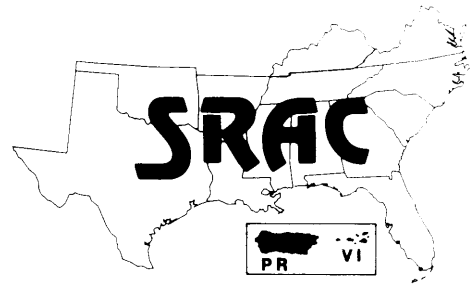


## Southern Regional Aquaculture Center



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# Trout Production

## Feeds and Feeding Methods

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Aside from final sale price of the fish, the amount and suitability of feed used for trout farming will be the primary factor determining the profitability of production. Digestive systems of trout and other salmonids are naturally equipped to process foods consisting primarily of protein (mostly from fish), and can obtain a limited amount of energy from fat and carbohydrates. Diets for fry and fingerling trout require a higher protein and energy content than diets for larger fish. Fry and fingerling feed should contain approximately 50 percent protein and 15 percent fat; feed for larger fish should contain about 40 percent protein and 10 percent fat. The switch to lower protein formulations usually occurs at transition from a "crumble" feed to a pelleted ration, called a "growout" or "production" diet. Several brands of high quality commercial trout diets are available in the South. Although a farm could produce its own fish food, it is usually uneconomical to do so.

### Feeding practices

The primary goals in feeding trout are to grow the fish as fast and efficiently as possible, maintaining uniformity of growth with the least degradation of water quality.

The amount of feed required by trout is dependent on water temperature and fish size; during normal production, trout should be fed 7 days per week with a high quality commercially prepared diet formulated for trout. Due to higher metabolic rates, smaller fish need more feed relative to their body weight than do larger fish, and fish in warmer water need more feed than fish in cooler water. Because fish are poikilothermic (cold-blooded) their body temperatures and metabolic rates vary with environmental temperatures.

In trout, the minimum temperature for growth is approximately 38°F. At this temperature and below, appetites may be suppressed and their digestive systems operate very slowly. Trout will require only a "maintenance" diet (0.5 percent to 1.8 percent body weight/day, depending upon fish size) at these temperatures; more than this will result in poor food conversion and wasted feed. Above 38°F, the metabolism and growth rate of trout will increase with temperature until approximately 65°F, depending upon the genetic strain being cultured. Optimum temperatures for efficient growth are from 55° to 65°F, wherein feeding rates should be at maximum levels (1.5 percent to 6.0 percent body weight per day). Above 65°F,

the metabolic rate will continue to increase until the temperature approaches lethal levels, but the oxygen carrying capacity of the water and respiratory requirements of the fish will limit the amount of food to be processed efficiently.

In very warm water (above 68°F), a trout's digestive system does not utilize nutrients well, and more of the consumed feed is only partially digested before being eliminated. This nutrient loading of the water, coupled with generally lower oxygen levels in warm water, can easily lead to respiratory distress and should be avoided. Under these conditions, feeding rates should be reduced enough to maintain good water quality and avoid wasting feed.

The best way to determine the correct amount and sizes of feed needed for trout production is to use a published feeding chart, usually provided by the feed manufacturer. The chart should be used as a guide, and may need adjustment to fit specific conditions on individual farms. The primary fact to remember is that fish need to be fed **less** than they will eat. Overfeeding will cause the fish to utilize the feed less efficiently, and **will not** increase growth rates significantly. To provide an appropriate amount of feed, know the number and size of the fish

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on your farm. At water temperatures above 55°F, sample count the fish every week and adjust feeding percentages accordingly. In cooler waters, a sample count every 2 weeks usually is adequate. Good growth records for trout on your farm help to predict the seasonal growth rate.

## How to feed trout

Once a quality feed has been selected and the amount of feed determined, the next consideration is how to feed the fish. Specific methods for feeding trout are somewhat dependent upon the size of the fish. First-feeding fry should be fed a small amount by hand at least ten times per day until all the fish are actively feeding. After this period, an automatic feeder is most practical, with two or three hand feedings daily to observe the fish.

