Overview of the Rainbow Trout Industry in Kentucky

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Introduction

Rainbow trout (Onchorynchus mykiss) are native to western North America and have been cultured for over 100 years. In recent years, the United States Trout industry has been relatively stable in numbers of operations and in value of sales and output. Idaho and North Carolina lead the nation and the southeastern states in trout production, respectively.

Trout are most often grown in paired, steel-reinforced concrete raceways with 15 -20 cm walls and floors. Raceways have an approximate length to width ratio of 6:1 and hold water at a depth of about 1 m. Large volumes of cold ($\leq 20^{o}C$) water flow via gravity through a series of terraced raceways and are discharged into a receiving stream. Aeration occurs between raceways as the water flows over a screened outfall and pours into the head of the raceway below. Water volume is exchanged approximately every hour. For profitable trout production, pumping these volumes of water would be cost prohibitive. Nitrogenous wastes must be removed from the raceways by flushing and dilution before toxic levels of un-ionized ammonia gas concentrates in the water. Total alkalinity (>100 mg/L) and pH ($\geq$ 7.5) limits the serial reuse of Kentucky's limestone spring water to 6-8 raceway passes. Waters that are lower in pH and total alkalinity may undergo more reuses before toxic concentrations of un-ionized ammonia are reached. Ultimately, flow rate, water chemistry, temperature, fish size, and rate of feeding determines the volume of fish which can be grown in a raceway system. Typically, rainbow trout are grown at a rate of 3 – 5 kg/L per minute of water flow.

Most farms are equipped with egg incubation facilities. Eyed eggs are purchased from commercial brood farms located in the western United States and will hatch in 4 to 7 days of incubation. The eggs should be of good quality and certified to be free of diseases. Trout fry and fingerling feed contains high concentrations of fish meal and other proteins (near 50%) and have a 15 – 20 % fat content. Larger fish are fed pellets which contain 38-45% protein and 10-18% fat. Rainbow trout grow best at water temperatures that range from 13-18^{o}C and will convert food at ratios of 1.0-1.5. Fish are graded within the raceways to maintain size uniformity from the fingerling stage to a harvest size of 30–40 cm.

Trout Production in Kentucky

Commercial trout production occurs in Green, Hart and Meade counties located in central Kentucky. This region is characterized by limestone, or karst geology which contains caves, sinkholes, sinking creeks and large, coldwater springs. Trout farms were constructed where larger, gravity fed springs ($\geq$28.32 L/s) were able to supply water to concrete or earthen raceways throughout the year. During the 1980's, ten small scale farms were producing approximately 455,000 kg of trout annually. Additionally, the Wolfe Creek National Fish Hatchery which is operated by the U.S. Fish and Wildlife Service, rears approximately 1,000,000 (152,000 kg) trout for stream stocking in Georgia, Kentucky and Ohio. The national fish hatchery is located downstream from Lake Cumberland's Wolfe Creek Dam near Jamestown, KY and is supplied by flowing tail waters from the dam.

The 2000-2002 drought conditions in central Kentucky forced all but the two largest, privately owned trout farms to close. Due to a town's need for water during a low flow period, one farm closed when it lost

water rights to a spring which it shared with the municipality. Another facility closed after experiencing reduced flow rates which decreased fish production by 75%. These fish had previously been marketed through an integrated catering business. By 2003 annual trout production in Kentucky was an estimated 91,000 kg. As a result of drought and market competition, the region's only trout processing plant closed in 2000. Trout are currently being sold live to fee fishing operations for prices near $2.75 per kg in undisclosed locations (presumably in the Midwest).

Future Outlook

The future remains uncertain for Kentucky trout producers. Market prices for live fish remain strong. However, trout producers from surrounding states have also been selling live fish in an effort to avoid competition in the processed fish marketplace. Limited in state acceptance of processed trout products and few sales of live fish for recreational stocking has left the industry dependent on out of state markets. Heavy rains in the fall and winter of 2002-2003 have abated drought conditions throughout much of Kentucky. Most of the state's gravity fed springs suited for trout production have been developed. To date, production of trout in ponds and cages during the winter season has not shown much profitability. Stocker trout (total length, 20-25 cm) may cost $0.75 each in addition to the cost of bagged feed which must be delivered from other states. Depending on location, the winter trout growing season is approximately 120-165 days, or from November to April. Most trout growth occurs in the late fall before water temperatures have cooled below 8^{o}C, or after water begins to warm in spring..

Future expansion of the state's trout industry may depend on the utilization of abundant mine water resources located in the coal fields of eastern Kentucky. Small scale production and marketing projects are under way where mining companies have allowed access to their property. Some locations offer a year-round supply of good quality water. Obstacles to the development of a successful trout industry in eastern Kentucky will include site accessibility, lack of industry infrastructure (feed, processing) and distances from potential markets.