

**A**quaponics & Aquaculture Product Knowledge is a continuing education series of guides that will help us on our journey towards a sustainable garden and farm. We all live on this beautiful and wondrous place we call earth. At Advanced Biological Concepts, our goal is to improve our lives through sustainable cultivation, understanding and education. We will explore how we can be good stewards of our planet while keeping our minds, bodies, animals and plants healthy.

## Remember for your healthy mind and body, you are what you eat!

We will present most of our guides in easy to understand language, some issues will be geared towards the person just starting and some will be advanced that go into detail. We will learn as more information and technology becomes available and we will share it with you. We will listen to you, tell us what you want to know, we will do our best to cover topics and present them in future issues.

To start, we would like to share the ingredients we use in our signature blend:

### Organic Fish Pellets



This product contains only certified organic agricultural products or ingredients that conform to the National Organic Program's national list of materials acceptable for organic livestock production.

#### Guaranteed Analysis

Crude Protein (min).....	31.000 %
Crude Fat (min).....	4.500 %
Crude Fiber (max) .....	8.000 %
Lysine (min) .....	1.250 %
Calcium (Ca) (min).....	0.700 %
Calcium (Ca) (max).....	1.200 %
Phosphorus (P) (min).....	0.400 %

#### Ingredients

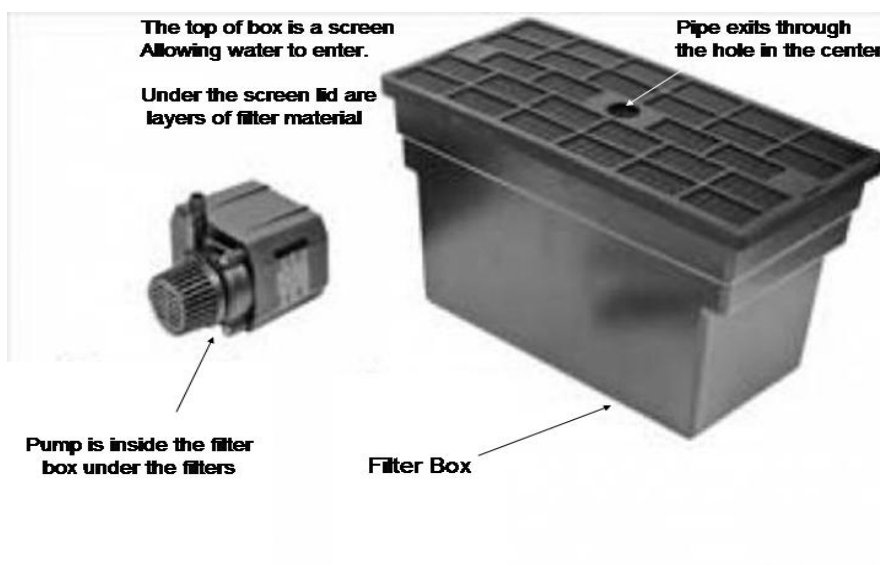
Organic Canola Meal, Organic Sesame Seed Meal, Organic Corn, Organic Linseed Meal, Dicalcium Phosphate, Calcium Carbonate, Lactobacillus Acidophilus Fermentation Product, Organic Wheat Middlings, Organic Dried Kelp, Reed-Sedge Peat, Choline Chloride, Ferrous Sulfate, Manganese Sulfate, Zinc Oxide, Sulfur, Magnesium Oxide, Copper Sulfate, Calcium Pantothenate, Thiamine, Biotin, Sodium Selenite, Ethylenediamine Dihydriodide, Vitamin B12, Cobalt Carbonate, Organic Dried Tomato Pomace, Attapulgitic Clay, Diatomaceous Earth, Monosodium Phosphate, Organic Apple Cider Vinegar, Organic Dried Whole Milk, Organic Aloe Vera Gel Concentrate, Organic Potato Starch, Organic Dehydrated Eggs, Yeast Culture, Organic Lecithin, Potassium Chloride, Niacin, Sodium Sulfate, Copper Choline Citrate Complex, Ferric Choline Citrate Complex, Zinc Sulfate, Zinc Amino Acid Complex, Manganous Oxide, Manganese Amino Acid Complex, Ascorbic Acid, Vitamin A Acetate, Vitamin D3, Natural Source of Vitamin E (d-alpha Tocopheryl acetate), Riboflavin, Pyridoxine Hydrochloride, Carotene, Folic Acid, Cobalt Sulfate, Cobalt Choline Citrate Complex, Lactobacillus Acidophilus, Lactobacillus Casei, Bifidobacterium Thermophilum, Enterococcus Faecium, Potassium Citrate, Citric Acid, Calcium Sulfate, Magnesium Sulfate, Silicon Dioxide, Organic Sugar, Organic Sources of (Cayenne Pepper, Peppermint, Fabaceae Poaceae, Garlic, Parsley, Dandelion Root Extract, Licorice, Orange Peel Extract, Elder Flowers, Dandelion Extract, Ginger Extract, German Chamomile, Lemon Grass Extract, Thyme, Hops Extract, Sweet Fennel Extract, Sweet Basil, Sage, Cloves), Natural Antioxidants.

