The Accuracy of Automated Feeding with different tools in Aquaculture

Fittrie Meyllianawaty Pratiwy[1], Yuli Andriani[1], Juli A. Sinaga[2]

[1]*Department of Fisheries, Faculty of Fisheries and Marine Science, Padjadjaran University, Jl. Raya Bandung-Sumedang, Hegarmanah Jatinangor, Sumedang 45363, West Java, Indonesia.*
[2]*Alumni, Faculty of Fisheries and Marine Science, Padjadjaran University, Jl. Raya Bandung-Sumedang, Hegarmanah Jatinangor, Sumedang 45363, West Java, Indonesia.*

ABSTRACT

Fish farming requires regular maintenance and feeding schedules to achieve maximum results and profits. Feeding manually cannot save time and add to the work of cultivators. The existence of an automatic feeder is very helpful for fish cultivators. Feeding in aquaculture needs to be monitored so that it is given according to the frequency of feed needed by the fish, excess frequency of feeding will cause the fish in the pond to get sick. However, monitoring of cultivation is not done manually for 24 hours. Therefore the purpose of this literature review study is to find out alternative feeding in the form of tool assembly which has several continuous components. The preparation of this article uses a comparative method which is carried out by means of literature review journals. The results of this article show that this feeder has some potential in its use, both advantages and disadvantages. With this automatic feeder, monitoring fish farming will be easier and can be done at any time

Keywords : *Automatic, component, feed, fish, farming, potency*

1. INTRODUCTION

The fisheries sector, which has such potential to be managed, provides quite promising opportunities to be utilized more deeply, with various cultivation commodities that can be developed[1]. However, sometimes the cost of feed production soars up, it may be too expensive and limit fish farming. to reduce these costs feed must be used efficiently[2]. Sowing feeds evenly and distributing them in the culture ponds. a good feeding method is done to overcome the, factors affecting growth. Fish farming requires maintenance and a regular feeding schedule to achieve maximum yield and profit. However, when raising fry-sized fish, fish tend to die due to uncontrolled water temperature in the culture pond and lack of timely fish feeding. Water temperature requirements in culture ponds range from 25-30°C[3].

Manual feeding cannot be time-efficient and adds to the work for the cultivator, so the existence of an automatic feeding device is very helpful for fish farmers. Automated feeding of fish farming, has been tried by several researchers to make tools for automatic fish feeders[4]. There are several things that need to be considered in fish farming, namely the timing of fish feeding, acidity and turbidity in the culture pond[5]. Good fish feed is given regularly and according to the needs of fish in cultivation. If the feed given is too little as a result the growth of fish becomes less than optimal along with the growth of fish or malnutrition, nutrients are much more needed by fish. if the feed is given too much it can cause contamination of food waste. together ensuring regular fish feeding can make feeding optimization[6].

The manufacture of automatic feeders can replace human labor in feeding fish regularly automatically and more adjust to the dose of fish needs. With this automation tool, it can increase the efficiency and effectiveness of the fish farming business[7]. Of the many factors, adequate and correct feed supply is a very important factor to ensure that farmed fish achieve the targeted harvest within a certain time frame. Therefore, improvement efforts must be made to optimize feed operations for maximum growth of farmed fish.

2. MATERIAL AND METHODS

In the process of preparing this article using a comparative method carried out by means of journal literature review. This method is to identify, examine, and assess findings in journal literature. The results of this journal review are then described in the form of a paper containing types, methods of use, and theories about research topics that are used as references[8]. This literature study was conducted by researchers after determining the research topic and confirming the formulation of the problem at hand [9].

3. RESULT AND DISCUSSION

3.1 Potential uses

Automatic feeders are one of the tools for aquaculture. According to[10] Automatic feeders have several potential advantages, namely, fish feeding can be monitored automatically through settings, optimization of operational costs, minimal human involvement so that feed management can be done easily, with technological advances this automatic feeder can be further developed so that it can be arranged via the internet with the help of a cellphone, the productivity of fish livestock can also increase with this automatic feeder. In addition to the potential advantages of this automatic feeder, it also has several potential shortcomings such as feeding schedules that experience input errors[11]. Other potential shortcomings also exist in the type of tool itself, because there are some automatic feeders that do not have sensors or warning signs when the feed in the tool is running low or has run out, causing the tool to stop by itself without the knowledge of the cultivator[12].

