12-1-1981

Sand Clearance by the Surf Clam, Spisula solidissima: A Preliminary Investigation

John N. Kraeuter
Virginia Institute of Marine Science

Sand Clearance by the Surf Clam, Spisula solidissima: A Preliminary Investigation

John N. Kraeuter

Introduction

Personnel of the American Original Seafoods Company in Willis Wharf contacted the Eastern Shore Laboratory of Virginia Institute of Marine Science and asked if surf clams, Spisula solidissima, would clear their body cavity of sand and how long such a process would take. They agreed to supply small batches of clams if we would conduct preliminary tests. The following report summarizes the results of these tests.

Materials and Methods

Batch 1 - Preliminary (Methods and Results)

November 18, 1981. Seven surf clams were delivered to the Eastern Shore Laboratory. These had been kept in seawater on board ship and then held on ice for transportation. Five of the seven were badly damaged: 3 - adductor muscles torn so the posterior dorsal hinge line was gaped; 1 - badly cracked shell; 1 - slightly cracked shell. Two clams appeared to be in fair shape. All individuals were placed in an upright position on a grid. This grid was suspended above the bottom of a tank filled with flowing seawater (10^{o}C, 29 o/oo). Animals were placed in the water at 1230 and all were checked at 1630 hours to be sure air had been vented from the body cavity. At that time all clams were placed on their sides.

November 19, 1981, 1030. Three gapers still contained large amounts of sand. The two individuals with broken shells were sacrificed and both had sand in the body cavity. The badly cracked individual had sand behind the mantle, surrounding the entire space between the viscera and the shell and behind the siphons. The slightly cracked individual had some sand behind the siphons near the posterior adductor muscle.

November 24, 1981, 0830. Three gapers had died and the remaining two individuals were sacrificed. These individuals were free of sand and silt. All remaining information relates to the second batch.

Batch 2. (Methods)

November 19, 1981. Because there were so few clams in the initial batch and because of their poor condition, a new group was brought to the laboratory. These individuals were transported to the lab as soon as practical after the shipment arrived at the Willis Wharf plant. They arrived and were placed in running seawater at 1300 hours. There were 57 clams in this batch and except for a few gapers they appeared to be in good shape. All individuals were placed in an upright position on a grid suspended above the bottom of a tank supplied with running seawater (9.3^{o}C, 30 o/oo). At 1530 hours 5 individuals were removed for an initial sample. The remaining clams were placed in two positions: upright, approximating a normal field position; and down, with the ventral margin on the grid. Five individuals were sampled from each position group each morning. These

individuals were measured (length and height) and visual examinations were made to determine the state of the animal: gaper, cracked, slightly gaped, no gape and dead. These animals were sacrificed by inserting an oyster shucking knife (stabber) behind the siphons and slicing toward the umbone to cut the posterior adductor and retractor muscles. The knife was then used to loosen the mantle edge from siphon toward the anterior adductor. The anterior adductor and retractor muscles were then sliced and the valve of the clam laid back. The presence or absence of sand in the body cavity, behind the mantle, in the muscle and near the siphons was recorded. If appreciable quantities of sand were present, it was washed into a beaker and the volume was recorded. Following each sampling and each afternoon any clams that had fallen over were placed in their previous position (upright or down). After sampling on day 5 the remaining seven clams were placed in the down position.

The only exception to the sampling scheme was during the weekends when samples were taken, visual examinations were made and individuals were placed in numbered plastic bags and frozen. The frozen individuals were thawed prior to measuring and examination for sand.

Results and Discussion

The numbers of individuals in various visual categories are given in Table 1. These data do not include the 7 individuals sampled on day 6 since no upright individuals remained for comparison. In general, there are more gapers and dead from

individuals in the upright category. Further tests would have to be conducted to determine if these are significant differences. The down position, after sufficient time for elimination of air from the body cavity, would be preferable because it is easier to maintain the animals in this orientation. Conversely, more animals can be packed into a given horizontal surface if they are in the upright position.

Table 2 summarizes the information on the presence of sand. All animals in good condition were able to rid themselves of sand by day 4. These results should be used with caution because there is an interaction of time and the initial state of the clams. Fewer gapers were present after day 3 because many damaged individuals had died. Individuals with sand near the siphons and posterior adductor muscle were still present on day 3. Temperatures were cold, 6-10^{o}C, during these tests. Warmer temperatures may have decreased the length of time required for the clams to void the sand; however, warmer temperatures may place more stress on the clams prior to their delivery and more may be gapers or die during the process.

Silt build up in the mantle cavity was noted as the sand decreased. This accumulation disappeared after day 4, but this may have been due to the decreasing temperatures and the cessation of feeding. The silt can easily be washed out after the animal is opened, but it may not be asthetically pleasing to the customer.

There was very little sand in the muscles. I cannot conclude that the sand often noted in these locations was blown in by the action of the dredge (except in those cases where animals are

gapers or badly damaged). The amount of sand inside the body cavity of apparently intact animals was as high as 14 ml, and smaller quantities were often present near the adductor muscles and labial palps. This sand can easily be dragged into the muscle tissue when the animal is opened. Another location where small quantities of sand are often found is laterally adjacent to the siphons. This may be external or be just under the area where the siphons are fused to the shell. This sand may be the result of dredge activity and it too can be implanted in the muscle during shucking.

Conclusions

Surf clams will rid themselves of sand in 4 days at 6-10^{o}C provided they are intact healthy specimens. Damaged clams should not be used for these purposes. If this process is to be used commercially, many more clams per sample period will be examined to give greater confidence in the results. The effects of using higher temperatures should be investigated. The effects of these elevated temperatures on the amount of silt accumulated in the body cavity should also be examined. The elimination of silt build-up by the use of artificial seawater should also be considered.

Although we did not investigate the problem with these clams, our prior work with these organisms indicated the initial positioning of all individuals in the upright position is essential. Without this orientation the clams cannot rid themselves of air which has been trapped in the body cavity and they will die.

Table 1. Relationship of the position of the clams vs condition. Data include only clams of the second batch and only to Nov. 23. Data are the number of clams in each category.

	Condition			
Position	OK	Slightly gaping	Gapers	Dead
Upright	10	4	6	3
Down	14	4	2	

Table 2. Comparison of clam position, condition and time required to eliminate sand from the mantle cavity. Data are numbers of clams in each category.

		(Day 1) Control		Sand Day 2		Day 3		Day 4		Day 5		Day 6	
		Sand	Clean	Sand	Clean	Sand	Clean	Sand	Clean	Sand	Clean	Sand	Clean
Up	OK	3	1	3		1	1	3		2		None	
	Slight			1								available	
	Gap	1		1		3		2		3			
Down	OK	None		1	2	1	2	5		3		6	
	Slight	available		1		1				1	1		
	Gap			1		1						1	
Temperature		9.3		10.3						8.2		7.0	