

Module 4. USE OF DISCARD FISHERIES TO PRODUCE PET FOOD

Understanding how the discard fisheries can be
used to produce Biologically Appropriate Raw
Food (BARF) to decrease water footprint

Warm-up: How does EU define discard fisheries?

Choose correct answer	
a)	Discarding is a term specifically used for catches of species which are not kept, but returned to the sea
b)	Non commercial fish
c)	Fish for fish meal
d)	Commercial fish
e)	Fish prohibited to catch

Warm-up: What does BARF stand for?

Choose correct answer	
a)	BARF stands for mix of dried food and raw food for pets
b)	BARF stands for raw fish food for pets
c)	BARF stands for Biologically Appropriate Raw Food for pets
d)	BARF stands for Bones and Raw Food for pets
e)	BARF stands for dried food for pets

Warm-up: What could be the % of nutrients in a MARI PET BARF diet formulation based on discarded fish?

Please fill the blanks	
75 %	Discarded fish
15 %	Pasta
9 %	Seasonal Vegetables and Fruits
1 %	Mechanically Separated Poultry Meat

Part 1

Getting to know pet ownership
statistics and pet food sector in EU

Introduction

- The pet dog has been the closest friend of humans for over 12,000 years and the domestic cat for 9000 years.
- In the EU, the estimated percentage of households owning at least one pet is 46% of all households.
- There are 72.7 millions dogs and 83,622,248 cats in the EU.
- According to FEDIAF, there is annual sales revenue of €50 billion in 2021 for pet food and related services. The sales value of pet food products in 2021 was €27.7 billion.
- The pet food industry in Europe provides employment to approximately 100,000 people. It is also estimated to create an additional 900,000 new jobs in related pet care industries.

Globally, it is estimated that between 7 and 10 million tonnes of commercial fisheries catches are discarded annually.

It is important to eliminate discards for sustainable fisheries by encouraging fishers to fish more selectively and to avoid unwanted catches.

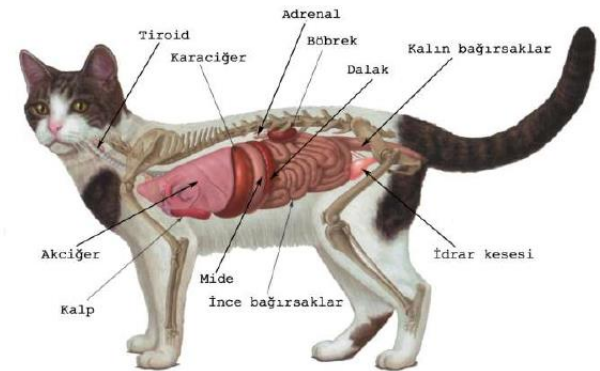
The use of discarded fish that are not suitable for human consumption may become an important issue for raw pet food, BARF production.

Part 2

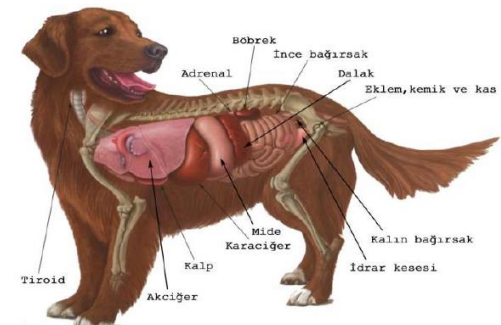
Getting to know important issues
in pet (cats and dogs) nutrition

Overview of the pet (cats and dogs) nutrition

- Cats are carnivores and dogs are omnivores, and there are some differences in their nutrient needs and nutrient digestion.
- Except for a few features, there are no significant differences between the digestive anatomy of the dog and cat.
- This system begins with the mouth and includes the esophagus, stomach, liver, pancreas, intestines, rectum, and anus.



Digestive System in Dogs



Water

- Cats can withstand acute dehydration slightly better than dogs.
- The daily water consumption of dogs is 50-60 ml of water per kg of body weight or 200 ml of water for an energy intake of 200 kcal/day.

Protein

- There are 10 essential amino acids for dogs and 11 essential amino acids for cats.
- ***Taurine*** is found only in proteins of animal origin. De novo synthesis of arginine and taurine is very limited in cats. Taurine deficiency can cause many disorders in cats.
- Cats also have special needs for ***arginine*** to produce ornithine. Because ornithine is necessary to bind ammonia.

