

Web-Based Chicken Feed Equipment Monitoring System

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ABSTRACT

The broiler chicken farming industry is a strategic sector in meeting the community's animal protein needs. Feed contributes the largest cost in chicken farming, accounting for approximately 65% of total production costs. Inaccurate feeding can result in suboptimal chicken growth and increased production costs. To address this issue, this research developed a web-based chicken feed weight monitoring system aimed at helping farmers monitor feed availability in real time and analyze feed data more effectively. The system uses a load cell sensor to measure the weight of feed in the feed container and displays the monitoring results online, facilitating user monitoring and decision-making. The initial research phase included analyzing user needs to ensure the system meets field requirements. However, the system still has limitations, such as the lack of integration of environmental sensors (temperature and humidity), which are also important for maintaining chicken health, and limited features such as data backup, data download, and mobile display. For further development, the implementation of environmental sensors and these features is expected to improve the system's functionality. This way, farmers can not only monitor feed consumption accurately but also manage coop conditions more comprehensively and gain easy data access through a mobile application for faster and more accurate decision-making.

Keywords: *Feed monitoring system, chicken feed weight, feed management, real-time monitoring.*

INTRODUCTION

The chicken farming industry, particularly broiler chickens, is a crucial sector in meeting the community's animal protein needs. Feed availability and management are crucial factors in chicken farming. Feed is the largest cost component in chicken farming, accounting for approximately 65% of total production costs (Vebi et al., 2024). Inaccurate feeding can impact chicken growth, costs, and production yields.

This problem creates a gap between expected feed management and field practice (Eka, 2024). Several previous studies have attempted to address this issue by developing automated feeding systems using load cells and application-based monitoring, but these were limited to advanced data processing features (Harun, 2019). This research presents a novel approach through the development of a web-based system for monitoring and analyzing feed weight data integrated with load sensors and Internet of Things (IoT) technology using a NodeMCU ESP8266 microcontroller (Widiatmika & Pratama, 2015). This system not only measures feed weight data, but also provides daily feed consumption analysis information that can be accessed by farmers.

Thus, this study supports and extends previous research by providing a more accurate and easily implemented feed monitoring automation solution for small to medium-scale farms (Akhsan et al., 2022). The main objective of this study is to develop a chicken feed weight monitoring system that helps users ensure feed availability through feed container monitoring and data analysis.

METHOD

The Waterfall method is a research method that involves six stages (Sujono & Herlambang, 2021). The steps in the waterfall method are as follows:

- a) Requirements Analysis, which is the analysis of user needs.
- b) System Design, which is the design creation stage.

- c) Implementation, which is the system creation stage.
- d) Testing, which is the system testing stage.
- d) Deployment, which is the implementation of the system.
- e) Maintenance, which is the system maintenance stage.

1. Diagram Blok

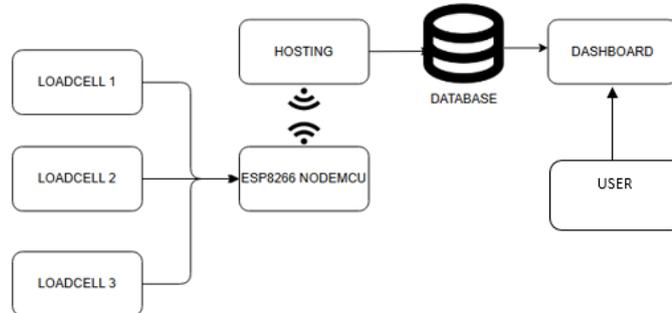


Figure 1 Diagram Blok

The system uses three load cell sensors, each installed at a different feed weight measurement point in the chicken feed container. The load cell sensors accurately measure the feed weight and transmit the measurement data to the ESP8266 NodeMCU module. The ESP8266 NodeMCU module acts as a data processing center by receiving signals from the three load cell sensors and then processing the data simultaneously. Next, this feed weight data is sent wirelessly via a Wi-Fi connection to a pre-arranged hosting server. The hosting server is responsible for storing the feed weight data in a database that allows it to be accessed at any time. From this database, feed weight data can be displayed and monitored via a web-based dashboard, allowing users to view feed weight information in real-time or based on specific time periods.

