



## Effect of Different Salinity on Life and Growth of Clown Fish (*Amhiprion Percula*)

Aqnes Putri M. Rohi<sup>1\*</sup>, Franchy C.H.Liufeto<sup>2</sup>, Wesly Pasaribu<sup>3</sup>  
Universitas Nusa Cendana

**Corresponding Author:** Aqnes Putri M. Rohi : [aqnesrohi053@gmail.com](mailto:aqnesrohi053@gmail.com)

---

### ARTICLE INFO

*Keywords:* Survival, Growth, Clown Fish, Salinity

*Received :* 20, March

*Revised :* 23, April

*Accepted:* 26, May

©2025 Rohi, Liufeto, Pasaribu(s): This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/).



### ABSTRACT

Clownfish *Amhiprion percula* is a marine ornamental fish that began to be cultivated by the government in 2009. by the government in 2009 which has advantages in unique color patterns and high survival. Clownfish usually live on protected coral reefs at a water depth of 15 meters, clownfish also live in a salinity range of 30-40 ppt. This study aims to determine the survival and growth of clownfish at different salinities. This research was conducted from July to October 2024 at the Dryland Laboratory of Nusa Cendana University Kupang. The experiment used a completely randomized design (CRD) method with 3 treatments and 3 replicates consisting of treatment A (30ppt), treatment B (25ppt), and treatment C (20ppt) each treatment consisted of 6 clownfish per aquarium. The parameters observed in this study were survival, absolute length growth and absolute weight growth.

The results of this study are the treatment of the effect of different salinity on the survival and growth of clownfish gives a real effect on survival and absolute weight growth with the best treatment in treatment A and B and where in each treatment does not have a real effect on absolute length.

## INTRODUCTION

Clownfish is one of the marine ornamental fish species that is in great demand and is quite famous among aquarium lovers (Fitriawati H. *et al* 2024). Percula clownfish (*Amphiprion percula*) is a high-value marine ornamental fish that is widely cultivated (Rasyid R. *et al* 2025). Clownfish is one of the popular ornamental fish species in the global aquarium industry that has high economic value and lives in seawater salinity of 30-35 ppt (Novita R.D. *et al* 2019). Clownfish is a marine ornamental fish that is in demand because of its beauty and affordable price aquariums are used to maintain it, but this fish is difficult to find in the market because its care requires special attention to fish conditions, food, pH, salinity, and water temperature (Insany G.P *et al* 2024). Clownfish (*A. percula*) is a marine ornamental fish that is often kept in aquariums, but its activity can accelerate the decline in water quality (Santikawati S. *et al* 2023).

Salinity is an important environmental factor affecting growth, reproduction, and physiological responses of fish species (Mousa M. A. *et al* 2024). Salinity in aquaculture environments is an important factor affecting fish body functions, including appetite and growth, especially in clownfish (Dhaneesh K.V. *et al* 2012). Salinization of water caused by human activities and global warming is increasing, and which poses a great challenge to the survival of aquatic animals (Ding L. *et al* 2023). Salinity stress occurs when salt levels in the environment change dramatically, for example due to tides, rainstorms, drought, or evaporation from small bodies of water. Slower changes in salt can also cause osmotic stress if they exceed limits that affect the survival of the organism (Evans T. G., Kultz D., 2020).

Previous studies have shown that changes in water salinity can affect various aspects of physiology and sublethal responses in black molly ornamental fish and also nemo fish (Komoroske L.M *et al.*, 2016) and (Singh L., Khairnar S.O *et al.*, 2023). as for other previous studies Previous research on clownfish cultured at low salinity had no significant effect on growth but significantly different on survival (Carneiro *et al* 2024). Therefore, research was conducted to determine the effect of different salinities on survival and growth of clownfish (*A. percula*).

## METHODS

This research was conducted in July-October 2024 for 60 days at the Fisheries Dry Laboratory of Nusa Cendana University Kupang. Aquarium containers measuring 30 cm x 40 cm x 50 cm as many as 9 pieces, filling the aquarium with sea water from Pasir Panjang beach that has been prepared, then installing aeration in each aquarium. Then Preparation of test animals, Fish used during the study came from Tablolong Village, West Kupang District, Kupang Regency. and Preparing clown fish fry measuring 3-7cm and weighing 0.58-2.94 grams with a total of 6 clown fish in each aquarium, with feeding using the add situation method then paying attention to the condition of the fish, maintenance containers, controlling water quality once a week and flushing twice a week and observing fish behavior every day. This study used a completely randomized

design (CRD) method with three treatments and three replications. The treatments in this study were:

Treatment with water salinity of 30 ppt

Treatment with water salinity of 25 ppt

Treatment with water salinity of 20 ppt.

