Strategies for control of pathogens and spoilage flora in caviar products during storage

- Prevent cross-contamination in caviar processing facilities from rinse water.
- Food contact surfaces, particularly screens are a source of contamination because they are difficult to clean.
- The goal should be to keep total aerobic counts on processing area surfaces range at 1 log CFU/in^2 (or less).
- Refrigeration temperature: Product should be processed on ice and kept as cold as possible.
- Storage temperature should be kept at 3°C (37°F). Mildly abusive temperature causes out growth of foodborne pathogen and endogenous microflora which lead to spoilage.
- Knee activated spray and faucet handles reduce chance of cross-contamination.

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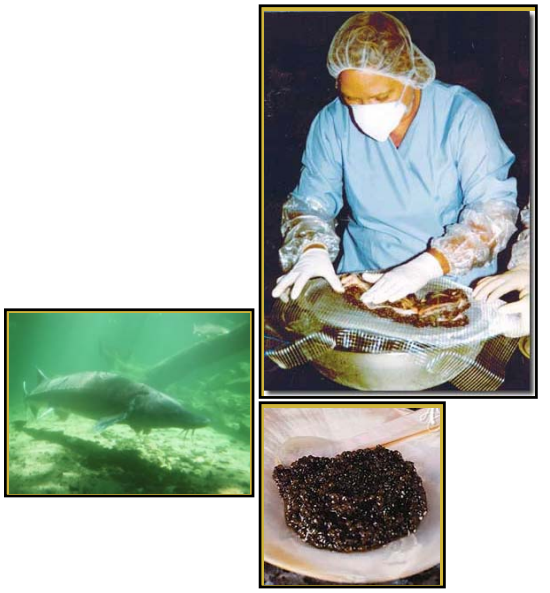
Sanitation Standard Operating Procedure (SSOP)

- **Safe water**: Safety of water that comes into contact with food or food contact surfaces, or is used for ice
- **Clean food contact surfaces**: Condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments
- **Prevent cross-contamination**: Prevent cross-contamination from insanitary objects: to food, food packaging material, and other food contact surfaces, including utensils, gloves, and outer garments; and from raw product to cooked product
- **Employee hygiene**: Proper maintenance of hand washing, hand sanitizing, and toilet facilities
- **Adulteration**: Protection of food, food packaging material, and food contact surfaces from adulteration with lubricants, fuel, pesticides, cleaning compounds, sanitizing agents, condensate, and other contaminants
- **Toxic compounds**: Proper labeling, storage, and use of toxic compounds
- **Employee health**: Control of employee health conditions that could result in the microbiological contamination of food, food packaging materials, and food contact surfaces

Safe, High Quality Caviar



Washington State University

University of Idaho

Caviar preparation

Sturgeon

Screening

Washing

Draining

Salting

Packing

Packing

Sturgeon caviar

- Caviar is the eggs of sturgeon (Family Acipenseridae) preserved with salt. It is prepared by removing the egg masses from the fish and recovering the eggs by rubbing them carefully through a screen to separate the eggs and remove tissue and fat. Salt (4-8%) is added to preserve the eggs and bring out the flavor. Caviar is usually aged for flavor development.

Sanitation and use of sanitizing chemicals

- Currently, salt (sodium chloride) is the only ingredient permitted in the United States for caviar preparation. Borax is used for preservation in other countries.
- Salt content up to 6.32% WPS (Water phase salt) does not prevent the growth of *Listeria* sp. and endogenous microflora under refrigerated storage.
- Chemical treatments (chlorine dioxide and chlorous acid – food-grade FDA approved) can control *Listeria* sp. and endogenous microflora. Care must be taken so that there are no effects on sensory qualities.

Fish skin sanitation

- Hydrogen peroxide (3%)
  Chlorous acid (250 ppm)
  Chlorine dioxide (100 ppm)
- Antimicrobials are applied on the belly surface of fish for 10 sec, and rinsed with water before opening the fish.
- Chlorous acid (250 ppm) was the most effective in reducing bacteria on fish skin

	TAC (log cfu/g)	
	Before	After
HP	3.23	1.62
CA	1.19	ND
CD	1.98	0.54

Microbial count of eggs

- Eggs can have a total aerobic count more than 2 log of bacteria per gram that survive the process.
- Rinse water can contain 2 log of bacteria per ml.