2. Flowchart

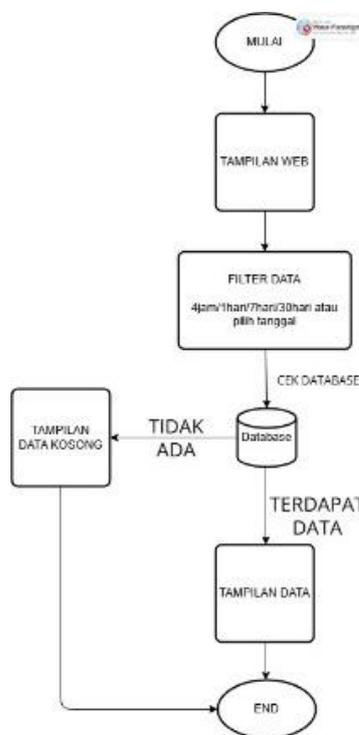


Figure 2. Flowchart

Chicken feed monitoring system flowchart that explains how the system works, when the user starts it will display the dashboard, after that the user displays the data with a data filter then

continues with a database check, if there is data then the data will be displayed, if there is no data then the data display is empty

3. Database Design

Table 1. data_pakan

No	Field	Tipe Data	Null
1	Id	Int(11)	NO
2	waktu	Datetime	NO
3	loadcell1_berat	Decimal(8,2)	NO
4	loadcell2_berat	Decimal(8,2)	NO
5	Loadcell3_berat	Decimal(8,2)	NO
6	total_berat	Decimal(8,2)	NO
7	konsumsi	Decimal(8,2)	NO
8	tanggal	Date	NO
9	waktu_input	timestamp	NO

In this data_feed table, it has a function as a data storage device sent by the NodeMCU microcontroller from the load sensor.

Table 2. ringkasan_harian

No	Field	Tipe Data	Null
1	Id	Int(11)	NO
2	tanggal	Date	NO
3	total_konsumsi	Decimal(8,2)	NO
4	rata_rata_berat	Decimal(8,2)	NO
5	berat_minimum	Decimal(8,2)	NO
6	berat_maksimum	Decimal(8,2)	NO
7	waktu_input	timestamp	NO
8	waktu_update	timestamp	NO

This table functions as a data storage for feed which will be displayed in the daily summary data.

Table 3. konfigurasi_sistem

No	Field	Tipe Data	Null
1	Id	Int(11)	NO
2	kunci_config	varchar(50)	NO
3	nilai_config	text	YES
4	keterangan	varchar(255)	YES
5	waktu_update	timestamp	NO

This configuration table is used to store important settings that govern how the chicken feed weight monitoring system displays and processes data.

Tabel 4 analisis_sistem

No	Field	Tipe Data	Null
1	Id	Int(11)	NO
2	tanggal	Date	NO
3	Konsumsi_30menit	Decimal(8,2)	YES
4	total_perhari	Decimal(8,2)	YES
5	rata_wadah1	Decimal(8,2)	YES
6	rata_wadah2	Decimal(8,2)	YES
7	rata_wadah3	Decimal(8,2)	YES
8	max_wadah1	Decimal(8,2)	YES

9	max_wadah2	Decimal(8,2)	YES
10	max_wadah3	Decimal(8,2)	YES
11	min_wadah1	Decimal(8,2)	YES
12	min_wadah2	Decimal(8,2)	YES
13	min_wadah3	Decimal(8,2)	YES
14	waktu_update	timestamp	NO

This feed consumption summary table is designed to store daily recapitulation data on chicken feed usage and condition with quite detailed details

4. User Interface

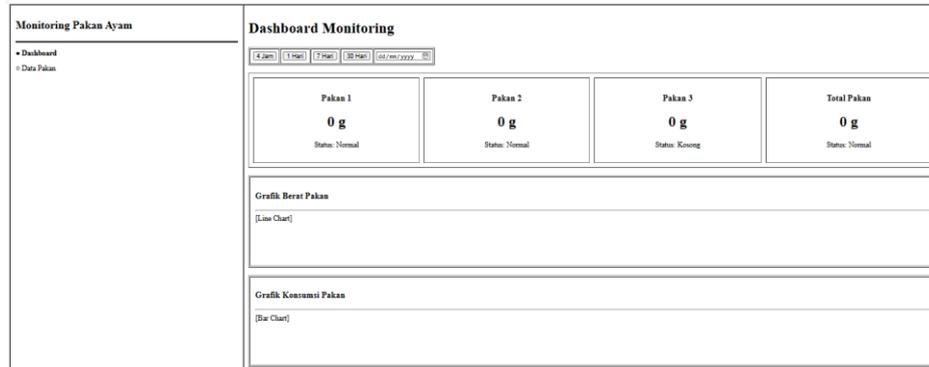


Figure 3. Mockup Dashboard

In Figure 3 is a display of the design of the main dashboard, there are 4 main features, namely filters for 4 hours, 1 day, 7 days, 30 days and custom date options, data from each feed container and total feed, feed weight graphs, and feed consumption graphics..