## Plants

Plants require light and carbon dioxide supplied to the leaves for photosynthesis to occur. Roots bring in water, oxygen and nutrients. This provides the energy for the plant to grow flower and produce seed. We are going to concentrate on the roots. In an aquaponic system the fish waste is supplying the majority of the nutrients. The fish excrete ammonia; the ammonia is converted into fertilizer for the plants called ammonium nitrate or nitrogen. Nitrogen is the most important and most consumed nutrient the plants need to live and grow. The equivalent in our bodies would be carbohydrates, without them we will die. All of the surface areas, including the roots of the plants, start to support beneficial bacterial colonies that do the work of converting the ammonia into ammonium nitrate. You will see and feel a slime coating on the surfaces inside your aquaponic system called a biofilm - it is essential to keep the biofilm and the beneficial bacteria healthy. Fish also excrete solid waste, or the technical name, "poopy." We need to filter the poopy out of the water, or it will build up inside the tank and clog up the biofilm - the biofilm must have oxygen to live. Solids will also enter the hydroponic part of your system and may accumulate on plant roots and create anaerobic or no oxygen zones that prevent nutrient uptake. The challenge is to manage the waste within your system; the water must be filtered, however we want part of the poopy to be able to mineralize. As solids are decomposed by microorganisms, nutrients such as magnesium, zinc and other nutrients essential to plant growth are released into the water, a process known as *mineralization*. Mineralization supplies several essential nutrients. **ABC's organic fish food** uses high quality ingredients; these ingredients break down more completely than crude low quality food. **ABC's organic fish pellets are always free of Genetic Modification (GM), pesticides, herbicides or any other chemicals that could be potentially harmful to your fish, your plants or you!**

## Filtration

The surface area in an aquaponic system is considerably larger than needed for the biofilm, so there is no need to add extra media such as bio balls. A common method of filtering the water in your aquaponic system is a filter box. The filter box has the pump inside the box and is inside a clarifier filter.



The clarifier filter traps solid waste so it can break down and mineralize, providing micronutrients for the plants.



## Protein Skimmer

If the amount of fish you have in your system is high, a protein skimmer should be added. Fine and dissolved solids cannot be easily or economically removed by traditional filtration. Foam fractionation, also called protein skimming, is successful in removing these solids. Foam fractionation is a process of introducing air bubbles at the bottom of a closed tube of water that creates foam at the top. As the bubbles rise through the water, solid particles attach to the bubbles surfaces, forming the foam at the top of the column. The foam build-up is then channeled out of the fractionation unit to a waste collection tank.

## Do It Yourself

You can make your own filter box! Use a shoebox size plastic tote (about \$4.00). Make sure the size of the box is large enough to fit the pump and filter media. Drill 20 1/8" inch holes spaced out across the lid, cut or drill a hole for the out flow pipe usually 1/2 to 3/4 inch and a small hole for the power cord. Purchase filter media from the pet store (about \$8.00) and cut to the size of the box. Place the pump in first then 2 layers of filter media then snap on the lid. The pump size depends on your system, 250 to 800 GPH should be sufficient (\$30.00 to \$70.00).

**For comments, questions, or more information - Contact:**  
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