiological function that may lead to high mortal rate and eventually decline of biota of fish (Wim, et al., 2007). In Pakistan, industrial effluents, domestic wastes as well as runoffs of agriculture is directly released into canals, ponds, streams, rivers, lakes and as well as other water resources (Samantha et al., 2005). Heavy metals are regarded as important in this respect because these are easily taken into the food chain as well as the process of bioaccumulation. Few heavy metals are important for normal physiological activities of fish but these become toxic when these metals accumulate in the body tissues of fish and are not able to metabolize (Fazio et al., 2014).

Increased concentrations of heavy metals into the water bodies have serious consequences on aquatic biota and in order to conserve the native fauna it is essential to check their tolerance limits against metallic ion toxicity (Al-Akel and Shamsi, 1996). As (Arsenic), Hg (Mercury), Pb (Lead), particularly Mn (Manganese) are much harmful, poisonous, toxic and even in range of parts per billion (ppb) (Witeska and Kosciuk, 2003).

Manganese is heavy metal which is most widely distributed as well as abundant naturally. During the life span of organisms, the amount of manganese is required in trace amount. In the body of living organisms, it controls normal body function as well as development. Actually, it plays important role in different non-metabolic as well as metabolic regulatory functions (Santanaria, 2008). Manganese functions like a part of metallo-enzymes or like an activator of enzyme as Arginase, pyruvate carboxylase, cytosolic enzyme, the manganese superoxide dismutase (Crowley et al., 2000). Manganese is the latest emerging pollutant of the environment which is caused by a wide variety of industrial sources like that of welding, mining, processing of goods and production of alloy, may be liberated in to the marine water which becomes an unseen toxic metal in the marine ecosystem. The rates of accumulation of manganese (Mn), and its liberation, are usually fast-regulating processes. The high levels of exposure of manganese prove toxic as well as decrease the fitness of the body living organisms (Wang et al., 2013).

Different research work shows that heavy metals can change the biological parameters as well as physiological activities both in blood as well as tissue (Canli, 1995), (Basa et al., 2003). Biological cycles become very slow by contamination of heavy metals. Some elements like as copper (Cu), zinc (Zinc), cadmium (Cd) as well as mercury (Hg) may considered very harmful in the aspect of Eco toxicological effects.

Organisms of aquatic environment are capable of accumulating of heavy metals up to concentration which are 10 times to as well as even thousand times higher as the concentration in the environment. In many vital organs heavy metals are accumulated. The supporting structures as well as gills show mostly bioaccumulation waterborne heavy metals, as well as intestines and stomach accumulate elements which are food-associated. Often the highest concentration of heavy metals is found in kidney, gills as well as liver of fish (Golovanova, 2008).

Fish is major organism which is extensively use to determine the condition of health of aqueous environment because of pollutants accumulated in the food chain as well as is responsible for harmful effects and mortality in the aquatic ecosystem. Now a day, aquariums culture is a very beneficial as well as useful tool in certain treatment of psychological disorders both in orphan as well as old people and children (Petrescu-mag et al., 2013). Trade of aquarium fish culture has also negative impacts on the biodiversity. The industry of aquarium culture became a beneficial enterprise for many companies from all over the World, mainly for Southeast Asian companies of aquaculture trading in aquarium farming (Naz et al., 2012).

Tiger barb is very beautiful and small sized aquarium fish. A school of this species in a suitable sized aquarium makes more attractive and awesome display. In aquarium world, this species is most popular, favorite and standard. In past it has also been known as “Sumatrans”. Tiger barb is easy to keep, due to its small sized body and well suited to aquarists for all level of experience. This fancy fish is quite hardy. So their water is kept clean and requires being change regularly. Due to its prime importance among aquarium fish, it is necessary to determine the factors which affect its growth”. Naturally Tiger barb is found with dense vegetation and feed on insects, algae, detritus, diatoms and small invertebrates (Subathra et al., 2007).

This research work was planned to evaluate the metal (Manganese) concentration in *Puntius tetrazona* collected from regions of Multan city, effects of heavy metal (Manganese) on morphometric parameters of Tiger barb (*Puntius tetrazona*), effect of Mn on wet and dry weight of *Puntius tetrazona* and bioaccumulation of heavy metal (Manganese) in *Puntius tetrazona*.

2. MATERIALS AND METHODS

An aquarium fish which is commonly called Tiger barb (*Puntius tetrazona*) is collected from region of Multan city. It consists of approximately 35-40 fishes in number. The fish samples are variable in body size and

weight. The used chemicals were of highly purified form and were of analytical reagent grade. The chemical used were Chloroform, Methanol and 1% HNO_3 . These were purchased from G.M. Scientific store Multan city.

All materials such as Magnifying lens, Vernier calipers, graduated scale, conical flasks, Beakers, Petri dish, Aluminum foil, China crucible, digital scale, microwave oven, Muffle furnace, agate pestle and electric mortar were of high quality.

Morphometry

Each sample of fish (*Puntius tetrazona*) is subjected to Morphometry (external morphology) very carefully for every parameter with the help of graduated scale and Vernier calipers as well as magnifying lens. The measurements of morphometric parameters are made with the help of measuring tape, Vernier calipers, measuring board as well as scales of the nearest 0.1 cm as total body length (TL), length of fork, length of head (HL), standard length (SL), width of head, girth of body, dorsal fin base, dorsal fin length, adipose fin length (2nd dorsal fin length), base of adipose fin (2nd dorsal fin base), length of pectoral fin, length of anal fin, pelvic fin length, base of anal fin, length of tail as well as width of tail. Weight of body of each fish sample is measured for the nearest .01g with digital electric balance. Before the weighing of fish its adhered water as well as the particles are removed from surface of the body of each fish.

The relationship of length-weight (RLW) is determined by the equation: $w = aL^b$, where W= weight (g), L= total body length (cm), b= growth exponent and a = constant. For the determination of linear relationship logarithmic transformation is used as $\log W = \log a + \log b L$ (LeCren, 1951).

Drying

After Morphometry and determination of wet body weight of each sample, the samples are wrapped in pre-weighted aluminum foil and are dried carefully in microwave oven for 8-10 days at 70°C for complete drying. After complete drying all samples are weighted after each 24 hours during three days to obtain constant weight of the samples.

Grinding

After complete drying, each sample is unwrapped and weighted again on digital electric balance very carefully and then is grinded to powdered form in agate pestle and electric mortar until homogenous powder is formed for further analysis. This powdered sample is further used for ashing process and solution formation.

Sample Preparation

For ashing, each pre-weighted powdered sample is shifted to pre-weighted China crucible. China crucible having sample in powdered form is shifted to Muffle Furnace. Each sample is numbered and marked and kept in the furnace in a specific sequence to avoid any mistake of mixing the samples. The temperature of furnace is adjusted at 550°C for 24 hours duration. Then all the samples are cooled for approximately 24 hours of duration, all the samples are collected from the furnace carefully. Then each sample is weighted again and recorded [16].

Solution Formation

For the formation of sample solution, 1% HNO_3 solution is prepared for preservation. Ash of each sample obtained from Muffle Furnace is weighted again and measured quantity is dissolved for solution preparation in 25 ml of solution. After filtration of solution and sample mixture, each sample is poured in polyethylene bottle and is allocated proper number (Naeem *et al.*, 2012).

Elemental analysis

Samples are sent to laboratory of Pakistan council of research in water resources (PCRWR) Islamabad for elemental analysis. All samples are subjected to elemental analysis (detection of Manganese) for each sample by Atomic absorption spectrum of Atomic Absorption Spectrophotometer (Hitachi Polarized Zeman AAS, Z 8200, Japans). Then the presence and effect of these heavy metals on sample fish i.e. *Puntius tetrazona* (tiger barb) is determined.

Statistical Analysis

Statistical description of each character is estimated as Mean \pm Standard Error. All the analysis by statistics includes analysis by regression as well as calculations for coefficients of correlation; estimation of the standard error is calculated by the use of Minitab as well as MS-Excel. Each condition factor of sample fish is evaluated by Fulton's Condition Factor.

Calculation of relations of variables. The equation for this relation is given as followed:

$$Y = ax + b$$

Y= elemental concentration ($\mu\text{g/g}$)

X = Length of fish (cm)

(a) And (b) are constants

3. RESULTS AND DISCUSSION

Elemental value of wet body weight Concentration of Manganese is in range of 3.21-143.88 and in mean of 35.67 ± 34.90 which is also highly significant as described in figure 1 and table 1.