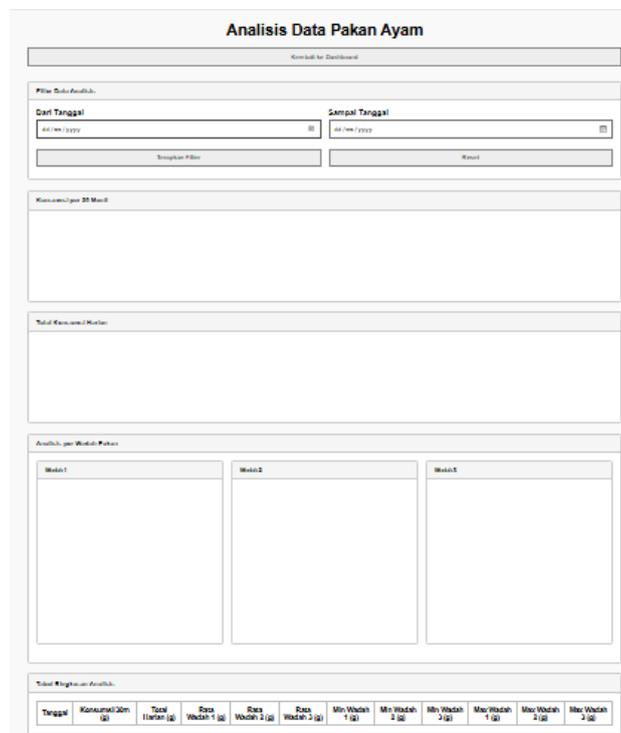


Figure 2. Mockup Analyst Data Design

Figure 4 shows part of the chicken feed weight data analysis, there are main features, namely date filter, feed consumption per 30 minutes, total daily consumption, analysis per feed container, and total summary..

RESULT AND DISCUSSION

This chapter will discuss the testing of the system design that was created, as well as a discussion of the results.

Research Results

The result of this design is a web-based chicken feeding device.

a) Dashboard



Figure 3. Dashboard

The Chicken Feed Monitoring Dashboard displays real-time information on feed conditions at three different points (Feed 1, Feed 2, and Feed 3). In addition to displaying numerical data, this dashboard is also equipped with a Feed Weight Graph that visualizes feed usage trends over time. This graph helps farmers or administrators analyze feed consumption patterns, such as periods of peak usage or significant stock declines. With this feature, users can make faster decisions, such as scheduling refills or evaluating feed distribution.

b) Feed Data Analysis

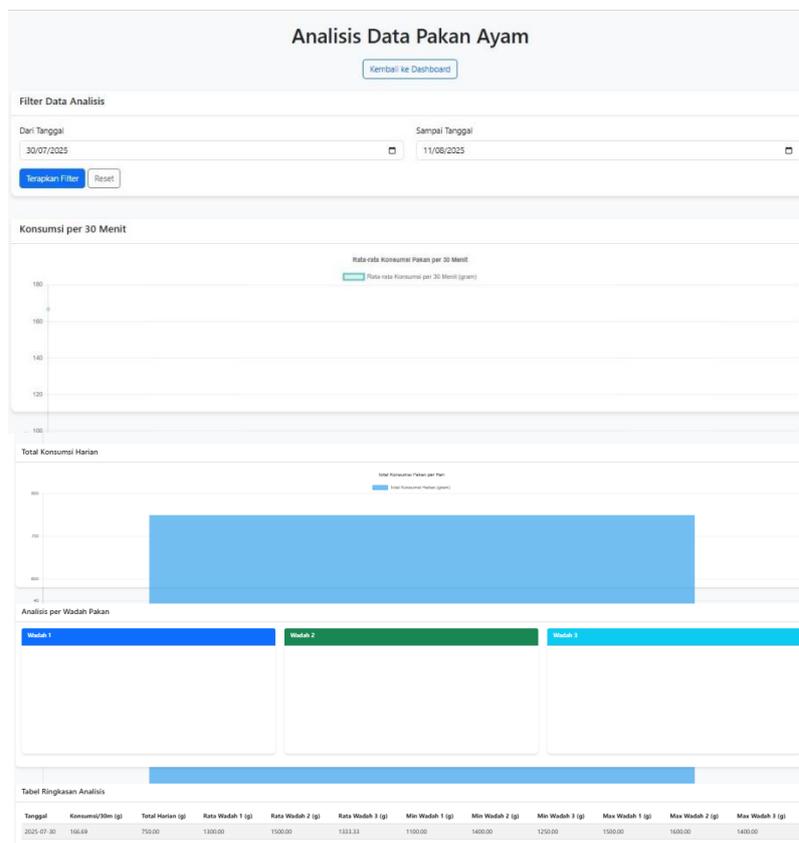


Figure 6: Feed Data Analysis

This display displays the Analysis Data Filter panel with two date input fields and two buttons for setting or clearing filters. Next, the 30-Minute Consumption graph area is still empty, with dedicated space for later data display. The bottom section consists of the Total Daily Consumption area at the top, followed by three parallel boxes for Analysis per Feed Container for Container 1, Container 2, and Container 3, each neatly framed. At the very bottom is the Analysis Summary Table with columns already organized, but no data yet. All elements are arranged in a simple box style for easy reading and focus on structure rather than content.

