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Introduction

Traditional approach of using antibiotics in aquaculture industry for disease control leads to the generation of antibiotic resistant microorganisms [1]. Also, there is a threat associated with spread of antimicrobial resistant gene from aquatic environment to human pathogens [2]. Alternative approach for controlling of pathogen instead of using antibiotics involves use of probiotics for modi cation of gut ora, which is supplemented through diet and thus increases the amount of health promoting bacterial in the gut [3].

In order to ensure aquaculture production, Probiotic treatment becomes a better of way in terms of disease control and prevention [4]. Probiotics are de ned as living micro-organisms administered in a suf cient number to survive in the intestinal ecosystem and they must have a positive e ect on the host [5]. ere are certain demands for a micro-organism to become a probiotic. Providing a de nition for a probiotics in aquaculture industry is a bit di cult and challenging too. But most accepted de nition given by (FAO/ WHO, 2002) [6]. According to it, Probiotics are de ned as,

"Live micro-organisms which when administered in adequate amount confer a health bene t on the host".

eir bene ts to aquatic organism's health have been mentioned in many scienti c research papers [7-9]. As per Council Directive 70/524/ EEC these bacterial strains (Probiotics) are certi ed as additives in their feeding stu [10].

Bacillus cereus var.toyoi, Bacillus licheniformis, Bacillus subtilis, Lactobacillus sp., Enterococcus faecium, Lactobacillus casei, Lactobacillus farciminis, Lactobacillus plantarum, Lactobacillus rhamnosus, Pediococcus acidilactici, Streptococcus infantarius, Carnobacterium sp., and yeast Saccharomyces cerevesia also.

e aim of this article is to demonstrate probiotic selection aspects, mode of action, guidelines for evaluation process, and their respective roles in shrimp nutrition.

Selection aspects of a probiotic

e critical concept behind the choosing of a microorganism as a probiotic is selection process because undesirable e ects may occur in the host due to inappropriate choice of a probiotic [11]. e selection of a microorganism as a probiotic requires various selective aspects such as 1) Basic aspects 2) Technological aspects 3) Biosafety aspects [12-17].

Modes of action

e mechanism of interaction between bacteria and host remains unde ned but the evidences suggest that the functioning of the immune system at both systemic and mucosal level in the gut can be modulated by the bacteria [18].

According to Oelschlaeger in 2009, he stated that a probiotic can exert its e ects in three modes of action:

1) A probiotic can be able to in uence host immune defence system which involves both innate as well as acquired immune system.

2) A probiotic must show its action on the other microorganisms, which comprises of both commensal as well as pathogenic ones.

3) Lastly, a probiotic might be capable of displaying its action on microbial products like toxins and host products [19].

A Probiotic exercises their bene cial e ects by mean of any of the following: [20-26] (Figure 1).

Guidelines for evaluating a probiotic - An outline

For the use of a given microorganism as a probiotic and its practice in shrimp aqua- farming, the microorganism has to be evaluated as per the given procedure in Figure 2. Once the organism is successfully evaluated as a probiotic it can be safely applied.

