THE DOSE DEPENDENT EFFECT OF GIR GO-ARK ON THE GROWTH AND FOOD UTILIZATION OF *LABEO ROHITA* FINGERLINGS

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Abstract: Go-Ark or cow urine distillate (CUD) is well known for its medicinal properties with therapeutic and prophylactic values since Vedic times in India. In an attempt to utilize its values in integrated farming with aquaculture, Gir Cow urine distillate (Go-Ark) was used in this present study, to evaluate its growth enhancing and food utilization properties in *Labeo rohita* fingerlings one of the Indian major carps. The fingerlings were tested with Go-Ark by mixing directly in the medium in different concentration (0.1%, 0.25% and 0.5%). Investigations were undertaken to study of the efficacy of Cow urine distillate on growth, food utilization parameters and survival rate. The results showed significant effect of Go-Ark on the growth performance and food utilization of the fingerlings of India major carp *Labeo rohita*.

Keywords: Aquaculture, CUD, Gir, Go-Ark.

Introduction: Aquaculture has been the fastest growing food producing sector in the agriculture. Due to its rapid growth, fisheries may become the major sources of future supplies of food fish. The rapid increase in human population has escalated the demand for quality food like fish in the world. To fulfill the food requirements, fish assume greater importance because, it contains high quality proteins, fats and minerals [1]. Several commercial fish species have been cultured intensively in narrow or enclosed spaces such as ponds, cages or tanks under crowding or high density leading to adverse, effect on health of cultured fish with a potentially stressful environment and infectious diseases [2].

Hence there is a development of need for identifying compounds that can enhance the growth and production aquaculture with ecofriendliness. Indian cow breeds are very unique and distinct species both in their appearance and characteristics. The indigenous cattle, scientifically called as *Bos indicus* or *Zebu* cattle, mainly habitat the Indian subcontinent. Presently cow rearing is an important source of income and an enterprise, which enables poor and landless farmers to earn income using common property resources and land [3].

Cows were regarded as wealth and were the backbone of the economy of ancient Indians. Cattle were one of the most frequently used animals described in Vedas. Voluminous treatises are also available on cows, e.g., *Gau Ayurveda*'. Cow urine is elaborately described in ancient Ayurvedic scriptures such as Charaka Samhita, Shushruta Samhita, and Brahad-Wagbhatt as bitter, pungent, spicy and warm. Cow urine, used as an insecticide or as a regulator for various disorders like gas, acidity, and cough, promotes the power of wisdom in human beings, acts like a universal medicine and is easily digested by all [4]. Diseases in human beings and animals are due to shortage or accumulation of certain elements in the body. Cow urine contains all such elements. Cow urine was reported to cause weight loss and to cure leprosy, cardiac and kidney problems, indigestion, stomach ache, edema, *etc*.

Cow urine contents are 95% water, 2.5% urea and 2.5% minerals, salts, hormones, and enzymes. It contains iron, calcium, phosphorus, carbonic acid, potash, nitrogen, ammonia, manganese, sulphur, phosphates, potassium, urea, uric acid, amino acids, enzymes, cytokine, lactose etc [5]. Cow's urine was found to contain various inorganic, including silver, traces of gold, Sodium and Potassium in ratio of 4:1 (36%: 9% in dried urine), apart from about 3% urea. Further important findings were, that fresh cow-urine contains 50-100 mg oestrogens/100 ml; 20-200 µg of cortico-steroids/100 ml and 0.05-0.15 mg of 17- keto-steroids/100 ml [6].

Labeo rohita, an Indian Major Carp, is one of the most preferred species in the subcontinent, which contributes about 35% of the total production [7]. *Labeo rohita* is the highly valued of all carp species farmed using traditional or modern aquaculture systems in the Indian sub continent. It has been introduced to other areas of India beyond its natural range for aquaculture [8], [9]. Rohu is likely to become an even more important aquaculture species in near future, as research on selective breeding of rohu in India lead to the availability of the seed of faster growing strains. Monoculture of rohu in cages, pens, running waters and closed re-circulatory systems might be possible. Both fresh and processed rohu might then become significant commodities with much wider markets. Hence the present study's objective of stimulating growth of rohu with CUD is having more socio economic importance.

