Evaluation of Discarded Fish as a Value-Added Product

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Main Idea

Discarded fish may not be used as human food; but they can be made available as raw materials in the production of fish meal and pet food as a product with increased added value.

Converting discarded fish to fish meal as an ingredient for feeds;

Converting discarded fish to a raw ingredient for the pet food industry.

What is fish meal?

Fish meal is the primary protein source in aquafeeds, and concurrently it is a limiting factor in the aquaculture industry and conventionally used as a livestock feed supplement. For carnivorous fish species, as its crude protein levels are between 65-72%, aquafeeds have been mostly dependent on the FM as the principal protein source for several motives; for its superior essential amino acid profile, high protein content, better nutrient digestibility, and absence of anti-nutritional factors.

Around 97% of the world's fish meal production is used in animal feeds:

- Aquafeeds : 69%
- Pig feed : 23%
- Poultry feed : 5%

Using of Discarded Fish in Raw Food Content

As it is frequently stated within the scope of the MARIPET project, discarded fish can be used as a raw material in the content of raw food, the importance of which has been increasingly understood in the nutrition of domestic cats and dogs, in a way that can be described as health from the sea.

The Global Situation of the Pet Food Industry

With the emergence of the Covid-19 pandemic in 2020, with the emergence of working-from-home conditions and the closure of people in their homes, significant activity has been observed around the World;

In recent years, it has been determined that at least one pet is kept in 88 million households in the world, 25% of which are cats and 25% are dogs.

The amount of food produced for the feeding of these animals has reached 8.5 million tons per year, which is estimated to be 102.6 billion dollars in monetary value. In the calculations, it was determined that the sector grew by 2.6% per year.

Varieties of Pet Food

- **Dry food:**

Thanks to today's developing mixed feed production technologies, the foods produced by the method called extrusion under a certain temperature and pressure are stored in the desired package size and offered for sale.

When looking at the production stages, raw material supply, grinding to bring the raw materials to the same size, mixing that ensures homogeneous raw material distribution, the addition of vitamin and mineral premixes that support meeting the nutritional requirements of the animal, conditioning in which water vapor and oil are added, cooking in a feed shaping device called an extruder, It consists of stages that enable the food to be brought to room temperature, and finally packaging it to reach the user.

Erasmus+

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Crusher

Mixer

Extruder Machine

Dryer

Flavor Roller

Cooling Machine

Packing Machine

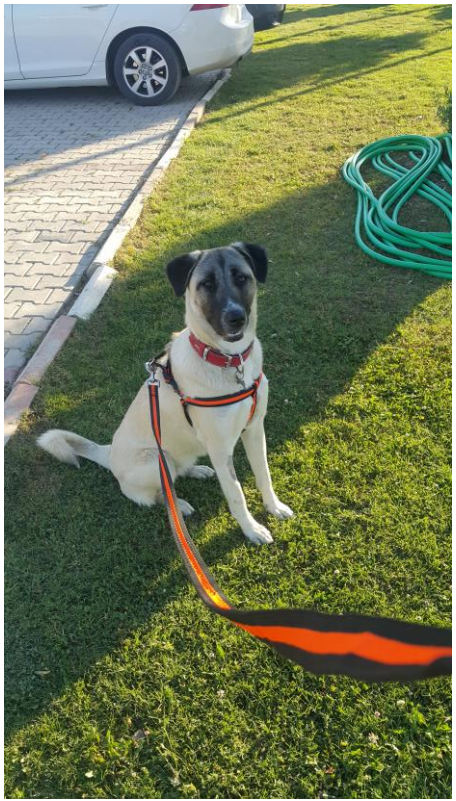
Fish Feed or Pet Food

- **Canned products - Wet food**
- In this type of product, it can be mentioned that animal foods have been processed using heat treatment and that have been protected with various food chemicals.
- **Main ingredients and production method**
- Meat by-products, vegetables, grains, minerals and fats are mixed with water and gelling agents and then ground into a puree.
- Then it is partially cooked in a steam tunnel to solidify, and the products are cut into cubes by cutting with knives. Thus, the product looks like a real piece of meat and is filled with sauce or gel and placed in a can or container, then the container is closed and cooked in a pressure cooker for about two hours to ensure sterilization.
- Due to these process conditions, it is very difficult to produce a completely nutritionally balanced wet food and usually needs to be supplemented with a supplement in the daily diet.

Raw Food

- Cats and dogs naturally have a raw diet. Many additives not found in these creatures' natural diet and support elements such as food processing technology are used in the contents of dry and wet foods, the production technologies of which are specified in the above sections.
- No heat treatment, food or digestive supplements can be used in raw food production, and it is stated that feeding in this way has a positive effect on animal health and lifespan.

Basic Ingredients of the Raw Food



➢ **Animal-based products:**

Cow meat and fat, cow liver, cow trachea, calf spleen, chicken meat, tripe, anchovy and cow udder…

Cold chain and HACCP principles must be used in accordance with the nutritional requirements of cats and dogs during the production process.

➢ **Vegetable and fruit-based products:**

Olive oil, rice, eggs, apple cider vinegar, beets, broccoli, carrots, zucchini, pumpkin, green apples and spinach, and all-natural products such as cinnamon, turmeric and cumin

In processes such as mixing and packaging these products, the cold chain is not allowed to be broken, and the cold chain is required for the products to be delivered to the end consumer, and consumers should store these products in a deep freezer at -18°C.

Criteria	Raw Food	Dry Food
Production Technology	Raw material, grinding and mixing	Extrusion
Nutrient loss due to heat treatment in production	-	+
Grain content	-	+
Energy, protein and fat availability	Maximum level	Medium level
Food digestibility	Maximum level	Medium level
Increase in muscle mass	High	Low
Presence of additives in the content	-	+
Health of internal organs	High	Low
Daily defecation amount	1	2 - 4
Possibility of encountering allergic problems	-	+
The amount of milk and protein of the broodstock individuals	High	Medium
Protein content (%)	35 - 45	25 - 28
Level of omega 3 and 6	High	Low
Shedding and odor	Very little	High
Storage conditions	Deepfreeze-Refrigerator	Cool, dry and moisture-free environment

The most important differences between feeding with raw food and feeding with dry and wet food are as follows;

- Animal health is maximized when pet owners switch to raw food;
- Disorders related to internal diseases, especially organ failures, are largely eliminated;
- The average life expectancy of animals increases;

Main challenges to using raw food

- **Supply of raw materials:** Raw materials of discarded fish and terrestrial animal origin (beef liver, cow udder, spleen and some offal products) used in raw food are used. It may not be possible to supply these products every day of the year and in the same quantity.
- **Transportation of raw materials:** The products listed are products that are suitable for rapid microbiological and bacteriological deterioration. It must be transported using the cold chain absolutely.
- **Storage of raw material:** Cold air environments at +4°C, 0°C, -18°C and -40°C are needed until it is used in production;
- **Delivery of the product to the end consumer - pet owner:** It must be transported by cold chain within 24 hours at the latest, as shocked at -40°C.
- **Pet owner's storage conditions:** Freezer for storage at -18°C, refrigerator for 0°C or +4°C.
- **Defrosting and use of raw food:** It should be removed from -18°C and defrosted at +4°C in 36 hours. Once defrosted, it is not possible to freeze the product again. The daily usage rate is 2-3% of the average live weight of the animal.

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