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# The Impact of Fresh Golden Snail (*Pomacea canaliculata*) on Gonad Productivity of Sangkuriang Catfish

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**Abstract**: This research aims to investigate the effect of golden apple snail (*Pomacea canaliculatae*) supplementation on the gonadal productivity of female Sangkuriang catfish. The experiment was conducted in the Wet Laboratory and Basic Laboratory of the Faculty of Fisheries, University 45 Mataram. The study involved the provision of fresh golden apple snail meat as additional feed at varying percentages. Gonadal productivity parameters observed in this research included gonadal maturity index (GMI), egg diameter, gonadal maturity level (GML), and fecundity. The experimental design employed a completely randomized design with four treatments, namely P1 (Pellet 3% + snail 4%), P2 (Pellet 3% + snail 7%), P3 (Pellet 3% + snail 10%), and P4 (Pellet 3%), each with three replications. The results indicated that the supplementation of golden apple snail as additional feed could stimulate the gonadal productivity of female Sangkuriang catfish. The enhanced GML, egg diameter, and GMI values demonstrated that golden apple snail can be utilized as supplementary feed for female Sangkuriang catfish.

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## INTRODUCTION

Sangkuriang catfish (*Clarias gariepinus*) is one of the most popular varieties of catfish (Dedi et al., 2015) and has a trend of increasing demand every year (KKP, 2015). Efforts to meet the increased demand are made with intensive cultivation. This condition causes an increase in the need for catfish seeds both in quantity and quality. The need for seeds can be fulfilled continuously by increasing the production of Sangkuriang catfish broodstock seeds. Increasing seed production can be conducted by improving the productivity of the broodstock gonads. Improving gonad productivity conditions can be done by increasing the protein content in the feed given to Sangkuriang catfish broodstock. As stated by Sinjal et al. (2014), these conditions show that feed with high protein is good for gonadal maturation. Several studies have proven that the quality of feed containing protein is a factor that greatly influences the level of gonad maturity and the amount of fecundity produced by the broodstock (Sinjal, 2007).

One of the additional feed alternatives that can be given to the Sangkuriang catfish broodstock is the golden snail (*Pomacea canaliculata*). The golden snail is an introduced animal that is widespread and underutilized. The golden snail is rich in nutrients and can be used as a high source of protein. Golden snails are also easy to obtain and do not require high costs. According to Tarigan (2008) in Solehudin (2016) golden snail meat contains 51.8% crude protein, 13.61% crude fat, 6.09% crude fiber and 24% ash content. In another study, it was also tried that by providing additional feed in the form of a combination of golden snail flour and fish meal, each of 50% affected the growth rate, gonad maturation and fecundity

produced by brood fish (Sandjojo et al., 2013). However, using fishmeal in this combination is still inefficient because the price is quite high. Other research related to the use of the golden snail in increasing the productivity of catfish gonads needs to be done. This study aims to determine the effect of giving golden snails as additional feed on the gonad productivity of female Sangkuriang catfish.

## RESEARCH METHOD

This research was an experiment (Payadnya & Jayantika, 2018) which was carried out at the Wet Laboratory and Basic Laboratory of the Faculty of Fisheries, University of 45 Mataram. The research was carried out by giving fresh golden snail meat as an additional feed with different percentages. Gonadal productivity observed in this study included gonad maturity index (IKG), egg diameter, gonad maturity level (TKG) and fecundity. The research design used a completely randomized design (CRD) with four treatments, namely P1 (Pellet 3% + snail 4%), P2 (Pellet 3% + snail 7%), P3 (Pellet 3% + snail 10%), and P4 ( Pellet 3%) with three replications each. Feeding in each treatment was adjusted to the body weight of the Sangkuriang catfish broodstock (3% pellets + 10% brood weight). The treatment of feeding was carried out by giving pellets plus golden snail meat with different percentages. The productivity of the gonads observed in the study consisted of the level and index of gonad maturity (TKG and IKG), egg diameter and fecundity. Data on each observation parameter is tabulated and analyzed descriptively (Nasution, 2017) based on visual observations. GMI data, egg diameter and fecundity, were analyzed using ANOVA (Rahmawati & Erina, 2020), followed by a post hoc test (Benavoli et al., 2016) using SPSS software (Yamin & Kurniawan, 2009).