Materials and methods:

Experimental Fish: Fingerlings of *Labeo rohita* (Hamilton) were procured from S.M. Fish farm, Swamimalai, Thanjavur District and were brought to

the laboratory in polythene bags filled with oxygen. The polythene bags were kept floated for 30 minutes in the cement tank for acclimatization of the fingerlings before being released into the tank. Glass aquaria were washed to avoid fungal contamination and then sundried. Healthy fishes were then transferred to glass aquaria (Vol 20 lt) containing decholrinated tap water. Fish of both sexes weighing 1.0±0.2g were used in the present study. They were regularly fed with formulated food and the medium (Tap water) was changed daily to remove faeces and food remnants.

Mode of feeding: Each of the growth treatment was fed with formulated feed of 2% total body weight [10]. The experimental fish were fed twice in a day for an hour between 9.00am to 10.00am and 4.00pm to 5.00pm. The unfed was collected and dried (60º C) in a hot air oven and weighed. The faeces were also collected separately, dried and weighed.

Collection of Cow Urine: Six disease free cows were selected for urine collection. The early morning (4.00am) first urine of Gir breed cattle (*Bos indicus)* was collected from Goshala, Sri Vittal Rukminni Samsthan, Govindhapuram near Kumbakonam. The urine was pooled and transported to laboratory in airtight sterile containers.

Cow Urine Distillate: Gir Cow urine was distilled at 100°C using by glass distillation apparatus [11]. The cow urine distillate (Go-Ark) was stored in sterile glass container in refrigerator (4°C) till use.

Experimental setup: After two weeks of acclimatization three groups of fish were treated, each with Gir cow urine distillate at 0.1%, 0.25% and 0.5% concentration respectively. A control group was maintained separately without cow urine treatment [12].

Morphological growth analysis: For length and weight the fishes were measured individually. The fishes were weighted by digital electronic balance. Ruler was used to measure the total length from head and tip of caudal fin. The fingerlings were released in water immediately after body measurements.

Growth and Food utilization parameters: The weight and length of individual fish were recorded at the initiation of experiment and then at the interval of 10 days. The growth parameters were calculated by using the following formulae:

Growth = Final weight – Initial weight (mg)

$$\text{Growth Rate} = \frac{\text{Weight gain}}{\text{No of days x initial weight}} \text{ (mg. day-1)}$$

$$\text{Specific Growth rate} = \frac{\text{Ln final weight} - \text{Ln initial weight}}{\text{Number of days}} \times 100$$

$$\text{Percentage of Increase in Body weight} = \frac{\text{Final weight} - \text{Initial weight}}{\text{Initial weight}} \times 100$$

$$\text{Average Daily Growth} = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{No of feeding days}} \text{ (gm/day)}$$

Food utilization parameters were calculated as follows:

$$\text{Feeding rate} = \frac{\text{Total dry food consumed}}{\text{No of days x initial live wt. of fish}} \text{ (mg. g body wt. -1 day -1)}$$

Food absorbed = Food consumed – faeces produced (mg. g. body wt.-1 day -1)

$$\text{Absorption rate} = \frac{\text{Total food absorbed (dry)}}{\text{No of days x initial live wt. of fish}}$$

$$\text{Absorption efficiency} = \frac{\text{Food absorbed}}{\text{Food consumed}} \times 100$$

$$\text{Gross Conversion efficiency (K1)} = \frac{\text{Growth rate}}{\text{Feeding rate}} \times 100$$

$$\text{Net Conversion efficiency (K2)} = \frac{\text{Growth rate}}{\text{Absorption rate}} \times 100$$

Survival rate is calculated by following formulae:

$$\text{Survival rate} = \frac{\text{Initial number of fish} - \text{mortality}}{\text{Initial number of fish}} \times 100$$

Statistical analysis: The test of significance was done manually with student's-t test assuming unequal variance in Excel.

Results:

Growth performance : The growth response of *Labeo rohita* in terms of increase in body weight, growth rate, specific growth rate (SGR) are presented in Table 1. The experiments were revealed that on the 30th day, the highest growth rate was recorded in T1. The maximum growth enhancement was recorded in T1 (0.1%) with a growth rate of 0.0095, when compared with 0.0015 of control. Hence the 0.1% CUD of Gir breed cattle has a significant effect on the growth rate (P< 0.005), (Table 1).

