

**DASHBOARD DESIGN DEVELOPMENT OF BROILER FARMER FOR FARM
MANAGEMENT DECISION MAKING AND PERFORMANCE MEASUREMENT**

POSTGRADUATE THESIS



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2023

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Yogyakarta, March 8th, 2023



Muhammad Farhan Hidayat

POSTGRADUATE THESIS APPROVAL OF SUPERVISOR

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POSTGRADUATE THESIS



(Winda Nur Cahyo, S.T., M.T., Ph.D.)

POSTGRADUATE THESIS APPROVAL OF EXAMINATION COMMITTEE

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MANAGEMENT DECISION MAKING AND PERFORMANCE MEASUREMENT**

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DEDICATION PAGE

Assalamu'alaikum Wr. Wb.

Al-hamdu lillahi rabbil 'alamin and Gratitude are presented to Allah *Subhānahu wata'ālā* for blessing, love, opportunity, health, mercy, Who granted the author primary inspiration and stamina all along to complete the Postgraduate Thesis which entitled “Dashboard Design Development of Broiler Farmer For Farm Management Decision Making And Performance Measurement”. Greeting devoted to our beloved Prophet Muhammad *Sallā -llāhu 'alayhī wa- 'ālihī wa-sallam*, who has brought humankind to the world full of knowledge as it is today.

This report is dedicated to the author's family and all of the readers, especially Industrial Engineering Department students as one of the collection in developing the knowledge. Therefore, the author would like to thank to those who have been sincerely delivering supports and motivation in the completion of this undergraduate thesis report. The author would like to thank:

1. Allah SWT, for all of the uncountable blessing and Prophet Muhammad SAW for His guidance in the right way.
2. The author's beloved father, Letkol (Purn) Suharso SKM., mother, Siti Mahmudah, A.md. Kep., sister, dr. Fajar Mutmainah, and other families who have prayed and given encouragement and moral also material support during the process of report completion.
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constructive criticism from all parties is expected for the perfection of this report. The author hopes this report t would bring advantages for everyone who reads this.

Wassalamu'alaikum warahmatullahi wabarakatuh

Yogyakarta, April 2023

A handwritten signature in Arabic script, which reads 'Muhammad Farhan Hidayat'.

Muhammad Farhan Hidayat

MOTTO

“For indeed, with hardship [will be] ease.” “Indeed, with hardship [will be] ease.”

- Q.S. Al-Insyirah [94]: 5-6

“So, which of the favors of your Lord would you deny?”

- Q.S. Ar-Rahman [55]: 61

“Sesungguhnya mereka yang membencimu, cuma tak mampu mengalahkan akhlak dan kebaikanmu, jadi tak perlu marah apalagi membalas”

- Syaikh Ali Saleh Mohammed Ali Jaber

“Your mind must be stronger than your feelings.”

“Freedom will only come when you no longer trade your time for money.”

“Cost is the enemy of the poor man, so the poor try to save money. Time is the enemy of the rich man, so the rich try to save time.”

“Close your eyes. Focus on making yourself feel excited, powerful. Imagine yourself destroying goals with ease.”

“Do the impossible and you’ll never doubt yourself ever again.”

“High standards protect you from low-quality experiences.”

“You can become rich, you can become strong, you can take care of your loved ones and enjoy the fact it will be very difficult.”

“Don’t listen to the advice of people who are living lives you don’t want to live.”

“The temporary satisfaction of quitting is outweighed by the eternal suffering of being a nobody.”

- Andrew Abu Tate

ABSTRACT

The poultry industry provides about 65 percent of all animal protein and employs about 12 million workers, or 10% of the overall national labor force. About 85% of broiler farming industry are dominated by partnership system. Although the core-plasma partnership is one of the solutions to the shortage of resources (financial, technological, and human), those partnership system has resulted in various problems: plasma farmer has significant dependency on the partner management company which makes plasma farmer bargaining position to the main corporation is poor. Broiler farmer, on the other hand, seldom maintained thorough data on farming operation or economic costs, which makes doing a more extensive performance measurement difficult (Coyne, et al., 2020). Therefore, a study on farm performance measurement is crucial. In order for providing solution of manual bookkeeping, the induction of information system is essential. The research focused on the dashboard design for farm management and performance measurement of broiler farmer. The dashboard expected to provide independency in bookkeeping, maximizing current farming cycle profit, and future performance measurement. The approach of self-service business intelligence used for developing and designing the dashboard. The result of the research, there are five dashboard designed with the coverage of history of all farming period, RAG analysis, all farming performance, and harvest setting for maximizing profit.

Keywords: *Information System, Dashboard Design, Self-Service Business Intelligence, Farm Performances*

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CHAPTER I

INTRODUCTION

1.1 Background

The meat demand increased recently owing to rising living standards, encourage meat production and consumption. Meat demand runs linearly with yearly increase in population by 83 million over the recent 10 years (Hovhannisyan & Grigoryan, 2016). Poultry and pig meats have seen to be the greatest growth in consumption among the other types of meats that are currently available on the market (Milford, et al., 2019). Moreover, the worldwide increase in chicken meat consumption is universal. Poultry production is a vital component of human nutrition, and it is expanding rapidly around the world (Costantini, et al., 2021). Globalization necessitates competitive goods, such as Indonesian poultry meat (Wahyono & Utami, 2017). In Indonesia, the poultry industry provides about 65 percent of all animal protein and employs about 12 million workers, or 10% of the overall national labor force (Wright & Darmawan, 2017).

Despite the industry's optimism, Indonesia's broiler chicken and egg costs remain much higher than those in Europe and the United States. Average prices for broiler chicken meat in the EU were about IDR 32,600/kg (+24%) from March to October of 2018, but Indonesia price are around IDR 40,500/kg (+42%). During this time in Indonesia, a kilogram of eggs cost about IDR 28,000. During the same time period, the average egg price in Indonesia was around IDR 28,000/kg, but in the Europe it was slightly above IDR 21,000/kg (+33%) (Ferlito & Respatiadi, 2018).