Energy

- The three main sources of energy are fat, carbohydrates and protein.
- **Fats** provide energy and also essential fatty acids that the dog or cat's body cannot synthesize on its own. Omega-3 fatty acids in oils are essential for cell membranes and reduce inflammation. Fish is a good source of omega-3 fatty acids. Cats cannot convert linoleic acid to other fatty acids. Arachidonic acid is an essential fatty acid for cats, so they need animal fat.
- **Carbohydrates** are nutrient stored as glycogen in the liver and muscle. Cats can use the glucose formed by digesting starch in their diet. However, there is a problem in digesting **lactose**. That's because the levels of lactase enzyme needed to break down lactose into individual sugars are lower. This causes **lactose intolerance**.

Minerals and Vitamins

- The most important ***macro minerals*** needed in the body are calcium, phosphorus, potassium, sodium, chloride and magnesium. ***Trace minerals*** such as iron, copper and selenium are needed in less quantity.
- While the desired Ca:P ratio in their diet is 1:1 in cats, it is 1.4:1 in dogs. However, in sources such as meat, poultry and fish, Ca:P is 1:15-20. This leads to Ca deficiency and causes some health problems.
- Dogs and cats cannot synthesize all the ***vitamins*** they need and therefore these vitamins must be provided through their diet.

Food allergy

- In some cats and dogs, immunological mechanisms come into play against specific antigens.
- Antigenic foods for dogs are milk protein, soybeans, wheat, beef, horse-chicken-pork, eggs and yeast.
- ***Fish is also antigenic to cats.***

Part 3

Getting to know Biologically Appropriate
Raw Food (BARF) for cats and dogs

BARF for cat and dog nutrition

- In Europe, animal by -products are divided into three categories.
- Pet Food Industry can only use Category 3: animal-by products (ABPs). These are ideal pet food components.
- Giving raw meat -based diets to pets has become an increasingly popular tendency among pet owners. However, the benefits of these feeds in terms of nutrition, risks (infectious diseases) and especially meat -based pet diets in terms of public health should be taken care of.

What is BARF?

- BARF stands for biologically suitable raw food or bone and raw food.
- The BARF diet is defined as a pet food diet consisting of thermally untreated animal products for domestic pets.
- However, there is not much lack of information regarding the potential risks and benefits from this nutritional practice.

What does a BARF contain?

- A BARF diet is usually 75 % meat, 5 % offal organs, 10 % raw bones, 5 % fresh vegetables and fruit and 5 % other healthy components.

What are the main risks of BARF feeding?

- Nutritional problems such as Ca/P imbalances and specific vitamin deficiencies,
- Bacterial pathogens (Salmonella, E. coli, Campylobacter spp., Listeria monocytogenes, Yersinia enterocolitica, Brucella spp., Toxoplasma gondii),
- Antimicrobial resistant bacteria,
- Non-bacterial pathogens and zoonoses.

What are the benefits of BARF feeding?

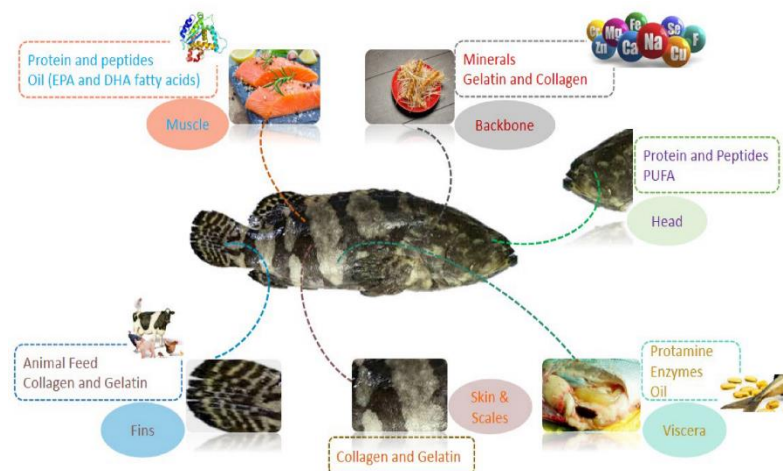
- A balanced BARF provides dogs with all essential nutrients,
- A stronger immune system and improved cardiovascular health,
- Increased mental ability,
- Lower digestive problems, healthier hair and skin,
- Decreased incidence of obesity,

Part 4

Getting to know discard fish for BARF production
and processing technology for BARF from discard
fisheries

Discard fish for BARF production

- In general, the whole fish body contains about 70% to 80% water, 20% to 30% protein, and 2% to 12% lipid.
- Nutritional composition of fish muscle 15-24% protein, 0.1-22% lipid, 6.1-10.3% Docosahexaenoic acid (DHA), Eicosapentaenoic acid (EPA), 0.1% vitamins, 1-2% minerals, It consists of 0.5% calcium and 0.25% phosphorus.
- A large amount of by-products is produced as a result of fishing and fish processing, and this is estimated to be up to 60% of the total fish weight.