Food utilization parameters: The effect of Go-Ark in *Labeo rohita* fingerlings on food utilization parameters of Feeding rate, food absorbed, absorption rate, absorption efficiency, Gross conversion efficiency and Net conversion efficiency were showed in table 2. The food utilization parameters were significantly higher in experimental fishes treated with Go-Ark, when compared to the controls. It was noted that highest feeding rate of 0.0031 was observed in T1, which is higher (P<0.005) compared with control which feeding rate is 0.0021, (Table 2).

Survival Rate: The mortality was recorded at 10 days interval. The highest survival rate of 75% was recorded in the T1, which is significantly higher (P<0.005) than the untreated control group having a survival rate of 50%. T2 shows a lesser survival rate while T3 has effected 100% mortality, (Figure 1).

Discussion: The knowledge on the influence of any chemical in the environment over the growth and food utilization efficiency is essential for aquaculture practices in water bodies with such environmental conditions. The chemicals, adversely affect aquatic fauna. In spite of this, chemicals and hormones are also used as growth promoters to increase food utilization in fishes and to achieve high growth and production in fishes. [13], [14]. Different authors reported the suitability of food components of both plant and animal origin for their ability to contribute better growth performance in cultured stocks [15]. Various growth promoters like vitamins, hormones and amino acids were used as growth promoters in different fishes and shrimps.

Cow dung is found to be an effective source of organic fertilization, which positively influences the growth performance of major carps of fish production [16]-[18]. Pond fertilization is a management protocol to enhance biological productivity using both organic manure and inorganic chemical fertilizers. Evaluation of fertilizer value of different organic manure (pig, cow, chicken and green manure) has been a subject of research in aquaculture [19]-[21].

In semi-intensive polyculture system, the frequent application of organic manure, inorganic fertilizers, supplementary feed and stocking species ratio make the maintenance of production, population of natural food organism and the maximal utilization of productivity of pond ecosystem.

Cow urine has been recorded for its various bioenhancing properties in mice. The redistillate of cow's urine was found to possess total antioxidant status of around 2.6 µmol, contributed mainly by volatile fatty acids (1500 mg/L) as revealed by the GC-MS studies. These fatty acids and other antioxidants might cause the highly protective effects [22].

Garg [23] evaluated the effect of distilled cow urine on the nutrient utilization by the white leghorn layers. The results showed that there was increase in feed intake, decreased feed conversion ratio and feed efficiency ratio. Digestibility of dry matter, crude protein, ether extract, crude fiber and organic matter increased significantly in the cow urine treated group. Padmapriya and Venkatalakshmi [12], reported an increase in growth rate of *C. mrigala* fingerlings treated with the different breeds of cow urine.

As literature reveals, the present study also confirms the potential of cow urine distillate in promoting the health, which was expressed as good survival rate, increased growth rate and feeding rate in the present study. Since this is a preliminary work for finding the optimal concentration of cow urine distillate treatment for growth enhancement different concentration like 0.1%, 0.25% and 0.5% were put for trails. The results revealed that 0.1% is the optimum concentration from its, increased growth rate, feeding rate and survival rate. Though the gross conversion efficiency and net conversion efficiency are higher in 0.25% treated groups (T2) than the optimal 0.1% treated group (T1), the high mortality rate and less survival rate make it a unfavorable concentration for future studies. Hence the present study suggests the 0.1% concentration of CUD as the best optimal concentration for enhancement of growth and food utilization parameters in *Labeo rohita* fingerlings.

Conclusion: The results clearly showed that Go-Ark had beneficial effects on the growth performance. In conclusion, Go-Ark Gir could be suggested for pond management at 0.1% concentration to get a better yield.

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Table 1: Effect of Gir Go-Ark on the Growth parameters of *Labeo rohita* fingerlings.