Table 1. Grand mean as well as standard error value of concentration of element in wet weight of body in *Puntius tetrazona* (whole sample), (n = 35).

Elements	Concentrations	
	Range	Mean±S.E
	μgg^{-1}	μgg^{-1}
Mn	13.13-190.69	72.86 ±44.22

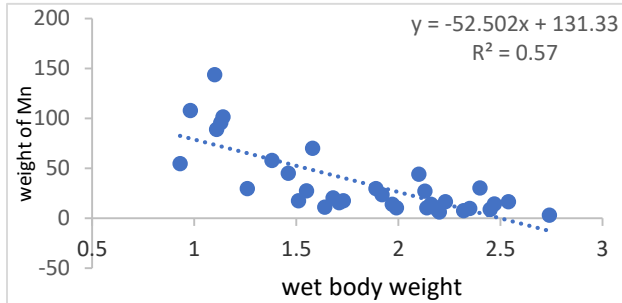


Figure 1. Plot showing weight of Manganese in wet body weight (μgg^{-1}) for *Puntius tetrazona*.

Elemental value of dry body weight

The range value of Manganese is 13.13-196.69 as for as the mean value of Manganese is 72.86±44.22 which is also highly significant as described in Figure 4 and table 2.

Table 2. Grand mean as well as standard error value of concentration of element in dry body weight in *Puntius tetrazona* (whole Sample), (n = 35).

Elements	Concentrations	
	Range	Mean±S.E
	μgg^{-1}	μgg^{-1}
Mn	3.21 - 143.88	35.67±34.49

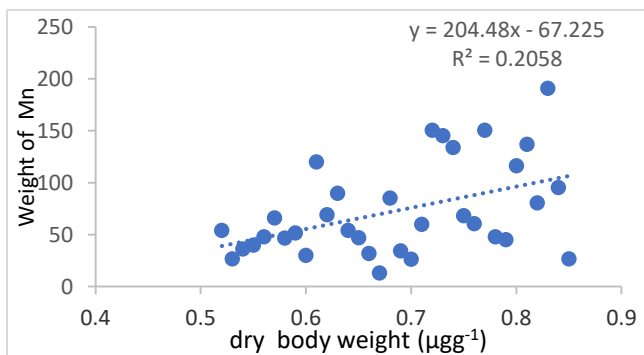


Figure 2. Plot showing concentration of Manganese in dry body weight (μgg^{-1}) for *Puntius tetrazona*.

Parameters of Regression of weight of wet body versus body burden element

Concentration of Manganese is **0.753** which is also highly significant as describe in table 3. For Manganese t value is -52.192, standard error value is 7.910 as described in table 3.

Table 3. Parameters of Regression of wet body weight (g) versus elemental body burden (μg) in *Puntius tetrazona* (Tiger barb), (n = 35). [Elemental body burden (μg) = a + b weight (g) of wet body]

weight of Wet body (g)	Elements	R	A	B	S.E (b)	t-value (b=1)
	Mn	0.753***	130.22	- 52.066	7.91	- 52.192

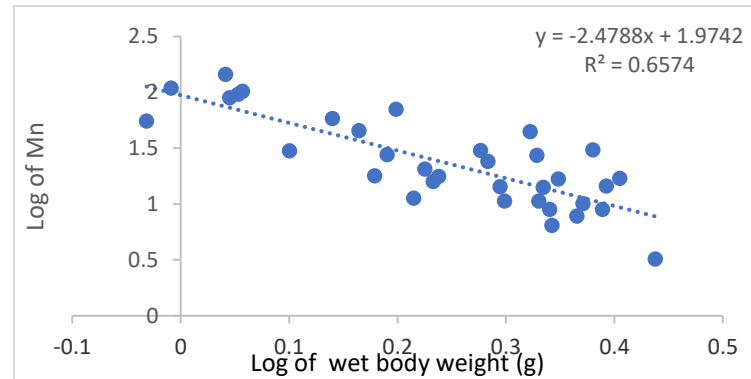


Figure 3. Plot showing log of wet body weight (g) versus elemental (Mn) body burden (μg) for *Puntius tetrazona*

Table 4. Parameters in Regression of log of weight (g) of wet body versus log of elemental body burden (μg) in *Puntius tetrazona* (n = 35) [Log of elemental body burden (μg) = a + b Log of weight (g) of wet body]

weight of Wet body (g)	Elements	R	A	B	S.E (b)	t-value (b=1)
	Mn	0.697***	294.79	-54.766	9.801	- 57.766

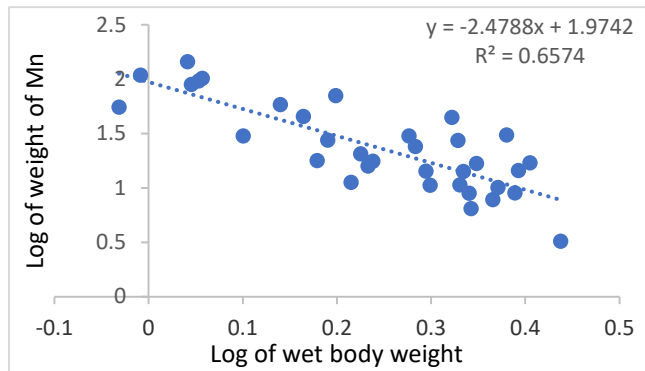


Figure 4. Plot showing log of weight of Manganese versus log of wet body weight for *Puntius tetrazona*.

Regression value of log of weight of wet body versus log of body burden element

The concentration of Manganese is also significant in value of 0.813 as shown in table 4. Manganese t value is -5.7044 and standard error (S.E) value is 0.311 as described in table 4.

Table 5. Parameters in Regression of log of weight (g) of wet body versus log of elemental body burden (μg) in *Puntius tetrazona* (n = 35) [Log of elemental body burden (μg) = a + b Log of weight (g) of wet body]

weight of Wet body (g)	Elements	R	A	B	S.E (b)	t-value (b=1)
	Mn	0.722***	6.100	-7.016	1.171	-10.2742

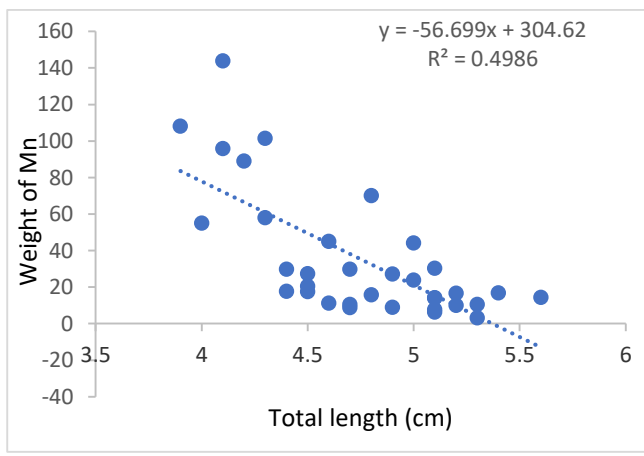


Figure 5. Regression of log of weight (g) of wet body versus log of elemental body burden

Log of Body Burden elements versus total length (cm)

The concentration of Manganese is highly significant which is in value of 0.697 as shown in table 5. For Manganese constant has value of 294.79, constant b is -54.766, standard error (S.E) is 9.801 and t value is -57.766 as described in table 5.

The range of Manganese is 0.722 Both these values are more significant as shown in table 6. For Manganese constant a has value of 6.100, constant b has -7.016, standard error (S.E) value is 1.171, t value is -10.2742 as described in table 6.