## RESULT AND DISCUSSION

### Gonad Maturity Index (IKG)

The results of the analysis of variance showed that the F-count was smaller than the F-table (1.42 <4.07), which meant that the IKG values in the four treatments did not give significantly different results. Even so, giving the golden snail 10% had the best effect on IKG values compared to the control treatment. The results shown in Figure 1 shows that the P3 treatment had the highest score with an IKG value of 7.69%, followed by the P1 treatment (5.74%), then the P4 treatment (5.64%), and the lowest was in P2 (5.46%). The results obtained in this study were not much different from those reported by Sukendi et al. (2013) regarding adding vitamin E to feed, which showed that the best IKG values ranged from 7.06 to 8.36%. The addition of vitamin E functions as an antioxidant, protecting fatty acids in vivo and in vitro so that the development of IKG in the parent is better (Murtejo, 2008). However, using vitamin E requires a higher cost, while using golden snails can be cheaper and easier to obtain.

The role of feed in gonadal development is important for normal endocrine function. The level of feeding that contains high protein affects the synthesis and release of hormones from the endocrine glands. Meanwhile, the lack of feed intake in the reproductive process causes delays in gonadal development due to insufficient energy and nutrients. It can cause low gonadotropin levels produced by the adenohypophysis gland, poor ovarian response or failure of the ovaries to produce sufficient amounts of estrogen, resulting in low gonadal reproduction rates. Sinjal, et al. 2014). The IKG values obtained in the study showed that adding 10% golden snail feed was sufficient to meet the gonad development needs of the female Sangkuriang catfish. This also indicates that protein and other nutrients are needed and have a large role in supporting the gonad development of female Sangkuriang catfish during the preparation for spawning.

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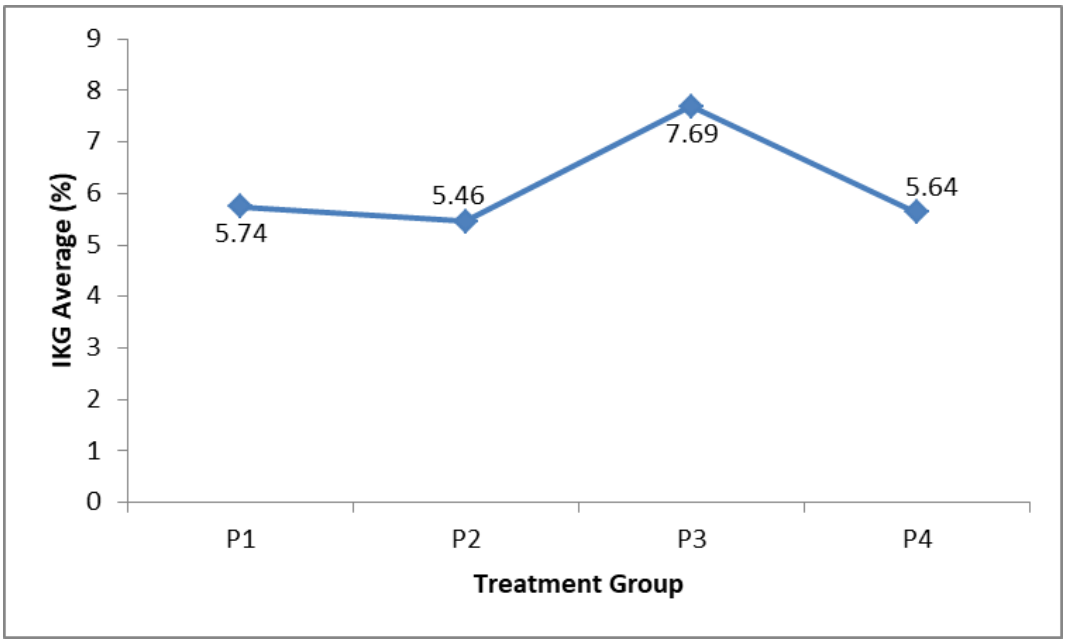


**Figure 1.** IKG value of Sangkuriang catfish broodstock after treatment

**Egg Diameter**

The results of the analysis of variance in egg diameter showed that the F-count was greater than the F-table (22.08>4.07), which meant that the treatment gave significantly different results. This shows that giving golden snails significantly affects egg diameter compared to the control treatment. Figure 2 shows the highest average egg diameter in the P3 treatment with an egg diameter of 1.45 mm, followed by the P1 treatment (1.28 mm), then the P2 treatment (1.23 mm) and the P4 treatment (1.11 mm). This study showed higher results than those obtained by Hardjamulia et al. (1995) in Sukendi et al. (2013), which showed that rearing broodstock catfish for 40 days with different feed doses resulted in the highest egg diameter reaching 0.99 to 1.22 mm.