#### OBSERVED VARIABLES

Survival was carried out at week one and week eight, observations and measurements of fish body weight growth and length growth were carried out at the beginning and week eight.

#### Survival Rate

Fish survival rate is the percentage of fish that successfully survive in a certain period after being stocked in a culture system.

$$SR = N_t/N_0 \times 100 \%$$

Description:

SR: Survival rate (%)

N<sub>t</sub>: Number of fish at the end of rearing

N<sub>0</sub>: Number of fish at the beginning of rearing

#### Absolute Weight Growth of Fish

Absolute growth is the difference between the total body weight of the fish at the end and the beginning of maintenance. Absolute fish measurements were taken on Saturday.

$$W_m = W_t - W_0$$

Description:

W<sub>m</sub> : Absolute average growth (grams)

W<sub>t</sub> : Biomass weight at the end of the study (grams / tail)

W<sub>0</sub> : Biomass weight at the beginning of the study (gram/tail).

#### Absolute Length Growth

Absolute length growth is a measure of fish length measured from the head to the tail fin.

$$L = L_t - L_0$$

Description:

L : Absolute length growth of fish kept (cm)

L<sub>t</sub>: Length of fish at the end of maintenance (cm)

L<sub>0</sub> : Length of fish at the beginning of rearing (cm).

Data Analysis

Data analyzed Quantitative parameter data observed in the form of survival rate, absolute weight growth of fish, absolute length growth. Analysis with Anova variance test with 95% confidence level. If there is a significant difference, it is continued with the Duncan test.

## RESULTS AND DISCUSSION

Survival Rate

The results of the study of the effect of different salinities on the survival and growth of clownfish on the data obtained show the average survival of different clownfish. The results showed that treatment A where at 30ppt salinity the average growth of clownfish with (100%), followed by Treatment B (100%), and Treatment C (44%).And can be seen in figure 1.

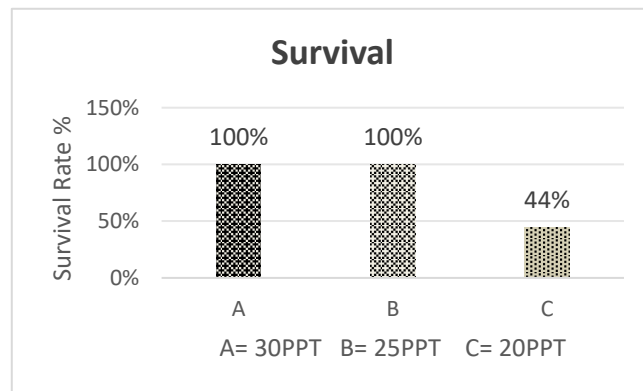


Figure 1. survival (*A. percula*).

Based on the ANOVA results of the survival percentage of clownfish (*A. percula*), it can be seen that the 30 ppt and 25 ppt salinity treatments show significant differences at  $P < 0.05$ , where the highest survival occurs at 30 ppt salinity, and the lowest survival at 20 ppt salinity. Research by Dona M. *et al* (2019) also found the same thing, that clownfish are more adaptable if the water salinity is close to their natural habitat, namely salinity around 30-35 ppt. Salleh *et al* (2024) showed that Amphiprion *percula* would stress and even die if salinity dropped below 10 ppt, with mortality occurring at a salinity of 7 ppt. This suggests that clown fish are not suited to living in freshwater and need a certain salinity to survive. In addition, Carneiro *et al.* (2024) observed that clown fish living in low salinity experienced stress and slowed growth compared to fish

living in 35 ppt salinity. Thus, higher salinity is better for clownfish health and growth. In this study, a salinity of 30 ppt proved to be the most suitable as it is similar to its natural environment, thus helping the fish's body work better and reducing the risk of mortality.

### Absolute Weight Growth

Absolute weight gain of fish refers to the increase in body weight of fish as they grow. In the early stages, fish experience a significant increase in weight because they are in the rapid growth phase, where they utilize energy from food to build new tissues and increase body size. As age and size increase, the rate of absolute weight gain of fish usually slows down. Based on the results of the study, absolute growth of clownfish (*A. percula*) showed differences in weight gain influenced by different salinity treatments. The highest absolute weight growth occurred in the treatment (25 ppt salinity) with a value of 1.48 g, followed by treatment (20 ppt salinity) at 1.05 g, and treatment (30 ppt salinity) at 0.71 g. Thus, the growth of clown fish with different salinity treatments was the lowest in the 30 ppt treatment. Thus, the lowest growth of clownfish with different salinity treatments occurred in the 30 ppt treatment. The absolute weight growth value of clown fish (*A. percula*) was measured at two times, namely the beginning and the end for 60 days, and the results of the study can be seen in Figure 2 below.

