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Aquaculture & Fisheries"
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Tanta university
Faculty of agriculture
Tanta, Egypt.

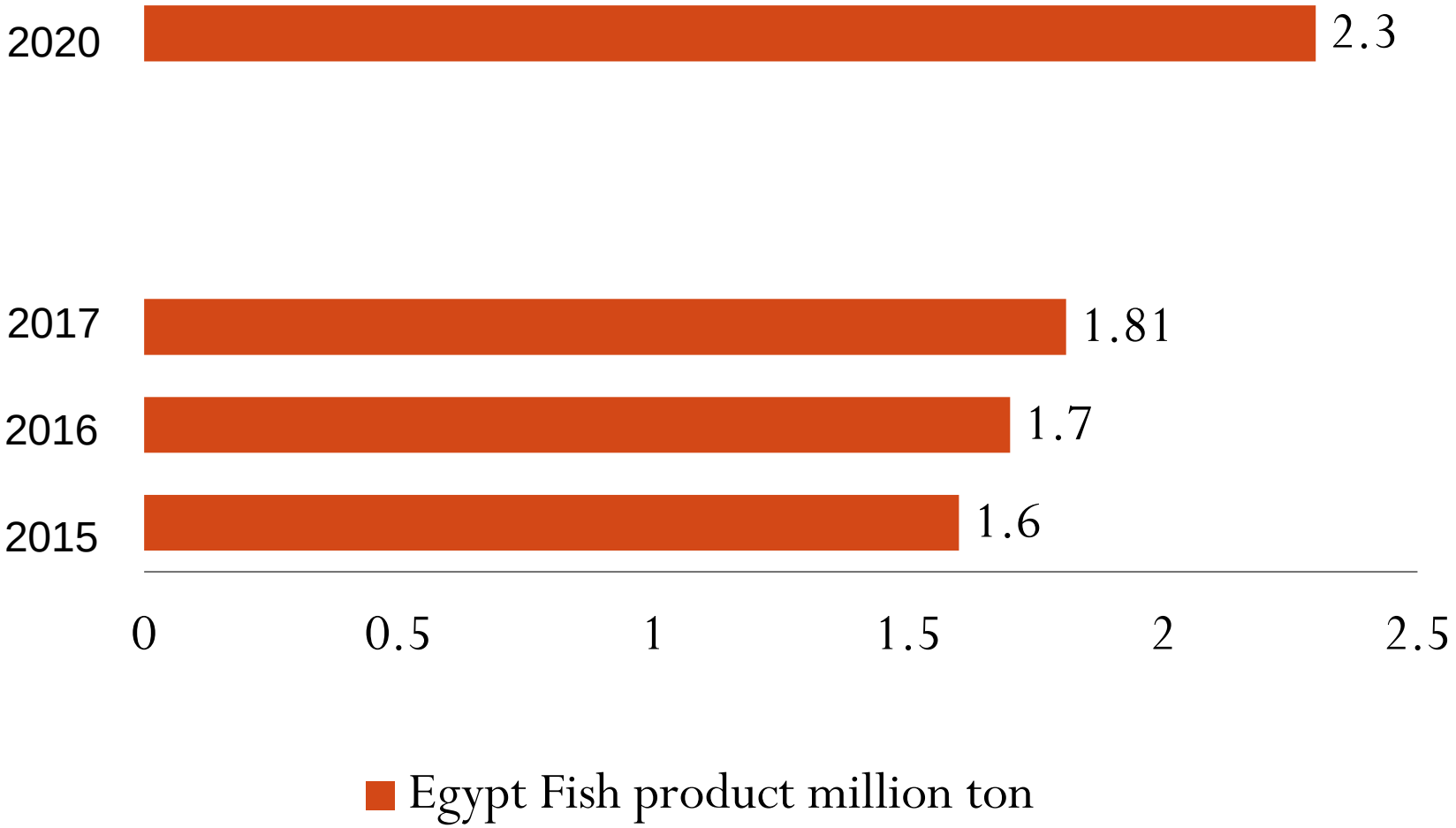
WASTE MANAGEMENT FOR SMOKING SALMON BY-PRODUCTS TO EXTRACT OMEGA-3 FISH OIL

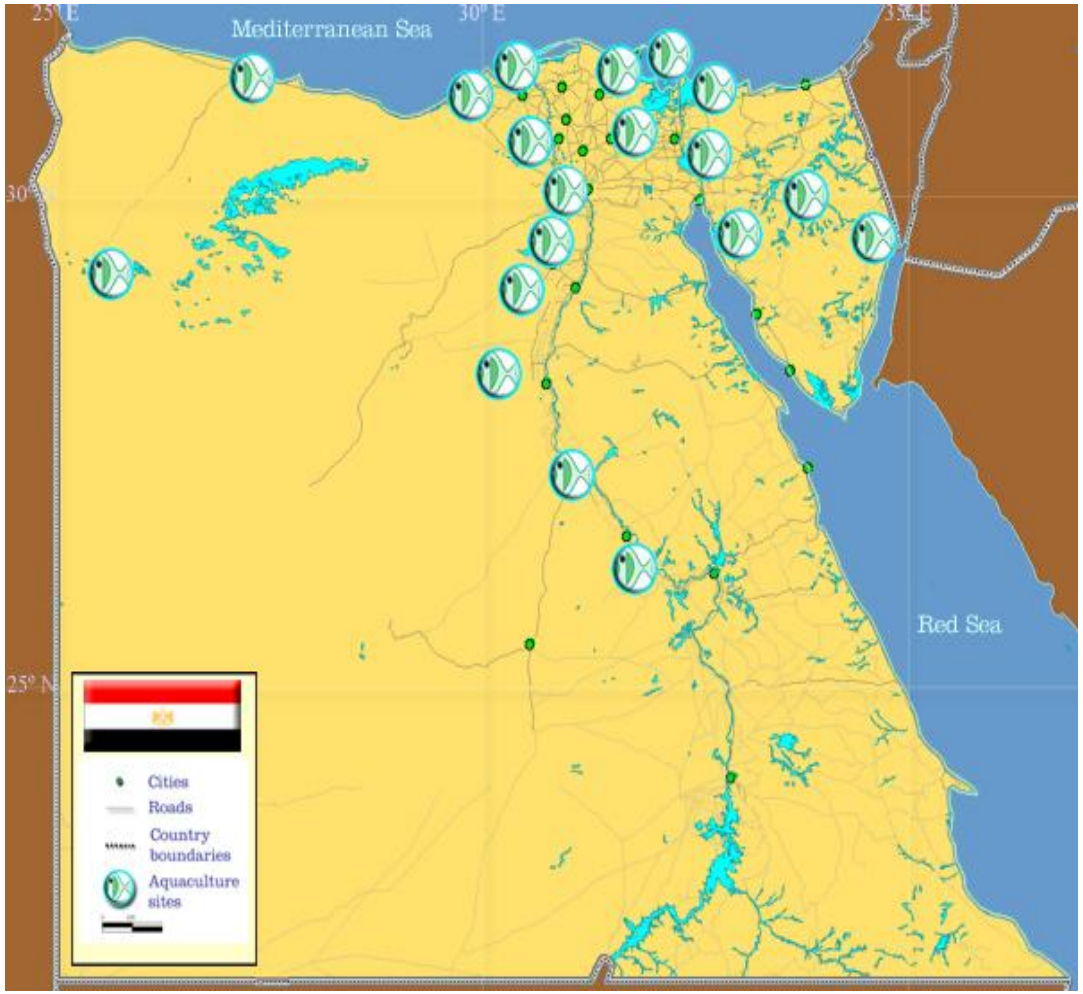
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Management and processing of fish by-products and waste

- The development and expansion of modern aquaculture began in Egypt leading to a sharp increase in production.
- Egypt fish products rise to 1.810 million ton 2018 increased to 2.30 million ton in 2020
- fish waste which often represent about 20-50% of the total fish weight.
- The fish processing industry generates large quantities of tissue waste and by-products which tend to be either discarded or retailed at low value for fertilizer or animal feed.


2020
2.3
2017
1.81
2016
1.7
2015
1.6
0
0.5
1
1.5
2
2.5
Egypt Fish product million ton



Most aquaculture activities are generally located in the Northern Nile Delta Region, with fish farms usually found clustered in the areas surrounding the four Delta Lakes (Maruit, Edko, Boruls and Manzala). Fish hatcheries are also generally located in the vicinity of the fish farms except for five large Government hatcheries scattered along the course of the Nile in Upper Egypt. The distribution of aquaculture units is shown as blue circles

Fig. Distribution of the main aquaculture production sites (Google Egypt map,)

FAO Fisheries and Aquaculture Department. National Aquaculture Sector Overview Egypt

What Is The problem of this Research?



The fish processing industries produce large quantities of fish waste which often represent about 20-50% of the total fish weight.