- The use of discarded fish in the production of raw feed, i.e. BARF, especially for pet animals such as cats and dogs, is a very important topic within the scope of circular bioeconomy and reducing water footprint.

Processing technology for 'MARIPET BARF' from discard fisheries

- The most important step in the preparation process of MARIPET BARF is to determine the production stages. Once the production stages are established, including the selection of leftover fish on the ship to delivery to pet owners, a quality plan and HACCP (Hazard Analysis and Critical Control Point) manual can be prepared.

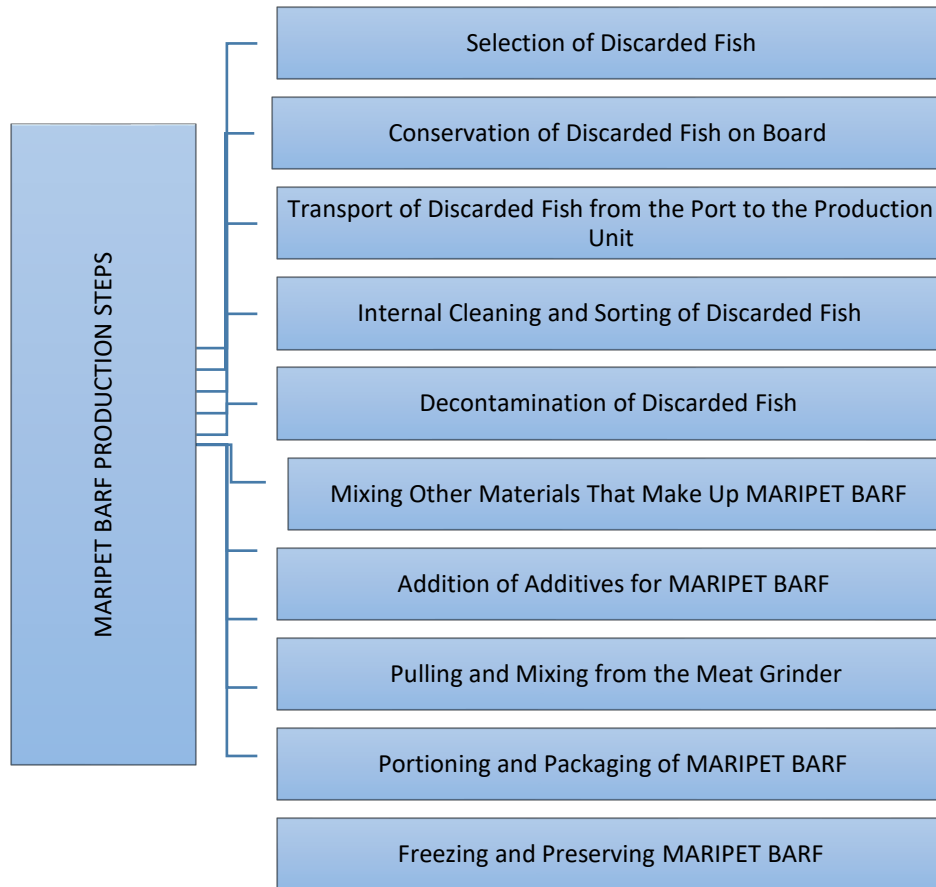


Step 1: Selection of discarded fish

- No commercially valuable discard fish are either thrown back into the sea directly or brought to the port for disposal.
- In MARIPET BARF production, the discard fish to be used must be selected on board and preserved.



Erasmus+





Erasmus+



Step 2. Preserving discard fish on board

- In order to prevent spoilage indicators, the most effective and widespread methods applied, such as cooling and freezing, should also be applied to discard fish.



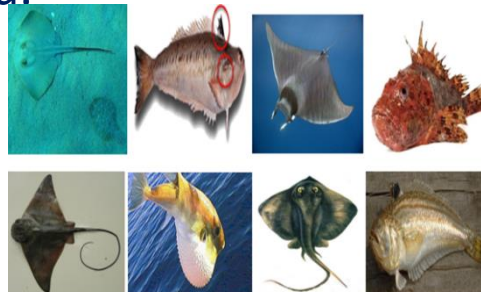
Step 3. Transporting the discarded fish

- The discarded fish, whose center temperature is lowered to 0 °C on the ship, is transported to the BARF factory by refrigerated vehicles that are at 0/+4 °C or foam boxes.
- Precautions must be taken to prevent the center temperature of fish from rising above +4 °C during transportation.



