Some Observations on the Heading of Peneus Shrimp [1]

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ABSTRACT

Reports in the literature stating that shrimp must be headed before icing in order to ensure maintenance of quality do not appear to be based on experimental data. However, this practice is widely applied, and at this time is economically expedient.

In order to evaluate the effect of heading prior to icing, fresh *Peneus* shrimp were obtained from both coasts of Florida and stored in ice with and without heads for up to 14 days. Loss of total solids from the shrimp was the same in both treatments. Microbial analyses demonstrated that bacterial counts on shrimp tails stored with and without heads were essentially the same. A 15-member taste panel could not detect a significant difference in flavor, texture or overall acceptability between shrimp stored with or without heads throughout the 14-day storage period.

INTRODUCTION

Numerous reports (Carroll et al., 1968; Clark & MacNaughton, 1917; Fieger, 1950; Fieger and Novak, 1961; Fieger et al., 1950; Green, 1949; Lantz, 1951; Williams et al., 1952) are found in the literature stating that *Peneus* shrimp without their heads can be held longer than those shrimp stored with their heads left on. These observations are probably based, at least in part, on the fact that the head portion of the shrimp undergoes a more rapid darkening and softening than the tail portion. While current practice is to head shrimp before iced storage, there do not appear to be any experimental studies available which indicate that this practice favors the retention of shrimp quality.

This study was undertaken to determine what effect leaving the heads on *Peneus* shrimp during iced storage would have on bacterial counts, total solids and consumer acceptance.

METHODS

Shrimp were obtained dockside from both Fernandina Beach (Atlantic coast) and Port St. Joe (Gulf coast), Florida. At least three different sample lots were

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obtained from each location. The Atlantic coast shrimp were predominantly white shrimp of about 30 count. Shrimp from the Gulf coast were of mixed species, mostly browns with some pink shrimp, averaging about 50 count.

Shrimp were packed in ice and transported to the laboratory at Gainesville. One half of each shipment was headed; the shrimp were then rinsed in tap water and packed in ice. All analyses were conducted at 1, 7 and 14 days.

For bacteriological analyses, 100 g of shrimp from each treatment was randomly selected. Shrimp stored with their heads on were then headed. Both batches were gently rinsed in tap water and analyzed. Microbial analyses were by standard procedures (Amer. Pub. Health Assoc., 1970) with incubation at 20° C.

Total solids were determined by AOAC procedures (1970). Approximately 200 g of shrimp tails from each treatment were ground in a Hamilton Beach meat grinder with a 5/16 inch plate. Duplicate analyses were conducted on each treatment.

Organoleptic evaluation of the shrimp was conducted by a 15-member panel familiar with good quality shrimp after 1, 7 and 14 days storage. An attempt at continuing the evaluation through 21 days resulted in outspoken resistance from panel members due to the poor quality of both sets of samples. Samples were prepared for the panel by heading and rinsing. Shrimp from the two treatments were then boiled separately for 5 minutes in unsalted water, drained, peeled and deveined. The samples were coded for presentation to the panel. Four shrimp, two stored headed and two stored with heads on, were presented to the panelist at each trial. A hedonic scale from 1-9 was used, with 9 being assigned to the most acceptable. Taste panel scores were evaluated by analysis of variance.

RESULTS AND DISCUSSION

Changes in both the total solids (Table 1) and total aerobic plate count (Table 2) were similar for the shrimp tails stored with and without heads. Little differences were observed in the results, with the date showing no consistent trend favoring one treatment over the other. In addition, no differences could be noted between shrimp from the two coasts.

The taste panel evaluations (Table 3) of the shrimp also indicated no preference for one treatment over the other ($P > .05$). However, it is interesting that the panel rejected the shrimp following 21 days storage, in that it is not

Table 1. Effect of Heading on Percent Total Solids of *Peneus* Shrimp Stored in Ice with and without Heads (av. of 3 studies)

	Days		
	0	7	14
Heads on	22.49	18.43	16.43
Heads off	22.51	18.93	16.21

Table 2. Aerobic Plate Counts (org/g) of *Peneus* Shrimp Tails Stored in Ice with and without Heads (av. of 4 studies)

	Days		
	0	7	14
Heads on	263,000	22,800,000	530,000,000
Heads off	274,000	19,400,000	730,000,000

unusual for shrimp to be held this long or longer aboard ship. While many reasons could be suggested for this observation, it does point out the major role that processing plays in the delivery of a high quality product.

It seems that the early reports on the effect of heading shrimp had a pronounced effect on how later workers were influenced in their efforts. Clark and MacNaughton in 1917 stated that, "It is essential that the shrimp be headed before they have become warm, because the dark liquid in the stomach of the shrimp consists of oily, partially digested plant and animal material, which readily decomposes." This statement was made without any supporting data and has persisted throughout the years.

A paper by Green (1949), which describes a limited bacteriological study of the effect of heading, only succeeds in demonstrating the variability encountered in performing bacterial counts on fresh shrimp. It states that the head portion contains 75% of the bacteria present in shrimp, but nevertheless presents some data in which the tail portion of shrimp had a higher bacterial count than whole shrimp taken from the same batch. That work, therefore, does not seem to justify the recommendation that fresh shrimp be headed in order to increase their shelf life.

Likewise, Lantz in 1951, whose frequently cited paper states that removal of the heads before icing extends shelf life by 2 days offered no experimental evidence to support this statement.

Bieler et al. in 1972, however, reported that storage life of rock shrimp (*Sicyonia brevirostris*) was enhanced by not removing the heads of these shrimp.

Table 3. Organoleptic Acceptance of Stored *Peneus* Shrimp by a 15-member Taste Panel (Each value, the mean of three studies).

		Texture		Flavor		Overall	
	Days	on	off	on	off	on	off
Gulf Coast	1	7.6	7.7	7.6	7.7	7.6	7.7
	7	7.4	7.5	7.2	7.1	7.3	7.0
	14	6.9	6.9	6.1	6.2	6.4	6.2
Atlantic Coast	1	7.4	7.4	7.3	7.3	7.3	7.3
	7	7.1	7.2	6.7	6.5	6.7	6.6
	14	6.7	6.7	5.8	5.7	5.9	5.9

Both microbial growth and taste panel data were presented to support this observation.

As with rock shrimp, *Peneus* shrimp undergo a marked discoloration and softening of the head portion during storage. However, this does not affect the overall quality of the edible portion of the shrimp as shown by taste panel data. Therefore, when time and economics make it impractical to remove the heads of shrimp, the results of this study indicate that quality will not be adversely affected as long as iced storage is limited to a reasonable period of time.

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