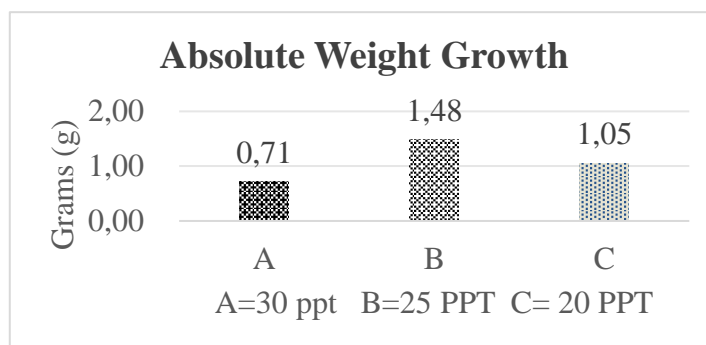


Figure 2. Absolute Weight growth.

Changes that occur in organisms, both in terms of length and weight, can be interpreted as growth within a certain period of time Hasanah *et al.* (2020). clown fish growth shows a significant effect on the absolute weight of fish. Absolute weight growth in treatment A showed no significant difference ( $P > 0.05$ ) compared to treatments B and C. Treatment A with 30 ppt salinity produced the lowest absolute weight growth, which was 0.71 g, followed by treatment C (1.05 g) with 25 ppt salinity, and treatment B (1.48 g). Effendi (2009) states that in simple terms, growth is the process of changing size (both length and weight) within a certain period. Growth is a complex biological process that is influenced by many factors. The best fish weight growth occurred in treatment B, where the absolute weight of clown fish was the highest.

### Absolute Length Growth

The absolute length growth of clownfish shows the results of measuring the length of clownfish for 60 days. The average length growth of clownfish in treatment A ranged from 2.49 cm which was higher than treatment B which was 2.27cm and treatment C 2.00cm. For absolute measurement results based on the length of clownfish observation for 60 days can be seen in Figure 3 below.

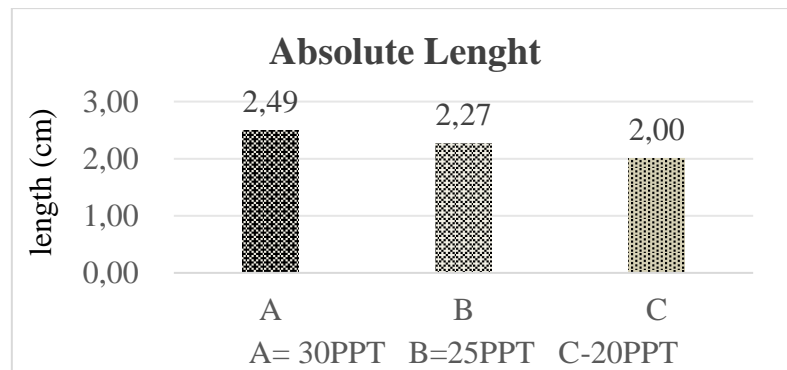


Figure 3. Absolute length (*A. percula*)

The results of further tests (BNT) showed that variations in media salinity did not affect the absolute length growth of clownfish at the 95% confidence level. This is thought to be caused by the osmoregulation process that occurs due to a decrease in the salinity of the clownfish rearing media. For aquatic organisms, this process is used to balance the osmosis pressure between substances in the body and the environment. Potadromous fish that are hyperosmotic to their environment experience osmoregulation by means of water entering the body and ions leaving the environment by diffusion. Fluid balance in the body can be achieved by drinking little or no water Marshall *et al.*, (2006). According to Zuib M.A. *et al.* (2024), water quality is a key factor that determines the ability of fish to adapt to salinity during movement.

### CONCLUSIONS

Based on the results of treatment research using different salinities in fish rearing in aquariums, it shows that water salinity affects the survival and growth of clownfish (*A. percula*). Salinity of 30 ppt is the best condition for survival because it produces 100% survival rate, while salinity of 20 ppt is only 44%. For weight growth, the best results occurred at 25 ppt salinity (1.48 g), although the survival rate was the same as 30 ppt. Fish length growth showed no significant difference between salinities. Thus, 30 ppt salinity is most ideal for keeping fish alive, while 25 ppt salinity is more favorable for body weight gain. This study confirms the importance of proper salinity management in clownfish culture to improve fish survival and growth, and provides important information for future research and practice in ornamental fish farming.

