



Marine Mammal Meals

Name: _____

Period: _____

Date: _____

Determining Dolphin Diets

Dolphin Research Center is currently home to sixteen Atlantic bottlenose dolphins and two California sea lions. The main focus at DRC is providing excellent care to the animals that call DRC home. Animal husbandry refers to the science and practice of breeding and caring for animals. This includes everything from meeting nutritional needs to providing medical care to maintaining habitats. Meeting all of these needs requires collaboration between the medical staff, animal training staff, and animal care staff at a facility.

One very important responsibility of the medical and training staff is ensuring that every animal receives the proper amount of calories per day. For every new shipment that comes in, laboratory testing must be done to determine the new caloric content of the fish and diets must be adjusted accordingly. The individual animal diets are regularly adjusted for other reasons as well. For example, nursing females will require more calories than they would typically take in when not expending extra calories from nursing. Dietary needs can also change as the seasons change. Dolphins eat less during the summer when it is hot and they need to shed blubber. In the winter, it gets cooler so they will eat more to build up their insulation layer.

Herring is a type of fish that usually has large amounts of fat and protein, and it is a very high-calorie fish. This type of fish can be compared to the “meat and potatoes” in your diet. Another type of fish that the dolphins eat is capelin. Capelin is more like the “salad” in your diet—it contains a lot of water, and not as much protein or fat. In addition to these two types, other kinds of fish are incorporated into the animals’ diets on a rotating basis to provide variety in their diets. These other types may include smelt, silversides, sardines, and squid.

Use the information below to help you answer the questions about dolphin diets!

Type of Fish	Calories per Kilogram (Shipment 1)	Kilograms per Case
Herring (1)	1,880	20
Herring (2)	1,470	11
Smelt	870	11
Capelin	730	15
Sardines	1,616	23

NOTE: Herring (1) and Herring (2) are just two different types of herring. Herring (1) are usually larger than Herring (2).





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Examples of individual dolphin diets are shown below. Typically, each dolphin will receive three meals throughout the day—a morning (AM) meal, a mid-day meal, and an afternoon (PM) meal. The chart below gives some examples of the types and amounts of fish in each of these meals. The letters represent the different types of fish, and the number that comes before each letter refers to the number of kilograms of that type of fish. Take a look at Calusa’s AM meal. According to the chart, Calusa’s morning meal is made up of one kilogram of capelin, one kilogram of marine smelt, and two kilograms of herring (2).

Fish Abbreviations	
C	= Capelin
M	= Smelt
H ₁	= Herring (1)
H ₂	= Herring (2)
V	= Sardines

Dolphin	AM Meal	Mid-Day Meal	PM Meal
Calusa	0.5C 0.5M 1H ₂	0.5C 0.5M 0.5H ₁ 0.5V	1C 0.25M 1H ₂
Kibby	0.5C 0.5M 0.5H ₁ 0.5V	0.5C 0.5M 0.5H ₁ 0.5V	1C 0.75M 1H ₁
Merina	0.5C 0.5M 0.5H ₁	0.5C 0.5M 0.5H ₁	0.5C 0.75H ₁ 0.5V
Rainbow	1C 0.5M 0.5H ₁ 0.5V	1C 0.75M 1H ₁	1C 0.5M 1.25H ₁ 0.5V

Write and solve algebraic expressions to answer the questions below. Round your answers to the nearest tenth. Be sure to show your work in the space provided—attach additional paper if necessary.

Example: What percent of Merina’s total calories comes from smelt?

- First, write an equation to calculate the total number of calories Merina eats daily.

$$T_{\text{cal}} = C_{\text{kg}} (C_{\text{cal}}) + M_{\text{kg}} (M_{\text{cal}}) + H1_{\text{kg}} (H1_{\text{cal}}) + V_{\text{kg}} (V_{\text{cal}})$$

$$T_{\text{cal}} = 1.5\text{kg}(730\text{cal/kg}) + 1\text{kg}(870\text{cal/kg}) + 1.75\text{kg}(1,880\text{cal/kg}) + 0.5\text{kg}(1,616\text{cal/kg})$$

$$T_{\text{cal}} = 1,095\text{cal} + 870\text{cal} + 3,290\text{cal} + 808\text{cal}$$

$$T_{\text{cal}} = 6,063\text{calories}$$

- Next, set up an equation to determine the percentage of the calories that comes from smelt.

$$M_{\%} = \frac{M_{\text{cal}}}{T_{\text{cal}}} \times 100\%$$

$$M_{\%} = \frac{870\text{cal}}{6,063\text{cal}} \times 100\%$$

$$M_{\%} = 14.3\%$$

Variables Used	
T_{cal} = total calories	$H1_{\text{kg}}$ = kg of herring (1)
C_{kg} = kg of capelin	$H1_{\text{cal}}$ = cal/kg in herring (1)
C_{cal} = cal/kg in capelin	V_{kg} = kg of sardines
M_{kg} = kg of smelt	V_{cal} = cal/kg in sardines
M_{cal} = cal/kg in smelt	$M_{\%}$ = % of total cal from smelt

- Check your answer.





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10. Theresa has been receiving 2 kilograms of capelin, 1.5 kilograms of smelt, and 2 kilograms of herring (1) every day.
- How many calories does Theresa consume daily?
 - The training department has noticed that Theresa doesn't eat her smelt. In order to make sure that Theresa is still getting the calories she needs, the staff has decided to try giving her sardines instead of smelt. How many kilograms of sardines will Theresa need to receive in order to make sure she is still receiving the necessary amount of calories?

Every new shipment of fish is analyzed to determine the exact caloric content of the fish. As you can see below, all of the fish in Shipment 2 have a slightly different caloric content than those in Shipment 1. Use the information in this table to answer the following questions.

Type of Fish	Calories per Kilogram (Shipment 1)	Calories per Kilogram (Shipment 2)
Herring (1)	1,880	2000
Herring (2)	1,470	1200
Smelt	870	920
Capelin	730	638
Sardines	1,616	1,576

11. Tanner receives 2,940 of his daily calories from herring (2).
- How many kilograms of herring (2) would Tanner need if Shipment 1 was being used to prepare meals?





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b. How many kilograms of herring (2) would Tanner need if Shipment 2 was being used to prepare meals?

12. Pax receives 7,100 calories per day. Pax receives 60% of his calories from herring (1), 20% from capelin, and 20% from sardines.

a. How many kilograms of each type of fish would Pax receive while Shipment 1 was being used to prepare meals?

b. What will Pax's new daily diet be when staff members start using Shipment 2?

