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Research Article

EFFECT OF COW URINE ON THE GROWTH OF *LITOPENAEUS VANNAMEI*

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ABSTRACT

Organic manure utilization in aquaculture is a well-established and economically sound practice. In order to limit the adverse effects of chemical fertilizers and antibiotics in aquaculture, these are substituted with organic fertilizers and phytobiotics. Cow urine or gomutra is a liquid by product of metabolism in cows, while cow urine and cow dung have benefits as fertilizers. Cow urine acts as a very good liquid fertilizer and can also use directly in pond. Application of Gomutra in aquaculture has not been explored so far. *Litopenaeus vannamei* was selected in the present study due to high growth rate and production, commercial or marketing value Hence the present study has been aimed to know the effect of cow urine on the growth of *Litopenaeus vannamei.* The experiment was conducted for four weeks. Four groups were taken ie., sample A, sample B, sample C and control. In five litres of water 20 *L.vannamei* fingerlings were taken. (age one month). Sample A with 3%, sample B with 4%, sample C with 5% solution of cow urine was taken and control without cow urine. The feed is given same to the both sample and control. Then the growth parameters were calculated by using standard formulas for knowing the effect of cow urine on the growth of *Litopenaeus vannamei* finger lings. The survival rate is highest in Sample B (70%)**,** indicating that the 4% cow urine treatment not only promotes significant growth but also improves shrimp survival. Samples A and C also show improved survival rates compared to the control, which remains at 50%. The results from the fourth week demonstrate that 4% cow urine is highly effective in promoting both weight gain and specific growth rates in *Litopenaeus vannamei,* while also ensuring high survival rates. Sample C (5% cow urine) also shows promising growth metrics, particularly in specific growth rate, suggesting potential benefits at varying concentrations. The data indicates that cow urine can be a valuable growth promoter in shrimp aquaculture, warranting further investigation into optimal concentrations for achieving maximum growth and health benefits.

Keywords: Cow urine, Growth parameters, *Litopenaeus vannamei*, Fertilizer, Aquaculture.

INTRODUCTION

Ecofriendly practices lead to sustainable aquaculture. The recycling of animal wastes in aquaculture reduces expenditure. Fertilizers play an important role in aquaculture. Chemical fertilizers and antibiotics are necessary in aquaculture inorder to maintain culturing pond. But along with the beneficial effects these having some adverse effects hence started thinking of alternatives to chemical fertilizers and antibiotics. The organic fertilizers and phytobiotics are invented. Organic manure utilization in aquaculture is a well-established and economically sound practices, this practice gives attractive economic returns (Bardach *et al*.,1972) antibiotics. To overcome the increased rate of mortality and morbidity due to the ban of in -feed antibiotics, a number of alternatives have been proposed (Seal *et al*.,2013). Organic fertilizer typically composed of poultry litter, cow manure, rice bran,

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cotton seed meal (which first must undergo decomposition to release nutrients for phytoplankton growth) Cow urine has natural disinfectant and antiseptic quantities. In traditional medicines cow urine was consumed as an effective and simple medicine. It contains 24 types of salts as well as iron, calcium, phosphorous, carbonic acid, potassium and lactose. (Mandavgane SA *et al*.,2005). Cow urine acts as a very good liquid fertilizer and can also use directly in pond. Cow urine has property of Rasayana tatva responsible for modulating various bodily functions including immunity. Cow urine is an effective anti-bacterial agent against a broad spectrum of gram -negative and gram-positive bacteria and also against some drug-resistant bacteria. It acts as a bio-enhancer of some antimicrobial drugs. It has antifungal, antihelmintic, antineoplastic action, is useful in hypersensitivity reactions and in numerous other diseases including increasing the life-span of a person. Recent researches have shown that cow urine is an immune enhancer also. (Chauhan RS and Garg N 2003) (Randhawa Gk and kullar,2011) (Randhawa, G. K., & Sharma, R. 2015). Different fractions of cow urine possess antimicrobial activity due to the presence of certain components like volatile and non-volatile ones (Jarald, E *et al.,* 2008). (Murphy *et al*.,2007) (Shaw SL *et al*). presence of urea, creatinine, swarnkshar(aurum hydroxide), carbolic acid, phenols, calcium and manganese has strongly explained the antimicrobial and germicidal properties of cow urine (Achliya GS *et al.*,2004) (Jain Nk *et al.*, 2010) (Kumar AA 2001). It has been proved that manure affects the growth rate in aquaculture (Geen *et.al.*,1989) Hence the present study has been undertaken in order to evaluate the effects of cow urine on the growth of *Litopenaeus vannamei.*

