
| RESEARCH ARTICLE

Analysis of Chicken Temperature Control Using a Control System

Junaidi¹ ✉ Tony Siagian², Din Aswan Amran Ritonga³, Irpansyah Siregar⁴ and Rahmadsyah⁵

¹³*Department Mechanical Engineering Fakultas Teknik Universitas Harapan Medan*

²*Department Mechanical Engineering Fakultas Teknik Universitas Pembinaan Masyarakat Indonesia*

⁴*Department Mechanical Engineering Fakultas Teknik Universitas Amir Hamzah Medan*

⁵*Department Mechanical Engineering Fakultas Teknik Universitas Asahan*

Corresponding Author: Junaidi, **E-mail:** junaidi413@yahoo.com

| ABSTRACT

Chicken is one of the side dishes favored by many people in the world. Therefore, many entrepreneurs do business with chicken. This research is the result of a survey of several technical journals about the temperature of the chicken coop taken. From observations and tests carried out in the field carefully, this research was carried out to analyze the temperature. The chicken coop regulation system is carried out with the aim of preventing livestock from dying due to the surrounding temperature not being appropriate for his age. This study uses the Atmega 8535 microcontroller as the main controller, LM35 as the main controller temperature sensor in the enclosure, and IC L293D as a DC motor driver. The microcontroller will instruct DCmotor to work if the measured temperature is above the specified temperature limit and will instruct the relay to turn on or turn off the incandescent light if the measured temperature is below the specified temperature limit. By using this relay, the temperature of the chicken coop will be appropriate for anticipating disease outbreaks from the chickens.

| KEYWORDS

Temperature regulation, microcontroller, DC motor, temperature sensor

| ARTICLE INFORMATION

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1. Introduction

Livestock such as broiler chickens are a type of chicken produced from farming technology that has the characteristics of fast growth, as a producer of meat with low feed conversion and ready to be slaughtered at the age of 28-45 days [Delima, 2009; Junaidi, 2009]. In raising chickens, that need to be considered include the provision of balanced chicken feed and the appropriate temperature of the chicken coop. Chicken is a warm-blooded (endothermic) animal whose body temperature is regulated accordingly. Chickens can reproduce optimally when internal and external factors are within normal limits [Soebhakti, 2007; Junaidi, 2017] according to their needs. Environmental temperature is one of the external factors that can affect chicken productivity. The hot temperature in a chicken raising environment has become one of the main concerns because it can cause economic losses due to increased mortality and decreased productivity. The relatively high temperature in a maintenance environment causes heat stress. Heat stress causes disruption to the growth of broiler chickens [Bayu, 2012; Yani, 2019]. This growth disturbance is related to a decrease in feed consumption and an increase in drinking water consumption as long as chickens experience heat stress [Rangkuti et al. 2018]. In order to answer these challenges, chicken farmers are required to choose appropriate methods for raising chickens. These methods include land selection methods, cage making methods, feeding methods, and cage cleaning methods. One solution to overcome these problems is the use of technology. Therefore, the author tries to design a chicken coop with an automation system to help and support farmers in the field of maintenance, especially in regulating the temperature of chicken coops. This tool is expected to help farmers in reducing mortality or decrease the productivity of poultry due to an increase in ambient temperature. The main reference used is the use of the Atmega8535 AVR series microcontroller as the main controller of the system [Riza et al. 2001].

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2. Research Methods

Flow Chart.

