



protector

Zoofeed

Fish-Eater Tab



Our goal: healthy fish-eaters

In a natural environment, fish-eating animals, such as penguins, seals and dolphins, feed on a huge variety of species of fish, molluscs and crustaceans. In a zoo environment, often only a small selection of fish species is available for feed and, moreover, this is not fresh but thawed. During storage and the thawing process, water-soluble vitamins and vitamin E are lost. This loss is variable, depending on the species (saltwater fish > freshwater fish), duration of storage, thawing and feeding method, but in any case should be replaced by a standardised supplement.

Fat-soluble vitamins

Vitamin E is an important antioxidant and decreases in consequence of the oxidation process, even in optimal storage conditions and particularly in fish with a high level of unsaturated fatty acids. In addition, parasites can lead to malabsorption of vitamin E, which increases the need further. A vitamin E supplement of 100 IU/kg fish (as fed) is recommended. Deficiency can lead to clinical symptoms, such as panniculitis of blubber in dolphins. Contrary to other fat-soluble vitamins, vitamin E is not stored in the body for long periods. A continuous intake is therefore important.

Vitamins A and D are usually present in high amounts in fish and do not need to be supplemented, unless eviscerated fish is fed. An excess of both vitamins can accumulate in the body. In particular, vitamin A can have adverse effects if over-supplemented, with a negative impact on the status of vitamin E. Sea otters and polar bears are an exception: in these species, a higher requirement of vitamin A has been described and a separate supplement could be recommended.

Vitamin K is important for blood clotting and a supplement is useful if vitamin E and/or A is also supplemented at the same time.

Water-soluble vitamins

Vitamin B1 Some fish species, e.g. smelts, contain large amounts of thiaminases – an enzyme that degrades vitamin B1. This vitamin is also lost with the thawing water. Clinical thiamin deficiency can be observed in all fish-eating species, and leads to disorders of the central nervous system and even death. A supplement of 25-30 mg/kg fish (as fed) is recommended.

Other B vitamins: Most of the B vitamins are found in a higher content in viscera than in flesh. Thawing water will lead to some loss. An excess of water-soluble vitamins is not accumulated in the body, but excreted.

Vitamin C can be produced by many but not all animal species. It serves as an antioxidant and is important for collagen synthesis. As it is water-soluble, some thaw losses are to be expected.

Fish-Eater Tab 27373 specification

Vitamin	Unit	Final content per tab
Vitamin E	IU	250
Vitamin K3	mg	0.5
Vitamin C (stabilised)	mg	30
Vitamin B1 (thiamine)	mg	100
Vitamin B2 (riboflavin)	mg	1.5
Vitamin B6 (pyridoxine)	mg	1.5
Vitamin B12 (cyanocobalamin)	mg	0.001
Folic acid	mg	0.5
Niacin	mg	1.5
Pantothenic acid	mg	2.5
Biotin	mg	0.013



Fish-Eater Tab 27373:

Composition: vitamin premix, calcium phosphate, microcrystalline cellulose, magnesium stearate





Dosage recommendation

Number of tablets per animal per day		Body weight animal kg	Estimated feed intake % of body weight	Examples (adult animals)
lower feed intake	higher feed intake			
¼	½	0-5 kg	10-30 %	Small penguin species
½	1	5-15 kg	10-20 %	Pelicans, penguins, otters
1	2	15-40 kg	9-15 %	Emperor penguin, sea otters
1½	3	40-100 kg	4-9 %	Common dolphin, small seals
2	5	100-150 kg	3-9%	Harbor seal
3	7	150-200 kg	3-9 %	Grey seal, female polar bear
4	9	200-400 kg	2-7 %	Bottle nose dolphin, California sea lion
5	10	400-600 kg	2-5 %	Beluga, male polar bear

Dosage: Dosage depends on age, activity, reproduction state and feed intake of the animal. The dosage recommendations are guideline values and refer to the estimated feed intake. The quantities are given as a dose per animal, per day. For maintenance, the lower dosage is generally sufficient. With increasing feed intake, for example, during lactation or growth, the dosage should be adapted correspondingly.

A general guideline for dosage is 1 tablet per 2.5 kg of fish (as fed).