MATERIAL AND METHODS

Selection of animal

Litopenaeus vannamei was selected in the present study due to high growth rate and production, commercial or marketing value, growing to marketable size in shorter time, high frequency of harvest and high rate of fecundity.

Collection of fingerlings

Zero salinity fingerlings of 10 days are collected from Sri Manjunatha hatchery, Alagayapalem nearby Kavali and transported to the laboratory in polythene bags filled with oxygen.

Acclimatization

Fingerlings are acclimatized in plastic tub of 20 L capacity for 20days in laboratory, fingerlings are fed with standard commercial diet, regular aeration is provided, cleaning and filtration of water is done for every day.

Collection of cow urine

Cow urine was collected from the desi cow nearby our university campus and then we prepared 3%,4%,5% solution of cow urine.

Experimental setup

After acclimatization, four plastic tubs of 5lit water capacity are taken, named the tubs A, B, C and the control. Then twenty fingerlings of *Litopeneaus vannamei* were transported in to each tub. All the three samples were treated with 5ml of cow urine solution for every 24 hrs. Sample "A" with 3%, sample B with4%and sample Cwith5%cow urine and the control without cow urine. Standard Pelleted feed was given for control and A, B, C samples for every 24 hours. The following growth parameters were calculated by using the formulae after each week.

Growth parameters

The growth parameters were calculated by using the following formulae

1) Weight gain (WG)= Final Weight-Initial weight

2)Length gain (LG) =Final Length-Initial length

3) Average daily weight gain (ADG) =Final weight –Initial weight /No of days (culture period)

4) Average daily length gain (ADL) =Final Length-Initial length/No of days (culture period)

