

Hybrid Striped Bass – A QIM Scheme for a Major U.S. Aquaculture Species



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Abstract

Hybrid striped bass (HSB), a cross between striped bass (*Morone saxatilis*) and white bass (*M. chrysops*), is rapidly becoming a major product of U. S. aquaculture. The HSB industry has been expanding at an annual rate of 7 percent in the U.S. In 2000, HSB was ranked fifth in volume (5,097 mt) and value (US\$29.5 million) of all food fish grown. In North Carolina, 22 HSB growers produced 1,091 mt of fish valued at US\$5.7 million in 2002. Farm-raised HSB is very popular in the U.S. because of its favorable sensory characteristics and long shelf life. The flesh is white with a mild odor and flavor and a firm and juicy texture. Shelf life of whole fish on ice is 14 days. The fish are commonly marketed between 0.45-1.14 kg in weight. This poster presents results in development of a Quality Index Method (QIM) scheme for hybrid striped bass. U.S. growers and buyers can use the QIM scheme to make quantitative sensory assessments of fish quality. The QIM parameters used in the HSB scheme are skin color/appearance, discoloration, odor and texture of the whole fish, appearance and shape of the eyes and color/appearance, mucus and odor of the gills. Each QIM parameter is given a demerit point (0-2) and the sum of the points is the quality index (0-16).

Objectives

- To develop a Quality Index (QI) for farm-raised hybrid striped bass based on the Quality Index Method (QIM).
- To introduce the QIM concept for assessing fish quality to the North Carolina fish and aquaculture industries.

Introduction

- Major aquaculture food fish species produced in the United States are catfish, trout, salmon, tilapia and hybrid striped bass. Hybrid striped bass (HSB) is a cross between striped bass (*Morone saxatilis*) and white bass (*M. chrysops*). Early attempts to culture HSB were made in the 1970s. In the mid-1980s, Kent SeaTech Corp. (formerly Aquatic Systems, Inc.) produced large quantities of hybrids for the food fish market.
- Kent SeaTech successfully developed high-density tank culture using geothermal groundwater in southern California. Early success of pond culture can be attributed to research funding by the National Sea Grant Program and South Carolina Marine Resources Department. Numerous tank and pond culture facilities were developed in the late 1990s in North Carolina and other southeastern states.
- The HSB industry has been expanding at an annual rate of 7 percent in the U.S. In 2000, HSB was ranked fifth in volume (5,097 mt) and value (US\$29.5 million) of all food fish grown. In North Carolina, 22 HSB growers produced 1,091 mt of fish valued at US\$5.7 million in 2002.
- Farm-raised HSB is very popular in the U.S. because of its favorable sensory characteristics and long shelf life. The flesh is white with a mild odor and flavor and firm, juicy texture. Shelf life is 14 days on ice. Whole fish are commonly marketed between 0.45-1.14 kg in weight.
- Current restraints on industry growth are adequate supply of fingerlings, domestication of brood stocks and inconsistencies in the appearance and fresh shelf life of whole fish.
- This study was conducted as part of a North Carolina fishery resource grant investigating the effectiveness of sodium chlorite for extending the fresh shelf-life of whole HSB. U.S. growers and buyers expressed an interest in a quality scheme to make quantitative sensory assessments of fish quality.

Methods

- Whole fish were obtained from two local farms (Pure Water Aquaculture, Creswell, NC; White Rock Fish Farm, Vanceboro, NC). Fish were dipped from ponds by nets into chill tanks to render them senseless before packing on ice for transport.
- Whole fish were packed in ice and held in a walk-in cooler at <math><2^{\circ}\text{C}</math> for 21 days. Fish were examined to describe all detectable quality parameters during cold storage in ice. The descriptions served as a basis for development of a Quality Index Method (QIM) scheme.
- At least 9 fish were used from each of two sample dates in this preliminary study. The sensory analysis of cooked fish was performed near the end point of shelf life to judge acceptability in terms of odor, taste and texture.
- Photographs of each stage in sensory evaluation were taken. Photographs are used to illustrate quality attributes when introducing the QIM concept for assessing fish quality to the North Carolina fish and aquaculture industry members.

FIGURE 1.

Quality Parameters	Descriptions	Points
Skin color/appearance	Pearl-shiny, iridescent pigmentation all over	0
	Less pearl-shiny, yellowish, stripes still distinct	1
	Slight to none	0
	Minor (5 - 10%)	1
Discoloration (red spots, bruising)	Severe (10 - 25%)	2
	Neutral, pond, fresh fish, seaweed	0
Whole fish Odor	Melon, cucumber, green grass	1
	Cardboard, fishy, putrid, rotten	2
Eyes Shape	Black, clear, bright, iridescent	0
	Dark gray, mat, dull	1
	Milky, cloudy, hazy, light gray	2
Eyes	Convex, bulging	0
	Flat	1
Eyes Shape	Concave, sunken	2
	Bright red, red, burgundy, uniform in color	0
Color/appearance	Pale red, pink, light brown	1
	Brown, dull, non-uniform in color	2
Mucus	Transparent, clear, none	0
	Milky, clotted	1
Gills Odor	Pond, fresh fish, fresh rain	0
	Melon, cucumber	1
Gills	Musty, fishy, putrid, rotten	2
	In rigor	0
Texture	Firm, resilient, finger mark disappears immediately	1
	Soft, finger mark still persists after 3 seconds	2
Quality Index (total score)		0-16

Results and Discussion

- The QIM scheme developed for hybrid striped bass is shown in Figure 1. Each QIM parameter is given a demerit point (0-2) and the sum of the points is the quality index (QI) (0-16).
- The shelf life of fresh hybrid striped bass in this study was determined to be 10 days on ice for high quality and 14 days on ice for acceptable quality. Major quality defects observed were in discoloration (red spots, bruising) along the ventral and anal fins, gill opercula and belly areas.
- Eye (pupil) color began to lose its clear bright appearance on day 5 while gill color (bright red) decreased about the same time and odor development was noted at day 10. Texture of fish muscle remained firm up to 14 days on ice.
- Off-odors and flavors in cooked fish fillets were noted on day 14 of storage on ice.
- Comments received from North Carolina industry members were very favorable. Industry expressed interest in learning more about the QIM scheme and offered additional quality parameters (presence of parasites and intensity of skin color) for inclusion in future studies.
- The desire to correlate raw fish with cooked fish quality parameters was of great interest to fish growers concerned about shelf life extension for their products. This desire and the need to repeat our preliminary studies may lead to future work.

Future Work

- Additional trials are planned including involving more fish farms and sampling at different times of the year. Work will involve checking linearity of QI versus time on ice and determining the correlation for QIM of whole fish to Quantitative Descriptive Analysis (QDA) of cooked fillets.
- Plans are to involve several industry growers in the development process and conducting industry training workshops for use of the QIM scheme on an industry-wide basis.

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