The high diameter of the eggs produced in this study is thought to be due to the protein and fat contained in the golden snail meat, which greatly influences the development of the eggs of the Sangkuriang catfish broodstock. During the reproductive process before spawning, most of the metabolic products such as protein, fat, carbohydrates and vitamin E contained in the feed are used for gonad development, causing gonad weight to increase and offset by an increase in egg size. The protein component is an essential nutrient needed during gonadal maturation. In addition, feeding that is not optimal causes a lack of energy to support the reproductive process, especially in synthesizing hormones involved in the process of egg development (vitellogenesis) (King and Pankhurst, 2003). While observing egg diameter, many eggs were still with non-uniform egg diameters. This causes a minimum number of mothers who can ovulate. The non-uniformity of egg diameter is thought to be related to less optimal gonad development because the energy from the feed consumed for reproductive activities cannot be absorbed optimally (Susanti and Mayudin, 2012).

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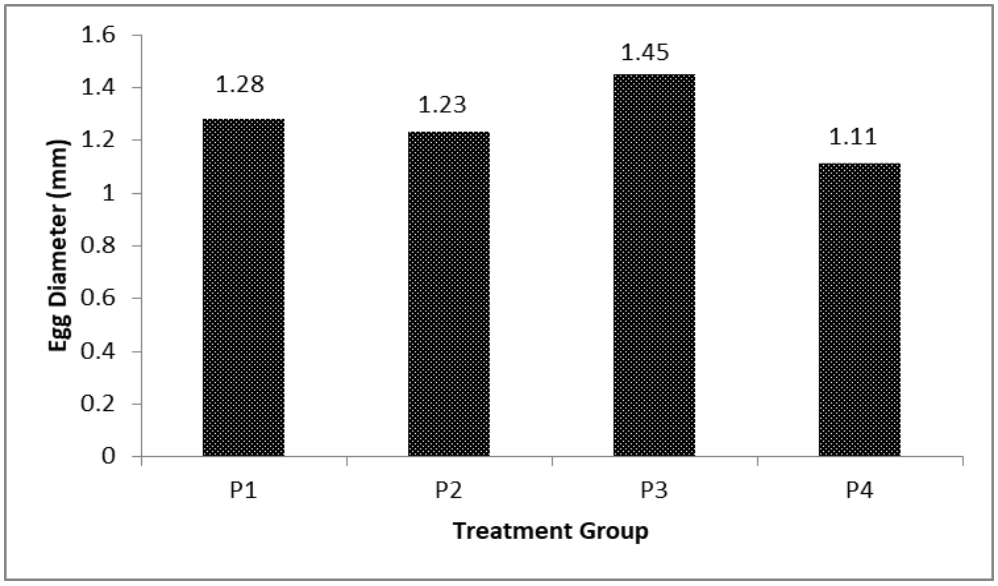


**Figure 2.** Egg diameter after the Golden Snail treatment

**Gonad Maturity Level (TKG)**

The results of observations on the achievement of TKG of Sangkuriang catfish given the golden snail from TKG II to TKG IV. TKG of the four treatments for 30 days of study can be observed from 2 parameters: the IKG value and egg diameter. The results obtained are shown in Table 1.

**Table 1.** TKG based on IKG values and egg diameter

| TKG | Parameter | |
|---|---|---|
| | IKG | Egg diameter |
| I | 1-2%* | 0.10-0.60 mm** |
| II | 2.5-4.5%* | 0,.0-0.90 mm** |
| III | 5.5-6%* | 0.99-1.20 mm** |
| IV | 7-11%* | 1.35-1.55 mm** |

Note: *: Effendi (1992) in Sukendi et al. (2013), **: Sukendi (2012)

Table. 1 shows that the broodstock of Sangkuriang catfish in treatment P3 had reached TKG IV with an IKG value of 7.69% and an egg diameter of 1.45 mm. Meanwhile, in the P1, P2 and P4 treatments as controls, the level of gonadal maturity only reached TKG III. In this case, Sinjal (2007) reported that the delay in reaching TKG IV broodstock was caused by a lack of energy produced by the broodstock in the reproductive process due to insufficient nutrition and protein as needed by the broodstock so that the gonad maturity rate slowed down.

Salong and Lamondo (2009) also stated that the basic ingredients for accelerating the process of gonadal maturity level at TKG IV consisted of sufficient carbohydrates, fats and proteins. Therefore, the protein and fat contained in golden snail meat affect vitellogenesis; the number and size of egg yolk granules increase, so the gonad volume is larger and the resulting IKG value increases, and the egg diameter becomes larger. Murtejo (2008) added that the more protein, fat and carbohydrates contained in the feed given, the greater the gonad volume of the brood fish, the more evenly distributed the yolk and the resulting egg diameter

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increases so that the process of achieving TKG IV becomes faster. Sukendi et al. (2013) also reported that each specific GMI shows a range of egg diameter values according to the TKG phase so that the parent TKG can be determined by egg diameter and IKG values and their distribution in the ovary. Hardjamulia et al. (1995) in Sukendi et al. (2013) also added that the value of egg diameter is always influenced by IKG because the greater the value of IKG, the greater the value of the egg diameter produced.