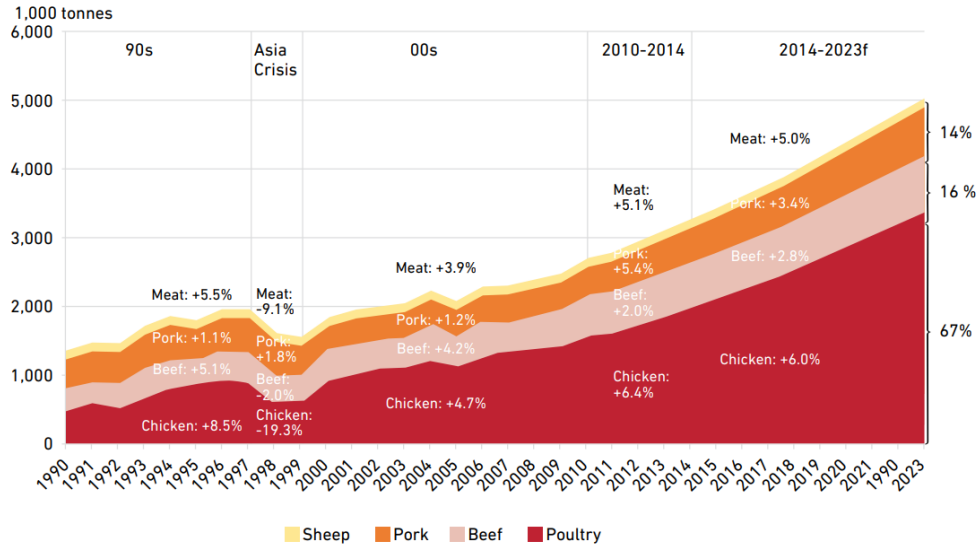


Figure 1. 1. The Indonesian Meat Market (Mulder, et al., 2015)

As seen in the graph, Rabobank anticipates significant industrial development, although slower than in previous decades. All of the big businesses are contemplating additional expansions due to the tremendous growth in 2017 and 2018 (Anonymous, 2018).

It is worth noting that in several countries, broiler production chains are partially controlled by integrated corporations (Burgos, et al., 2019). The term "integrated company" refers to a business whose holdings include not just broiler farms but also feed facilities, farmers, slaughterhouses, processed chicken products, and even the store (Vinueza, 2017). Before going through the production stage, the broiler must go through the farm raising stage. In Indonesia, there are at least three business types of broiler farms namely: 15 % from farms owned by their owners, 45 % through partnerships inside the companies, and 40 % partnerships from farm outside the company. (Saptana, et al., 2017). Indicated about 85% of broiler farming industry are dominated by partnership system. One of the most known partnership model for broiler farming in Indonesia is core-plasma partnership. Broiler farmer as plasma aligned with livestock firms as the primary group in the core-plasma relationship model, and cooperative operations proposed in a production share arrangement, method(s) mutually agreed upon by the parties, such as a contract (Suranto & Pratiwi, 2020).

Broiler management company act as a core which for a period of time assisting farmers with processing facilities such as Day Old Chicken (DOC), feed, medications, vaccines, supplements, and selling of poultry goods for mutual benefit (Muzzayyanah, et al., 2017). This partnership model integrates productive farm management with the various livestock processing methods. Modernization and concentration have contributed to the growth process. As of 2017, the Indonesian broiler chicken market leader, PT Charoen Pokphand Indonesia had a 31% share of the poultry feed market and a 41% share of the day-old-chicken market (DOCs) (Partners, 2017).

Although, lack of resources (monetary, technical, and human) has slowed the expansion of the broiler industry, but the core-plasma collaboration is one way to address this problem. In the other hand, Rohmad (2013) mentions that the current relationship has resulted in various problems:

1. The plasma farmer has significant dependency on the partner management company.
2. The plasma farmer bargaining position to the main corporation is poor.
3. The rural population does not usually accept the distribution and marketing of broiler distribution systems.
4. Small-scale farmer should well prepared for the broiler market.

In reality, broiler farmer situation reveals that capital procurement, input and output price fluctuation, supporting farmer resources including manpower are in shortfall (Rudra, et al., 2018). The widespread reliance on manual bookkeeping processes increases the risks of information loss and mistakes. (Sari & Pandowo, 2020). Moreover, data divergence often occurred between plasma farmer and core company which lead to financial loss on one side.

Until now, there are many broiler farmer in Indonesia running their operations without the vision, purpose, and management plan. Additionally, broiler farmer barely access to the performance of their farming operations. Broiler farmer, on the other hand, seldom maintained thorough data on farming operation or economic costs, which makes doing a more extensive performance measurement difficult (Coyne, et al., 2020). Therefore, a study on farm performance measurement is crucial.

Various performance measurement methods have been widely applied by academics and practitioners. A research by Muda, et al. (2018) promoted Balanced Scorecard as performance measurement methods for examining the Palm Oil Cooperative performance. A study of the performance of the Slovakian Republic's public administration using the Balanced Scorecard Lesakova & Katarina (2016). An IPMS was utilized by Aziza et al. (2019) to determine objectives and key performance indicators. Sangwa & Sangwan (2018) offered a comprehensive performance assessment approach for evaluating the influence of lean deployment across an organization's activities. Li, et al. (2021) applied performance pyramid or better known as SMART system in STEM education by identifying six major systems.

However many various performance measurement methods have been widely applied by academics and practitioners, broiler farms have their own KPIs for measuring farm performance. In terms of mortality, feed consumption, ultimate body weight, Feed Conversion Ratio (FCR), and index of performance (IP), Nuryati (2019) argues that these metrics best characterize the success of broiler production. Feed usage, harvested weight, the Feed Conversion Ratio (FCR), and the depletion rate were all used by Marom (2017) as farm performance metrics. Mortality, body weight growth, weekly feed consumption, Feed Conversion Ratio (FCR), Income Over Feed and Chick Cost (IOFCC), and the European Economic Factor (EEF) were all utilized to evaluate broiler chicken performance by Fitro et al. (2015). The measurement employs a RAG analysis, with green signifying on the target, yellow indicating approaching target, and red signifying failure to meet the target (far from target).

In order for providing solution of manual bookkeeping, the induction of information system is essential. Information systems can be useful for optimizing the use of raw data and handling them in integrated and real-time manner (Oliveira, et al., 2016). In the industrial era 4.0, the information system has become an accurate source to support decision making and to determine the flow of information processes. Refers to the information system in the supply chain system has been greatly developed today (Fiorini & Jabbour, 2017).

Business Intelligence is the one of the most known IT system. For many businesses, Business Intelligence (BI) seems to be a key driver of success (Olszak, 2016). In other hand, the

implementation of Business Intelligence is not easy things to do that reflected from previous study that concluded to high percentage of BI implementation failure. Depending on the source, between 70 and 80 percent of Business Intelligence adoption efforts fail due to a combination of technical and administrative issues (Garcia and Pinzon, 2017). Two of the top known reason behind failure of BI implementation are lack of IT experts and high dependence on IT department. Furthermore, most of the broiler farmer in Indonesia did not have sufficient IT resources. The solution provided by Imhoff & White (2011) with Self-Service Business Intelligence (SSBI). SSBI, according to Johannessen & Fulglseth (2016) is a data analytics technique that aims to allow non-technical business users to capture, collect, and analyze company and environmental data without the need for computer expertise. In conclusion, the study would use Self-Service BI in order for dashboard development of broiler farmer for performance measurement.

1.2 Problem Formulation

From this context, the writer able develop the research question. The question posed: "How are dashboard design for farm management and performance measurement of broiler farmer with Business Intelligent approach?"

