

Research Article

Reproductive performance and intestinal bacterial changes of *Carassius auratus* fed supplemented lactoferrin and *Lactobacillus rhamnosus* PTCC 1637 diet

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Abstract: This study broadens research in to improving the reproduction and intestinal microflora of *Carassius auratus* broods stocks via lactoferrin and *Lactobacillus rhamnosus* PTCC 1637 in 120 days. The experimental treatments included: *L. rhamnosus* PTCC 1637 (10^6 CFU g diet⁻¹), lactoferrin (200mg kg diet⁻¹) a combined treatment (*L. rhamnosus* PTCC 1637 with lactoferrin) and a control group in three replications. On the basis of results, the highest ($p < 0.05$) working fecundity, absolute fecundity, gonadosomatic index (GSI) were observed in *L. rhamnosus* PTCC 1637 treatment. Egg and one-day-old larvae characteristics and fertilization rate were not affected significantly. As the results showed, the highest survival rate of larvae was found in lactoferrin treatment but not significant. While the counts of viable lactic acid bacteria in the probiotic and in the combined treatment were higher than those of lactoferrin treatment and control group ($p < 0.05$), the total count of aerobic bacteria was not affected by the probiotic and lactoferrin. According to our findings, it is recommended to use *L. rhamnosus* PTCC 1637 (10^6 CFU g diet⁻¹) to increase reproduction and the combination of *L. rhamnosus* PTCC 1637 and lactoferrin to control the reproduction efficiency of the *C. auratus*.

Keywords: Reproduction, Bovine lactoferrin, Probiotic, Gold crucian carp.

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Introduction

One of the most important ways to increase the production of fish stocks and preserve them is to increase their reproduction and improve the quality of larvae and fry through improved nutrition of brood stocks. In this respect, various factors like race and quality of brood stocks, their rearing and breeding conditions,

food type and quality, water quality and fish health status may affect the hatchery production (Ahmadian et al. 2012). However, the nutrition of brood stocks is particularly important, since it affects all aspects of fertility from maturation to gametogenesis. Therefore, researchers have drawn special attention to the constituent of brood stocks diets over the past two decades