Discussion

The system testing yielded the following results.

Data Pakan Hari Pertama							
No	Tanggal	Waktu	Wadah 1	Wadah 2	Wadah 3	Isi Pakan	Konsumsi
1	01/07/2025	07.00	4000	4000	4000	12000	0
2	01/07/2025	07.30	3540	3780	3672	10992	1008
3	01/07/2025	08.00	3270	3490	3395	10155	837
4	01/07/2025	08.30	3250	3370	3350	9970	185
5	01/07/2025	09.00	3250	3280	3280	9810	160
6	01/07/2025	09.30	3180	3159	3190	9529	281
7	01/07/2025	10.00	2730	2580	2840	8150	1379
8	01/07/2025	10.30	2640	2380	2610	7630	520
9	01/07/2025	11.00	2570	2290	2580	7440	190
10	01/07/2025	11.30	2540	2290	2570	7400	40
11	01/07/2025	12.00	2540	2290	2570	7400	0
12	01/07/2025	12.30	2470	2240	2500	7210	190
Rata-rata Konsumsi							399,167

Figure 7: First Day Test Table

The table above shows that the chickens' eating patterns tend to be morning and midday. This is demonstrated in the table, where 7:30 to 8:00 and 10:00 to 10:30 have the highest consumption rates compared to the other tables, which show lower consumption rates.

Data Pakan Hari Kedua							
NO	Tanggal	Waktu	Wadah 1	Wadah 2	Wadah 3	Isi Pakan	Konsumsi
1	02/07/2025	07.00	4000	4000	4000	12000	0
2	02/07/2025	07.30	3950	3910	3980	11840	160
3	02/07/2025	08.00	3930	3890	3790	11610	230
4	02/07/2025	08.30	3870	3830	3620	11320	290
5	02/07/2025	09.00	3080	3280	3150	9510	1810
6	02/07/2025	09.30	2950	3180	3050	9180	330
7	02/07/2025	10.00	2830	3030	2900	8760	420
8	02/07/2025	10.30	2780	2860	2875	8515	245
9	02/07/2025	11.00	2380	2430	2390	7200	1315
10	02/07/2025	11.30	2200	2370	2240	6810	390
11	02/07/2025	12.00	2200	2370	2240	6810	0
12	02/07/2025	12.30	2150	2190	2180	6520	290
13	02/07/2025	13.00	2070	1870	1940	5880	640
Rata-rata Konsumsi							470,769

Figure 8: Second Day Test Table

The table on the second day of testing shows that the chickens' eating patterns changed. Prior to the test, the chickens were fed a small amount of feed to determine whether their feeding times would change or remain the same. This indicates a change in the chickens' eating patterns. In the first test, the highest feeding rates were between 7:30 and 8:00 and 10:00 and 10:30. In the second test, this changed to 9:00 to 9:30 and 11:30, but at 12:00, the chickens remained inactive. From both tests, it was shown that chickens consumed feed every hour, and with 12 samples, chickens could consume 5 to 6 kilos in half a day.

CONCLUSIONS

Based on the design, development, and implementation results, this web-based chicken feed weight monitoring system has successfully monitored feed weight and consumption in real-time in three containers with sufficient accuracy and fast response, replacing less efficient manual methods. The system provides feed consumption analysis at various time intervals with interactive graphs and filters that facilitate trend identification, and is equipped with a simple, responsive, and easy-to-use dashboard. The feed weight limit setting feature allows for optimal consumption control, positively impacting feed distribution and chicken growth. In addition, the system is designed flexibly to be adjusted to field needs and has the potential to be further developed through the integration of other IoT sensors and predictive

analytics to support more anticipatory management decisions.

However, this research also has limitations, such as the lack of integration of environmental sensors, such as temperature and humidity, which play a crucial role in maintaining chicken health and stable coop conditions. Some features, such as backup, data download, and a mobile display, would simplify data review for users. As a potential development opportunity, the implementation of temperature and humidity sensors, data backup, data download, and a mobile display are expected to expand the system's functionality, enabling farm management to monitor not only feed consumption but also the development of a mobile application for fast and simple data access, which will also facilitate monitoring and decision-making for farmers. Future research could explore optimizing data processing algorithms for predicting feed requirements and integrating the system with other automation devices on farms to create a more comprehensive smart farming ecosystem

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