Table 6. Parameters of regression of log of weight (g) of wet body versus log of elemental body burden (μg) in *Puntius tetrazona* (n = 35) [Log of elemental body burden (μg) = a + b Log of total length (g)] [Elemental body burden (μg) = a + b condition factor].

weight of Wet body (g)	Elements	R	A	B	S.E (b)	t-value (b=1)
	Mn	0.722***	6.100	-7.016	1.171	-10.2742

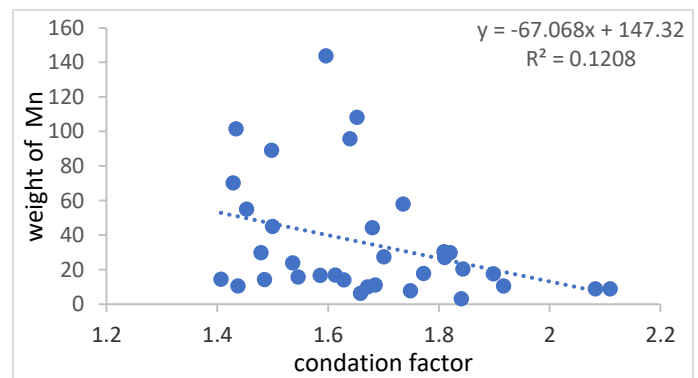


Figure 6. Plot showing log of Chromium versus log of length of body for Puntius

Table 7: Parameters in regression form of condition factor versus concentration of metal (wet weight, $\mu\text{g g}^{-1}$) in weight of wet body in *Puntius tetrazona*, (n = 35)

[Elemental body burden (μg) = a + b condition factor]

weight of Wet body (g)	Elements	R	A	B	S.E (b)	t-value (b=1)
	Mn	0.321 ^{ns}	134.93	59.18	30.38	1.948

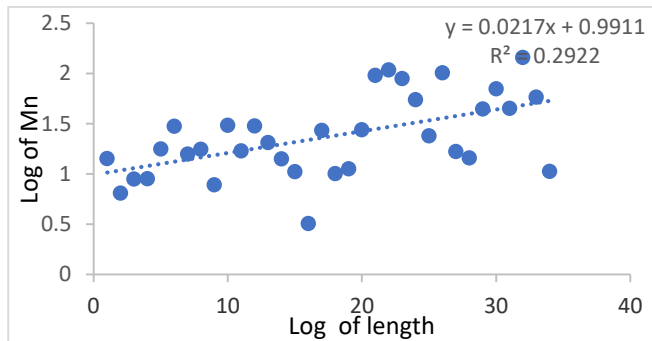


Figure 7. Plot showing log of Manganese versus log of length for *Puntius tetrazona*

Regression values of metal concentration versus condition factor.

The concentration of Manganese is non-significant in values of **0.321**, range of condition factor is 0.6 to 1.02 as described in tables 7. For Manganese a = 134.937, b = -59.184, standard error (S.E) = 30.380, t value = -1.94812 as described in table 7.

4. CONCLUSION

Overall, it could be concluded that majority of heavy metals tend to concentrate in tissues as well as other organs of the fish's body after drinking polluted water, resulting in fish poisoning. These metals can interfere with reproduction and growth, as well as damage the immune system and cause pathogenic repercussions. Water in Multan city may be polluted with several heavy metals. The usage of this water given to the aquarium may have an effect on the growth and weight of the Tiger barb. Present study recommends that control planning should be adopted in order to save this creature.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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PERFORMANCE ANALYSIS OF DAJAL CATTLE UNDER SEMI INTENSIVE SYSTEM AT RAJANPUR

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ARTICLE INFORMATION

Article History:

Received: 26th April 2022

Accepted: 31th August 2022

Published online: 27th June 2022

Author's contribution

All authors contribute equally.

Key words:

Dajal cattle, performance, semi intensive system, Rajanpur

ABSTRACT

The present study was conducted on Dajal cattle at Government livestock station, Fazal pur, Rajanpur. For this purpose, the available data of last four years (2017-2020) on the reproductive and productive performance of Dajal cattle was utilized. Information of 30 animals was used and remaining data was excluded from the record. Productive performance in an average value are for traits like birth weight, lactation length, milk yield, were 26 ± 1.65 , 203 ± 1.38 , 826 ± 1.38 respectively. Similarly, reproductive performance in an average value are for traits like age at first calving, age at first conception, dry period, service period and calving interval were 1219 ± 3.21 , 937 ± 1.15 , 239 ± 17.7 , 164 ± 1.69 , and 448 ± 1.84 respectively. On the basis of high weaning weight, birth weight and growth rate, In Dajal cattle there is late age at first calving, so this breed not suitable for dairy purpose. It is concluded that the Dajal breed is low milk producer, attained late age at first calving, late age at puberty, and having calving interval long and postpartum estrus period. It has been noted that the Dajal breed could be reared for meat purpose. The reproductive performance and milk yield was found very low, which needs to be improved by improving management practices and outcrossing or cross breeding program on scientific line.

1. INTRODUCTION

Livestock throughout the ages has arisen such as the biggest sub-area in cultivation. This one is a basis of far-off trade profit and donates near 3.1 part in absolute fares.

Deciding greater than 35% to 40% of their compensation from that space. The administration has currently prioritized this area for the country's financial development, food safety and scarcity reduction. The overarching livestock progress plan is centered on encouraging "private section conducted progress with the governmental section providing a

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supporting background by means of plans. (Siyal et al., 2021)

By successfully covering health issues, managing practices, artificial insemination facilities, animal breeding techniques, using well-balanced rations to feed animals and the control of diseases of livestock for business and financial status. The goal is to capitalize on the potential of the livestock sector for commercial development, food safety, and countryside socioeconomic progress. Before, cattle were saved for draft reason. Afterward, through the industrial development, the steers involved the spot of meat and dairy creation. The most significant job of animals remains the creation of great type protein used for human utilization over the stock of meat and milk. Milk assembly remains the best proficient interaction in changing over herbal solid to an ideal nutrient. Milk establishes an indispensable piece of our day by day nutrition vital used for sustenance and wellbeing improvement of the individual (Irshad et al., 2011).

The reproduction and production are straight forwardly affected by hereditary capability of the animals, nourishment, climate, the executives of ranch and staff included (Kunbhar, et al., 2015). Despite the fact that Pakistan is supplied with rich cattle hereditary variety and assets. Notwithstanding, proficient use and the executives of these assets are missing because of the absence of mindfulness and institutional shortcomings. Also, improvement in substantial variety and its use is restricted. Just a predetermined number of hereditary improvement projects could get foothold in government strategy because these projects customarily take long to finish, and because of political reasons, nearby governments in Pakistan are by and large intrigued by programs which yield fast and unmistakable outcomes (Afzal, et al., 2004).

The Dajal breed found in Dajal spaces of Punjab region; area Dera Ghazi Khan, Bahkar, Bahawalpur, Multan and so forth Dajal dairy cattle are white tone or light dark in shading. The male cows are blackish dim on bump. Typical load of male cows is 480 and female weight contains 380 kg. Dajal cows are like Bhagnari breed yet are less in size and the shading is lighter than Bhagnari cows. Dajal cattle are utilized for meat, anyway lower milk maker, guys are useful for draft purposes (Shah, 1994).

Dajal variety of steers existed as thicker in stopping milk mass (91.25kg) trailed through Dhanni calves (78.54 kg). Dhanni and Dajal cow varieties remain viewed as average draft types of Pakistan, Punjab. Notwithstanding, these animals position is rare as far as efficacy and protection (Khan et al., 2008). So, for, very little study has been reported of Dajal cows in Pakistan, the aims of the study were to investigate the productivity of Dajal cows in a semi intensive management system and to study the reproductive performance of Dajal cattle in a semi intensive management system.

The present investigation was carried out on Dajal cattle at Government livestock station, Fazal pur, Rajanpur. For this purpose, the available data of last four years (2017-2020) on reproductive and productive routine of Dajal cattle remained utilized. Data of 30 animals (lactation wise 1st to 5th) was used and remaining data was excluded from the record.

Productive parameters

Birth Weight: The natal heaviness of a new parturied calves is named as birth weight. Lactation wise birth weight of 30 animals remained recorded from the available record (2017-2020).

Lactation length: The number of days in which animal produce milk. Lactation wise lactation length of 30 animals was recorded from the available record (2017-2020).

Milk yield: The quantity of total milk in one lactation period. Lactation wise lactation milk yield of 30 animals was recorded from the available record (2017-2020).

Reproductive parameters

Age at first conception: This one is computed as the time period amongst date of delivery and first conception. Age at first conception of 30 animals remained recorded from the available record (2017-2020).

Age at first calving: This one is computed as the time interval amongst time of birth and first parturition of animal. Stage at first calving of 30 animals remained recorded from the available record (2017-2020).

Service period: The interval from parturition to fruitful mating. Lactation wise service period of 30 animals was recorded from the available record (2017-2020).

Dry period: The interval amongst the completion of one lactation and beginning of the other lactation. Lactation wise dry period of 30 animals was recorded from the available record (2017-2020).