That it mean we have more than 0.5 million ton from Egypt fish yield (1.810 million ton) in this year 2018 as fish waste

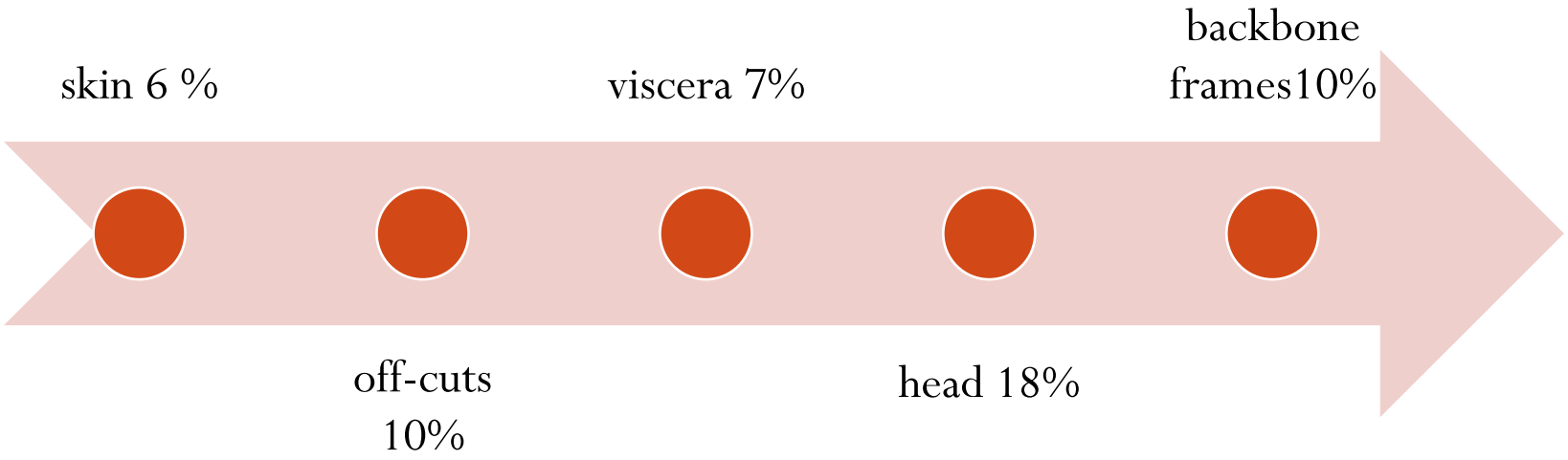
Component of Waste generated from fish

The fish by product is nearly

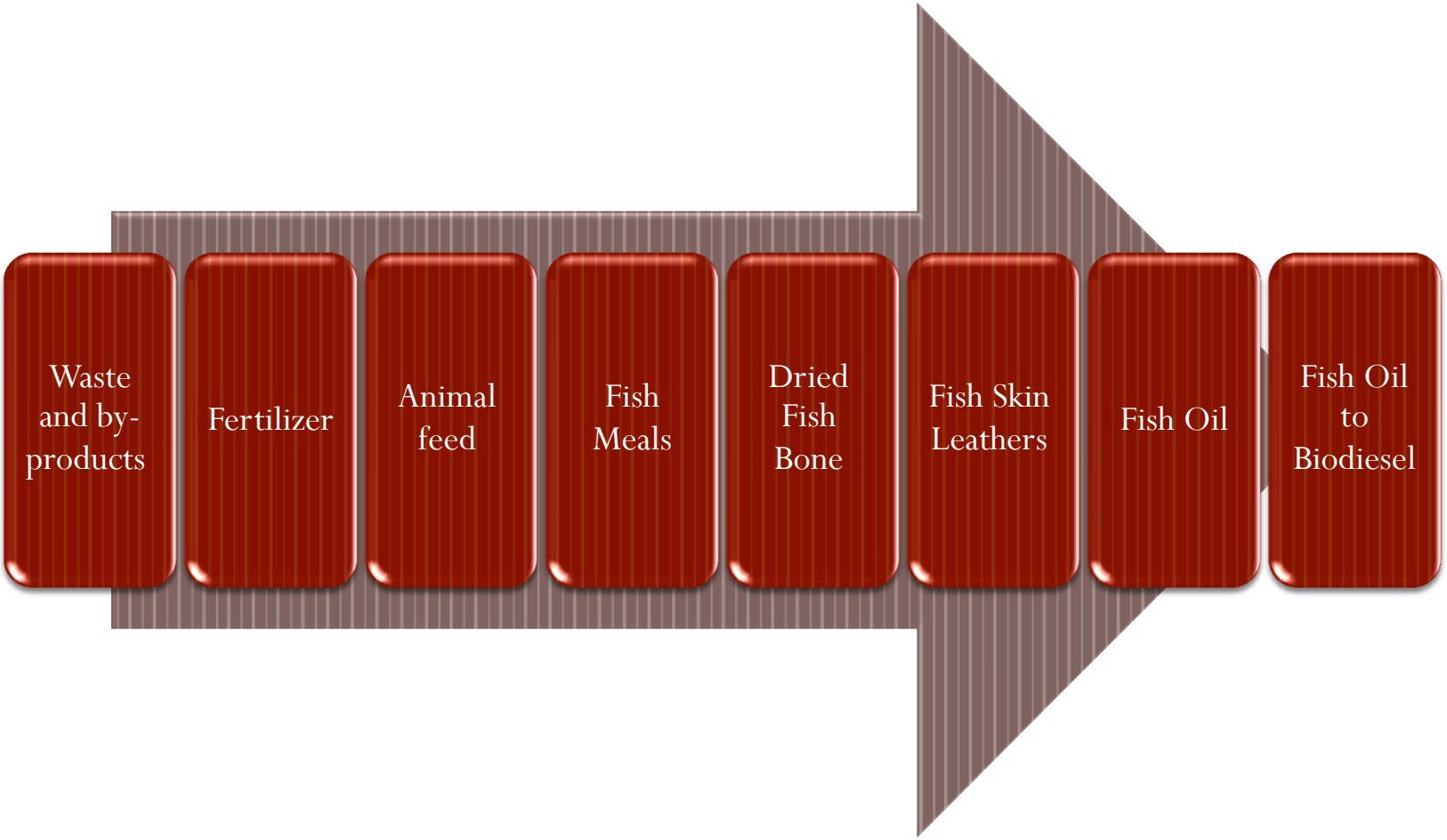


- skin 6 %
- viscera 7%
- off-cuts 10%
- head 18%
- backbone frames10%).

Component of Waste generated from fish



Reprocessing of waste and by-products to fertilizer or animal feed.



Oils extracted from wild salmon by-products are excellent sources of long chain omega-3

Fish oil is a very effective nutrient and contains important omega 3 fatty acids that can be absorbed easily.

- **Fish Oil Benefits**
- **Less Pain and Inflammation.**
- **Cardiovascular Health.**
- **Protection from Stroke and Heart Attack**
- **Better Brain Function and Higher Intelligence**
- **Lower Incidence of Childhood Disorders**
- **Reduction of Breast, Colon and Prostate Cancer**

By-products of Salmon smoking waste **sample**

- Samples were collected from Bentleys Egypt company one from Egyptian industrial group, the by-products of Salmon smoking waste (skin, viscera, backbone frames and off cuts), weighted 500 grams and package under vacuum. The raw material of Salmon waste (skin, viscera, backbone frames and off cuts) frozen at -12 °C for one day before it was used in the experiment.

Oil mass in sample

- **Oil mass in sample** determined three times for 100 g. of Salmon by-products by cold pressing and wet rendering methods the oil content ranged between 18.45 and 18.89 g/100 g. Also the oil content obtained through semidried samples and enzymatically treated samples of salmon processing by- products ranged between 16.234 and 18.212 g/100 g. (enzymatic extraction method was considered as the control method)

The main objective of this research was to

investigate the possibility of producing fish oil

- *from smoking salmon waste*

by using

- *cold pressing*
- *wet rendering methods*

Extract methods

There are many methods to extract fish oil such as wet and dry rendering, solvent extraction, silage production and supercritical fluid extraction.