1.3 Research Objective

Concerning the stated goal in the problem formulation, objective for the results of this research is proposed dashboard design for farm management and performance measurement of broiler farmer.

1.4 Research Limitations

Research limitations are set by the writer to prevent fruitless debates. The limitations are as follows.

1. The research conducted in two farms within three farming periods for Farm A and two farming periods for Farm B

2. The research focused on performance measurement for farms with minimum 40000 broilers capacity.
3. The research conducted in broiler farm that engaged in core-plasma partnership model.
4. The research would employ just defined reports that strongly connected to the farm performance indicators identified.
5. The dashboard created as result of this research is only a prototype and has not been implemented yet.

1.5 Research Benefits

This research undertaken with the belief that it would be mutually beneficial. The projected advantages consist of:

1. Broiler farmer able to ascertain farm performance indicators that specified as an output from the research.
2. Broiler farmer can transform its raw data into visually appealing information that they can simply comprehend and process.
3. By examining identified certain key farm performance, the business may able to determine the appropriate actions and solutions to the results in order for maximizing profit and preventing any excessive losses.
4. Core company of farmer can easily monitor current performance of many of their farmer partner.
5. By comprehending the process of creating dashboard, broiler farmer can perform future performance measurement independently.

CHAPTER II

LITERATURE REVIEW

2.1 Inductive Study

Inductive studies explain prior study related to the research topic which will be carried out. The aim is to make previous research as a reference in developing methods and problems in current research. Identifying the gaps between the prior research and that of present research requires a visual representation of the state of the art in the field of study:

Table 2. 1. Research State of the Art

No	Author	Year	Scope of Research					Object			
			Performance Measurement	Dashboard Development	Business Intelligence	SSBI	Implementation	Small-Medium Enterprise	Big Enterprise	Core-Plasma Partnership	Broiler Farmer
1	Suranto & Pratiwi	2020	✓						✓	✓	✓
2	Rudra, et al.	2018	✓								✓
3	Sari & Pandowo	2020	✓								✓
4	Coyne, et al.	2020	✓						✓		✓
5	Muda, et al.	2018	✓						✓		
6	Lesakova & Katarina	2016	✓	✓	✓				✓		
7	Aziza, et al.	2019	✓	✓	✓			✓			
8	Sangwa & Sangwan	2018	✓						✓		
9	Li, et al.	2021	✓					✓	✓		
10	Gaardboe, et al.	2017			✓		✓		✓		
11	Devi & Priya	2016	✓		✓		✓	✓			
12	Lennerholt, et al.	2018	✓	✓	✓	✓	✓		✓		
13	Silahtaroglu & Alayoglu	2016	✓		✓			✓	✓		
14	Peters, et al.	2016	✓		✓				✓		

No	Author	Year	Scope of Research					Object			
			Performance Measurement	Dashboard Development	Business Intelligence	SSBI	Implementation	Small-Medium Enterprise	Big Enterprise	Core-Plasma Partnership	Broiler Farmer
15	Vajirakachorn & Chongwatpol	2016		✓	✓			✓	✓		
16	Radenkovice, et al.	2018	✓	✓	✓				✓		
17	Immawan, et al.	2019	✓	✓				✓			
18	Banerjee & Mishra	2017	✓		✓				✓		
19	Hapsari, et al.	2017	✓								✓
20	Samsi, et al.	2021	✓								✓
21	Nurtini, et al.	2017	✓							✓	✓
22	Nuryati	2019	✓								✓
23	Marom, et al.	2017	✓								✓
24	Supartini, et al.	2017	✓							✓	✓
25	Woro, et al.	2019	✓								✓
26	Burhanuddin	2018	✓	✓	✓				✓		✓
27	Hidayat	2023	✓	✓	✓	✓				✓	✓

Implementing BI to IS of healthcare data was the focus of the research by Gaarboe et al (2017). Twelve Danish public hospitals participated in the study's experimental testing. This study's results show that the efficacy of business intelligence is affected by a variety of factors, such as the quality of the system, the quality of the information, and the satisfaction of the users. Successful implementation of BI on Indian SMEs for invoicing reasons was accomplished by Devi and Priya (2016). To analyze application input data and provide a visual BI solution, a sampling method was used. The research of Lennerholt et al. (2018) was centered on the challenge of putting self-service BI into practice. There are six problems with SSBI related to "data access and utilization," and four problems with "self-reliant users," that are explored in the form of literature review.

Silahtaroglu & Alayoglu (2016) assessed the usefulness of a BI system. As part of this study, interviews were conducted with the senior executives of organizations operating in a variety of sectors. The study confirmed what had been suspected beforehand: eight of the organizations were not using any strategic management tools. Improving management control system quality is aided by research on the capacity to assess BI system quality. This study's results indicate that BI improves the precision with which performance is measured. Possessing these skills might give you a leg up in the business world. To better manage and convert data into insight for festival tourism, Vajirakachorn and Chongwatpol (2017) investigated the feasibility of incorporating a business intelligence framework. Researchers employed a system that included database management, business analytics, business performance monitoring, and data visualization to get insight from visitor data.

Radenkovic et al. (2018) examined the analytic aspects of smart grids and how they may be repurposed for business intelligence growth. This research shows that with the use of business intelligence, monitoring performance and handling the market can be done more effectively. Immawan et al. (2019) used the SMART system, together with the AHP and OMAX scoring systems, to evaluate the performance of SMEs. The study's findings, a catalog of 31 key performance indicators (KPIs) employed by SMEs, are presented. In addition, a dashboard was built specifically for displaying critical qualities, which may be used to evaluate SMEs and proper performance solution.

Specifically for broiler chicken performance measurement scope, lot of prior research specifically mentioned for broiler performance. Hapsari, et al. (2018) measured broiler feed conversion ratio and body weight gain while using *Ciripedia sp* powder as a feed alternative. The research concluded that a mixture of 70% feed and 30% *Ciripedia sp* powder may raise the body weight and FCR of broilers. Samsi, et al. (2021) examine the impact of closed house farm density level to albumin plasma level on cobb broiler chickens. There was no impact on final weight, but there was a significant effect on plasma albumin levels in 1m² cages housing Cobb strain broiler chickens at densities of 8-12 chickens/m². The best density in terms of plasma albumin levels is 10, 11, and 12 chickens/m², since these densities had a substantial impact on lowering plasma albumin levels. In the same cases, result by Woro, et al (2019) stated that the denser the farm, the

higher the amount of consumption and FCR. While the body weight decreased but when viewed with a unit area of 20 chickens it was more efficient. Farming using farm densities of up to 20 chickens/m² considered more efficient and economical.