Calving interval: The time interval in the middle of two successive calving's called calving interval. Lactation wise calving Interval of 30 animals was recorded from the available record (2017-2020).

Statistical analysis

The acquired record was analyzed in descriptive statistics and one-way variance analysis to determine the significance and difference between distinct variables by means of statistic version 8.1 software.

2. MATERIALS AND METHODS

The present investigation was carried out on Dajal cattle at Government livestock station, Fazal pur, Rajanpur. For this purpose, the available data of last four years (2017-2020) on reproductive and productive routine of Dajal cattle remained utilized. Data of 30 animals (lactation wise 1st to 5th) was used and remaining data was excluded from the record.

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Service period: The interval from parturition to fruitful mating. Lactation wise service period of 30 animals was recorded from the available record (2017-2020).

Dry period: The interval amongst the completion of one lactation and beginning of the other lactation. Lactation wise dry period of 30 animals was recorded from the available record (2017-2020).

Calving interval: The time interval in the middle of two successive calving's called calving interval. Lactation wise calving Interval of 30 animals was recorded from the available record (2017-2020).

Statistical analysis

The acquired record was analyzed in descriptive statistics and one-way variance analysis to determine the significance and difference between distinct variables by means of statistic version 8.1 software.

3. RESULTS AND DISCUSSION

Birth weight of Dajal cattle calves

The influence of semi-intensive management system towards the newborn mass of Dajal cattle calves was recorded and results are depicted in Table 1. The statistical analysis revealed ($P<0.05$) interaction variation in the birth mass of calves of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) greater body weight of Dajal cattle was noted in; DC-11 (31.00kg) and were recorded newborn mass of Dajal cattle calves coded with DC-3, DC-8, DC-9, DC-14 and DC-29 (23.00, 23.00, 23.00 and 23.00kg, respectively) achieved significantly ($P<0.05$) minimum body weight under semi-intensive management system compared to rest of above mentioned Dajal cattle calves coded with

different number codes under similar type of management system.

Service period of Dajal cattle

The influence of semi-intensive management system on service period of Dajal cattle was recorded and results are depicted in Table II. The statistical analysis revealed ($P<0.05$) interaction variation in the service date of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) greater service period of Dajal cattle was noted in; DC-23 (200 days) and minimum value of service period in DC-16 which is about 121 days, and on an average value of service period in Dajal cattle is recorded 164 days.

Calving interval of Dajal cattle

The influence of semi-intensive management system on Calving interval of Dajal cattle was recorded and results are depicted in Table III. The statistical analysis revealed substantial ($P<0.05$) interaction variation among the calving interval of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) greater calving interval of Dajal cattle was noted in DC-23 (485days) minimum recorded in DC-16 (406days) and average is (448days).

Age at first calving of Dajal cattle

The influence of semi-intensive management system on time at first calving of Dajal cows was recorded and results are depicted in Table IV. The statistical analysis substantial ($P<0.05$) interactive variation among the time at first calving of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) higher time at first calving of Dajal cattle was recorded in; DC-23 which is (1250 days) and minimum is recorded in DC-18(1185 days) and average value of time at first calving was noted as (1219) days.

Lactation length of Dajal cattle

The influence of semi-intensive management system on lactation length of Dajal cattle was recorded and results are depicted in Table V. The statistical analysis revealed significant ($P<0.05$) interactive variation among the lactation length of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) higher lactation length of

Dajal cattle was noted in; DC-28 (222 days) and minimum is recorded in DC-30 (118 days) and average value is 203 days.

Milk yield of Dajal cattle

The influence of semi-intensive management system on milk yield of Dajal cattle was recorded and results are depicted in Table V. The statistical analysis revealed substantial ($P<0.05$) interaction variation among the milk production of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) higher milk yield of Dajal cattle was noted in; DC-28 (888 liters) and minimum value of milk yield was recorded in DC-16 (748 liters) and average value is recorded as 826 liters in 30 Dajal cattle per lactation.

Dry period of Dajal cattle

The influence of semi-intensive management system on dry period of Dajal cattle was recorded and results are depicted in figure VII. The statistical analysis (AVOVA) revealed significant ($P<0.05$) interactive variation among the dry period of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) greater dry period of Dajal cattle was noted in; DC-23 (269 days) and minimum dry period is recorded of DC-18 (150 days) and on an average value of dry period in Dajal cattle is recorded as (239 days).

Age at first conception of Dajal cattle

The influence of semi-intensive management system on age at first conception of Dajal cattle was recorded and results are depicted in figure VIII. The statistical analysis revealed ($P<0.05$) interaction variation among the time at first conception of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) higher age at first conception of Dajal cattle was recorded in; DC-23 (967 days) and minimum value is recorded in DC-18 (907 days) and on an average value of age at first conception was recorded 937 days.

4. DISCUSSION

Birth mass is a quality of extraordinary financial significance in the steers business. Now in dairy cows, it attribute has been extensively concentrated by various analysts in a few spots amongst various

varieties. Contrasts between birth loads of calves are additionally utilized as a sign of contrasts among them in energy, likely development frequency and develop mass. This isn't just a simple and dependable estimation of pre-birth period, yet additionally a significant factor that influences the post pregnancy development and improvement (Akubulut *et al.*, 2001). In our study, birth weight of Dajal cattle was ranged between 23-31 kg. Consequences of this investigation are matched with definitions of (Khatri *et al.*, 2004) revealed that natal heaviness of male and female calves of Red Sindhi steers was 19.0 to 0.189 kg and 16.5+0.126 kg individually. (Vijaya *et al.*, 2019) discovered the birth weight of new conceived calves of crossbred cows is 23.99 ± 0.43 kg. That one discovery is in near concurrence with birth weight of HF×Jersey×Sahiwal crossbred calves.

Result of this study showed that service period of Dajal cattle was ranged between 121-200 days. Fewer days service duration indicates timely gestation period and extra existence from main milk production. Service duration varied because of contrasts in taking care of and rearing administration (Irshad *et al.*, 2011). (Ahmad *et al.*, 1989) announced a service duration of 145.5 days for Sahiwal cattle from Pakistan. (Mustafa *et al.*, 2003) detailed extended (235.87 ± 14.05) days service duration in Red Sindhi yearlings in Pakistan. (Ahmad, 1999) detailed the service duration designed as first group, second and third group's equality Sahiwal cattle normal remained 153 days and 136 and 118 days, individually.

Findings of current investigation indicate that calving interval of Dajal cattle was ranged between 406-485 days. The overall mean calving interval of Achai cattle recorded was 461.89 ± 20.23 days reported by (Hayaz *et al.*, 2014). (Saleem *et al.*, 2012), who reported 476.37 ± 5.17 days calving interval of Achai cattle. Calving span in Zebu cattle is about 418 days, in Red Sindhi cows it is about 429 days and in Sahiwal cows it is about 418 days has been accounted for through different writers (Qureshi, 2003). More limited calving span (380 ± 36.6 days) remained accounted for by (Abeyagunawardena and Abeyawansa, 2013) for zebu cows.

Results of current study shows that age at first calving of Dajal cattle was ranged between 1185-1250 days.

(Rege *et al.*, 1992) additionally revealed time of delivery as significant wellspring of variety meant for time at first calving. (Haq *et al.*, 1993) described that reduced time at first calving in Friesian yearlings (787 and 822 days, individually). (Sattar *et al.*, 2005) detailed no critical impact of period of delivery taking place time at first calving for Jersey and Friesian yearlings in Pakistan, separately. Time at first calving remained greater in Zebu cows as compared in Hybridized dairy cows. The time at first calving reported 1080 days for Zebu cows and for Red Sindhi steers 1119 days (Sheikh *et al.*, 200), that drop in the reach 726.0 to 1132 days of the present examination for Red Sindhi cattle.

In this study, lactation length of Dajal cattle was ranged between 118-222 days. Normal lactation length of 212.70 in addition to short 2.23 long stretches of Bhagnari cows revealed by (Jalbani, 1999). Lactation length in sahiwal cows is 235 ± 2 , announced by (Rehman *et al.*, 2008). This similar scope of lactation stretch (239-268 days) in Sahiwal cattle has recently stayed accounted for (Ilatsia *et al.*, 2011). Now Cholistani cows the lactating stretch noticed remained (165) days (Farooq *et al.*, 2010). Though lactation length (LL) of Red Sindhi cows is recorded 277.3 ± 5.6 days by (Mustafa *et al.*, 2002). (Rehman and Khan 2012) revealed that in Sahiwal steers lactation stretch is about 235 ± 1.4 days for 5 fundamental groups of Sahiwal in Punjab.