Step 4. Internal cleaning and trimming of discarded fish

- When filleting fish and seafood, species such as Needle (Tail) Stingray, Gurnard, Turbot, Scorpionfish, Toadfish, Pufferfish, Rina Fish, and Varsam Fish, which contain toxins, must be selected.



Step 5. Decontamination of discarded fish

For this purpose:

- 0.5 ppm chlorine dioxide for 1 minute,
- ozonated water (5 ppm of atmospheric ozone),
- electrolyzed water.

Step 6. Adding food additives and

- Antimicrobial additives such as rosemary extracts to prevent oxidation in fish and Sorbic acid to prevent microbial spoilage can be used.

Step 7. Grinding and mixing in a meat grinder

- 0.5% NaCl

Step 8. Portioning and Packaging of MARIPET BARF

- The MARIPET BARF mixture is filled into plastic permeable artificial sausage casings in 500 g portions for dogs and 100 g portions for cats.

MARIPET BARF-1*

- Discarded fish 75%
- Pasta 15%
- Seasonal Vegetables and Fruits 9%
- Mechanically Separated Poultry Meat 1

MARIPET BARF diet-2*

- Discarded fish 80%
- Bulgur 10%
- Seasonal Vegetables and Fruits 9%
- Mechanically Separated Poultry Meat % 1

**For both examples, 5 g of rosemary extract, 200 g of sorbic acid, and 500 g of salt will be used for 100 kg of MARIPET BARF production*

Stabilisation:

- The most effective method to prevent these existing hazards is to reduce the core temperature of BARF to -18°C in shock freezing chambers at -40°C and to store it at -18°C .



Transfer to pet owners:

- BARF can be delivered in polystyrene foam boxes with dry ice. If the polystyrene boxes are not opened, they can maintain the -18°C feature for up to

- It can be delivered to pet owners have a shelf life of 4 days in a $+4^{\circ}\text{C}$ refrigerator, 8 days in a -6°C refrigerator, 3 weeks in a -12°C freezer, and 1 year in deep freeze.
- The amount to be given frezers at -18°C . to the pet should be thawed slowly in the lower compartment of the refrigerator at $+4^{\circ}\text{C}$ about 24 hours before feeding.

Risk Assessments and Precautions

- BARF hazards include parasite eggs, larvae and adult stages, as well as bacteria and viruses, and toxic species found in the marine ecosystem.
- When animals' tissues are eaten raw, dogs can be exposed to *Neospora caninum*, *Sarcocystis* spp., *Cryptosporidium* spp., *Cystoisospora* spp., *Echinococcus granulosus*, *Taenia multiceps*, *Taenia hydatigena*, *Taenia ovis*, *Toxocara canis* and *Trichinella* spp., and for cats *Toxoplasma gondii*, *Sarcocystis* spp., *Cystoisospora* spp., *Toxocara cati*, and *Trichinella* spp. Some parasites can be transmitted.

Avoiding BARF -related hazards

- Frozen BARF should be thawed in a tightly sealed container in the refrigerator,
- BARF should be consumed by the animal without being left in the food bowl for too long,
- Pet owners should wear gloves or use hand sanitizer or antimicrobial liquid soap,
- It should also be kept in mind that these pathogens may be present in the feces of our pets and can spread.

Part 5

ACTIVITIES

EU have developed roadmaps to decrease
discard fish and to produce BARF
production from discard fish for pets

What about your country?

Are you aware of what is being
done by your government to
prevent discard fisheries and to
produce BARF from discard fish
under sustainability of the
environment concept?

Activity ideas:

- Design a discard fish based BARF manufacturing process steps with a supply chain management plan, taking into account potential barriers
- Identify local/national risk assessments policy for BARF and find ways that you could improve it.

CRITICAL THINKING ACTIVITY

Activity ideas:

- Find videos that simply describe how BARF production from discard fish for pets can look like in the near future and what jobs it can create
- In groups design a society functioning on the BARF production from discard fish for pets concept

ROLE PLAY/ RESEARCH ACTIVITY

CASE STUDY ACTIVITY

Read through the case study of your choice from the case study module for module 4 and fill in the worksheet either alone or with a partner.

FINAL ACTIVITY

BARF production from discard fish

Watch the videos below:

-

-

ASSESSMENT OF THE MODULE

Kahoot Questionnaire