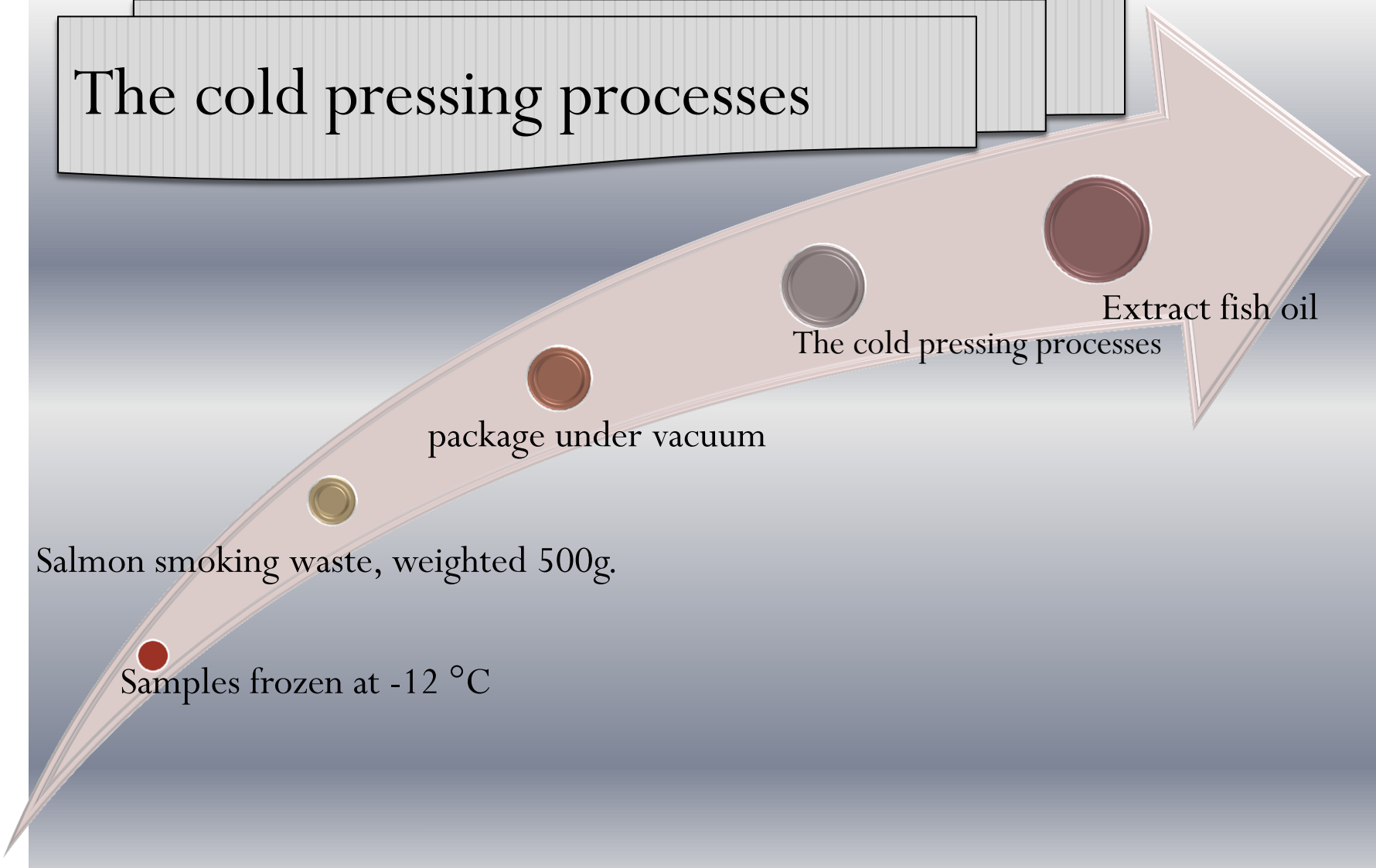
The wet rendering extraction process

- involved first cutting the viscera still frozen into small pieces and putting them in 550 mL boiling water for 20 minutes. Then cooling down for 40 minutes and filtering in a strainer with fast flow rate.