Findings of this study showed that milk yield of Dajal cattle was ranged between 748-888 liters. (Javed *et al.*, 2000) revealed that normal lactating return of (1862.4 ± 42) liters for a lactating stretch of (318 ± 3.24) days for Sahiwal cattle on single of the primary groups, Livestock Experiment Station (LES) Jahangir Abad, Punjab. In different varieties like Cholistani cows the all-out milk producing noticed remained 1235 liters (Farooq *et al.*, 2010) and for Frisian-Holstein cows the normal complete milk return noticed remained 2055 liters (Haile *et al.*, 2009). (Dahlin *et al.*, 1998) additionally revealed that Sahiwal cattle parturition in wintertime term created extra milk compared to those parturitions done in different terms. Milk production remained adapted to lactation stretch by utilizing the previous assessment time production and normal everyday production of the recognized piece of the lactation (Khan *et al.*, 1992). (Rehman and

Khan, 2012) revealed that for Sahiwal dairy cows the normal lactating milk production remained (1552±12.15) liters in a lactating stretch of (235±1.4) days at 5 principal Sahiwal crowds in Punjab.

Result of current study shows that dry period of Dajal cattle was ranged between 150-269 days. (Rehman and Khan, 2012) announced that crowd, time of parturition, period of calving, equality and milk production fundamentally influence the dry time frame in Sahiwal steers. Greater average worth of dry duration about 221.7±5.2 days remained recorded by (Javed et al., 2000) designed for first lactating Sahiwal dairy cows. (Suhail et al., 2010) announced no-significance impact of ancestor, term and date of parturition for dry time duration. Though dry time of 89 to 1200 days designed for Red Sindhi and 86 to 140 days in Hybrid cows remained observe in research by (Kunbhar et al., 2016).

In our study, the age at first conception of Dajal cattle was ranged between 907-967 days. The mean time at first conception of Red Sindhi dairy cattle is 1024.86±27.54 days announced by (Mustafa et al., 2003). Greater time at first conception 828.5±233.1 days remained accounted for through (Chaudhry and Shafique, 1994) in crossed yearlings in Pakistan.

Haq et al., 1993) noted lesser time at first conception 502±11.8 days for Holstein-Friesian calves from Pakistan. (Rafique et al., 2000) announced that the impact of period of natal on the oldness at first conception in quite a while remained ineffective. (Sattar et al., 2005) detailed that the normal stage at first conception for 236 Holstein Friesian yearlings remained (715±9.7 days), going to range of 421-1819 days.

5. CONCLUSION

Comparatively higher service period of Dajal cattle was recorded in; DC-23 (200 days) and minimum value of service period in DC-16, which is about 121 days, and on an average value of service period in Dajal cattle is recorded 164 days. Comparatively higher time at first calving of Dajal cows was recorded in DC-23 which is (1250 days) and minimum is recorded in DC-18(1185 days) and average value of time at first calving was noted as (1219) days.

Higher lactation length of Dajal cattle was recorded in; DC-28 which is (222 days) and minimum is recorded in DC-30 (118 days) and an average value is 203 days. Higher milk yield of Dajal cattle was recorded in; DC-28 (888 liters) and minimum value of milk yield was recorded in DC-16 (748 liters) and average value is recorded as 826 liters in 30 Dajal cattle per lactation. higher dry period of Dajal cattle was recorded in; DC-23 (269 days) and minimum dry period is recorded of DC-18 (150 days) and on an average value of dry period in Dajal cattle is recorded as (239 days). Age at first conception of Dajal cattle was recorded in; DC-23 (967 days) and minimum value is recorded in DC-18 (907 days) and on an average value of age at first conception was recorded 937 days.

6. ACKNOWLEDGEMENT

Authors are thankful to Government livestock station, Fazal pur, Rajanpur for provided the farm record and placement for the research work.

7. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table 1. Birth weight of thirty calves of Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
25.00	27.00	23.00	27.00	26.00	28.00	28.00	23.00	23.00	25.00
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
31.00	29.00	26.00	23.00	25.00	26.00	24.00	29.00	25.00	27.00
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
26.00	28.00	27.00	27.00	30.00	28.00	26.00	24.00	23.00	24.00

Table 2. Service period of thirty calves of Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
160 ^l	144 ^p	182 ^e	169 ^{ij}	171 ^{hi}	159 ^{lm}	165 ^k	175 ^g	187 ^d	122 ^s
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
166 ^{jk}	156 ^m	193 ^b	148 ^o	188 ^{cd}	121 ^s	132 ^r	123 ^s	186 ^d	173 ^{gh}
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
161 ^l	179 ^e	200 ^a	179 ^{ef}	140 ^q	176 ^{fg}	152 ⁿ	197 ^a	191 ^{bc}	138 ^q

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 3. Calving interval of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
440 ^j	425 ^m	467 ^e	450 ^h	455 ^g	440 ^j	445 ⁱ	460 ^f	472 ^d	405 ^p
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
450 ^h	440 ^j	478 ^b	430 ^l	473 ^{cd}	406 ^p	415 ^o	405 ^p	471 ^d	455 ^g
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
445 ⁱ	450 ^h	485 ^a	460 ^f	425 ^m	461 ^f	435 ^k	482 ^a	476 ^{bc}	420 ⁿ

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 4. Age at first calving of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
1207 ^{lm}	1226 ^{gh}	1221 ^{h-j}	1239 ^{b-d}	1236 ^{cd}	1206 ^{mn}	1233 ^{d-f}	1222 ^{hi}	1227 ^{f-h}	1235 ^{c-e}
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
1247 ^a	1199 ^o	1200 ^{no}	1219 ^{i-k}	1213 ^{kl}	1240 ^{bc}	1225 ^{g-i}	1185 ^q	1245 ^{ab}	1229 ^{e-g}
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
1221 ^{h-j}	1215 ^{jk}	1250 ^a	1225 ^{g-i}	1215 ^{jk}	1195 ^{op}	1190 ^{p-q}	1194 ^{op}	1215 ^{jk}	1192 ^p

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 5. Age at first calving of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
200 ⁿ	189.7 ^{pq}	211 ^{e-g}	207.33 ^{i-k}	203 ^{lm}	205.7 ^{j-l}	192 ^p	190 ^b	213.7 ^{de}	210.33 ^{f-h}
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
210 ^{g-i}	196.99 ^o	212 ^{e-g}	208 ^{h-j}	207 ^{jk}	187.7 ^q	197 ^o	184.7	204.67 ^{k-m}	212 ^{e-g}
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
202 ^{mn}	221 ^a	215.7 ^{cd}	213 ^{d-f}	215 ^{cd}	219 ^{ab}	217 ^{bc}	221.7 ^a	221 ^a	118 ^s

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 6. Milk yield of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
800 ^{q-r}	760 ^e	840 ^f	820 ^f	812 ^p	824 ^{m-n}	792 ^t	798 ^{r-s}	848 ^{g-h}	828 ^{l-m}
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
832 ^{k-l}	794 ^{s-t}	844 ^{h-i}	836 ^{j-k}	852 ^{f-g}	748 ^w	784 ^u	752 ^w	816 ^{o-p}	844 ^{h-i}
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
804 ^q	880 ^b	864 ^d	856 ^{e-f}	860 ^{d-e}	872 ^c	864 ^d	888 ^a	876 ^{b-c}	796 ^{r-t}

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 7. Dry period of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
240 ^{a-d}	235 ^{a-d}	257 ^{ab}	245 ^{a-d}	252 ^{a-c}	234 ^{a-d}	252 ^{a-c}	263 ^{ab}	260 ^{ab}	198 ^e
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
242 ^{a-d}	242 ^{a-d}	267 ^a	221 ^{c-e}	260 ^{ab}	229 ^{c-e}	219 ^{c-e}	150.33 ^f	267 ^a	244 ^{a-d}
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
244 ^{a-d}	230 ^{b-e}	269 ^a	246 ^{a-c}	210 ^e	243 ^{a-d}	219 ^{c-e}	260 ^{ab}	257 ^{ab}	221 ^{c-e}

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 8. Age at first conception of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
925 ^l	945 ^{fg}	952 ^e	935 ⁱ	955 ^d	923 ^l	963 ^b	938 ^h	947 ^f	955 ^d
DC-11	DC-12	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18	DC-19	DC-20
965 ^{ab}	915 ⁿ	920 ^m	938.33 ^h	933 ^{ij}	960 ^c	943 ^g	907 ^p	964 ^b	944 ^g
DC-21	DC-22	DC-23	DC-24	DC-25	DC-26	DC-27	DC-28	DC-29	DC-30
935 ⁱ	930 ^k	967 ^a	940 ^h	931 ^{jk}	914 ^{no}	910 ^p	912 ^{op}	910 ^p	932 ^{jk}



TORTICOLLIS AND CONTAGIOUS PARALYSIS OF PIGEONS: A MINI REVIEW

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ARTICLE INFORMATION

Article History:

Received: 3rd April 2022

Accepted: 28th May 2022

Published online: 27th June 2022

Key words:

Torticollis, Contagious, Paralysis, Pathology, Pigeons.

