

control group respectively. Payung et al. (2017) reported that the addition of ginger to diets at concentrations ranging from 1.0 to 8.5 g/kg resulted in growth promoting benefits in catla, Nile tilapia, and rohu accordingly. Similarly, Talpur et al. (2013) observed a notable increase in rate of development when rainbow trout were fed with ginger containing feed.

Setijaningsih et al. (2021) examined the impact of various immunostimulants on the growth rate of *Oreochromis niloticus*, and they found that treatment B resulted in the greatest size increase, with an increase in weight of 17.75 ± 0.48 g, followed by treatment C with a weight gain of 15.91 ± 0.71 g, treatment D with a weight gain of 11.92 ± 0.21 g, and treatment A with a weight gain of 11.97 ± 0.42 g accordingly. Purbomartono et al. (2021) found that the weight gain of African catfish nourished with a diet containing 7.5 g/kg of ginger (T3) and diets containing 25, 50, and 75 g/kg of turmeric were significantly different from the weight gain of fish nourished with the control diet. The magnitude of weight gain is greater than the magnitude of length increase. The inherent biology of the fish is one of the sources of this condition. Positive allometry refers to a growth pattern in which the rate of weight increase is greater than the rate of length increase (Dewi et al., 2017).

The feed conversion ratio (FCR) represents the proportion of feed required to generate 1 kg of cultured fish flesh. A lower feed conversion ratio indicates a more efficient transformation of feed into meat, whereas a higher ratio suggests a less efficient conversion. The current findings indicate that there is substantial variation in the feed conversion ratio across various immunostimulant diets in *Catla catla* fish. The feed conversion ratio is commonly employed to assess the quality of the feed provided for fish development (Saputra et al., 2018). According to Defrizal and Khalil (2015) the FCR variability is affected by factors such as feed quality, feed quantity, species type, and fish size. Mudjiman (2011) stated that the FCR in fish typically ranges between 1.5 and 8. According to this statement, it can be concluded that the FCR of most treatments in the current study is favourable as it is within an acceptable range.

Furthermore, the present findings are consistent with the results reported by Khattabya et al. (2004) who showed that the Biogen® diet led to an enhancement of consumption of feed, FCR, protein efficiency ratio, and other metabolic parameters such as crude protein, solvent extract, ash, and moisture in fish. Novian et al. (2023) reported that following a treatment period of 42 days, the feed conversion ratio ranged from 1.6 to 2.3. The treatment with the highest FCR value is A, whereas the treatment with the lowest FCR value is C. The symbiotic supplementation of 2.5 g/kg and 5 g/kg resulted in a ratio of 2.3 ± 0.3 . Udo et al. (2018) stated that the inclusion of chitosan in the *Clarias gariepinus* meal at the ideal dosage can enhance the survival rate of fish. The study conducted by Sarker et al. (2023) observed that the average FCR of fish treatments T1, T2, T3, and the control were 1.35 ± 0.009 , 1.10 ± 0.029 , 1.56 ± 0.010 , and 1.56 ± 0.022 respectively. In another study, Hassan et al. (2018) found that the FCR was considerably improved in the treatment groups supplemented with turmeric, rosemary, and thyme compared to the control group. Purbomartono et al. (2021) found that the FCR of African catfish fed with ginger and turmeric diets was significantly different from the control group.

In addition, the FCR of the turmeric diet and the ginger diet at a dosage of 75 g/kg exhibited the most optimal results. The results of this study showed that these treatments influenced haematological responses associated with immune status in *Catla catla*, thereby effectively enhancing metrics related to growth promotion. The fish fed with vitamin E mixed feed had the most favourable outcomes, as evident by notable enhancements in the final body weight, weight gain percentage, and FCR, in comparison to the fish that were fed with a control diet.

In the present study, it was found that a 30-day dietary supplementation of immunostimulants substantially influences the body length, feed intake, feed conversion, and biomass in *Catla catla*. Vitamins are vital chemical substances that play a crucial role in sustaining life, as they are necessary in small quantities for regular growth, reproduction, and overall health (Gouda et al., 2020). L-ascorbic acid phosphate is a stable variant of vitamin C that can be used in feed as a supplement and it plays several important functions including immunostimulant and free radical scavenger.