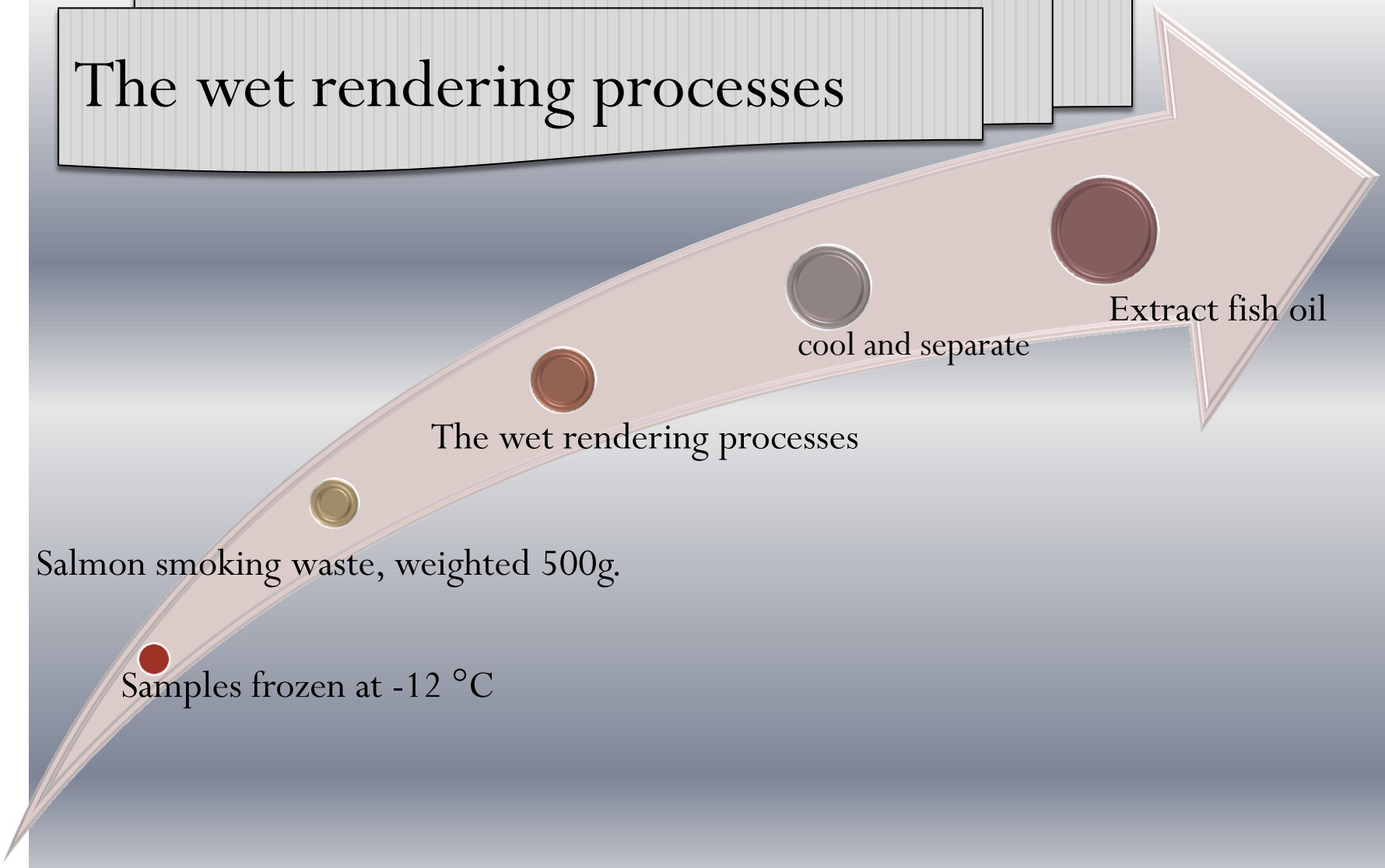
The cold pressing processes

- the pressing box have about 10 cm in deep, 30 cm in long, 15 cm in wide and two plate with the same dimensions one of them acting load on the sample's as a small prototype for cold pressing methods. Different compressed times from 10 to 260 min.

