Raising the Quality Bar.

Trollers go beyond pressure bleeding.

by Jeremy Brown and Tom Kelly.

Almost all seafood dies by asphyxiation, or by crushing trauma.

Think about that.

The process of asphyxiation; the restriction of oxygen, particularly to the sensitive tissues destined to be treasured table fare, leads to anaerobic respiration during the first stages of death which then causes a chain reaction and floods the tissues with lactic acid and cortisol's. In tuna, this is also accompanied by a marked increase in body temperature which can result in dull muscle then acidic and metallic aftertaste. (Goodrick 1987). Most fish, including salmon do not have the temperature increase that tuna experience, however the negative effects of the natural chemical chain reaction that begins with asphyxiation cannot be overlooked.

Adenosine triphosphate (ATP) synthesis is a natural effect of dying fish and is directly related to the rigor mortis process. ATP provides the energy to the muscles both to contract and relax. Loss of ATP means that each twitch becomes fixed, and the tissue becomes more and more contracted. This process is only resolved as the muscle proteins themselves start to break down through enzyme action and decomposition. The higher and longer a fisherman can sustain the levels of ATP and thus delay the onset of rigor mortis will result in a higher quality product. The more a fish struggles, then becomes stressed and dies of exhaustion through asphyxiation, the lower ATP will be, which hastens the onset of rigor mortis. (Ando 1996)(Dassow 1976) This will directly affect the shelf life and quality of the fish!
Pre-rigor stress has also been shown to lead to significantly increased myofibre (muscle tissue) breakage. (Bahuaud, 2010.)

So, a rapid capture method followed by a swift means to end of life to every fish by a harvester is paramount to achieve the highest quality.

Prompt chilling along with careful handling of commercially caught fish is just as important as the method of harvest and kill technique. The more stressed the fish, and the less it is chilled, the greater the damage to the tissue, as manifested in 'gape' and mushiness,(Borderias, 2011) the progress of which can be mitigated somewhat by rapid chilling. Liquid ice slurries chill faster than solid ice because its temperature is lower than traditional ice and temperature transmission is faster than traditional flake ice. However, bacterial growth in ice slurries is higher than flake ice so if practical, a harvester should utilize both methods, first the slurry followed by flake ice for prolonged storage. (Reynisson and others 2010).

The potential quality of the catch is defined by the how, when and where that the fish encounters the fishing gear.
That's as good as it will be. Its all downhill from there and the very best that the fisherman can do is not screw it up, to maintain that inherent quality as long as possible.

Conscientious trollers stun their fish in the water with a gaff blow on the head to prevent struggling, rather than clubbing on deck, but many fisheries bring too many fish aboard at once to permit even that.
Rapid bleeding and transfer to water close to freezing has been shown to reduce stress and hasten death.
The recently launched freezer longliner Blue North is set up to electro shock fish as they come aboard. This approach may offer volume fisheries an opportunity to reduce stress on their catch.

At the 2017 Wild Seafood Exchange, chef Shota Nakajima caught participants' attention describing techniques used by Japanese fishermen, particularly the destruction of the spinal cord, known in Japanese as ike jime. This season several trollers researched, experimented and adopted the technique, and we report here that the results are extremely positive, on a par with the improvements brought by pressure bleeding. 2

This is Spinal Tap?

Many of the nerves that control muscle action that is repetitive or reflexive connect and are controlled along the spinal cord - these nerves need not connect all the way to the brain and back for many simple functions. So even heading or brain-spiking does not interrupt their functioning and they can continue firing post mortem. When the nerves continue to fire and produce the reflex action in the muscle tissue, the action will consume ATP and produce lactic acid contributing to a much lesser quality product.

The purpose of ike jime is to destroy these nerve connections and prevent any further muscle contraction. The spinal cord is best destroyed by inserting a wire along the spinal cord the full length of the fish, thus severing the nervous system from the muscle tissue. The easiest approach and one used often in Japan is to partially sever the tail and insert a wire from that end, but for many reasons, both practical and aesthetic, we have found that making the insertion from the head directly after and in the same location of the brain spike is the most effective.

Each species of fish has a somewhat different skull structure, so a good deal of exploration is necessary to find the 'sweet spot' to avoid a misapplication of the wire and a potential corruption of the flesh. What you are looking for is the 'brain stem', the point at the back of the brain cavity in the skull where the spinal cord leads into the backbone. This will allow the wire to follow the spinal cord the full length of the fish without corrupting any flesh.
"Piano wire" in 1/32-3/64" diameter available in 3ft lengths at most hardware stores has

proven reliable, with the initial hole being made with a ‘scratch awl’ or ice pick.

As the wire is pushed down the segments of the backbone a distinctive ‘bump bump bump’ is felt, and a clear tremor along the lateral line indicates the severing of nerves. f

So what is so different?

Different species show slightly varied response, but there are some clear general effects that are consistently apparent.

• the fish immediately relaxes, the flesh appears quite ‘springy’,
• onset of rigor mortis is delayed and more deliberate
• release from rigor mortis is delayed and gradual-after 4 days in ice ling cod still present very firm muscle texture along the backbone,
• post rigor flesh is firmer, several fishmongers have observed significant improvements in filet yield,
• filets show very little if any gape,
• cooked portions hold together well, and exhibit a supple texture.

So, is it worth it?

Clearly much more systematic assessment is needed before conclusive claims can be made.

Subjectively, the authors are convinced, we plan to continue and improve the ike jime process on all our fish in the future.

The response from a number of highly respected chefs including Blaine Wetzell at the The Willows Inn on Lummi Island and Chris Webber at The Herbfarm has been clear and positive.

For the commodity market such extra steps may be inconvenient, but for anyone serious about direct marketing and delivering the best possible product, ike jime offers a way to significantly raise the bar and separate your fish from the competition.

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Chef Dave Arnold at the International Culinary Center in New York has conducted several comparisons;
http://www.cookingissues.com/index.html%3Fp=5661.html et seq,

Japanese Ike Jime tools;
http://www.anglers-secrets.com/product/04cooking/ike-jime-wire-combo-long/

Sidebar;

Art imitates death.

If you think Ike Jime seems like something out of a macabre Japanese horror story, you would not be far wrong!
In his critically acclaimed ‘1Q84’, novellist Haruki Murakami has his assassin Aomame dispatch her victim in a creepily similar fashion!