The performance of broiler chicken farmer using a partnership arrangement evaluated by Nurtini, et al (2017). The study done via a survey of broiler farmers who joined the partnership scheme. The results revealed that the broiler farmer got IDR 13,836,594/period in income from the core-company, but the farmers' net income was IDR 7,864,326/period. Nuryati (2019) analyzed the performances on broiler chicken within closed house farm and opened house farm. The results showed that in closed houses, mortality was 13.07%, feed consumption was 2.53 kg/bird, harvested body weight was 1.43 kg/bird, FCR was 1.78 and IP was 213, while in open houses, mortality was 7.70%, feed consumption was 2.24 kg/bird, harvested body weight was 1.38 kg/bird and FCR was 1.78 and IP was 255. Broiler chicks do better in open housing conditions. Broiler performance was dismal in both housing types, with indexes far below 300.

The goal of the study by Marom et al. (2017) was to compare and contrast the productivity of broilers raised in closed and open house systems at two different elevations. The upland closed farm had the lowest depletion value (1.8%), the lowland open farm had the lowest feed consumption value (3.26 kg/head), the highland closed farm had the highest harvest weight (2,121 kg/head), and the lowland closed farm had the lowest FCR value (1,551). Broilers farmed in a controlled environment outperformed their open-air counterparts. High-altitude, closed-house farming is the most productive kind of farming. The following describes the production and the farmers who produce it, as identified by Supartini et al., (2017) (1) Ninety percent of broiler farmers are of working age, seventy-five percent have at least a high school diploma, and forty-five percent are business owners with at least three years of experience in the broiler industry and knowledge of either of the two common forms of broiler partnership structures. According to the results, the most common kind of broiler partnership is the management contract.

Research by Burhanuddin (2018) has closest similarity to the current research which inducted the use of information system for core-company in order for controlling the provision of animal feed, determine the effectiveness of daily feed through the indication of FCR (feed

conversion ratio), determine the harvest performance of farmers based on IP calculation. The current research by Hidayat (2023) proposed the dashboard model for broiler farmer in order for controlling the daily performance of chicken farming through body weight, depletion, FCR and maximizing profit through IP, IOFCC.

2.2 Deductive Study

2.2.1 Daily Gain of Body Weight and Average Harvested Body Weight

Daily body weight gain is determined by subtracting body weight at the moment of weighing from body weight on the previous day. The increment in daily body weight of broilers is not constant, but rather grows everyday until it achieves its maximum growth rate, after which declines (Woro, et al., 2019). According to Soeharsono's opinion (1976), that body weight gain is an easier measure to give a clear picture of growth. The growth of broilers is very fast and growth starts from hatching until the age of 7 weeks, after which the growth rate will decrease (North & Bell 1990).

Based on Wijayanti (2016), variations in sex, feed intake, habitat, seeds, and feed quality are factors that influencing body weight gain. The rate at which chickens increase body weight is determined by genetics (strain), gender, environment, management, and the quality and amount of the feed they eat. In contrast to when they are under stress, the process of weight gain in broiler chickens may function well when they are kept in a comfortable environment. Due to the elevated temperature in the farm, the chicken will experience stress if it is unable to expel excess heat (Mariyam & Tantalo, 2020).

2.2.2 Depletion

Mortality is a measure of the number of deaths (generally or as a result of a particular cause) in a population, on a large scale population (Lacy & Vest, 2000). Whereas, defect chicken means chickens that are in an unhealthy condition which have physical disabilities or have diseases

in their bodies. Defect chicken are required to be removed from the farm because the disease they are suffering from allows it to affect the health condition of the normal chickens in the farm.

Therefore, the defect chickens were accumulated with the number of mortality due to the similarity that the chickens had been removed from the farm and were no longer stay with normal chickens. The rate of depletion determined by comparing the total number of chickens on the farm to the initial number of chickens.

Depletion rate is affected by various variables, including body mass, country, chicken breed, climate, ambient cleanliness, equipment and cage sanitation, and illness (North & Bell, 1990). Additionally, North and Bell (1990) concluded that broiler raising were effective if the total depletion rate was less than 5%. If an event is found to have an excessively high depletion percentage, a possible cause must be sought (Middelkoop & Gussem, 2013).

2.2.3 Feed Conversion Ratio (FCR)

The feed conversion ratio measures how much weight an animal gains relative to its total feed consumption during a certain time period. Feed conversion ratio (FCR) is a measure of livestock productivity; a higher FCR indicates that more feed is needed to increase an animal's body weight by one unit of weight. Feed conversion ratio (FCR) indicates how well chickens utilize feed to grow and thrive; a lower FCR value indicates better feed utilization. (Middelkoop & Gussem, 2013).

A high feed conversion number implies poor feed efficiency, whereas a low feed conversion value shows cattle consume more feed (Aryanti et al. 2013). According to Daud (2005), the higher the feed conversion value, the greater the amount of feed required to raise body weight per unit of weight, and the lower the feed conversion value, the higher the quality of the feed.

According to Hooidonk (2004), the probable reasons of a high FCR include wasted feed due to poor weighing of feed, faulty equipment, and feed lost due to tiny pest animals. In addition, it is possible due to poor quality feed, a high depletion rate, feeding strategy (ad libitum or

restriction), water availability (amount and quality), illness and health issues, poor quality chicks, a high ratio of males to females, a high body weight at harvest, and low temperatures.

2.2.4 European Economic Factor (EEF) for Poultry or Index Performance (IP)

To assess if a broiler farm is successful or not, the IP (Index of Achievement) was developed. This index was created in Europe under the name European Economic Factor (EEF) to evaluate the economics of a broiler farm. This indicator covered average body weight over a certain age, the feed conversion ratio (FCR), and the percentage of chicken alive during farming.

According to Kamara (2009), the performance index value is derived from harvested body weight, feed conversion, harvest age, and the proportion of chickens that survive throughout a farming cycle. When the IP value is high, the farm is productive and feed is used efficiently (Fadillah, 2007). A higher performance index value suggests efficient and effective broiler raising. According to Santoso and Sudaryani (2009), the production index can be categorized as follows:

- $IP \leq 299$ indicates poor performance
- $300 \leq IP \leq 325$ indicates fair performance
- $326 \leq IP \leq 350$ indicates satisfactory performance
- $351 \leq IP \leq 400$ indicates very satisfactory performance
- $400 \leq IP$ indicates excellent performance

2.2.5 Income Over Feed and Chick Cost (IOFCC)

Gross revenue is calculated by subtracting the cost of feed and Day Old Chicks from the overall costs incurred by the chicken farmer during the course of raising the hens. This yields the Income Over Feed and Chick Cost (IOFCC) (Fitro, et al., 2015). However, most of Indonesian broiler farmer known IOFCC as *Rekapitulasi Hasil Panen Peternak* (RHPP). The only differences for RHPP over IOFCC which RHPP considered the chemicals (drugs and vitamins) given by core-company as additional expenditures.

Different feed costs, DOC, and chemicals, in addition quality variation, may result in varying IOFCC values. Tantaló (2009) reported that the IOFCC value was affected by final body weight, feed consumption, feed price, and broiler selling price. Sjöfjan (2008) stated that the high and low IOFCC values were the result of a bigger or smaller disparity between chicken sales and feed costs incurred during the farming cycle. This is consistent with Rasyaf's (2007) assertion that the higher the IOFCC score, the more efficiently transformation of chicken feed into meat (excellent feed conversion).