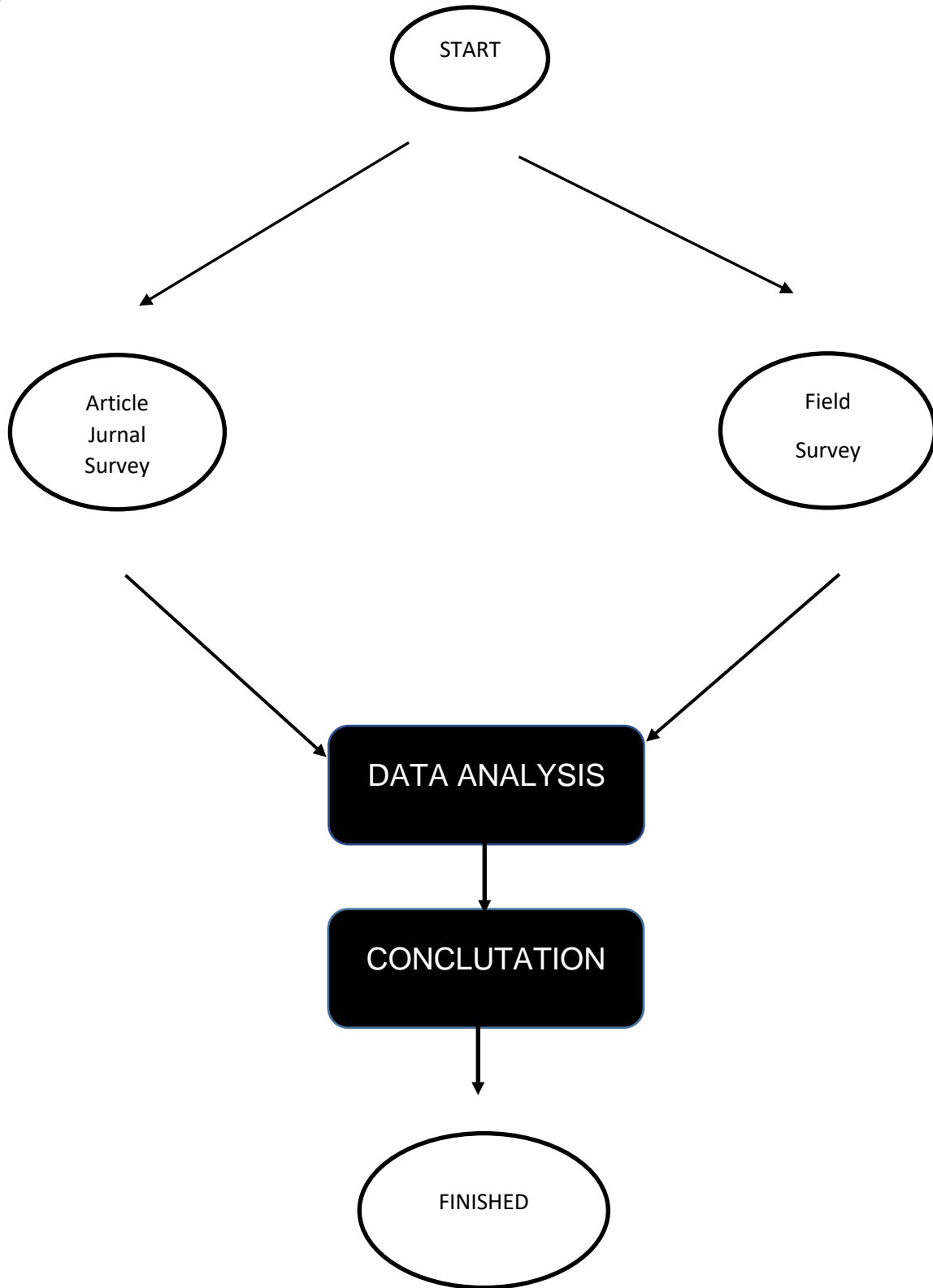


Figure 1. Research Flow Chart

3. Results and Discussion

Table 1. Temperature Measurement Results with Temperature Limits 24 - 26 ° C.

TIME (WIB)	Ambient temperature (°C)	Enclosure Temperature (°C)	Information
00.00	26	25.5	-
03.00	24.5	25	-
06.00	26.5	25.5	Fan Live
09.00	28	26	Fan Live
12.00	31.2	28.4	Fan Live
15.00	29.4	28	Fan Live
18.00	28.4	26.9	Fan Live
21.00	27	25	Fan Live

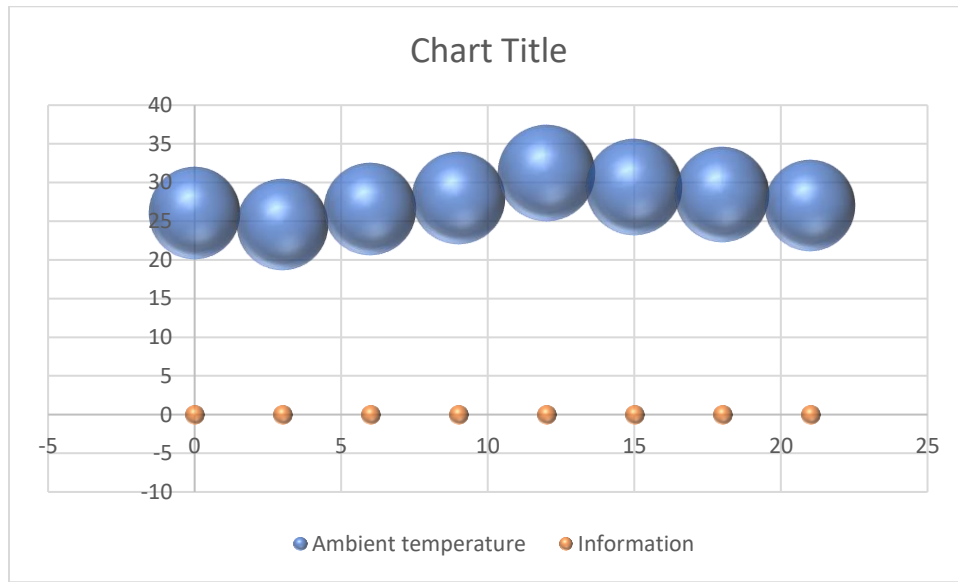


Figure 1.1 Graph of Temperature Measurement Results with Temperature Limits 24-26 ° C