The cold pressing processes



The wet rendering processes



Salmon fish components

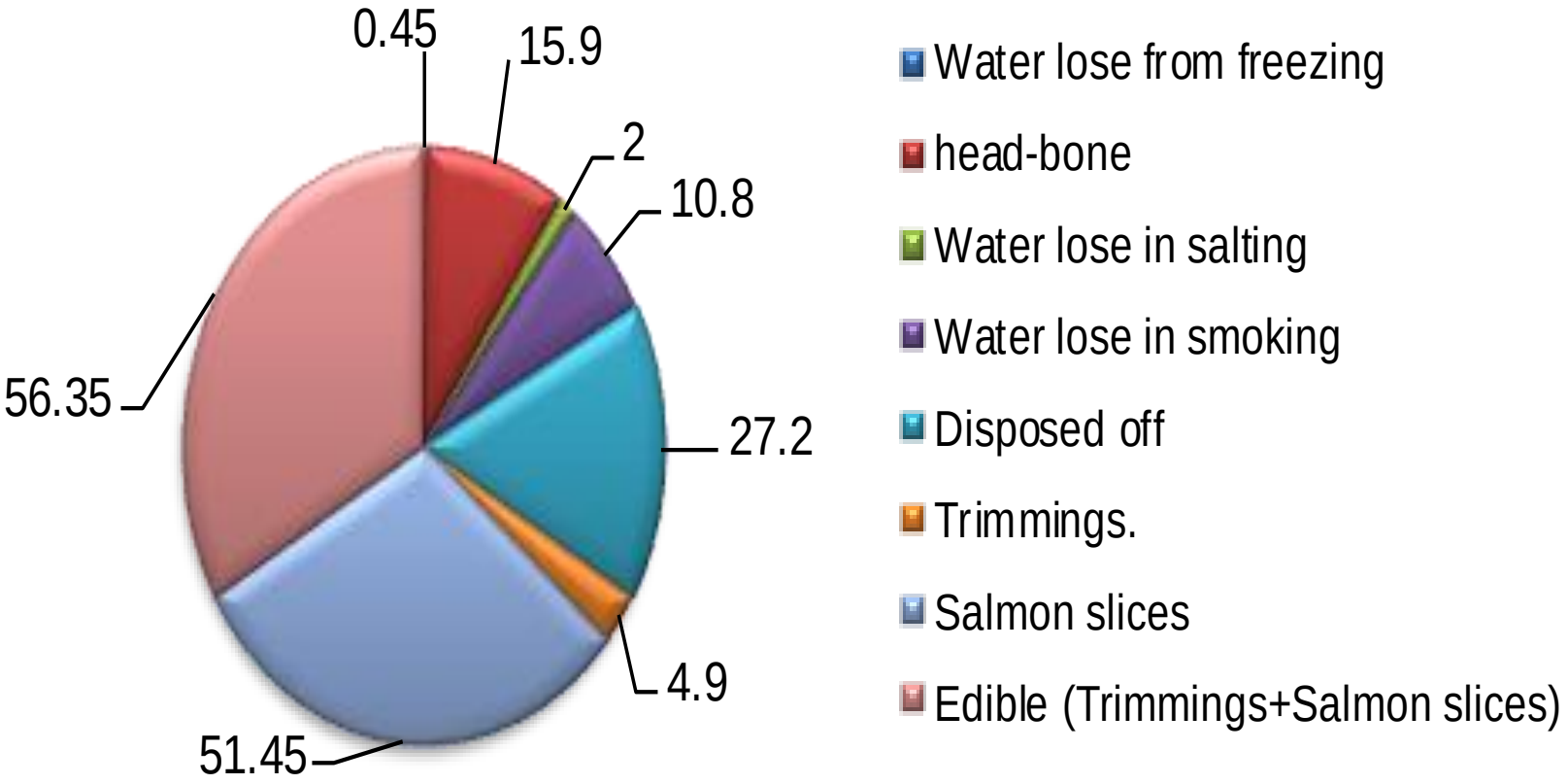


Fig. 1. Average distribution of edible portion and by-products percentage in salmon fish

Oil productivity with cold pressing

The results showed that pressing time increased from 10 to 260 min. oil weight increased from 10 to 93 g. oil/500 g.

Salmon by-products, oil productivity increased from 2.00 to 18.60%, and extraction efficiency increased from 10.58to 98.46 % at constant pressure, stress