3.2 Utilization of Automatic Feeding

Automatic feeding that can be adjusted periodically can be done using an automatic feeder[13]. This tool can increase efficiency in feeding and can minimize labor in cultivation[14]. The use of this tool is assumed to be an effort to feed according to the needs so that the integrity of the feed given is not left and can be absorbed in the fish body[15]. Feed is released automatically based on the time that has been set for so many seconds[15]. An important element in supporting growth and survival in aquaculture depends on the feed given[16]. Feeding in aquaculture regularly, scheduled and not late is one of the important efforts of feed management that can affect development and growth [16].

3.3 Components of an Automatic Feeder

In general, automatic feeders are a collection of several computer components that are assembled into one and then programmed by humans. These components usually use electricity but are energy efficient so as not to increase electricity usage. According to[10] the first of these components is arduino uno, this component is the brain of an automatic feeder because this component is able to adjust the opening and closing of the feed bin according to the wishes of the cultivator. there are many types of arduino but only this type is able to control the flow of feed coming out of the storage area according to the commands that have been programmed[10].

Servo Motor is the second component that is interconnected with arduino uno because this component acts as a gate to remove or close the feed flow from the storage area. after receiving a command from arduino uno this component will open the lid on the feed that will come out[17]. Load Cell Module the last component needed in an automatic feeder. This tool acts as a bridge sensor between the servo motor and the arduino uno. arduino uno cannot give direct commands to the servo motor therefore this component is needed to bridge the command which is where when the arduino uno gives the command then the sensor to know the command and continue the command to the servo motor to open the feed lid. These three components are the most important parts in the automatic feeder if one of these components is not fulfilled then the tool cannot be run properly.

Table -1. Synthesis

Fish Species	Feed Form	Tool Type	Accuracy	Source
Vannamei shrimp *(Litopenaeus vannamei)*	Pellets	IoT	97 %	[16]
Parrot fish (*Oreochromis niloticus)*	Pellets	Assembled feeder	94,63%	[19]
Zebra fish (*Danio rerio*)	Pellets	Raspberry Pi 3 B +	5% of fish weight	[20]
Killifish Afrika (*Aphyosemion)*	Pellets	Raspberry Pi	98.1%	[21]
Koi fish (*Cyprinus carpio*)	Pellets	Arduino uno	90%	[18]
Carp fish (*Osphronemus goramy)*	Pellets	IoT	90,47%	[22]

4. CONCLUSION

Alternative feeding tools that can make it easier for humans to monitor feeding automatically can use several sustainable computer components, namely Arduino uno, Servo motor, and Load cell module. Automatic feeding tools have the potential to reduce operational costs, facilitate monitoring of feeding, and facilitate feed management. However, there are shortcomings in this automatic feeding tool, namely that there can be input errors in the feeding schedule and some tools do not have sensors or warning signs if the feed runs out.

5. REFERENCES

[1]. Ariadi H., Madusari B.D., Mardhiyana D. (2022). Analisis Pengaruh Daya Dukung Lingkungan Budidaya Terhadap Laju Pertumbuhan Udang Vaname (L. vannamei). EnviroScienteae 18 (1), 29-37.

[2]. Sihombing, P, C. 2018. Pengaruh Perbedaan Suhu Air Terhadap dan Kelangsungan Benih Hidup Ikan Nila (*Oreochromis niloticus*). *Repository Institusi USU*

[3]. Salsabila, M., & Suprapto, H. 2018. Teknik Pembesaran Ikan Nila (*Oreochromis niloticus*) Di Instalasi Budidaya Air Tawar Pandaan, Jawa Timur. Jurnal Aquaculture, 7(3), 3–8.

[4]. Ginting, T. A. P. 2020. Rancang Bangun Alat Pembersih Akuarium Dan Pemberi Makan Ikan Otomatis Berbasis Mikrokontroler Atmega 8535.

[5]. S. Weku, V. C. Poekoel, F. Robot, "rancang bangun alat pemberi pakan ikan otomatis berbasis mikrokontroler," e-journal tek. Elektro dan komput., vol. 4, no. 7, pp. 54–64, 2015.

[6]. Dedy Prijatna, Handarto, Yosua Andreas . 2018. Rancang Bangun Pemberi Pakan Ikan Otomatis. Jurnal Teknotan Vol. 12 No. 1.