2.2.6 Business Intelligence

Business intelligence is a wide term that comprises a number of activities, procedures, and technologies used to gather, store, analyze, and disseminate data to improve decision-making (Wanda & Stian, 2015). A key principle of business intelligence is the distillation of massive amounts of data and information into achievable steps of knowledge and insight (Correia, et al., 2019). Therefore, both the business purpose and technological functionality must be included in a good BI description. In order to develop a business intelligence system, data from many sources combined for business intelligence operations.

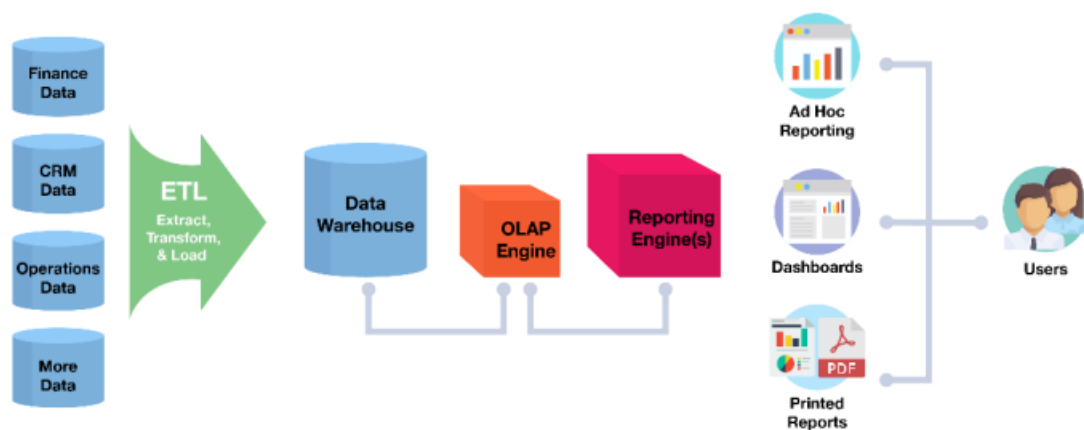


Figure 2. 1. Business Intelligence Structure (Retrieved from www.bigdataframework.org/analytcs-business-intelligence-and-biwhats-the-differenc/)

As previously seen, business intelligence functions by combining data from several sources to form a business intelligence system. Olszak and Ziemia (2006) state that there are four main components to consider while developing business intelligence:

1. ETL (Extract, Transform, and Load)

Data warehouses need a number of steps to be completed before they can be loaded into the structure, the first of which is to extract data from legacy systems and other sources.

2. Data Warehouse

Information compiled and presented in a structured manner for the purpose of guiding managerial action.

3. Online Analytical Processing (OLAP)

Its purpose is to optimize businesses by reporting, analysis, modeling, and planning using multidimensional, condensed representations of business data.. Data warehouses developed for advanced business intelligence systems may benefit from the usage of OLAP software and methodologies.

4. Data Mining

The data processing designed to detect patterns, correlations, and rules.

Business intelligence (BI) and data science are related fields that both involve working with data, there are some key differences between the two. BI is typically focused on collecting and analyzing data from within an organization, with the goal of providing insights that can be used to make informed business decisions (Chen, et al., 2012). BI often involves working with structured data that has been collected in a centralized data warehouse or other repository, and may use tools such as dashboards, data visualization, and reporting to help users understand and act on the data.

Data science, on the other hand, is a more broad and interdisciplinary field that involves using statistical and computational methods to extract insights and knowledge from data (Larose & Larose, 2014). Data science often involves working with both structured and unstructured data from a variety of sources, and may involve tasks such as data cleaning and preparation, exploratory data analysis, modeling and analysis, and interpretation and communication of results. Data

science also often involves the use of machine learning and other advanced techniques to build predictive models and uncover patterns in the data.

In summary, while BI is focused on providing insights from structured data within an organization to support decision-making, data science is a broader field that encompasses a wider range of techniques and approaches to working with data, often with a focus on predictive modeling and uncovering patterns in complex and unstructured data. Furthermore, there are several roles associated within business intelligence score:

1. Data scientist

A data scientist is responsible for identifying relevant questions, collecting data from various sources, cleaning and preprocessing the data, analyzing the data using statistical and machine learning techniques, and communicating insights and recommendations to stakeholders (Dhar, 2013). Data scientists work on complex and open-ended problems, often involving large and unstructured data sets.

2. Data engineer

A data engineer is responsible for designing, building, and maintaining the infrastructure and systems necessary to support the collection, storage, processing, and analysis of large and complex data sets (Marz & Warren, 2015). Data engineers work with both structured and unstructured data, and may be involved in tasks such as data modeling, database design, data warehousing, and ETL (extract, transform, load) processes.

3. Data analyst

A data analyst is responsible for analyzing data to extract insights and identify trends, patterns, and correlations. Data analysts work with both quantitative and qualitative data, and may use statistical software or programming languages to manipulate and analyze data (Bowser & Hajek, 2018). Data analysts typically focus on answering specific questions or solving specific problems, and may work with smaller and more structured data sets than data scientists.

4. Data storyteller

A data storyteller is responsible for communicating insights and recommendations from data analysis to stakeholders using data visualization, storytelling techniques, and

other methods. Data storytellers help to ensure that data insights are easily understood and actionable by non-technical audiences (Cairo, 2013).

5. Business Intelligence

A BI professional is responsible for designing, building, and maintaining the systems and tools used to collect, store, analyze, and report on data within an organization (Tuban, et al., 2019). BI professionals may work with both structured and unstructured data, and may use tools such as dashboards, data visualization, and reporting to help stakeholders understand and act on the data.

In summary, data scientists, data engineers, data analysts, data storytellers, and BI professionals all play important roles in working with data, but their responsibilities and focus may differ depending on the specific role and organization.

2.2.7 Self-Service Business Intelligence

Imhoff and White (2011), the authors who first suggested the idea of self-service BI, described self-service BI as a feature of the BI environment that empowers BI users to rely less on the IT department and more on their own initiative. Moreover, self-service BI is a term that has been defined in a variety of ways. According to Lennerholt and Laere (2019), SSBI is a new fad that empowers consumers who lack technological expertise in order to use BI on your own, without any assistance from BI experts. Ploder, et al. (2020) stated that SSBI development allows business users to perform activities in the areas of BI, statistical analysis, and data science on their own. To become less reliant on the IT department, end users need to learn the semantic layer of the organization's data warehouse, as stated by Schlesinger and Rahman (2015). The information presented by the semantic layer is presented in a businesslike manner, using terminology which end users are more likely to be familiar with. Imhoff and White (2011) also found that the advent of business intelligence has sparked the interest of corporate users. Empowering business intelligence practitioners to investigate self-service BI include the following:

1. Frequent fluctuations on market condition
2. IT's failure to respond rapidly to changing demands
3. Becoming a data-driven company is essential.
4. Business who have slow or inconsistent access to information.

