

# Comparison Between Paralytic Shellfish Toxins in Littleneck Clam Tissues

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## Hypothesis

I predict that toxins levels have high values in the meat because I believe it takes longer for toxins to process from the siphon to the guts.

## Introduction

Climate change has affected different environmental conditions throughout the world. With increase in temperature it causes harmful algae blooms to grow and increase, which in return affects shellfish (Moore, et. al 2008). I believe that many people on the island will benefit from this data. They would like to know that when they are eating little necks, what part they should avoid more to avoid getting paralytic shellfish poisoning (PSP) (Harley, et. al 2020). There hasn't been any research directly related to the study of the different PSP toxin levels in little necks. On the other hand there have been studies done that have been testing levels of PSP toxin levels in other animals such as butter clams (Matweyou, et. al 2020). My hypothesis is that I think that the meat will hold onto higher levels of toxins because it might take longer for the PSP toxins to process from the siphon to the guts. The point of this research is to be able to tell the community of Craig about the dangers of the certain tissues in little necks.

## Methods



Figure 1  
Littleneck clam samples and a sea cucumber



Figure 2  
Satellite image of False Island Boat Launch



- Littlenecks and butter calm samples were gathered at False Island Boat Launch (55°29'21.4"N 133°08'20.0"W 55.489267, -133.138889).
- Samples were collected at a zero tide when the littlenecks and butter clams were obtainable.
- Around 7-10 littlenecks and at least 1-2 butter clams were gathered for a good sample at each zero tide.
- Littlenecks and butter clams samples were gathered at zero tides each month from January - March.
- Samples were brought back to the lab to be prepared to send off to the Sitka Tribe of Alaska Environment Research Lab to be separated and tested using a receptor binding essay (Harley, et. al. 2020).