ABSTRACT

To fulfill complete hobby and finally economically solvent, need to know the true causes of the diseases of pigeons. Oral communication with many pigeon keepers helped to analyze this review. The result suggested that without proper pathological tests, this is quite impossible to detect the true causes of those diseases. Sometimes, pigeon keepers observed the same types of symptoms of the different health issues of their pigeons.

1. INTRODUCTION

Torticollis

Torticollis is a common symptom in various poultry species due to infectious, non-infectious, and nutritional causes. Newcastle Disease (ND) is caused by RNA virus (paramyxovirus serotype 1) (Ali *et al.*, 2014). This disease is highly contagious affecting poultry species of all ages and causing huge economic losses (Aldous and Alexander, 2001). 8000 species of birds including chickens, turkeys, pigeons, peacocks-peahens, and ducks are susceptible to this infection (Kaleta and Balbauf 1988). Among non-infectious causes, head injuries, roundworm and tapeworm infestations, and ammonia toxicity can lead to this clinical manifestation in poultry. The nutritional causes may be deficiencies in magnesium, vitamin E (somersaulting), and thiamine. Various food poisoning like botulism, heavy metal (lead toxicity), and Aflatoxicosis are associated with this problem (Ali *et al.*, 2014).

The paramyxovirus (PMV-1) has variable pathogenicity, produces typical nervous disorder, respiratory or reproductive signs in affected birds. Morbidity is usually high and mortality varies 0-100% depending upon the immunological status of birds and the pathotype of the virus (Ali *et al.*, 2014).

This virus affects the cerebellum and brain stem cells, producing multifocal glial nodules and necrosis, mild lymphocytic infiltration, demyelination, and degeneration of the Purkinje cells in the cerebellum (Okoye *et al.*, 2000). The trachea, lungs, and spleen were shown necropsy and cloacal swabs confirm shedding of the ND virus through virus isolation using egg inoculation (Alexander, 1989). The paramyxoviruses are mostly transmitted through horizontal routes and survived for long periods at ambient temperature, and can persist in feces, litter, cages, etc. The paramyxoviruses are quite susceptible to disinfectants, fumigates, and sunlight and can be inactivated by temperatures above 50°C, acidic pH, formalin, and phenol (Ali *et al.*, 2014).

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It is rather suggested that the ND vaccine should be given to all birds including pet birds like pheasants, pigeons, ducks, etc. (Chong *et al.*, 2010). Tablet Mits and Deltacortril, vitamin B12 (syrup), and syrup Phenergan are effective on this disease (Ali *et al.*, 2014).

Contagious Paralysis

The causative agent of this condition was a virus identified by Cornwell (Cornwell *et al.*, 1967) as a herpesvirus. Signs of illness always started with declination to walk or fly; circling and torticollis were sometimes observed. The mortality rate ranged between 40-80% from a few weeks to several months (Mohammed *et al.*, 1978). The objective of this study is to insist all pigeon keeper's complete pathological tests for their pigeons' death.

Pathological Tests

Symptomatic treatments are not the real solution at all (Kabir, 2014). After any death case of pigeons, need to send those corpses to veterinary hospitals. They will complete the visceral test as well as the microscopic test for identifying those viruses that were responsible for Newcastle Disease (ND) virus (paramyxovirus) and herpes virus as well. All veterinary hospitals have these facilities. In addition, any agricultural universities have laboratory facilities to complete these tests. All pigeon keepers would have the link to those centers to get proper support for the above incidents in their lofts.

2. CONCUSSION

This is quite impossible to detect any diseases without pathological tests. Only disinfectant and biosecurity is the major subject for suppressing these pathogenic viruses. In Bangladesh, most lofts are not clean enough and those pigeon keepers undergo lots of diseases of their favourite pigeons. After any death whether we know those names or not, we will be completed the postmortem from the veterinary hospitals for ensuring the future attack of such diseases.

3. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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INHIBITORS MILITATING AGAINST ARTISANAL FISHERFOLKS IN EPE LOCAL GOVERNMENT AREA, LAGOS, NIGERIA

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ARTICLE INFORMATION

Article History:

Received: 23rd April 2022

Accepted: 28th August 2022

Published online: 27th June 2022

Author's contribution

All authors contribute equally.

Key words:

Fishing, Tilapia, Croaker, hyacinth, borrowing equipment.

ABSTRACT

This study examined the inhibitors militating against artisanal fisherfolks in Epe Local Government Area, Lagos, Nigeria. A two-stage sampling procedure was used to select 120 respondents. Data were obtained by the use of structured questionnaire. Based on the result of findings, most of the respondents were female (66.7%) with average age of 44 years. The average farming experience was 12 years. Tilapia and Croaker (mean=3.99), Catfish (mean=3.98), Obokun fish (mean=3.97), Pink shrimp (mean=3.91), Ejaosan (mean=3.88), Abo (mean=3.06) and Akokoni (mean=3.03) were highly harvested fish among respondents. The top ranked inhibitors were infestation of water by hyacinth (mean=2.67), inaccessibility to credit (mean=2.05), and inadequate technology (mean=2.02). Borrowing money (mean=2.27), Borrowing equipment (mean=2.05), Servicing boats before breakdown (mean=1.68) were the leading coping strategies to inhibitors against fisher folks in the study area. PPMC results show that sex ($r=0.254$; $p=0.006$), education ($r=0.233$; $p=0.012$) and primary occupation ($r=0.357$; $p=0.000$) were socioeconomic characteristics that significantly affect inhibitors against fisher folks in the study area. There is need for government to make fund available for artisanal fisher folks by creating loans through bank of Agriculture. Fisher folks should also be enlightened through extension programmes on how to control water hyacinth, improvement of fishing practices and technology adoption.

1. INTRODUCTION

Livestock Fish plays a vital role in feeding the world's population and contributing significantly to the dietary intake of millions of the populace (Ajao, 2011).

World apparent per capita fish consumption has been increasing steadily from an average of 9.9kg in the 1960s and risen to above 20kg in 2016 (FAO, 2016).

The fisheries sub-sector of the Nigerian economy is made up of artisanal (traditional), coastal (industrial) and cultured fisheries. The artisanal covers the operations of small-scale canoes, fisheries operating in the coastal areas, creeks, lagoons, inshore water and the inland rivers.

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The artisanal fishery is characterized by low capital outlay, low operational costs, low technology application and it is labor intensive (Aminu and Adekunle 2017; Adedokun *et al.*, 2006, Bolarinwa, 2014).

Artisanal fishing occurs around the world (particularly in developing nations) and are vital to livelihoods and food security (Daniel and Monsi, 2019). In Nigeria, large populations of artisanal fishermen who rely on the predominant use of small fishing gear are found around the coastal communities. Apart from being an income earner to many Nigerians especially people in coastal, riverine and lake areas of the country, people earn their living from fish processing and marketing while others engaged in fisheries research (Soyinka and Kusemiju, 2007; Bolarinwa, 2012).

(Faturotu, 2010) reported that artisanal fisheries in Nigeria provide more than 82% of the domestic fish supply, giving livelihoods to up to 5.8million fisher folks in the secondary sector but are faced with several challenges in their operation. To formulate relevant fisheries developmental programmes that will positively affect the enormous fishermen, it is important to identify the inhibitors to fisher folks in fish community like Epe.

Therefore, this research seeks to examine the inhibitors militating against artisanal fisher folks in Epe Local Government Area of Lagos State, Nigeria. The specific objectives of the study are to describe the socio-economic characteristics, identify dominants fish harvested, identify the constraints to fishing activities and coping strategies to the constraints identified.