5. The unhappiness of business users with the business intelligence tools provided by IT.

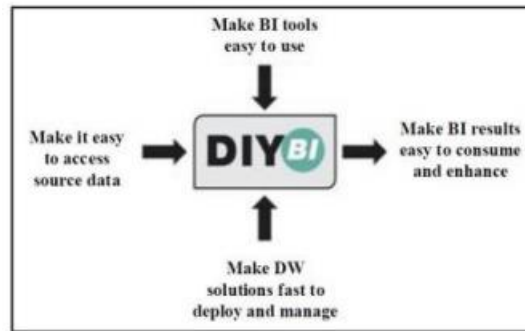


Figure 2. 2. Self-Service BI Main Objective

The four primary goals of self-service BI are to increase access to BI resources, streamline the collection of source data, facilitate the adoption and improvement of BI results, and speed up the deployment and management of data warehouse systems.

2.2.8 Red, Amber Green Analysis

The traffic-light system, also known as RAG analysis, is a popular choice for those seeking decision-making assistance. The RAG (Red, Amber, Green) matrix is a risk assessment tool used to determine the current condition of a project or process (PMI, 2017). There are three different colors used in the RAG method to represent the level of risk involved: red for very high risk, amber for some danger, and green for no risk at all. This enables stakeholders to quickly and readily identify areas of concern and take necessary action to resolve them.

The majority of traffic lights will use repeat measurements. Given the frequent nature of these observations, it is common practice to construct weekly or monthly averages and rolling averages to better depict patterns and ease analysis (Robertson, et al. 2017). However, connections between variables of interest might be overestimated when group data are pooled without accounting for the reliance of repeated observations on the same individuals (Williamson, et al. 1996).

CHAPTER III

RESEARCH METHOD

In order to guarantee that the researcher does not wander from the set goals, the research method utilized. The researcher should instead seek to answer the issue formulation in a more orderly and concentrated way in order to accomplish the study objective.

3.1 Research Area and Object

The primary focus of this study is the construction of a dashboard for assessing the performance of broiler farmers. The research scope is limited to the broiler farming process on periodically basis (approximately 35-45 days). The study analyzed and collected the data from farm A for three farming periods and two farming periods for farm B. The objective of this study is to proposed dashboard design for farm management and performance measurement of broiler farmer Furthermore, the dashboard are developed in order to provide independency in bookkeeping, maximizing current farming cycle profit, and future performance measurement.

3.2 Data Collection

Both primary and secondary data is required. Information gathered directly from field operations or activities known as primary data. Primary data collection conduct and aims to provide a broad picture of the research objective. Primary data are gathered by the directly assess daily farm condition and conducting interviews to ascertain the dashboard design for farm owner. Furthermore, reports that strongly connected to the farm performance indicators identified employed and categorized as primary data. Secondary data gathered via previous studies of organizational records, books, papers, articles, and interviews nor focus group discussion with broiler farm owner and workers. Secondary data employed in this study as research support and qualitative definitions reinforcement.

3.3 Data Processing

Following the completion of the data collection phase, the data processing phase will briefly describe how to construct a business intelligence system and produce various dashboards.

3.3.1 Farm Performance Measurement Criteria

Typically, the performance of a chicken farm is determined by technical criteria, such as the weight of the chickens, the age at which the weight is attained, the mortality rate, and the feed conversion ratio (FCR) (Nuryati, 2019).

Table 3. 1. Broiler Production Performance Development Since 1975

Year	1975	1980	1985	1990	1995	2000	2005	2008	2013
Harvested age (day)	56	53	49	48	47	46	44	42	42
FCR	2.1	2.05	2	2	1.95	1.95	1.9	1.76	1.71
Harvested weight (kg)	1.71	1.78	1.90	1.98	2.12	2.28	2.38	2.63	2.71

Typically, core-company businesses provide performance guidelines for broiler production, which used as a guideline for farming chickens appropriately. Because the United States and Brazil are capable of competing in the global broiler production market, data from these two nations frequently utilized as indications of global broiler production capacity. The table depicts changes in production performance as reported by poultry associations in the United States, which is the top producer of broiler chickens in the world.

Success in broiler farming can be gauged by assessing at metrics including mortality, feed intake, collected weight, feed conversion ratio (FCR), and index performance value (IP). DOC strain, feed, and management are determining variables in achieving optimal broiler performance. The farm management significantly determines the management factor itself. The farm plays a vital part in determining the profitability of a broiler farming enterprise in intense. Thus based on second chapter, the selected farm performance criteria are daily gain of body weight, average harvested body weight, depletion rate, Feed Conversion Ratio (FCR), European Economic Factor

(EEF) for poultry or Index Performance (IP), and IOFCC. For calculating each farm performances criteria, the daily recap of broiler farming are calculated using formulas below:

- *Daily body weight gain = Weight current day - Body weight yesterday*
- *Average harvested body weight = Total weight harvested / Total chickens harvested*
- *Depletion = $\frac{\text{Total mortality} + \text{Total defect}}{\text{Total population}} * 100 \%$*
- *FCR = $\frac{\text{Total weight of feed intake}}{\text{Total weight of chickens}}$*
- *IP or EEF = $\frac{(\text{Average Body Weight} * \% \text{ chickens alive})}{(\text{FCR} * \text{Age of harvest})} * 100$*
- *IOFCC or RHPP = Total sales of harvested chickens – (Feed expenditure + DOC expenditure + chemicals expenditure)*

3.3.2 Dashboard Development

The construction of a dashboard begins with a thorough assessment of the system's requirements. The goal of a system requirement analysis is to establish what features and capabilities the resulting system must have. Every metric used to evaluate farm output would be subjected to a system requirement analysis. The issue statement and study objectives pointed to the necessity for developing performance measurement utilizing Self-Service BI in order to construct the suggested dashboard for visualizing farm performance criteria.

After determining what the system requires, the next step is to design it graphically so that the broiler farmer can easily access the business data it delivers. In a 2015 article, Sherman outlined a six-step procedure for creating a DIY BI tool. Scope and planning, analysis and definition, architectural design, testing and refinement throughout construction, implementation, and rollout and service are the six stages. Since this study is still in its infancy, it has only completed the first

four steps of developing a dashboard and has not yet moved on to the implementation and roll-out phase.

1. Scope and Plane

After analyzing the criteria for farm performance, the researcher will establish the extent of the business intelligence system design. Scope and plane phase would define system design and development limitations

2. Analyze and Define

The data that strongly connected to the identified farm performances used to build the business intelligence system. All report needed gathered from broiler farmer in various form must be processed. Once analyzed, the most recent data may serve as a foundation for a database warehouse tailored to the needs of a specific broiler farmer.