Buwono (2000) states that energy utilization in fish starts from the food that enters the fish's body (food intake) as gross energy. Gross energy is distributed in two activity processes: the digestive process, which requires 85% energy, and the feces processing process, which requires 15% energy. In digestion, energy is distributed as a process of excretion of urine, such as excretion processes in the gills and metabolic processes. The excretion process requires 3% -5% of energy, while the metabolic process requires 80%. Therefore, 80% of the energy absorbed in the fish's body is used for growth and metabolism. 52.5% of metabolism is used as net energy to meet the needs of growth and egg production.

**Fecundity**

Fecundity is the number of eggs produced in one reproductive cycle; fecundity also shows the quality of the female parent. The fecundity results during the study based on the analysis of variance showed that the value of F-count <F-table was 1.45 <4.07, meaning that the treatment had no significant effect on fecundity. However, the addition of golden snails to the feed descriptively showed a better fecundity value than the control treatment (Figure 3). The lowest treatment was the P4 treatment, with 29.752 eggs, followed by the P1 treatment, with 35.117 eggs, the P2 treatment, with 35.651 eggs and the highest in the P3 treatment, with 41.144 eggs.

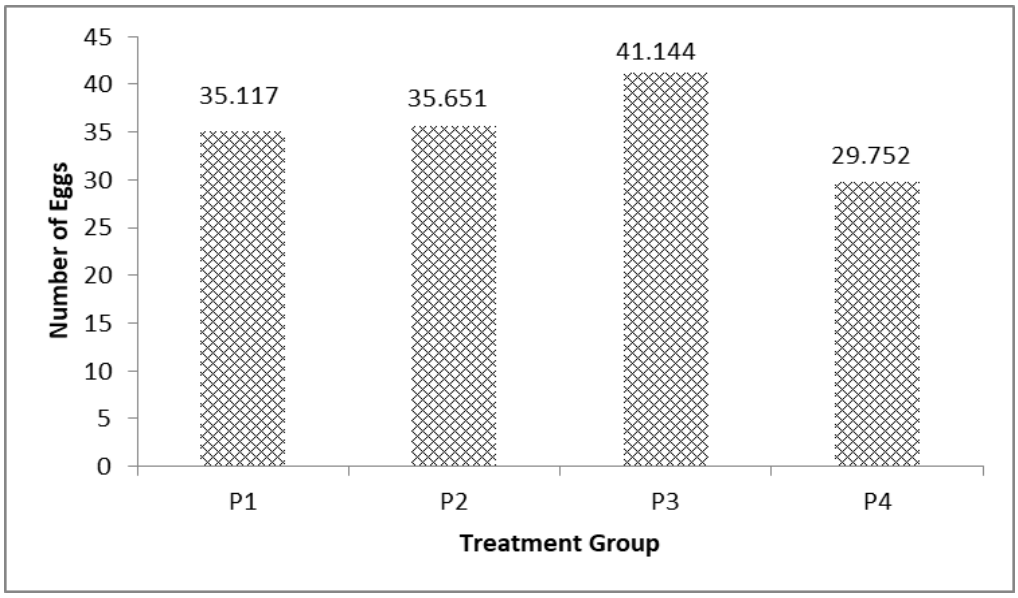


**Figure 3.** Fecundity in treated Sangkuriang catfish broodstock

The number of eggs produced in this study was not much different from that of Cruz et al. (2006) in Jalaluddin (2014), who reported that brood weights ranging from 400 – 500 grams produced 40,000 – 55,000 eggs. However, according to the Indonesian National

Standard (2000), this number is still lower, reaching 50,000 – 100,000 eggs. This low value is thought to be caused by the water quality, age and food. The fecundity of a brood fish is also strongly influenced by water quality (Jalaluddin, 2014). As reported by Effendie (2002), the factors that affect the low fecundity of catfish broodstock are physical and chemical environmental factors such as water temperature, pH, dissolved oxygen, free CO2, poor alkalinity, hardness and brightness. Other factors that can affect fecundity are the age of the sows and their response to food.

## CONCLUSION

The results showed that adding golden snail feed could stimulate the gonad productivity of the female Sangkuriang catfish. The gonadal productivity increases TKG, egg diameter and IKG value. This shows that the golden snail can be used as additional feed for female Sangkuriang catfish.

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