## ACKNOWLEDGMENTS

Thanks to the Head of the Dryland Laboratory of Nusa Cendana University for providing a place for research to be carried out.

## REFERENCES

- Carneiro M. D. D, Medeiros R. S. D, Monserat J. M, Rodrigues R. V .(2024). Growth and Oxidative Stress of Clownfish *Amphiprion ocellaris* Reared at Different Salinities *Fishes* 2024, 9, 30.
- Donna M.J., Supono,Suparmo. (2019). He *Study of Survival and Growth Rate of Clownfish (Bloch,1801) That Maintaned on Different Salinity Media*, *Jurnal Kelautan* Volume 12, No. 2,
- Dhaneesh K.V., Devi K.N.Ajith Kumar T.T.,Balasubramanian T.,Tissera K.(2012). Breeding, embryonic development and salinity tolerance of Skunk clownfish *Amphiprion akallopisos* 24, 201– 209.
- Ding L., Liu Y.,Wei X., Geng C., Liu W., Han L., Yuan F., Wang P., and Sun Y., (2023). Effects of Saline-Alkaline Stress on Metabolome,Biochemical Parameters, and Histopathology in the Kidney of Crucian Carp (*Carassius auratus*).
- Effendi, M.I. (2009). *Pengantar Akuakultur*. Jakarta: Penebar Swadaya.
- Evan T.G., Kultz D.(2020) The cellular stress response in fish exposed to salinity fluctuations *J. Exp. Zool.* 2020;1–15.
- Fitriawati H., Syahailatua D.Y, and Utami E.S.,(2024). Growth Performance of Clown Anemonefish (*Amphiprion ocellaris*) in Maluku at Optimum Salinity. *Omni-Akuatika*, 20 (1): 1-10,.
- Hasanah, U., Damayati A.A.,Azhar, F. (2020). Effect of Periodic Loading Rate on Growth Survival and Color Brightness of Clownfish *Amphiprion Ocellaris*.*Journal Tropical Biology*, 20 (1), 46 53.
- Insany G.P.,Somantri,Oktaviani S.Z.,Sujjada1 A., and KharismaI.L.(2024).PH monitoring system,temperature automation and clown fish feeding in aquarium using fuzzy logic method based on internet of things.
- Komoroske L.M.,Jeffries K.M,Connon, R. E., Dexter J.,Hasenbein M., Verhille C. and Fangue N. A.(2016) Sublethal salinity stress contributes to habitat limitation in An endangered estuarine fish.

- Marshall, W. S., and Grosell, M. (2006). Ion Transport, Osmoregulation, and AcidBase Balance. In the Physiology of Fishes. Evans, D .H and Claiborne, J.B. (eds). Taylor and Francis Group, (pp 601).
- Mousa M. A., El-sisy D.M, Barakat R.O,Alzahaby M.A.(2024). The Effects of Salinity on the Stress Response, Osmoregulation, Growth and Reproduction of *Liza ramada* in Captivity. Vol. 28(5): 1267 - 1280 .
- Novita R.D.,Nirmala K., Supriyono E., Ardi I. (2019). The effectiveness of LED light spectrum exposure on growth and color performance of orange clownfish, *Amphiprion percula* (Lacèpède, 1802) juvenile. 19(1): 127-141.
- Rasyid R. Dewantara Y.L.,Rahmatia F.(2025)The Difference On Salinity On The Growth And Survival Of Clownfish Larvae (*Amphiprion percula*). The Difference On Salinity On The Growth And Survival Of Clownfish Larvae (*Amphiprion Percula*).
- Santikawati S.,Syafriadiman,Syawal H. (2023). Water Quality Improvement and Analysis For Clown Fish (*Amphiprion ocellaris*) Cultivation In a Recirculation System.
- Salleh K.MD, Lokman E.D.,Ma'mur D.B., Ibrahim N.S.and M.Z.Yahaya.  
(2024). Effect of Salinity Variation on the Survival Rate of *Amphiprion ocellaris* (Common Clownfish)
- Singh L., Khairnar S.O, Kaur V.I, and Mandal A.(2023).Salinity tolerance response of ornamental black molly, *Poecilia sphenops* exposed to inland saline water.
- Zuib M.A. Rejeki S., Harwanto D.(2024) Salinity Adaptation Can Increase Growth and Survival of Sultana Tilapia (*Oreochromis niloticus*) (Class: Osteichthyes; Family: Cichlidae) Seeds. Vol.27(2):209-216..