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# Development and evaluation of an intelligent traceability system for waterless live fish transportation

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## Abstract

Chinese consumers prefer to purchase fish that have only recently been killed. The supplying of live fish is routinely delivered by water. However, the traditional transportation of live fish with water results in small volume of transportation and may cost prohibitive. Therefore, cold anesthetized waterless live fish transport is considered an alternative and promising strategy, since this is likely to demand less energy with large freight volume. This paper aims to develop an intelligent traceability platform based on HACCP system that integrates wireless monitoring and quality control models to improve the quality control and safety transparency in waterless fish transportation. In this research Chinese sturgeon is taken as experiment subjects for long-distance transportation. Oxygen change model is established as a life-sustained key factor by hybrid prediction method can optimize fish survivability. Survival prediction model is also designed for improvement of live delivery quality with minimum stress accumulation under precise temperature condition. For tracing function evaluation, the QR Code combined with existing EPC traceability technology enables users to expediently query and quickly trace the safety transport information from aquaculture to markets. To demonstrate the automatic monitoring and intelligent traceable management in this platform, sturgeon delivery experiments have been evaluated and analyzed. The results illustrate this system can reduce the potential risks, implement quality control with high survival results, and improve the live fish transport volume at low-costly. In brief, application of this smart platform will provide an effective, suitable technical reference for aquatic enterprises to follow, and help them to adjust the waterless transport techniques for the other types of aquatic products.

## Keywords:

Waterless fish live transportation
WSN
Prediction model
RFID
Survival prediction
QR Code

## 1. Introduction

Live aquatic products marketing is regarded as value-adding processes because live aquatic products obtain substantially higher prices, lower processing costs and the minimal governmental regulations compared with fresh chilled or frozen product. In China, consumers prefer to purchase fish that have only recently been killed, because in Chinese culture freshly