[7]. Eri Haryanto . 2021. Perancangan Dan Implementasi Alat Pemberi Makan Ikan Otomatis Berbasis Mikrokontroler AT89S52. Jurnal Jurusan Teknik Informatika Fakultas Teknik Universitas Janabadra.

[8]. Zed, Mestika 2003. Metode Penelitian Kepustakaan. Jakarta : Yayasan Obor Indonesia.

[9]. Darmadi, H. 2011. Metode Penelitian Pendidikan. Bandung: Alfabeta

[10]. Fauzi, A. I., Hiron, N., & Busaeri, N. 2020. Mesin Dispenser Pakan Otomatis Hemat Energi. *Journal of Energy and Electrical Engineering*, *1*(2). https://doi.org/10.37058/jeee.v1i2.826

[11]. Muharram, A., Pangesta I.G., Akbar T.M., Septiani, K.S. 2013. Sistem Cerdas Penampungan dan Pemberian Pakan Ikan pada Pusat Budidaya Ikan Berbasis Mikrokontroler. *Pekan Ilmiah Mahasiswa Nasional Program Kreativitas Mahasiswa Teknologi 2013, Jakarta, Indonesia*. Indonesian Ministry of Research, Technology and Higher Education. Hal:1-3

[12]. Prawiraharja, Gumilar. 2012. Alarm Kolam dan Pemberi Makan Ikan Otomatis http://www.scribd.com/doc/89435347/Pemberi-Makan-Ikan-Otomatis.

[13]. Uddin, M. N. 2016. Development of automatic fish feeder. *Global Journals of Research in Engineering*, *16*(A2), 15-23.
[14]. Md Jamal, M. H. 2013. *Modelling and control of the fish feeder system* (Doctoral dissertation, University Tun Hussein Onn Malaysia).
[15]. Arsad, S. 2019. Pemberdayaan pembudidaya kerapu melalui aplikasi automatic fish feeder untuk efisiensi pakan di tambak budidaya semi intensif. *ETHOS: Jurnal Penelitian dan Pengabdian kepada Masyarakat*, *7*(1), 108-113.
[16]. Samawi, G., Panjaitan, A. S., Marlina, E., Pamaharyani, L. I., Bosman, O., Suseno, D. N. 2021. Efektivitas Penggunaan Automatic Feeder Pada Budidaya Udang Vaname (*Litopenaeus vannamei*) di Pt. Windu Marina Abadi Kecamatan Sambelia, Lombok Timur. *Buletin Jalanidhitah Sarva Jivitam*, *3*(2), 93-99.
[17]. Putra, A. M., Pulungan, A. B. 2020. Alat Pemberian Pakan Ikan Otomatis. *JTEV (Jurnal Teknik Elektro Danvokasional)*, *6*(2), 113-12 doi:https://doi.org/10.24036/jtev.v6i2.108580
[18]. Cucu Suhery, Yudha Arman Kartika Sari. 2015. Implementasi Sistem Pakan Ikan Menggunakan Buzzer Dan Aplikasi Antarmuka Berbasis Mikrokontroler. Jurnal Coding Sistem Komputer Untan Volume 03, No. 2. hal 111-122 ,
[19]. Prijatna, D., Handarto., Andreas, Y. 2018. Rancang Bangun Pemberi Pakan Ikan Otomatis. *Jurnal Teknotan*, 12(1). Hal: 30-35.
[20]. Lange, M., Solak, A., Vijay Kumar, S., Kobayashi, H., Yang, B., Royer, L. A. 2021. ZAF, the first open source fully automated feeder for aquatic facilities. *Elife*, 10, e74234.
[21]. McKay, A., Costa, E. K., Chen, J., Hu, C. K., Chen, X., Bedbrook, C. N., Brunet, A. 2022. An automated feeding system for the African killifish reveals the impact of diet on lifespan and allows scalable assessment of associative learning. *Elife*, 11, e69008.
[22]. Anindita, S., Mahendra, C., Hadiyanto. 2022. Sistem Pemberi Pakan Ikan Otomatis Berbasis Internet Of Things Dengan Wemos D1r1. Jurnal Muara Sains, Teknologi, Kedokteran, dan Ilmu Kesehatan, 6(1), 91-100 .