5) Specific growth rate =Ln Final weight –Ln Initial weight/No of days x100

6) Survival Rate (SR) %=No of animals survived /No of animals leased x100

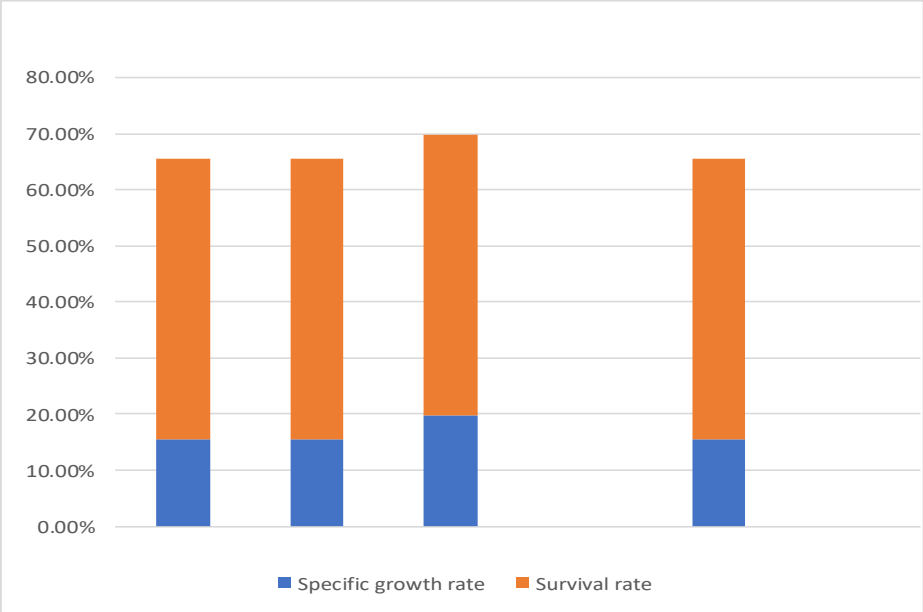
RESULTS AND DISCUSSION

From the ancient period in India, cow's urine has been used as a medicine. Cow urine is known to cause weight loss and reverse certain cardiac and kidney problems, indigestion, stomach ache edema etc (Cows are called as 'Kamadhenu 'in India (Padmapriya, S. and Venkatalakshmi, S. 2013).as it plays significant role in rural economy, represent cattle wealth and biodiversity. Fresh cow urine has been reported to increase protein digestibility (Rastogi, S and K Kaphle, 2011). There are numerous uses of cow urine for various human aliments like cancer, osteoarthritis, allergies, kidney failures, skin diseases, healing of wounds etc. Yet we consider all the things in a positive way, we find that the cows are comparatively much more useful than any other milk animal, as they not only provide milk but also protect our health .visualizing the potential use of cow urine in several elements including even cancer, the use of Gomutra (cow urine) and its scientific therapeutic validation is required for its worldwide acceptance and popularity(Garg Sk and Bhatnagar A, 1996). Organic manuring is widely practiced in carp culture systems to improve the pond productivity. A study was done on the effect of cow urine on the biochemical responses of the fish *Cirrhinus mrigala* exposed to the urine of Different cow breeds (Padma priya and Venkata lakshmi ,2014). Cow urine has enormous enhancing properties like more survival, more growth rate and environmental safety in aquaculture. reported that manuring promotes the growth of

Labeo rohita. Similar studies were done on the in the growth and production of prawn. Several researchers worked on the fertilization through liquid panchagavya and animal wastes in the rearing aquaculture species can be beneficial (Kuldeep jaiswal *et.al*,2019., Meghanathan *et al*., 2024).

Table 1. Showing the growth parameters obtained after7 days of exposure.

Treatments	Weight gain	Length gain	Average daily weight gain	Average daily length gain	Specific growth rate	Survival rate
control	0.02 gm	0.2cm	0.002gm	0.02cm	15.6%	50%
Sample "A" 3%cow urine	0.02gm	0.3cm	0.002gm	0.04cm	15.6%	50%
Sample "B" 4% Cow urine	0.03gm	0.4cm	0.004gm	0.05cm	19.8%	50%
Sample "C" 5% cow urine	0.02gm	0.4cm	0.002gm	0.05cm	15.6%	50%

