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The intelligent control strategy of frozen cooked shrimp production process and energy step utilisation

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Abstract

By the investigation of the frozen cooked shrimp production process in Zhanjiang area of Guangdong, China, it is found that Most of the production of frozen cooked shrimp production process control strategy will not be considered. Therefore, some individual processing sometimes may be caused repeat. Product quality would be affected and increase the processing energy use. Intelligent control of frozen cooked shrimp processing strategy as processing instructions, the quality of frozen cooked shrimp would be better, more conducive to energy saving, water saving and improve the production processing environment.

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1. Introduction

Because of *Penaeus vannamei* shrimps' high nutritional value, so its selling price is not low. If preservation does not good, it will cause the *Penaeus vannamei* shrimp turn rot, economic value will be greatly reduced. Market for frozen cooked shrimp requires not only good quality, good taste and good appearance. Food processing and production processes not only to meet health standards, also taking into account low-carbon production. Low carbon technology

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uses in the food chain of food production, processing, packaging, storage, transport, sale and consumption links. These links must be in favor of "low carbon" comprehensive measures. It can be seen from Table 1, Guangdong Zhanjiang aquatic product output was increasing year after year, marine products and deep processing export value reached a high value by 2014 and drop 29.4% from the peak by 2015. Zhanjiang is China's largest shrimp processing base, if aquatic product processing enterprise does not change from rough mode to deep and fine mode, then the export of aquatic products output would be difficult to improve. Inquire into frozen cooked shrimp's processing links' the intelligent control strategy and low carbon process technology will benefit the development of the industry.

Table 1. Data for Guangdong Zhanjiang aquatic product output, marine products and deep processing export value [1]

year	aquatic product output (kiloton)	marine products and deep processing export value (hundred million U.S.dollar)
2012	1163.1	6.34
2013	1246.2	8.29
2014	1271.0	8.44
2015	1283.9	5.96

2. 2. The intelligent control strategy of frozen cooked shrimp production process

Currently frozen cooked shrimp processing is usually: raw shrimp --classify--cooking-- cool-- quick frozen-- Spray water again frozen-- weigh-- inner package-- metal detector--outer package-- cold storage.

Penaeus vannamei shrimp has the general aquatic products characteristics, which are fresh shrimp in the muscle contents high water moisture, tissue fragility, natural immune substances less, unsaturated fatty acids easy to oxidant and soluble protein content is high. So, its meat tissue is more susceptible to corruption than usually animal meat tissue, not easy to store [2]. Foreign and domestic markets requirement the higher quality of frozen cooked shrimp, black head and broken head means bad quality. On the processing technology of frozen cooked shrimp, key nodes for fresh shrimp acquisition and transport, cooked, frozen need control strategies. Detailed control policy described in the following.

2.1 Fresh shrimp acquisition and transportation to processing plants adopt slurry ice or ice-temperature retention policy

Spray cooled brine on the fishing shrimp surface, making shrimp surface rapid freezing, rapid cooling in the shrimp body (but not frozen), and then places into the refrigerated vessel which temperature keeps at $-2^{\circ}\text{C}\sim-3^{\circ}\text{C}$. This method can significantly inhibit the action of enzymes and micro-organisms, and can significantly reduce moisture loss, less juice loss when it is thawed, is widely used in offshore fishing fresh-keeping [3, 4].

Using the chilled *Penaeus vannamei* shrimp as the object of study, by comparing using the refrigerated (blank), traditional crush ice and slurry ice three preservation methods, study on *Penaeus vannamei*'s changes of physico-chemical and muscle texture properties. Results show that in 0~16 days refrigerated period, slurry ice preserves the shrimp body senses quality, colour and texture characteristic of muscle to the best, and muscle pH value, TVBN and TBA were significantly lower than the refrigerated (blank)and traditional crush ice preservation groups. It is obvious that using the slurry ice preservation technology in chilled shrimp storage, transportation and sale process can effectively slow down the pace of quality fissile and keep its freshness indicators and organic quality and extend product shelf life [5]. Therefore, the freshness of *Penaeus vannamei* acquisition, storage and transportation to processing plants by slurry ice or ice-temperature storage is frozen cooked shrimp's high quality top control strategies.

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