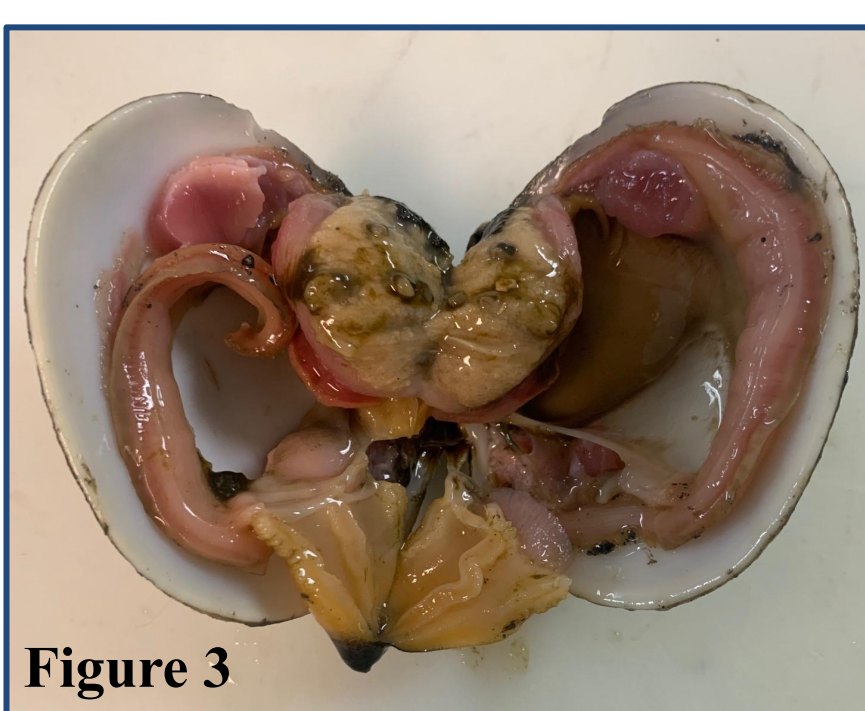


Figure 3  
Inside of a littleneck



Figure 4  
Dissecting the littlenecks

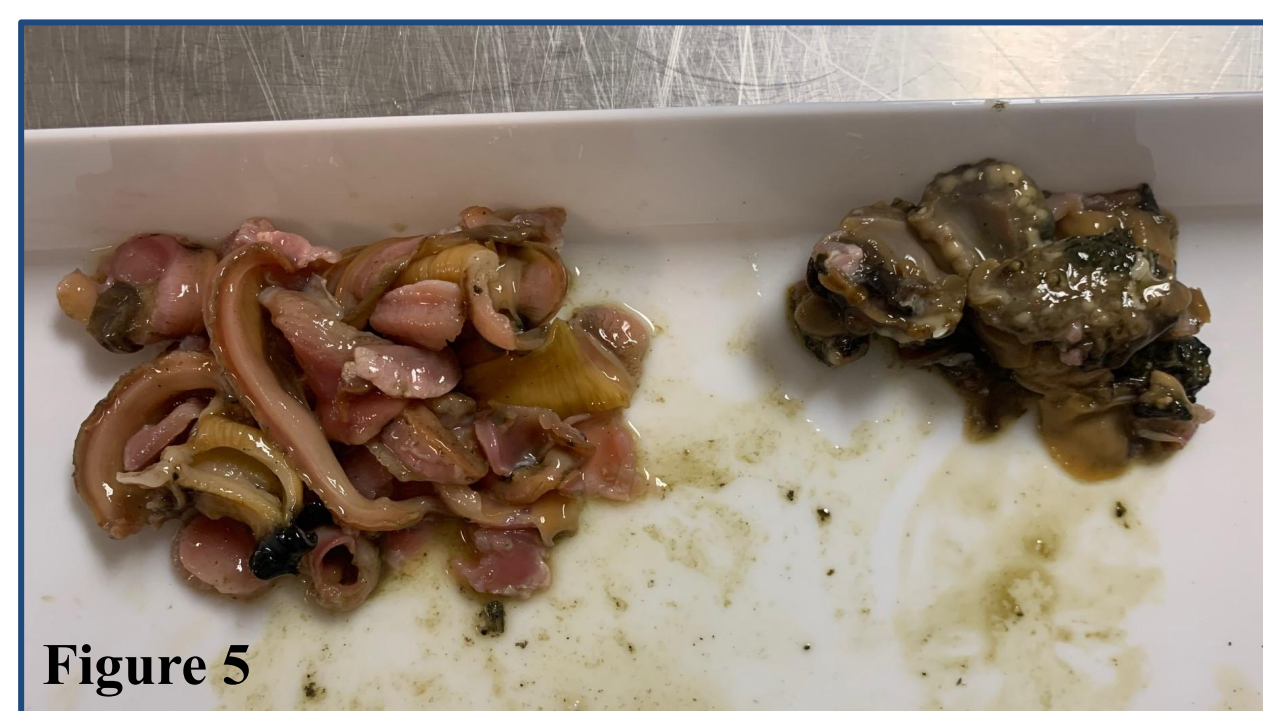


Figure 5  
On the right side is meat and on the left side is guts from littlenecks