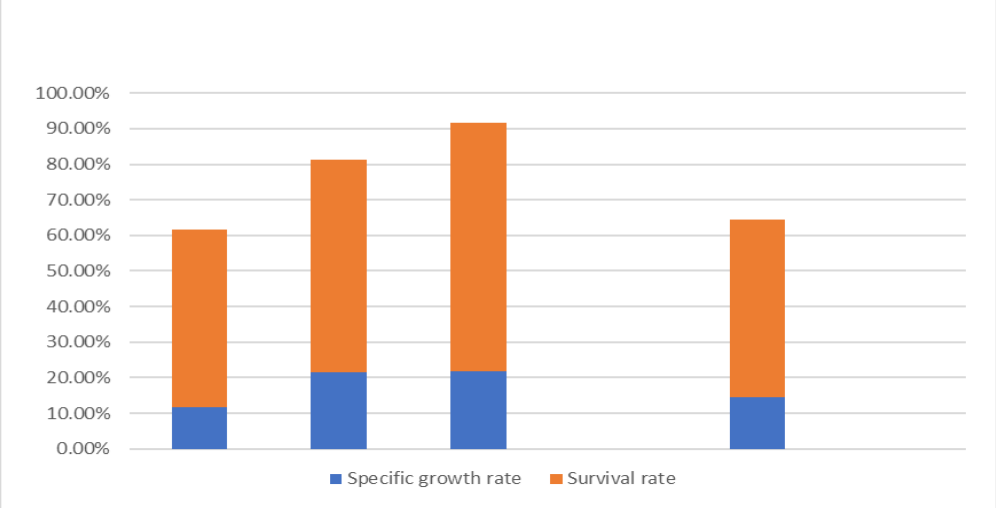


Graph 1. Showing the growth parameters obtained after7 days of exposure.

After one week the group treated with 4% cow urine exhibited the highest weight gain (0.03 gm), suggesting that this concentration may be optimal for promoting growth in the shrimp compared to the control and other samples.

Table 2. Showing the growth parameters obtained from 7th to 14th day of exposure.

Treatment	Weight gain	Length gain	Average daily weight gain	Average daily length gain	Specific growth rate	Survival rate
control	0.01gm	0.1cm	0.001gm	0.01cm	4.10%	60%
Sample "A" 3%cow urine	0.01gm	0.3cm	0.001gm	0.04cm	4.10%	70%
Sample "B" 4% Cow urine	0.03gm	0.4cm	0.004gm	0.05cm	7.99%	70%
Sample "C" 5% Cow urine	0.01gm	0.4cm	0.001gm	0.05cm	4.10%	60%