3. Architect and Design

The researcher then employs preliminary data warehouse generated in the phase of analyze and define phase. In order for Tableau to function, the input data must be compatible with the system in terms of its required interconnections and file formats. As part of the ETL (Extraction, Transformation, and Load) process, irrelevant information will be removed (cleaning data) and the data will be segmented (transformation). The purpose of this process is to create a warehouse database that can accommodate the needs of the system. After finishing the ETL procedure, the last step is to import the warehouse data into Tableau.

4. Build and Test

Following the ETL method and data importing into Tableau, the knowledge in the data warehouse may be seen via a dashboard. The built-test-refine process yielded a functional dashboard and report detailing the most important aspects for analyzing broiler farmer performance.

3.4 Research Flow

The following flowchart illustrates the steps required to discover more and generate a dashboard model for a self-service business intelligence platform. The research process flow shown in the following diagram:

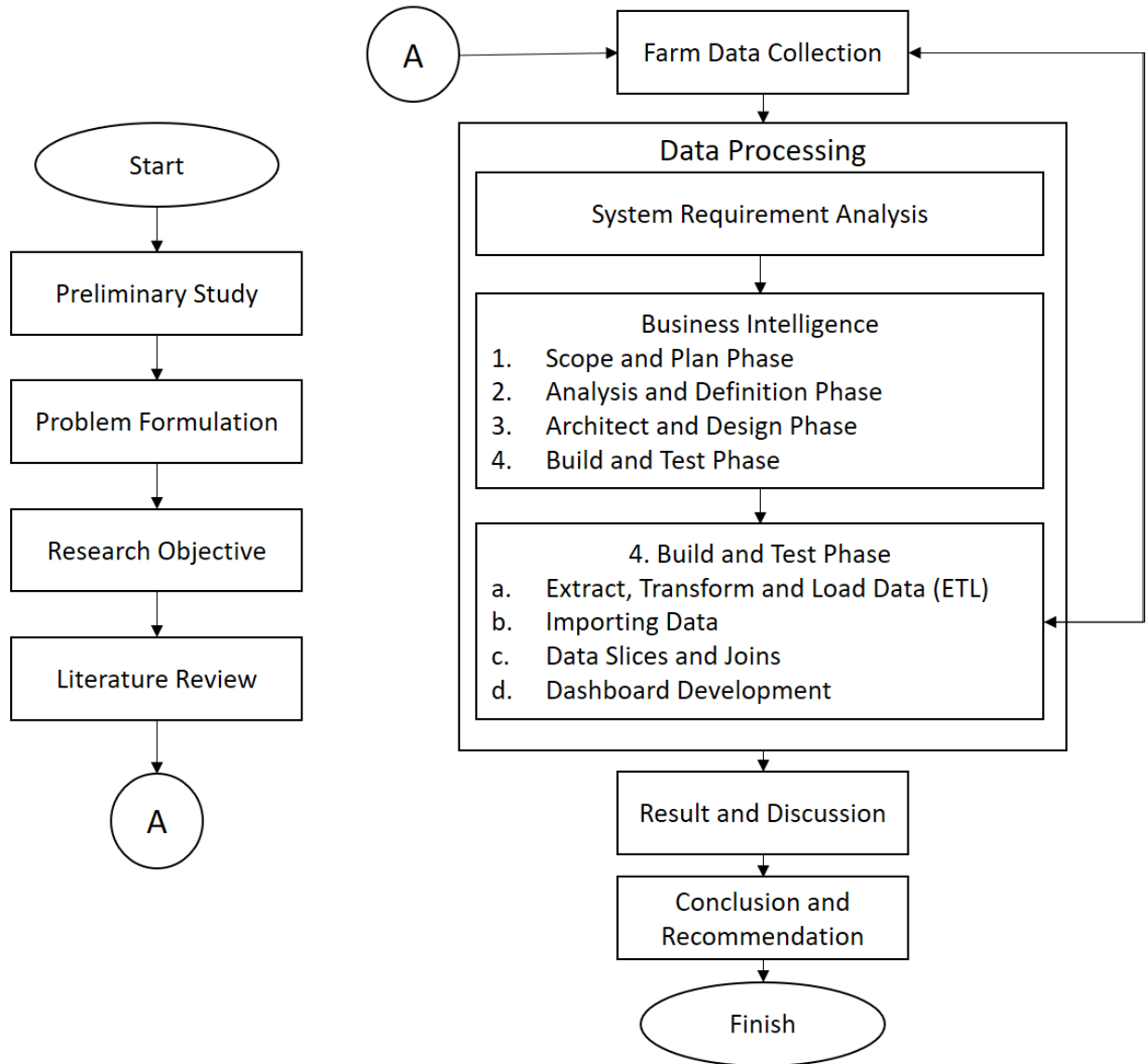


Figure 3. 1. Research Flow

CHAPTER IV

DATA COLLECTION AND PROCESSING

4.1 Data Collection

Interviews and a focus group were conducted with Grogol Broiler farm owner, farm workers and technical support from core company to gather the necessary information. Additionally, data was gathered on-site at Grogol Broiler farm A and Farm B using a combination of in-person interviews, and direct observation, as well as secondary data gleaned through article publications and other sources. Daily farm recap information are required for the research. In addition to that, the study calls for a review of the farm, as will be seen below.

4.1.1 Business Description

4.1.1.1 Farm Description

Grogol Broiler is a modern farm which started their broiler farm productions on October, 2018. At first, Grogol Broiler only have one farm namely farm A that have 40000 chickens capacity. Grogol Broiler expanded its broiler farm capacity through farm B development which started on January, 2022. Farm B begin to operates on July, 2022 and able to accommodate up to 50000 chickens.

4.1.1.2 Business Operation and Partnership History

Grogol Broiler run the broiler farm business within core-plasma partnership. The term "core- partnership" is used to describe the cooperative relationship between farmers (the plasma) and company (the core) in the broiler production industry. Core-company provides a various of resources, including DOC, technical advice, feeds, drugs, chemical and more. Once an agreement reached and the necessary resources are in place, Plasma will take the necessary steps to execute

the agreement and reach the agreed-upon goal. When the research report were made, Farm A have had 29 farming periods while Farm B have had 2 farming periods.

The first farming period until tenth period, Grogol Broiler partnered with PT Mustika Jaya Lestari as their core company. The owner of Grogol Broiler decided to cut the contract with PT Mustika Jaya Lestari on the 10th period because the core company can not control the harvesting time. Long harvesting time caused the feed consumption increased drastically but the weight gain starts the trend to be linear and even decreases. On the 11th period, Grogol Broiler started new journey with PT Ciomas Aditsatwa as subsidiary from PT Japfa Comfeed Indonesia. However, the partnership with PT Ciomas Adisatwa only lasted for two farming periods since 11th and 12th period Grogol Broiler only get RHPP below Rp 3000. New contract with PT Mustika Jaya Lestari again was made up on thirteen period. The contract with PT Mustika Jaya Lestari, lasted until 26th period because the conflict of allegations of fraud by one of the company's parties.