As the fry grow, frequency of feeding can be gradually decreased to about five times per day. Trout can hold roughly 1 percent of their body weight in dry feed at each feeding, so frequency should be adjusted accordingly. Fry gain weight rapidly so they should be sample counted weekly for the first 4 to 6 weeks on feed and the daily feed ration adjusted according to their weight. Feed should be distributed over at least 2/3 of the water surface when fry are less than 2 inches. This assures easy access to the feed and will help to achieve size uniformity within the population. Do not introduce the feed too close to the tailscreens or it may be washed out before the fish have a chance to eat it. Though the use of a published feeding chart is strongly recommended, charts are only guides and individual judgment should be exercised based on observations. Do not overfeed. Once feed settles to the bottom of the tank, small trout will ignore it. Excess feed leads to deterioration of water quality and promotes disease. Remove excess feed promptly.

After fingerlings are moved out to tanks or earthen ponds, a variety of feeding alternatives is available. Hand-feeding is generally not practical on a large commercial farm, ex-

cept in certain situations. Examples include training fish to use demand feeders or administering medicated feed to sick fish. Several types of automatic and mechanical feeders are available for trout farming, including electric, water powered, and solar powered feeders with variable timers. There are automatic feeders that use compressed air to blow feed out over the water surface at pre-set intervals, and truck or trailer mounted units which have hydraulically operated blower feeders.

The type of feeder most commonly used on commercial trout farms in the South is the demand feeder (Figure 1). This consists of a hopper for holding the feed pellets, and a movable disc below the hopper opening which is attached to a pendulum extending to the water. Trout greater than 5 inches can be readily trained to feed themselves, and with careful adjustment of the feeders, rapid weight gain and efficient feed utilization can be attained. The use of demand feeders can eliminate the sharp oxygen decline which occurs when fish are fed by hand or machine a few times each day. Demand feeders also reduce labor costs associated with daily hand feeding. Enough feed for several days can be loaded and topped off as needed. Disadvantages include the tendency to allow overfeeding due to improper adjustment of the feeders,

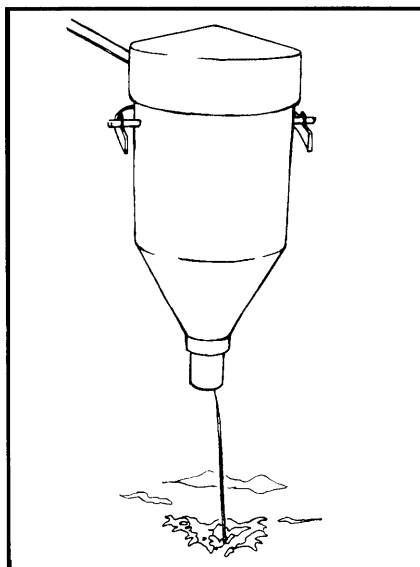


Figure 1. Demand feeder for trout.

and food release only in a small section of the pond or tank. Over-feeding with demand feeders can be a problem with larger trout.

Even if demand feeders are used, feeding according to a feed chart is recommended for best performance. When feeding by hand or with a mechanical distribution system, feed should be distributed throughout the pond and should not accumulate on the bottom. In concrete tanks, trout will feed on some pellets which fall to the bottom, but trout will rarely pick up pellets from the bottom of earthen ponds.

At times feeding should be restricted or stopped altogether, such as when water temperatures drop much below 40°F or rise much above 68°F. Feeding rates should also be reduced when fish are sick, as appetite will be depressed. Fish should always be kept off feed for a period before handling or transporting. For routine handling, such as grading or vaccinating, 24 hours without food is sufficient. If fish are to be transported a long distance or are to be processed, they should be kept off feed for a minimum of 3 to 4 days, longer if temperatures are low.

## Special purpose feeding

Commonly used specialty feeds for trout include those containing antibiotics (tetracycline hydrochloride or potentiated sulfadimethoxine or carotenoid pigments (canthaxanthin). More expensive than regular diets, they should be used only when appropriate. Antibiotic treated feeds should be used only with diagnosis of a bacterial condition susceptible to treatment. Carotenoid pigmented feeds impart a pink or red coloration to the flesh of fish and do not affect their health or growth rate. Successful pigmentation can be achieved in approximately 3 months when fish are actively growing, and in approximately 6 months during colder water conditions. Other specialty diets include an enriched diet for broodfish, and a "high-fat" diet (16 to 24 percent fat), for producing an oilier fish used for smoking or for specialty markets.