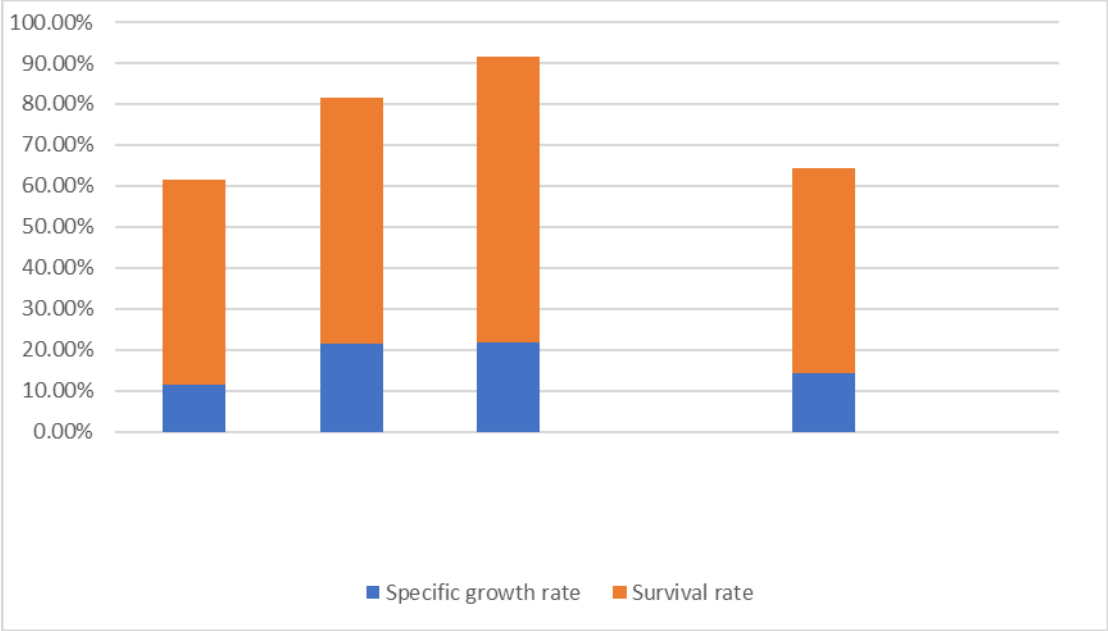


Graph 2. Showing the growth parameters obtained from 7th to 14th day of exposure

The results presented in Table 2(After two weeks) illustrate the effects of varying concentrations of cow urine on the growth performance of *Litopenaeus vannamei* during the second week of treatment. The 4% cow urine treatment resulted in the highest weight gain at 0.03 gm**,** indicating that this concentration is effective in promoting weight gain during the second week. The data from the second week of treatment suggest that 4% cow urine continues to be the most effective concentration for enhancing growth metrics in *Litopenaeus vannamei.* It leads to the highest weight gain, length gain, and specific growth rate while maintaining a favorable survival rate. The results indicate that cow urine can serve as a beneficial growth promoter in shrimp aquaculture, with optimal concentrations that warrant further exploration for long-term benefits. The ANOVA results demonstrate that there are significant differences in the growth metrics of *Litopenaeus vannamei* among the different treatments involving cow urine. The 0.1 treatment group appears to yield the best growth performance, as indicated by the high average and total growth. The low P-value and high F-value confirm that the treatments have a substantial effect on growth, supporting the hypothesis that cow urine can positively influence the growth of shrimp. Further analysis of individual treatment comparisons could help identify optimal concentrations for maximal growth benefits.

Table 3. Showing the growth parameters obtained from 14th to 21 days of exposure.

Treatments	Weight gain	Length gain	Average daily weight gain	Average daily length gain	Specific growth rate	Survival rate
Control	0.05gm	0.1cm	0.007gm	0.014cm	11.58%	50%
Sample “A” 3%cow urine	0.14gm	0.3cm	0.02gm	O.042cm	21.4%	60%
Sample “B” 4% Cow urine	0.25gm	0.1cm	0.03gm	0.035cm	21.7%	70%
Sample “C” 5% Cow urine	0.07gm	0.1cm	0.01gm	0.014cm	14.4%	50%

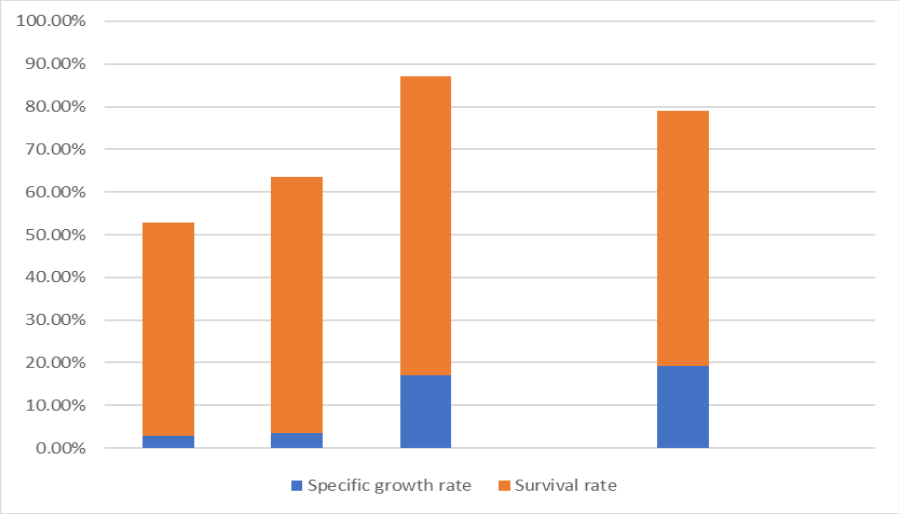


Graph 3. Showing the growth parameters obtained from 14th to 21 days of exposure.