Table 2. Temperature Measurement Results with Temperature Limits 25 - 28 ° C

TIME(WIB)	Ambient temperature (°C)	Enclosure Temperature (°C)	Information
00.00	26	26.4	-
03.00	24.5	25.9	-
06.00	26.5	25.9	Life lights
09.00	28	26	Fan Live
12.00	31.2	28.4	Fan Live
15.00	29.4	27.9	Fan Live
18.00	28.4	26.4	Fan Live
21.00	27	25.9	-

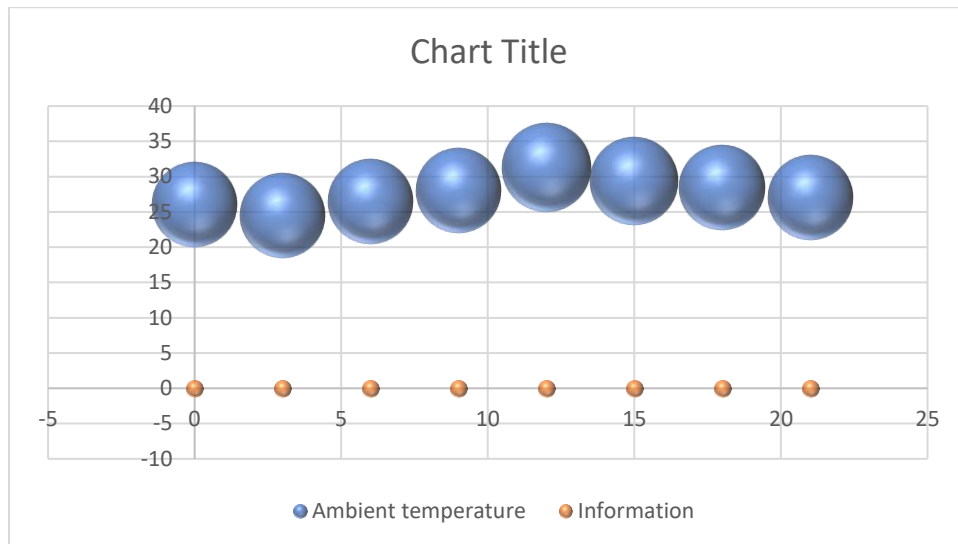


Figure 2.1 Graphic Results of Temperature Measurement with Temperature Limitation 25-28 ° C

Table 3. Temperature Measurement Results with Temperature Limits 28 - 25 ° C

TIME(WIB)	Ambient temperature (°C)	Enclosure Temperature (°C)	Information
00.00	26	26.4	-
03.00	24.5	26.4	-
06.00	26.5	25.9	Life lights
09.00	28	26.9	-
12.00	31.2	28.4	Fan Live
15.00	29.4	27.9	Fan Live
18.00	28.4	26.4	Fan Live
21.00	27	25.9	-

