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Selective Breeding of Food Size Rainbow Trout: Current and Future Prospects

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Abstract

Rainbow trout (*Oncorhynchus mykiss)* are a valuable aquaculture production species in the USA where an average 25,000 tons per year of food size rainbow trout were produced during 1988-2002. Clear Springs Foods, Inc., is one of the largest producers of aquacultured rainbow trout, producing 10,000 tons annually. Privately held by an employee owned trust, Clear Springs is a vertically integrated company from brood stock through egg production, feed manufacturing, farm operations, processing, and distribution.

Clear Springs has a significant commitment to research and development. Selective breeding of rainbow trout is an important component of its R&D program. The current goals of the selective breeding program are to improve growth and disease resistance. To improve these traits, data are recorded on thousands of individuals each year. Growth data is collected at various ages to determine which families and which individuals within each family have the best growth. To improve disease resistance, a portion of the progeny from each family are exposed to specific pathogens in a standardized challenge test. Currently, each family is tested for survivability to infectious hematopoietic necrosis virus (IHNV) and *Flavobacterium psychrophilum*, the causative agent of bacterial coldwater disease (CWD) and rainbow trout fry syndrome (RTFS).

Selection to improve growth began when the breeding program was initiated. The average weight of the odd-year generation group increased from 660 g at 328 days of age in 1991 to 921 g at 301 days in 2003. The average weight of the even-year group increased from 620 g at 328 days in 1992 to 866 g at 301 days in 2004. Selection to improve IHN resistance started with the 1994 generation. Using a standardized challenge test, IHN mortality decreased 25.8% in the odd-year generation group and 29.7% in the even. Growth is a moderately heritable trait that can be changed rapidly and economically with traditional quantitative genetic techniques. Disease resistance has much lower heritability and is more difficult to change. Better knowledge of specific and general disease resistance mechanisms in trout would aid the industry in improving future stocks.

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