Table 3 (After three weeks) summarizes the growth performance of *Litopenaeus vannamei* treated with various concentrations of cow urine during the third week of the experiment. The metrics assessed include weight gain, length gain, average daily weight gain, average daily length gain, specific growth rate, and survival rate. The group treated with 4% cow urine shows the highest weight gain at 0.25 gm, indicating that this concentration significantly enhances weight gain compared to the control and other treatment groups. In contrast, the control and 5% treatment groups show lower weight gains, while the 3% group shows a notable improvement. The results from the third week of treatment indicate that 4% cow urine is highly effective in promoting weight gain and specific growth rates in *Litopenaeus vannamei***,** while 3% cow urine appears to be optimal for length gain. The highest survival rate observed in the 4% treatment suggests that cow urine not only enhances growth metrics but also supports the health of the shrimp. The data emphasizes the potential benefits of cow urine as a growth promoter in shrimp aquaculture, warranting further research into optimal concentrations and long-term effects.

Table 4. Showing the growth parameters obtained from 21to 28th day of exposure.

Treatments	Weight gain	Length gain	Average daily weight gain	Average daily length gain	Specific growth rate	Survival rate
control	0.02gm	0.4cm	0.002gm	0.05cm	2.8%	50%
Sample "A" 3%cow urine	0.05gm	0.2cm	0.007gm	0.02cm	3.5%	60%
Sample "B" 4% Cow urine	0.74gm	0.4cm	0.10gm	0.05cm	17.1%	70%
Sample "C" 5% Cow urine	0.32gm	0.3cm	0.04gm	0.04cm	19.1%	60%



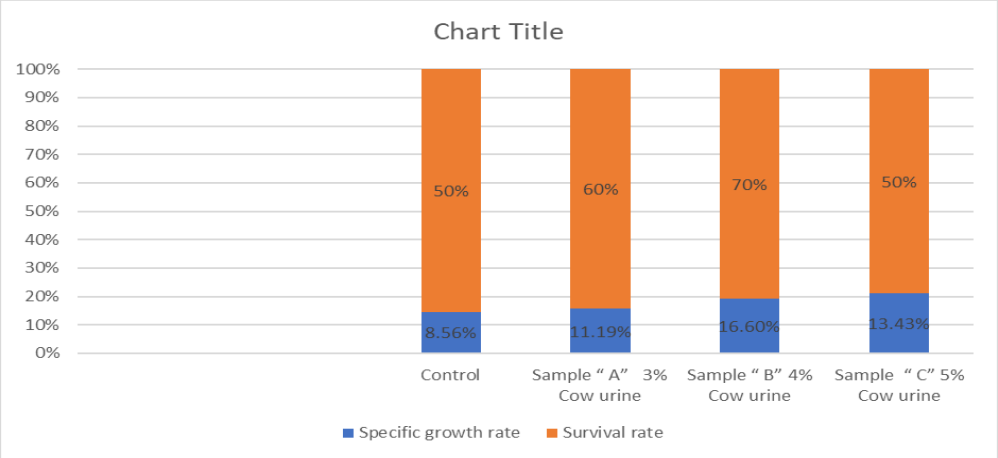
Graph 4. Showing the growth parameters obtained from 21 to28thday of exposure.

Table 4 After 4 weeks presents the growth performance of *Litopenaeus vannamei* treated with varying concentrations of cow urine during the fourth week of the experiment. The metrics assessed include weight gain, length gain, average daily weight gain, average daily length gain, specific growth rate, and survival rate. The group treated with 4% cow urine shows a remarkable weight gain of 0.74 gm**,** significantly higher than the control and the other treatment groups. This indicates that 4% cow urine is highly effective in promoting weight gain during this week. In comparison, the control and 3% treatment groups exhibit minimal weight gain.

Table 5. Showing the growth parameters obtained after 28 days (4 weeks) of exposure with cow urine.

Treatments	**Weight gain**	**Length gain**	**Average daily weight gain**	**Average daily length gain**	**Specific growth rate**	**Survival rate**
Control	0.1gm	0.8cm	0.0035gm	0.028cm	8.56%	50%
Sample “A” 3% Cow urine	0.22gm	1.1cm	0.0078gm	0.039cm	11.19%	60%
Sample “B” 4% Cow urine	1.05gm	1.3cm	0.037gm	0.046cm	16.6%	70%
Sample “C” 5% Cow urine	0.4gm	1.2cm	0.015gm	0.042cm	13.43%	50%

Source: Field Survey



Graph 5. Showing the growth parameters obtained after28 days of exposure.