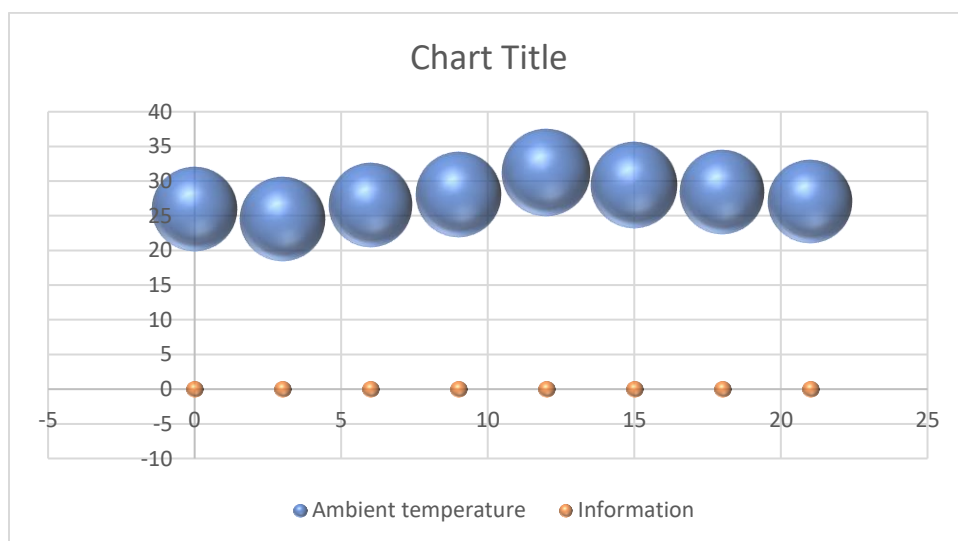


Figure 3.1 Graphic Results of Temperature Measurement With Temperature Limitation 28-25 ° C.

Table 4. Temperature Measurement Results with Temperature Limits 30 - 27 ° C

TIME(WIB)	Ambient temperature (°C)	Enclosure Temperature (°C)	Information
00.00	26	29.4	Life lights
03.00	24.5	29.4	Life lights
06.00	26.5	29.4	Life lights
09.00	28	27.9	-
12.00	31.2	28.4	Vane Light
15.00	29.4	29.4	-
18.00	28.4	27.9	Vane lights
21.00	27	29.4	Life lights

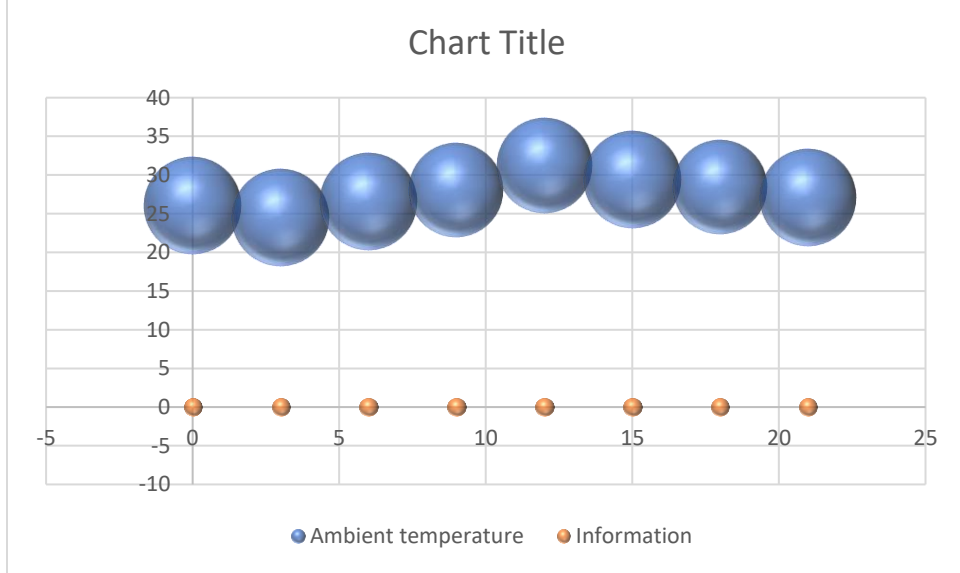


Fig. 4.1 Graphic Results of Temperature Measurement With Temperature Limits of 30-27 ° C.

Table 5. Temperature Measurement Results with Temperature Limits 32- 29 ° C.

TIME(WIB)	Ambient temperature (°C)	Enclosure Temperature (°C)	Information
00.00	26	29.4	Life lights
03.00	24.5	29.4	Life lights
06.00	26.5	29.4	Life lights
09.00	28	27.9	-
12.00	31.2	28.4	Vane Light
15.00	29.4	29.4	-
18.00	28.4	27.9	Vane lights
21.00	27	29.4	Life lights

