Perspective

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Depth Analysis of Biological Characteristics

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Description

Opportunistic pathogen Enterobacter hormaechei can be found in a wide range of foods, including those made from animals. Due to their increasing resistance to antibiotics, bacteria have become a significant clinical challenge in recent times. As a novel strategy for combating bacteria, bacteriophages have gained popularity. A novel E. hormaechei bacteriophage, IME278, was isolated in this study from hospital wastewater in Beijing, China. The genome of the bacterium IME278 was double-stranded, linear, and contained 51.99% GC. IME278 and other phages in the National Center for Biotechnology Information (NCBI) database shared 87% homology, according to whole-genome alignments. Also, phylogenetic analysis showed that IME278 was very similar to bacteriophages in the family Autographiviridae, which belongs to the genus Kayfunavirus. This means that IME278 is a new member of the Autographiviridae family. IME278 had an icosahedral head 51.72 nm in diameter and a tail 151.28 nm in length, according to transmission electron microscopy. Bacteriophage IME278 was able to survive at high temperatures 50°C–70°C, but at temperatures above 70°C, its activity decreased significantly and was almost completely inactivated at 80 °C. Bacteriophage IME278 was stable in chloroform and could survive in a wide pH range 4.0–11.0. UV light was harmful to the phage. Bacteriophage IME278's cleavage was approximately 8.21 108/3.66 108=2.24, with a latent period of 40 minutes and a plateau stage at 150 minutes. In a model that artificially contaminated pork with E. hormaechei 529, the bio control potential of bacteriophage IME278 was evaluated. The findings indicated that IME278 was capable of effectively controlling the bacterial contamination of pork. The foundation for applying bio control and treating bacteria with bacteriophages is IME278's comprehensive biological characteristics analysis, whole genome sequencing, and bioinformatics.

Improvement of Anti-Microbial Safe Strains

Vibrio harveyi is a Gram-negative pathogen that causes luminous vibriosis in shrimp. It also kills a lot of shrimp, which costs money. Antibiotic alternatives are always required due to the emergence of multidrug-resistant bacteria. Through the use of V. harveyi S2A, we were able to isolate the Vibrio-infecting bacteriophage VPMCC5 from an environmental sample and characterize it in order to assess its effectiveness in eradicating the pathogen. The bacteriophage had a short, non-contractile tail and a head that was isometric. The bacteriophage had a burst size of 20 and a 10 minute latent period. The bacteriophage had a 48938-bp genome with a G+C content of 40.7 mol%. A sum of 71 ORFs was distinguished and no tRNA and anti-microbial related qualities were identified. The bacteriophage VPMCC5 may be a new genus in the Zobellviridae family, according to comparative genomic analyses. The presence of a putative alginate lyase family protein-coding open reading frame sets this bacteriophage apart from the other ones that have been reported to infect Vibrio. It was discovered that the bacteriophage was able to survive across a wide temperature range and pH range of 3 to 9. After three hours in liquid culture inhibition, the bacteriophage could completely lyse the host bacteria. In the harsh environment of shrimp culture, this bacteriophage could be used as a bio control agent. In the agricultural and food industries, foodborne illness and produce spoilage due to bacterial contamination continue to be serious problems. Fresh produce is especially worrying because it hasn't been processed much and can be contaminated by a lot of different things during the growing and harvesting seasons. Despite the fact that there are presently various procedures of bio control against bacterial microorganisms, the improvement of anti-microbial safe strains neutralizes their adequacy, and customers look for additional regular options in contrast to synthetic sanitizers. As a result, there is an increasing demand for natural, more potent antimicrobials. A novel strategy for eradicating bacterial growth on produce has been proposed as the application of bacteriophages to food products. Due to their selectivity, safety, stability, and ease of use, bacteriophages are ideal. Commercial use of a number of bacteriophage products on crops and the fruits and vegetables they produce has already been approved. This paper provides an overview of recent experimental evaluations of the use of bacteriophages to reduce pathogen growth on fresh produce both prior to and after harvest. In order to evaluate the viability of this solution, the advantages and disadvantages of applying bacteriophage to food products are discussed. It is possible to draw the conclusion that bacteriophages are a viable option for enhancing food safety and reducing food waste.

Gene Expression of Heat Shock Protein

Salmonella Gallinarum is responsible for the severe disease known as fowl typhoid, which results in significant mortality and morbidity in laying hen farms. The current study has focused on using anti-Salmonella spp. to treat the infection in laying hens. Bacteriophage PC, without difficulty, was one of the treatments; S. Gallinarum challenged in NC; B5, SGC, and 5 mg/kg of bacteriophage; B10, SGC and 10 mg/kg of bacteriophage Laying hens were used to examine Salmonella shedding, inflammatory responses, and the gene expression of heat shock protein, toll-like receptor, and pro-inflammatory cytokines in the liver, thigh muscle, and jejunum. At days 3, 7, and 14, the presence of S. Gallinarum in the excrement was reduced by the addition of bacteriophage. At day 7, the B10 had a lower abundance of S. Gallinarum than the B5. Supplementation of bacteriophage diminished the wealth of S. Gallinarum in the oviduct, spleen, and cecum at d 14. When compared to the PC and B10 treatments, the laying hens in the NC group had a heavier relative spleen. Among the SGC treatments, the NC treatment had higher jejunal gene expressions of HSP27 than the B10, higher gene expressions of IL-4 than the B5, and higher gene expressions of interferon, TLR4, and tumor necrosis factor than the B5 and B10. When compared to the B5 treatment, the jejunum's mRNA expression of TLR4 and TNF was lower when B10 was added to the diet. HSP27, TLR4, and TNF gene expression in the liver was highest with the NC treatment. HSP27 mRNA expression in the liver was lower when B10 was added to the diet than when B5 was used. In addition, compared to the B5 and B10 in the muscle, the NC treatment had an elevated level of IFN and HSP27. All in all, it tends to be recommended that bacteriophage is a compelling enhancement to control S. Gallinarum disease in laying hens and potentially lower flat pollutions in laying hen runs.