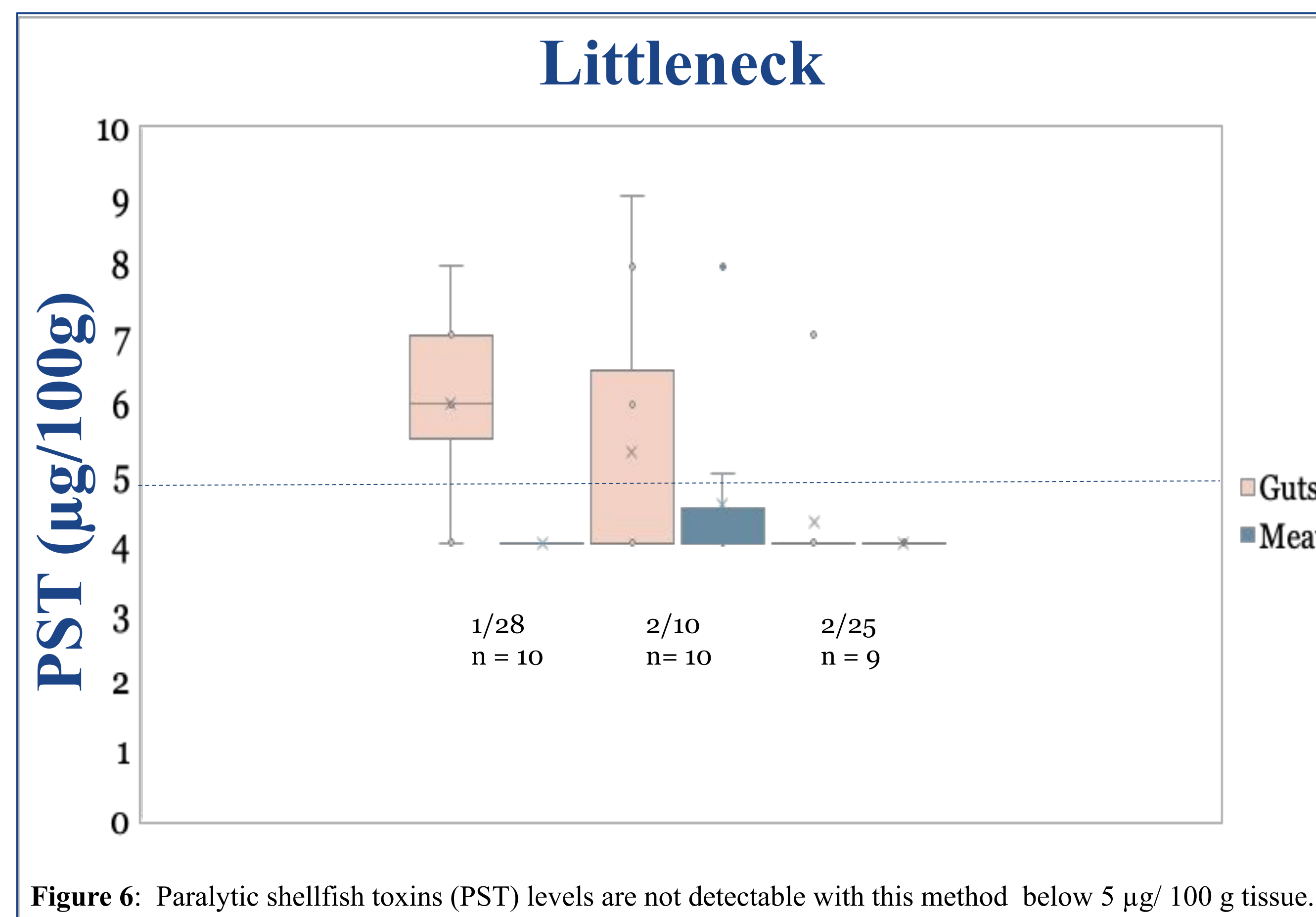


Figure 6: Paralytic shellfish toxins (PST) levels are not detectable with this method below 5 µg/100 g tissue.