Parameters	Control	T1	T2	T3
Initial Weight W1(g)	0.91±0.0340	0.9112±0.0269	0.9137±0.0396	0.9112±0.0238
Final Weight W2 (g)	0.99±0.0208	1.172±0.1535	1.1633±0.0568	-------
Initial Length (cm)	4.35±0.2345	4.23±0.315	4.175±0.2815	4.07±0.1488
Final Length (cm)	5.03±0.3055	5.2±0.3182	5.133±0.2516	-------
Growth W1-W2 (g)	0.0866	0.2608	0.2496	-------
Growth rate (gm/day)	0.0015	0.0095	0.0091	------
Average Daily Growth	0.0028	0.0086	0.0083	-------
Percentage of increase in body weight (%)	9.51	28.61	27.31	-------
Specific growth rate (%)	0.03041	0.1587	0.15172	------
Survival rate (%)	50	75	37.5	0
Mortality (%)	50	25	62.5	100

Table 2: Effect off Gir Go-Ark on the food utilization parameters of *Labeo rohita* fingerlings

Parameters	Control	T1	T2	T3
Feeding rate (mg/day)	0.0021	0.0031	0.0029	-----
Food absorbed (mg/day)	0.0560	0.08355	0.0691	------
Absorption rate (mg/day)	0.0021	0.0030	0.0025	------
Absorption efficiency (mg/day)	94.10	95.96	85.39	-------
Gross conversion efficiency (%)	69.67	299.49	359.38	-------
Net conversion efficiency (%)	71.41	312.18	369.82	---------

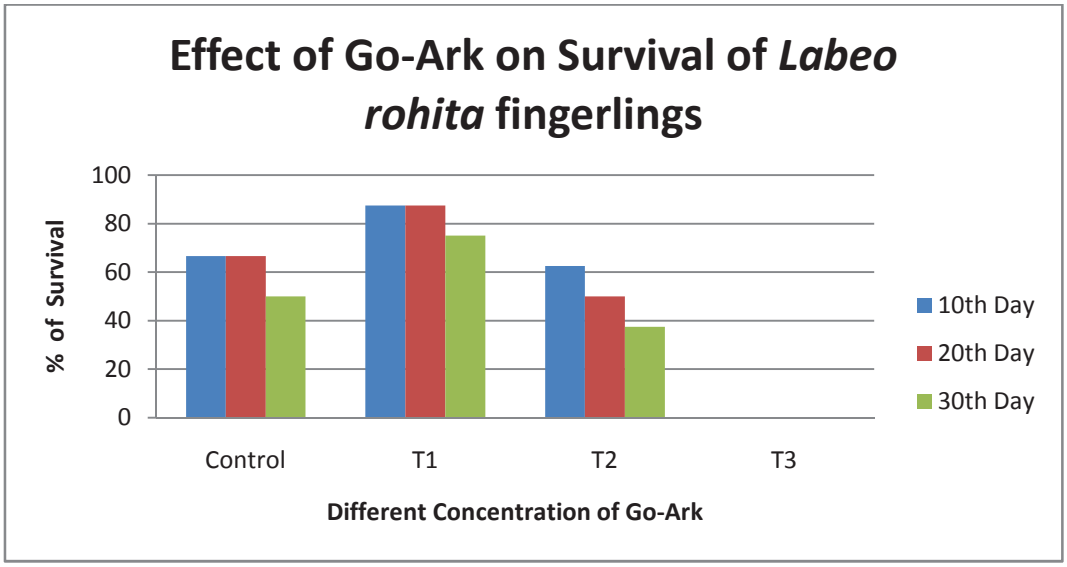

Figure 1: survival of Go-Ark on *Labeo rohita* fingerlings

Table 3: t-Test: Two-Sample Assuming Unequal Variances between Control & T1.		
	Variable 1	*Variable 2*
Mean	0.996667	1.172
Variance	0.000433	0.02357
Observations	3	5
Level of Significance	0.05	
Df	6	
$t_{0.05}$ for df 6 the table value	2.447	
T value for df 6 the calculated value	1.8197	

Inference: The calculated value (1.8197) is lesser than the table value (2.447). Therefore the difference in the means of the growth rate of *Labeo rohita* fingerlings is not significant.

Table 4: t-Test: Two-Sample Assuming Unequal Variances between Control & T2.		
	Variable 1	*Variable 2*
Mean	0.996667	1.163333
Variance	0.000433	0.003233
Observations	3	3
Level of significance	0.05	
df	4	
$t_{0.05}$ for df 4 the table value	2.776	
t value for df 4 the calculated value	6. 43218	

Inference: The calculated value (6.7432) is more than the table value (2.776). So the hypothesis is rejected at 5% level of significance. Therefore the difference in the means of the growth rate of *Labeo rohita* fingerlings is significant.

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