Introduction to the General Principles of Agro-Processing:
Faced with the current economic realities, farmers worldwide are searching for new options of surviving, as well as expanding their business. One of the many opportunities to grow markets, turnover and profits, is by adding value to farm produce through further processing. Most value added food products available to consumers have been processed in some way or other, even if the processing is as simple as cleaning produce before it is packed in plastic-or net bags. Two types of processing methods may be performed on raw materials:
- Primary processing: this type of processing includes the simplest of processes such as washing, peeling, chopping, ageing, the milling of wheat for flour production, and the processing of sugarcane;
- Secondary processing: this type of processing involves the conversion of primary processed products into more complex food products and includes procedures such mixing, depositing, layering extruding, drying, fortifying, fermentation, pasteurisation, clarification, heating etc.

Without the aid of food processing, we would not have the convenience of the large variety of food products available in supermarkets and other food outlets. Processing of raw products has a number of advantages:
- It allows for the year-round availability of food that have only a limited growing season, or is not grown in certain areas due to soil and climate factors, examples being frozen and canned fruit, vegetables as well as meat products;
- Processing extends the self-life of products, such as canned fish and UHT milk;
- Food processing improves the safety of our food supply through processes intended to destroy harmful bacteria and packaging helps in the prevention of food tampering.

Agro-Processing of Marine Foods:
Food products that are obtained from water environments, whether fresh water or salt water, are classified as marine foods. The main marine raw products used in food processing are saltwater fish, crustaceans and shellfish such as shrimp, lobster, crab, clams, oysters, as well as freshwater fish.

Large quantities of marine foods, including sea foods are frozen or canned, with examples of processed goods being pre-cooked, battered, breaded, and frozen fillets, fish sticks, and shrimp. Canned tuna, salmon and sardines are also produced, further fish products include salted fish, smoked fish, pickled- or dried fish. Whole fish are also sold, which means the fish is unprocessed and in its original state as it was caught.
Some processing options available include:

- **Fish fillets** are defined as the fleshy sides of the fish which have been cut from the whole fish, lengthwise along the backbone. Fish fillets are usually deboned to aid the consumer, although it must be noted that some small bones or “pins” may remain even after careful processing. The skin of the fish may also be left on on one side of the fillet. Butterfly fillets are defined as two fillets which are held together by the uncut flesh and skin sections of the belly. Apart from the raw filleted fish that is available to consumers, filleted fish may also be processed into cooked fresh-water fish fillets, fried fish fillet and also individually quick-frozen, or IQF, fish fillets;

- **Fish steaks** refer to large dressed fish which have been cut into cross-section slices with a thickness ranging from 1.25cm in thickness to 2.5cm in thickness with a cross section of the backbone remaining in the product. Fish usually processed in this fashion include halibut steaks and salmon steaks;

- **Fish sticks** are cut from pre-formed, pre-frozen fillet blocks. These blocks are formed by laying carefully prepared boneless and skinless fillets in a waxed kraft fiberboard container. The fillets are laid either parallel or perpendicular to the long axis of the container, with the thick portion of the fillet being placed adjacent to the edge of the container and the thin portion in the center. The depression that is formed through this method of stacking, is build up with fillets until the desired weight is obtained. For the freezing process, the containers of fillets are placed in a multiplate freezer with spacers 8.4cm less in depth than the cartons, which will result in a single compression of the cartons when the plates are moved together. The fish sticks are obtained by cutting the frozen fillets into portions of at least 9.5cm thick, and are offered to the consumer in frozen form, ready to eat, or frozen raw coated with batter and breaded, ready to be cooked;

- **Fish cakes** are prepared from cooked, flaked fish fillets, boiled potatoes, diced onions, and seasoning, and then shaped into cakes. These cakes are enrobed in batter, breaded and then packaged and frozen, ready to be cooked.

**Further Processing Options:**
The products discussed above are only a small sample of the many processing methods and products available to the processor. Other options also include breaded bite-size fish pieces, canned clams, canned oysters, canned shrimp, canned sardines, canned salmon, canned tuna, fish squares, fried fish fillets and smoked fish products.

The manual on the Agro-Processing of Marine Foods contain complete information on the products discussed above as well as many other processing methods and products available to the processor. The manual is available from the ARC – Institute for Agricultural Engineering. Contact: Elmarie Stoltz, 012 842 4017, stoltze@arc.agric.za.