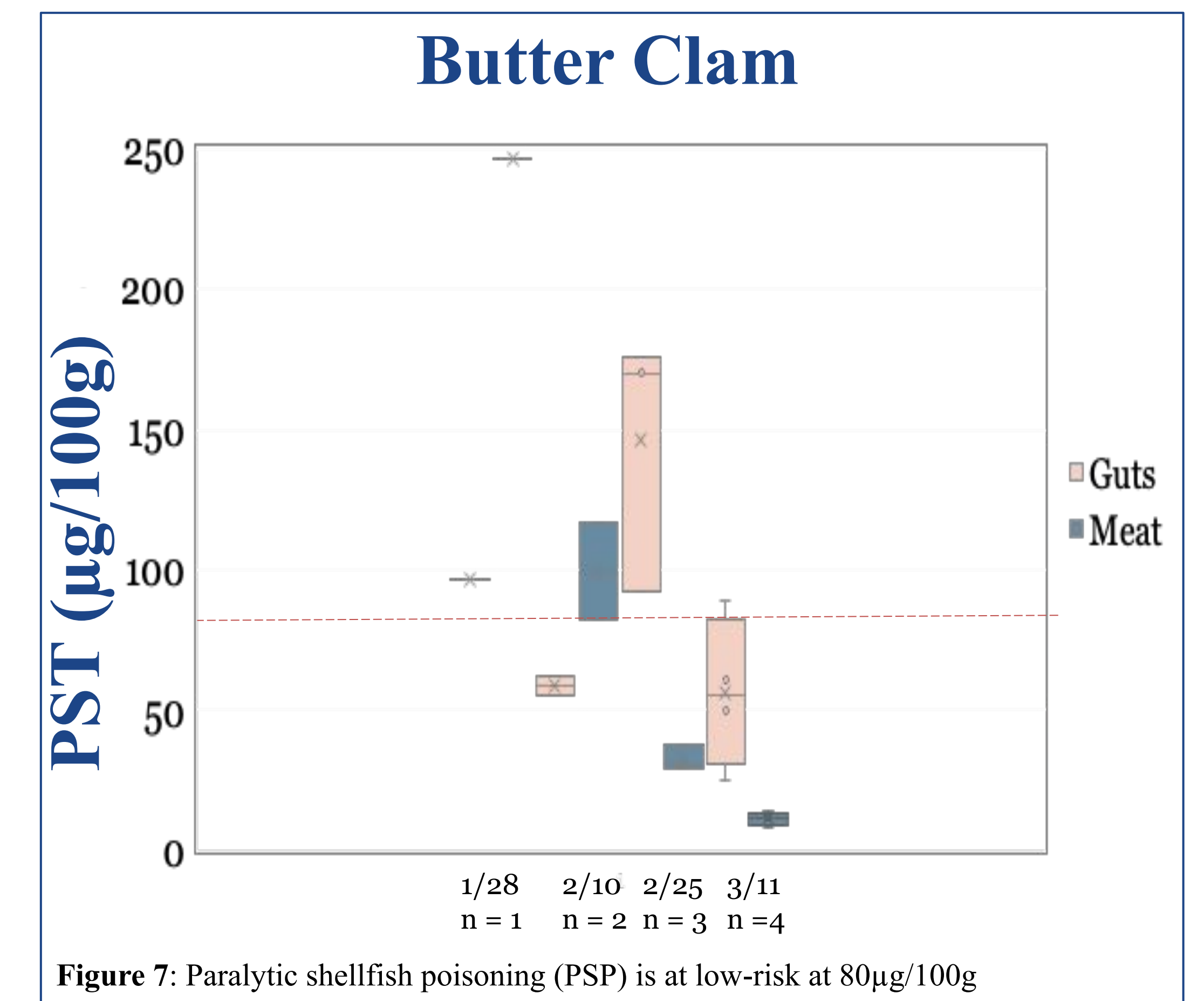


Figure 7: Paralytic shellfish poisoning (PSP) is at low-risk at 80µg/100g

- For littleneck clams, the guts had higher toxin levels than the meat.
- For butter clams, early in the sampling season, the meat had higher toxin levels than the guts, but later the opposite was true.
- Between butter clams and littleneck clams, butter clams had a higher level of PST.
- For littleneck clams, the PSP toxins were lower compared to more recent testing, due to leftover toxins for the previous years HAB.

## Discussion

As a result of the research that was conducted, my hypothesis was not completely supported by the data. In **Figure 4**, it shows that near the beginning of the year that the meat had a considerable amount of PST's compared to the guts but in late February the PST's in the guts increased. This could be because the butter clams were still holding on to some PST's from the previous years HABs. A reason as to why the guts hold more PST's is due to the possibility that in clams, like humans, PST's go straight to the gut and doesn't absorb as much into the meat. But we don't know how this data is affected by the previous years HAB's, so a next step in the research that could be taken is doing this study for a year or even two to see if there are any seasonal changes in the meat and gut with how long they hold toxins. Near the end of my data you can see the decrease in the toxins between both the littlenecks and butter clam in their meat and guts.

References:  
 1. Harley, Lanphier, Kennedy, Leighfield, Bidlack, Gribble, Whitehead (2020) "The Southeast Alaska Tribal Ocean Research (SEATOR) Partnership: Addressing Data Gaps in Harmful Algal Bloom Monitoring and Shellfish Safety in Southeast Alaska" *Toxins* 12(6): 1-12 <https://doi.org/10.3390/toxins12060407>  
 2. Matweyou, Kibler, Litaker, Wright (2020) "Paralytic Shellfish Toxins in Butter Clam Tissues" Kodiak, AK. Available through Alaska Sea Grant <https://seagrant.uaf.edu/bookstore/download.php?loc=fla%2FMAB-78%2FMAB-78PDF.pdf&pub=MAB-78PDF&title=Paralytic+Shellfish+Toxins+in+Butter+Clam+Tissues&by=TRUE>  
 3. Moore, Trainer, Mantua, Parker, Laws, Backer, Fleming (2008) "Impacts of Climate Variability and future climate change in harmful algae blooms and human health" *Environmental Health* 7, S4 (2008) <https://doi.org/10.1186/1476-069X-7-S2-S4>