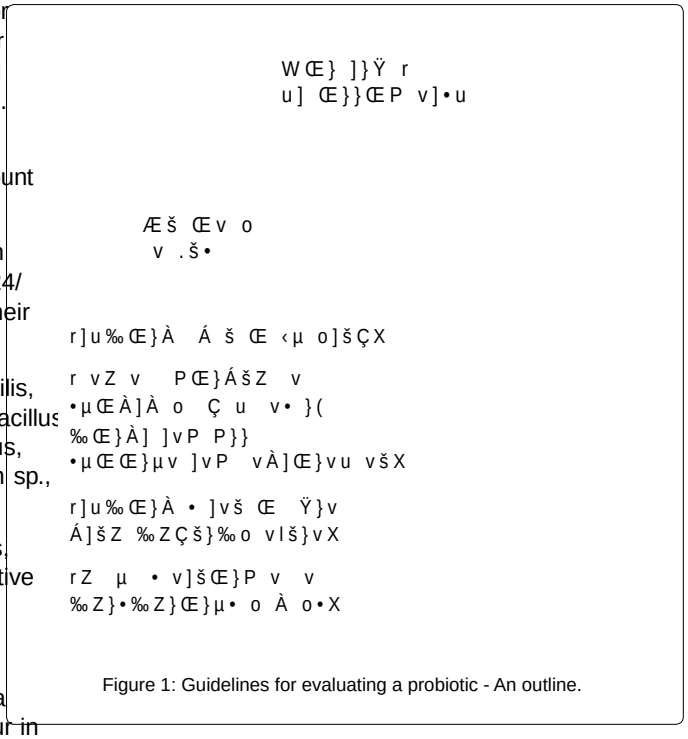

Figure 1: Guidelines for evaluating a probiotic - An outline.

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Received February 12, 2014; Accepted February 13, 2014; Published February 18, 2014

Citation: Korada SK, Yarla NS (2014) Probiotics: A Promoter for Aqua Farming. J Marine Sci Res Dev 4: e128. doi:10.4172/2155-9910.1000e128

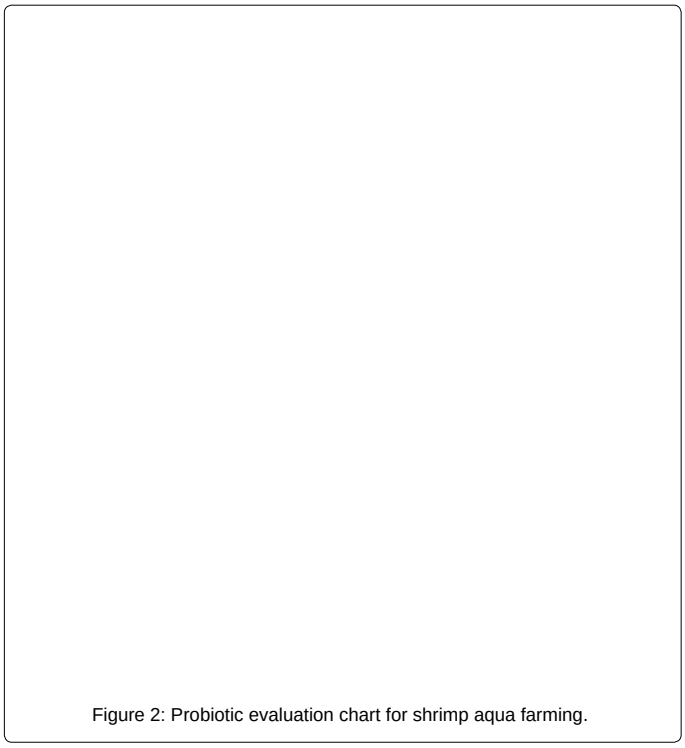

Figure 2: Probiotic evaluation chart for shrimp aqua farming.

Probiotic bene ts in shrimp nutrition

ere is always a complex interaction existing between host in aquatic environment and environment & vice-versa [27]. Probiotics can in uence health bene ts in variety of ways. e Table 1 outlines the research based evidences, suggesting about their health bene ts in the aquatic environment as well as host bene ts.

Conclusion

Probiotics has opened a new era in disease control, instead of the regular antimicrobial exercise in aquaculture. Research has actively shown in reports that a probiotic micro-organism can safely encourage considerable well-being benefits like immunity enhancement, increased disease resistant, and they can also improv nutrient digestion ability [31].

Probiotics present an exciting promise for signi cantly reducing the load of pathogenic microorganisms (especially luminous Vibrio harvey). But at this time no microorganism can be con dently suggested to shrimp's cultivation (Table 2). But positive outcomes are clearly exhibited with certain commercial products. Future research is needed in terms of scienti c based exploration and a proper safety evaluation. Risk assessment based studies are also needed in th essential eld.

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