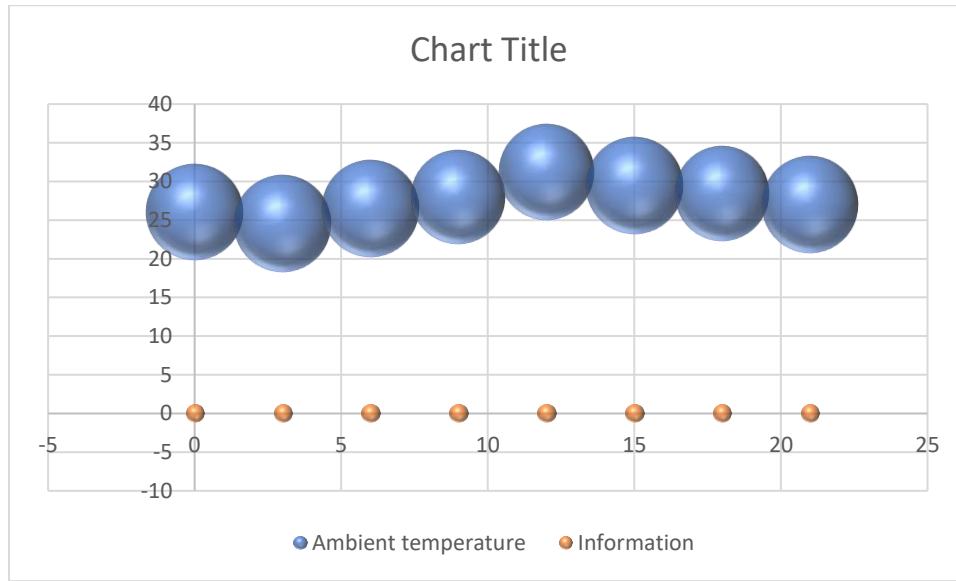


Figure 5.1 Graphs of Temperature Measurement Results with Temperature Limits 32-29 ° C.

4. Discussion and Conclusion

In Table 1. Chicken Age Test Results over 12 days Temperature Limit 24 - 26 ° C. From table 1 and figure 1.1, we can see the temperature of the cage can be maintained between the temperature ranges of 26 oC to 25 oC. Only in the range of 12.00 WIB noon to 15.00 WIB, the temperature of the cage reaches a temperature of 28.4 oC and 26.9 oC. This is due to the large value of the ambient temperature greatly affecting the temperature of the cage so that the fan cannot maintain the temperature of the cage at the specified temperature value. The light will automatically turn on at the temperature the cage is under 24 oC, and the lamp will automatically turn off when the temperature reaches a temperature above 25 oC. While the fan will automatically turn on when the temperature of the cage is above 26 ° C and will turn off automatically when the temperature reaches temperature of 25 ° C. Table 2. Results of Chicken Age Testing 9 days Temperature Limit 25 - 28 ° C. From table 2 and figure 2.1, we can see the temperature of the cage can be maintained between the temperature ranges of 27 oC to 25 oC. Only in the range of 12.00 WIB noon to 15.00 WIB, the temperature of the cage reaches a temperature of 28.4 oC and 26.9 oC. This is due to the large value of the ambient temperature greatly affecting the temperature of the cage so that the fan cannot maintain the temperature of the cage at the specified temperature value. The light will automatically turn on at the temperature the cage is under 25 oC, and the lamp will turn off automatically when the temperature reaches a temperature above 26 oC. While the fan will automatically turn on when the temperature of the cage is above 27 ° C and will turn off automatically when the temperature reaches a temperature of 25 ° C Table 3. Test Results for Chicken Age 6 days Temperature Limit 28 - 25 ° C. From table 3 and figure 3.1, we can see the temperature of the cage can be maintained between the temperature ranges of 28 oC to 25 oC. Only in the range of 12.00 WIB, the noon temperature reaches 28.4 oC; this is due to the large value of the ambient temperature greatly affecting the temperature of the cage so that the fan cannot maintain the temperature of the cage at the specified temperature value. The lamp will automatically turn on when the temperature of the cage is below 25 oC, and the lamp will turn off automatically when the temperature reaches a temperature value above 27 oC. While the fan will automatically turn on when the temperature of the cage is above 28 ° C and will turn off automatically when the temperature reaches a temperature of 27 ° C. Table 4. Results of Chicken Age Testing for 3 days Temperature Limit 30 - 27 ° C. From table 4 and figure 4.1, it can be seen that the temperature of the cage can be maintained between the temperature ranges of 30 oC. Up to 27 oC. The temperature of the cage can be maintained properly in accordance with predetermined temperature limits. The lamp will automatically turn on when the temperature of the cage is below 27 oC, and the lamp will turn off automatically when the temperature reaches a temperature value above 29 oC. While the fan will automatically turn on when the temperature of the cage is above 30 ° C and will turn off automatically when the temperature reaches a temperature of 29 ° C. Table 5. Results of Chicken Age Test for 1 day Temperature Limit 32- 29 ° C. From table 5 and figure 5.1 it can be seen that the temperature of the cage can be maintained between a temperature ranges of 32 oC to 29 oC. The temperature of the cage can be maintained properly in accordance with predetermined temperature limits. The lamp will automatically turn on when the temperature of the cage is below 29 oC and the lamp will turn off automatically when the temperature reaches a temperature value above 31 oC. While the fan will automatically turn on when the temperature of the cage is above 32oC and will turn off automatically when the temperature reaches a temperature of 31oC.

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