2. METHODOLOGY

Epe (town and port) is located in Lagos, its lies on the north bank of the coast lagoon and has road connected to Ijebu-ode and Ikorodu. It has a land area of about 965km² with coordinates 60 35'N and 30 59'E. Fishing is the major occupation of Epe people. Epe fish market is one of the leading Fish Market in Lagos State.

A two-stage sampling procedure was used for the study. The first stage involved the purposive selection of Chief Market because of the concentration of artisanal fisher folks in the market. The second stage was the random selection of 120 respondents from the market. Structured and validated questionnaire was used to collect primary data. Likert type scale was used to measure inhibitors of artisanal fisher folks as very severe=3, severe=2 and not severe=1. The collected data were analysed using frequency counts, percentages, and means score and Pearson Product Moment Correlation.

3. RESULTS AND DISCUSSION

Results presented in Table 1 show that the average age was 44 years with average household size of 5 persons and average farming experience was 12 years. This finding agrees with (Olaoye 2010) who found that most fisher folks are in their active ages to undergo strenuous tasks associated to the fishing enterprise.

The table further show that most of the respondents were female (66.7%), implying that women involvement in fishing activities was high in the study area. This finding agrees with (Olupade and Sesay, 2018) that women make up an important part of the fishing sector and play critical roles, particularly, in smallscale fisheries and increasingly in capture fishing and other activities. Similarly, (Odili *et al.*, 2012) reported that women are more commonly occupied in subsistence and commercial fishing from small boats and canoes in coastal or inland waters. The roles of women in the sector are diverse; and according to (Olufayo 2012), they take part specifically in fishing, processing and marketing. According to (Cliffe and Akinrotimi 2015), fisher women engage in coastal fisheries activities to meet their daily need which includes feeding, taking care of their children and lending a helping hand to support their husbands.

More than half of the respondents (58.3%) had primary education where fishing business is their primary occupation (56.7%). Only halve (50.0%) of the respondents were members of cooperative society. The results also show that radio (48.3%) and family and friends (45.8%) were the main sources of information of respondents on fishing activities.

The results illustrated in Table 2 reveal that Tilapia and Croaker (mean=3.99), Catfish (mean=3.98), Obokun fish (mean=3.97), Pink shrimp (mean=3.91), Ejaosan (mean=3.88), Abo (mean=3.06) and Akokoni (mean=3.03) were highly harvested among respondents. Earlier report by (Okeowo *et al.*, 2015) had similarly found *Mullet*s (*Mugil spp* & *Liza spp*) (Atoko) and *Cynoglossus spp* (Sole) Abo species of fishes harvested by artisanal fisher folks in Epe.

The top ranked inhibitors as revealed in Table 3 were infestation of water by hyacinth (mean=2.67), inaccessibility to credit (mean=2.05), and inadequate technology (mean=2.02). Olaoye *et al.* (2012) also identified infestation of water by hyacinth, inaccessibility to credit, and inadequate technology as major constraints among artisanal Fisher Folks in Ogun Water-Side Local Government Areas of Ogun State, Nigeria. Several authors have identified lack of access to credit as major constraints among artisanal Fisher Folks in Nigeria (Daniel and Monsi 2019; Bonjoru *et al.*, 2019; Oladimeji *et al.*, 2013; Olutunji and Olah, 2012).

Table 4 show that Borrowing money (mean=2.27), Borrowing equipment (mean=2.05), Servicing boats before breakdown (mean=1.68) were the leading coping strategies to inhibitors against fisher folks in the study area.

Results of the relationship between socioeconomic characteristics and inhibitors against fisherfolks show that sex ($r=0.254$; $p=0.006$), education ($r=0.233$; $p=0.012$) and primary occupation ($r=0.357$; $p=0.000$) were socioeconomic characteristics that significantly affect inhibitors against fisher folks in the study area.

4. CONCLUSION

Based on the major findings of the study, it could be concluded that artisanal fisher folks are given little or no attention by the extension services and the government even with the great role they play in the fisheries subsector of Nigeria. Due to lack of funding or credit facilities, they use baskets and cages which has great effect on their catch levels. The need for extension programme is of great importance to the

artisanal folks to help improve their livelihood economically and socially.

There is need for government to make fund available for artisanal fisher folks by creating loans through bank of Agriculture. Fisher folks should also be enlightened through extension programmes on how to control water hyacinth, improvement of fishing practices and technology adoption.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table 1. Socio-Economic Characteristics of Respondents

Variables	Mean score	Frequency	Percentage
Age	44 years		
Household size	5 persons		
Farming experience	12 years		
Sex			
Male		40	33.3
Female		80	66.7
Educational level			
No formal education		25	20.8
Primary education		70	58.3
Secondary education		25	20.8
Membership of cooperative society			
Yes		60	50.0
No		60	50.0
Primary occupation			
Fishing		68	56.7
Others		52	43.3
Sources of Information			
Television		7	5.8
Radio		58	48.3
Family and Friends		55	45.8

Source: Field survey, 2017

Table 2. Dominant fish species harvested

Fish species	Percentage Responses				Mean score
	Always	Occasionally	Sometimes	Never	
Tilapia	99.2	0.8	0	0	3.99
Croaker	99.2	0.8	0	0	3.99
Catfish	98.3	1.7	0	0	3.98
Obokun	96.7	3.3	0	0	3.97
Pink shrimp	95.0	2.5	0.8	1.7	3.91
Ejaosan	89.2	9.2	1.7	0	3.88
Abo	5.8	94.2	0	0	3.06
Akokoni	3.3	96.7	0	0	3.03
Crabs	2.5	25.8	68.3	3.3	2.28
Kote	2.5	0	2.5	95.0	1.10
Atoko	1.7	0.8	2.5	95.0	1.09
Shawa	0	0.8	3.3	95.8	1.05

Source: Field survey, 2017

Table 3. Constraints faced by artisanal fisher folks

Inhibitors	Percentage Responses			Mean	Ranking
	Very Severe	Severe	Not severe		
Infestation of water by hyacinth	75.0	16.7	8.3	2.67	
Inaccessibility to credit	5.0	95.0	0	2.05	
Inadequate technology	23.3	55.0	21.7	2.02	
Unavailability of spare parts	17.5	54.2	28.3	1.90	
Poor boat maintenance	15.8	51.7	32.5	1.83	
High cost of equipment	13.3	50.0	36.7	1.77	
Inadequate storage facilities	17.5	37.5	45.0	1.73	
Scarcity and high cost of net	5.0	50.0	45.0	1.60	
Climate condition	5.0	22.5	72.5	1.33	
Menace of trawlers	4.2	21.7	74.2	1.30	
Difficult access to fuel	2.5	22.5	75.0	1.28	
Lack of electricity	3.3	11.7	85.0	1.18	
Distance to market	2.5	9.2	88.3	1.14	

Source: Field survey, 2017

Table 4. Coping strategies of artisanal fisher folks

Coping strategies	Percentage Responses			Mean	Ranking
	Always used	Rarely used	Never used		
Borrowing money	29.2	68.3	2.5	2.27	1 st
Borrowing equipment	15.0	75.0	10.0	2.05	2 nd
Servicing boats before breakdown	20.0	27.5	52.5	1.68	3 rd
Hawking fish harvested	8.3	48.3	43.3	1.65	4 th
Catching small amount of fish	12.5	30.8	56.7	1.56	5 th
Fishing early in the morning	15.0	23.3	61.7	1.53	6 th
Use of ice block for preservation	8.3	24.2	67.5	1.43	7 th

Source: Field survey, 2017

Table 5. Relationship between socioeconomic characteristics and constraints faced by respondents

Variables	r -values	p -values	Decision
Age	0.025	0.791	Not significant
Sex	0.254*	0.006	Significant
Education	0.233*	0.012	Significant
Household size	0.038	0.684	Not significant
Primary occupation in fishing	0.357*	0.000	Significant
Fishing experience	0.140	0.133	Not significant
Membership of cooperative	0.053	0.529	Not significant
Source of information	0.060	0.520	Not significant

*Correlation is significant at 0.05 level



MASS REARING OF *ACRIDA EXALTATA* (ORTHOPTERA: ACRIDIDAE) UNDER THE LABORATORY CONDITIONS

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ARTICLE INFORMATION

Article History:

Received: 19th April 2022

Accepted: 13th June 2022

Published online: 27th June 2022

Author's contribution

MY designed the study, MW collected the samples, MZA complied the data, MS draft the manuscript

Key words:

Acrida exaltata, diets, *Pennisetum glaucum* *Saccharum officinarum*, moulting fecal.