Use: Put tabs in the freshly thawed fish just before feeding. Keep the container tightly closed in a dark, cool and dry environment. For sea otters and polar bears, vitamin A can be supplemented additionally. Depending on requirements, a separate salt supplement may be added for marine animals kept in freshwater.



Your advantages at a glance:

- ◇ Standardised vitamin supplement for fish-eating zoo animals
- ◇ Vitamin E and B1 supplement according to scientific recommendations
- ◇ Water-soluble vitamins to compensate thaw water loss
- ◇ No added vitamins A and D to avoid over-supplementation
- ◇ No added salt for flexible supplementation
- ◇ Dosage recommendations for body weight and/or feed intake

Order information:

Protector Zoofeed Fish-Eater Tab
2.2 g tablet, in containers of 1,000 units
Order number 27373

Ask us:

Do you have questions
concerning the fish-
eater tab? Email us at:
protector_zoofeed@cargill.com



Literature:

- Bernhard J. B. & Allen M. E.**, Nutrition advisory group handbook, Fact Sheet 005, Feeding captive piscivorous animals: Nutritional aspects of fish as food. September 1997, mod. March 2002. pp 1-12
- Büker M.** (2008) Literaturübersicht zur Ernährung, Verdauungsanatomie und -physiologie von Meeressäugern. Dissertation. Vetsuisse-Fakultät Universität Zürich
- Marine Mammals:** Merck Veterinary Manual: Nutrition and Nutritional Diseases of Marine Mammals (rev. by Stoskopf M. 2012), www.merckvetmanual.com; consulted 25. Nov. 2015
- St. Leger J. A. et al.** (2011) Vitamin A deficiency and hepatic retinol levels in sea otters, *Enhydra lutris*. *Journal of Zoo and Wildlife Medicine* 42: 98-104
- Soto S. et al.** (2010) Multifocal Granulomatous Panniculitis with Ceroid Pigment in Two Mediterranean Striped Dolphins (*Stenella coeruleoalba*). *Journal of Wildlife Diseases* 46:320-325
- Croft L. et al.** (2013) Clinical evaluation and biochemical analyses of thiamine deficiency in Pacific harbor seals (*Phoca vitulina*) maintained at a zoological facility. *J Am Vet Med Assoc* 243:1179-1189
- Pigott G. M. et al** (1990) Effects of Processing on Nutrients. In: *Seafood*. Marcel Dekker Inc. New York, p. 69
- Mattila et al.** (1995) Cholecalciferol and 25-Hydroxycholecalciferol Contents in Fish and Fish Products. *Journal of Food composition and Analysis* 8: 232-243
- Gimmel A. et al.** (2013) Vitamin-Status des grossen Tümmlers (*Tursiops truncatus*) in europäischen zoologischen Einrichtungen. Sind hohe Leistungen „Bio-kompatibel“? Herausforderungen für die Tierernährung. *ETH-Schriftenreihe zur Tierernährung*, Band 36. Pp 178-181
- Ostermeyer U.** (1999) Vitamine in Fischen, in: *Fisch als Lebensmittel*. Inf. Fischwirtsch. Fischereiforsch. 46: 42-50
- Crissey S. et al.** Nutrition advisory group handbook, Fact Sheet 012, Penguins: Nutrition and Dietary Husbandry. February 2001, mod. April 2002. pp 1-19
- Bernard, J. B. & Ullrey D. E.** (1989) Evaluation of Dietary Husbandry of Marine Mammals at Two Major Zoological Parks. *Journal of Zoo and Wildlife Medicine* 20: 45-52
- Mazzaro L. M. et al.** (2006) Study of Vitamin A Supplementation in Captive Northern Fur Seals (*Callorhinus ursinus*) and its Effect on Serum Vitamin E. *Marine Mammal Science* 11:545-553
- AZA Small Carnivore TAG** (2009). Otter (*Lutrinae*) Care Manual. Association of Zoos and Aquariums, Silver Spring, MD

Protector Zoofeed

PO box 1246

Rinaustrasse 380
CH-4303 Kaiseraugst

Tel. +41 61 816 16 16
Fax +41 61 816 18 00

Route des Treize Cantons 2A
CH-1522 Lucens

Tel. +41 21 906 15 15
Fax +41 21 906 85 54

www.protectorzoofeed.com
protector_zoofeed@cargill.com



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switzerland