Table 5 depicts that the effects of cow urine on various growth parameters over a period of four weeks (28 days). The treatments include the Control group and three groups treated with different concentrations of cow urine (3%, 4%, and 5%). Weight Gain: Control was 0.1 gm, Sample A (3% Cow Urine) was 0.22 gm, Sample B (4% Cow Urine) was 1.05 gm, and Sample C (5% Cow Urine) was 0.4 gm. Sample B (4%) shows the highest weight gain (1.05 gm), much higher than the other treatments. Length Gain: Control was 0.8 cm, Sample A (3% Cow Urine) was 1.1 cm, Sample B (4% Cow Urine) was 1.3 cm, and Sample C (5% Cow Urine) was 1.2 cm. Sample B (4%) also shows the greatest length gain (1.3 cm), indicating optimal growth in terms of length. Average Daily Weight Gain: Control was 0.0035 gm, Sample A (3% Cow Urine) was 0.0078 gm, Sample B (4% Cow Urine) was 0.037 gm, and Sample C (5% Cow Urine) was 0.015 gm. Sample B (4%) shows the highest daily weight gain (0.037 gm), indicating superior weight gain. Average Daily Length Gain: Control was 0.028 cm, Sample A (3% Cow Urine) was 0.039 cm, Sample B (4% Cow Urine) was 0.046 cm, Sample C (5% Cow Urine) was 0.042 cm, Sample B (4%) shows the highest daily length gain (0.046 cm), suggesting optimal growth in terms of length. Specific Growth Rate (SGR): Control was 8.56%, Sample A (3% Cow Urine) was 11.19%, Sample B (4% Cow Urine) was 16.6%, and Sample C (5% Cow Urine) was 13.43%. Sample B (4%) shows the highest specific growth rate (16.6%), indicating the most efficient growth. Survival Rate: Control was 50%, Sample A (3% Cow Urine) was 60%, Sample B (4% Cow Urine) was 70%, Sample C (5% Cow Urine) was 50%. Sample B (4%) shows the highest survival rate at 70%.

Table 5. Effect of cow urine in four weeks (28 days).

Treatments	Weight gain	Length gain	Average daily weight gain	Average daily length gain	Specific growth rate	Survival rate
Control	0.1gm	0.8cm	0.0035gm	0.028cm	8.56%	50%
Sample “A” 3% Cow urine	0.22gm	1.1cm	0.0078gm	0.039cm	11.19%	60%
Sample “B” 4% Cow urine	1.05gm	1.3cm	0.037gm	0.046cm	16.6%	70%
Sample “C” 5% Cow urine	0.4gm	1.2cm	0.015gm	0.042cm	13.43%	50%

In the four weeks (28 days) of observation, cow urine treatments showed positive effects on growth, with Sample B (4% Cow Urine) demonstrating the highest weight gain, length gain, daily growth rates, specific growth rate, and survival rate. The ANOVA results (p-value = 0.0001) confirm that the differences between the groups are statistically significant at the 0.05 significance level. This means that cow urine had a significant positive effect on growth and survival. Sample B (4% Cow Urine) stands out as the most effective treatment, suggesting that a 4% concentration of cow urine yields optimal growth and survival rates. After treating the samples ‘A’‘B’ and ‘C’ with 3%,4%,5% conc of cow urine the results obtained on growth characteristics are shown in the above table ,The results of the present study shows that treated samples exhibiting better growth characteristics than the control, among the three samples A,B and C the sample ‘B’ which is treated with 4% conc of cow urine shows the better growth than the remaining samples.

CONCLUSION

The study reveals that the application of cow urine is better way of safe application in aquaculture. Cow urine has a direct relationship with growth and production of *Litopenaeus vannamei*.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

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AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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