The results showing steady behaviour after 180 min

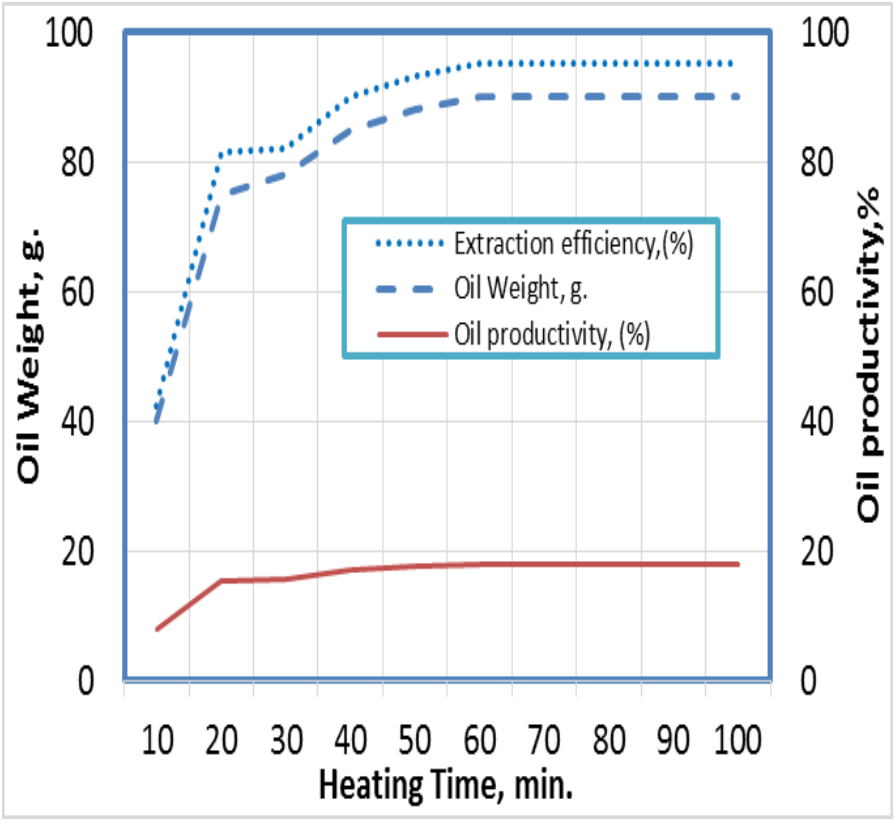


Fig. 2 the oil extracted from Salmon by-products with heating time and oil productivity and oil extract efficiency.

Oil productivity with wet rendering

The results showed that heating time increased from 10 to 60 min. oil weight increased from 40 to 90 g. oil/500 g.

Salmon by-products , oil productivity increased from 8.00 to 18.00%, and extraction efficiency increased from 42.35to 95.23% at constant temperature 100 °C.

The results showing steady behaviour after 60 min.

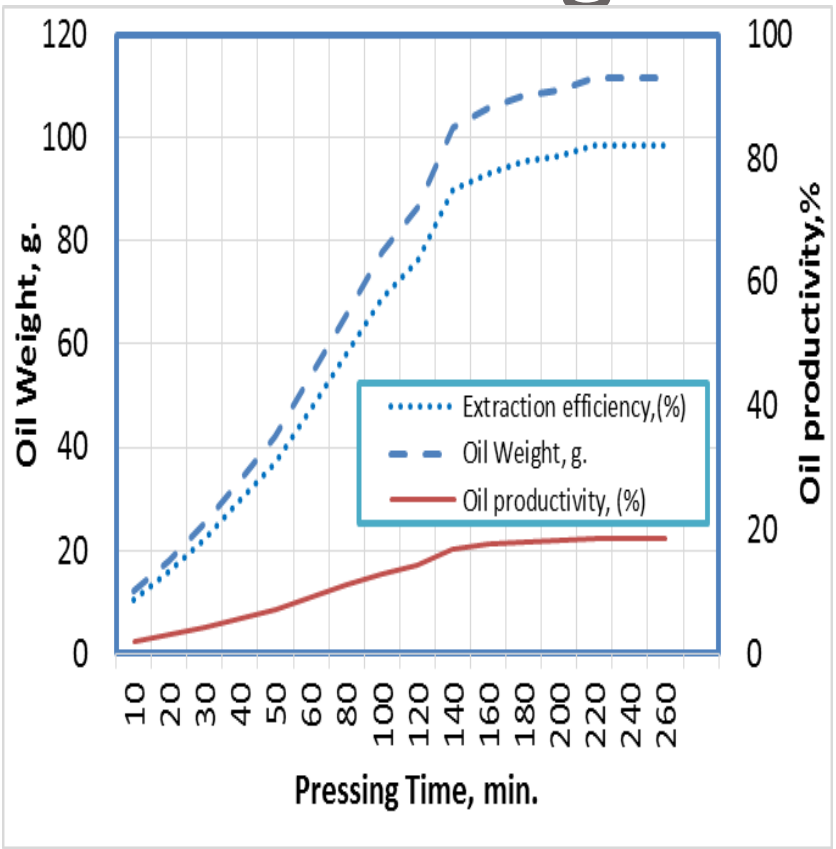


Fig. 3 the oil extracted from Salmon by-products with pressing time and oil productivity and oil extract efficiency.

CONCLUSIONS

- The important results obtained were summarized in the following:
- -The optimum conditions with wet rendering at a constant temperature 100 °C. and heating time 20 min., oil productivity about 15.40% and extraction efficiency was 81.52%
- -The preferred using cold pressing, oil extraction yield increased and characterization of quality. The optimum conditions at pressing time was 180 min., oil productivity was 18.00%, and extraction efficiency were 98.46% at constant pressure.

THANKS FOR YOUR ATTENTION