ABSTRACT

Pilot study was carried out in order to rear *Acrida exaltata* (Walker) under laboratory conditions. Target insects were reared on two diets *Pennisetum glaucum* and *Saccharum officinarum*. Culture was maintained for about 8 days in the laboratory in order to observe feeding preference, moulting and fecal production. It was noted that insects feed more on *P. glaucum* (bajra) leaves compared to *S. officinarum* (sugar cane). Mortality and molting were also noted during this time. However, there was no significant difference in Mortality of insects on these diets.

1. INTRODUCTION

Grasshoppers are the largest and most diverse group of insects. Grasshoppers have several advantages for such studies, relating to its great body size easy catch ability and high dominance so, that it became a main invertebrate group for biological indication in its wider sense. They are often the main invertebrate consumer in grasslands and are to be important food source for many groups of predators e.g., birds, lizards etc. The grasshopper insect fauna generally is grouped as short-horned grasshopper (Caelifera) and long-horned grasshopper (Ensifera).

Short horned grasshopper, (family Acrididae), any of more than 10,000 species of insects (order Orthoptera) that are characterized by short, heavy antennae, a four valved ovipositor for laying eggs, and three segmented tarsi (distal segments of the leg).

They are herbivorous and include some of the most destructive agricultural pests known. The plague, or migratory, species are called locusts.

Short horned grasshoppers' range in size from 5 mm to 11 cm (0.2 to 4.3 inches) in length. The shape of the body may be long and slender or short and stout. Many species are green or straw-colored, which helps them blend into their surroundings. The hind legs are adapted for jumping, with greatly enlarged femurs. Some species have wings, whereas others are wingless. Among the winged species, the males can produce characteristic noises by rubbing the front wings together or by drawing the hind legs across the edge of the wings. Most species have a pair of tympanal (hearing) organs at the base of the abdomen. A female short horned grasshopper lays about 100 eggs in the soil. The eggs hatch after a rest period, and newly hatched nymphs, miniature replicas of the adults, pass through a series of molts before they become adults. In temperate regions one to several broods are produced each year.

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Grasshoppers are the main important part of the class insecta and family Acrididea which are harmful in the agricultural field for the crops. Pakistan is the most significant agricultural country in this world; it comprised the major zone of our financial system. There are so many cash crops, fruits, vegetables are cultivated but these crops are more or less low due to serious harm of insects. Full adult male grasshoppers develop up to 28- 37 mm whereas female develop up to 34-50 mm.

Acrididae may be either gregarious and migratory, or solitary and sedentary, but any solitary species may transform into a gregarious or migratory species. The grasshopper's favorite foods are grasses, leaves and cereal crops. One particular grasshopper – the Shorthorn grasshopper only eats plants, but it can go berserk and eat every plant in sight – makes you wonder where they put it all. A Grasshopper does not actually 'jump'. What they do is use their legs as a catapult. Grasshoppers can both jump and fly and they can reach a speed of 8 miles per hour when flying. There are about 18,000 different species of grasshoppers.

Grasshoppers usually have large eyes, and are coloured to blend into their environment, usually a combination of brown, grey or green. In some species the males have bright colours on their wings that they use to attract females. A few species eat toxic plants, and keep the toxins in their bodies for protection. They are brightly coloured to warn predators that they taste bad. Grasshoppers live in fields, meadows and just about anywhere they can find generous amounts of food to eat. A grasshopper has a hard shell and a full-grown grasshopper is about one and a half inches, being so small you would not think they would eat much – but you would be so wrong – they eat lots and lots – an average grasshopper can eat 16 times its own weight.

Grasshoppers are herbivorous insects of the suborder Caelifera in the order Orthoptera. To distinguish them from bush crickets or katydids, they are sometimes referred to as short-horned grasshoppers. Species that change color and behavior at high population densities are called locusts.

2. MATERIALS AND METHODS

Sampling Sites

Grasshoppers will be collected from Cholistan desert. All sites will be visited after fortnight and most visits will be carried out at dawn time especially in the month of June-October.

Collection of Specimens

Adult specimens of grasshoppers will be collected from different localities of Cholistan desert and sampling will be made from agricultural land, open grounds, vegetation, herbs, shrubs, bushes, etc. Samples will be collected by insect hand net and some by hand picking. Collected material will be transferred to plastic bottles and then brought to Laboratory. All materials such as Magnifying lens, Vernier calipers, Graduated scale, conical flasks, Beakers, Petri dish, Aluminum foil, China crucible, digital scale, microwave oven, Muffle furnace, agate pestle and electric mortar were of high quality.

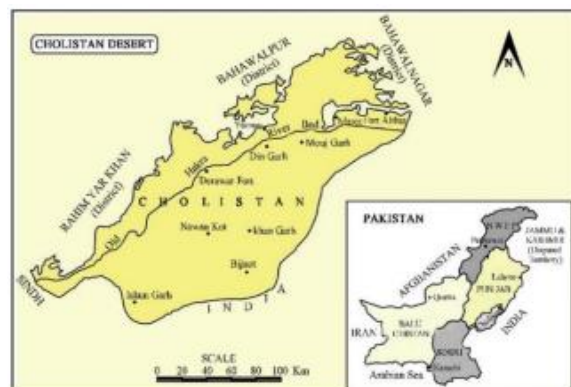


Figure 1. Map of Cholistan Desert

Killing & Preservation

Material will be brought to Department of Zoology, Cholistan University of Veterinary and Animal Sciences, Bahawalpur. Method for killing will be adapted by (Riffat and Wagan 2015) Specimens will be killed by using Potassium cyanide or Chloroform in standard entomological killing bottles for 5-10 minutes. Samples were not left to long because the color of the specimen would be change. Fully dry insects will be preserved at Department of Zoology, with labels showing collection date, habitat, locality,

and collector name. Naphthalene balls will be placed in boxes to prevent the attack of other insects.

Identification

Specimens were identified through bibliographies by (Uvarov 1966 & 1977), (Riffat and Wagan 2015).

Statistical analyses

The lengths or widths of body parameters will be measured by ImageJ software (1.48v) and MS Excel 2007. Relationship among parameters and different species will determined using repeated measures ANOVA with Tukey post-test.

3. RESULTS

During the present study fair numbers of *Acrida exaltata* were reported from agricultural lands of Cholistan Desert. Samples were brought to the laboratory where the separation and identification process took place. About 100 specimens were selected and put in two jars one having *Pennisetum glaucum* (Bajra) and *Saccharum officinarum* (Sugar Cane) leaves. Culture was maintained for about 8days in the laboratory in order to observe feeding preference, moulting and fecal production. It was noted that insects feed more on *P. glaucum* (bajra) leaves compared to *S. officinarum* (sugar Cane). Mortality and molting were also noted during this time (Table.1).



Figure 1 *Acrida exaltata*

4. CONCLUSION

Pennisetum glaucum (Bajra) was found more preferable food plant of *Acrida exaltata* it might be nutritional value of this plant.

5. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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Table 1. Rearing of *Acrida exaltata* under laboratory conditions

(FRIDAY TO MONDAY)

Before			After			
Bottle No.	DIET	FOOD WEIGHT	FOOD WEIGHT	FEACAL MATERIAL	MORTALITY	MOLTING
01	<i>Pennisetum glaucum</i>	10g	2.03	0.35	03	Yes
02	<i>Saccharum officinarum</i>	10g	4.10	0.20	06	Yes

(MONDAY TO THURSDAY)

Before			After			
Bottle No.	DIET	FOOD WEIGHT	FOOD WEIGHT	FEACAL MATERIAL	MORTALITY	MOLTING
01	<i>Pennisetum glaucum</i>	10g	2.150	0.443	04	Yes
02	<i>Saccharum officinarum</i>	10g	3.993	0.282	02	Yes

(TRIAL-3 FRIDAY TO MONDAY)

Before			After			
Bottle No.	DIET	FOOD WEIGHT	FOOD WEIGHT	FEACAL MATERIAL	MORTALITY	MOLTING
01	<i>Pennisetum glaucum</i>	10g	2.04	0.36	04	No
02	<i>Saccharum officinarum</i>	10g	3.80	0.30	08	Yes



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ISSN (E)	:	2531-6067
ISSN (P)	:	2521-8328
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