The new contract on 27th period started with PT Multi Sarana Pakanindo as subsidiary from PT Charoen Pokhand Indonesia. Since Farm B begin to operates on July, 2022, Grogol Broiler ask new contract with PT Multi Sarana Pakanindo for additional deal for Farm B. Because of the obligation of collateral in the form of cash, Grogol Broiler unable to deal with PT Multi Sarana Pakanindo as core-company for Farm B. As the result, Grogol Broiler started new contract with PT New Hope Indonesia as core-company for Farm B.

4.1.1.3 Farm Data Recording

The farm record the farming operations daily on a three recording papers which provides the information about daily mortality, defect chicken, mortality, cumulative mortality, used feed, and cumulative feed used. Three recording papers each provide the information of daily farming information on first floor, second floor and total of both of them. Unfortunately, the recordings are then moved to trash after the farming period over. Below are the example of paper recording on the farm.

4.2.2 System Requirement Analysis

Based on the problem definition and the goals of the study, it suggested developing a system of farm management that would optimize farm performance via the use of self-service business intelligence. There are four distinct sorts of farm performance proposed dashboard: all farming periods performance history, RAG analysis, single period with daily farming operations performance and decision support for determining the appropriate harvest time, the first step in creating information systems based on each review is determining the system's requirements, which should include its functionality. The following is an examination of the research team's system requirement study for farm performances.

4.2.2.1 All Periods Farming History

All periods farming history provides the performances conclusion from the final result of respective farming period. The dashboard serves the final result of various farm performances indicators including the profit taken.

a. Input Requirement Analysis

a. 1. *Recap Performa dan Pendapatan*

Final result data is provided by *Recap Performa dan Pendapatan* based various performance measurement on the end of farming periods namely: *Kandang, Periode, Populasi Kontrak, Lama Pemeliharaan, Jumlah Terpanen, Tonase Pakan Terpakai, Tonase Terpanen, FCR, % Ayam Hidup, Rataan Bobot Panen, Umur Tangkap, IP, Total Pembelian, Perkiraan Total Penjualan, Perkiraan Laba Kotor, RHPP*

b. Output Requirement Analysis

The information system for all periods farming history analysis generates the following types of output data:

b. 1. Scorecard of final result on each farming periods details of: *Populasi, Jumlah Terpanen, % Ayam Hidup, Lama Pemeliharaan, Tonase Pakan*

Terpakai, Tonase Terpanen, FCR, IP, Hasil Pemeliharaan and *RHPP* in selected farm.

- b. 2. Charts of final result of *Hasil Pemeliharaan* on each farming periods in selected farm.
- b. 3. Charts of final result of *RHPP* on each farming periods in selected farm.
- b. 4. Charts of final result of *FCR* on each farming periods in selected farm.
- b. 5. Charts of final result of *IP* on each farming periods in selected farm.
- b. 6. Charts of final result of *%Ayam Hidup* on each farming periods in selected farm.
- b. 7. Charts of final result of *Lama Pemeliharaan* on each farming periods in selected farm.

4.2.2.2 RAG Analysis

RAG analysis provides various performances insight in the form of traffic light system from respective farming period. The dashboard provide three criterion of five performances indicator described with red (far from target), amber (close to target), and green (within target).

a. Input Requirement Analysis

a. 1. *Performa Kandang All*

Several farm performances attributes namely *RHPP*, index performances, *FCR*, body weight and depletion are required to construct RAG analysis dashboard. Furthermore, additional measures in order to create logic behind traffic light system added.

b. Output Requirement Analysis

The information system for all periods farming history analysis generates the following types of output data:

- b. 1. RAG analysis of *RHPP* on daily basis in selected farm and selected period.
- b. 2. RAG analysis of index performances on daily basis in selected farm and selected period.
- b. 3. RAG analysis of *FCR* on daily basis in selected farm and selected period.

- b. 4. RAG analysis of body weight on daily basis in selected farm and selected period.
- b. 5. RAG analysis of depletion on daily basis in selected farm and selected period.

4.2.2.3 Each Periods Daily Performances

Each periods daily performances provides the performances on a daily basis for a respective farming period. The dashboard serves the daily performances on continuous variable of various farm performances indicators.

a. Input Requirement Analysis

a. 1. *Performa Kandang All*

Daily performance is provided by *Performa Kandang All* based various performance measurement on the daily basis namely: *Kandang, Periode, Tanggal, Umur, Kematian, Afkir, Depleksi, Total Depleksi, Pakan Terpakai, Total Pakan Terpakai, Bobot (kg), Standar Bobot (kg), Ayam Tersisa, Tonase Ayam Tersisa, Jumlah Panen, Tonase Panen, Jumlah Terpanen, Tonase Terpanen, Tonase Pakan Terpakai, Perkiraan Ekor Terjual, Umur Tangkap, % Ayam Hidup, Pembelian Pakan, Total Pembelian, Perkiraan Total Penjualan dan Bonus, Perkiraan Laba Kotor, Pertambahan Bobot, Rataan Bobot Panen, % Depleksi, FCR, FCR, Standar FCR, IP, RHPP.*

b. Output Requirement Analysis

The information system for daily performance analysis generates the following types of output data:

- b. 1. Charts of *FCR* on daily basis in selected farm and selected period.
- b. 2. Charts of *Bobot (Kg)* on daily basis in selected farm and selected period.
- b. 3. Charts of *% Depleksi* on daily basis in selected farm and selected period.
- b. 4. Charts of *Depleksi per hari* on daily basis in selected farm and selected period.

- b. 5. Charts of *Rataan Bobot Panen* on daily basis in selected farm and selected period .
- b. 6. Charts of *Index Performances* on daily basis in selected farm and selected period.

4.2.2.4 Harvesting Time Setting

Harvesting Time Setting provides forecasting of profit acquired from farming operations if the harvest done at once in a single day with a respective chickens left and certain body weight for a respective farming period. The dashboard serves the total of capital to be spent and the profit earned.

a. Input Requirement Analysis

a. 1. *Performa Kandang All*

Prediction of profit earned information is provided by *Performa Kandang All* namely: *Kandang, Periode, Tanggal, Umur, Kematian, Afkir, Depleksi, Total Depleksi, Pakan Terpakai, Total Pakan Terpakai, Bobot (kg), Standar Bobot (kg), Ayam Tersisa, Tonase Ayam Tersisa, Jumlah Panen, Tonase Panen, Jumlah Terpanen, Tonase Terpanen, Tonase Pakan Terpakai, Perkiraan Ekor Terjual, Umur Tangkap, % Ayam Hidup, Pembelian Pakan, Total Pembelian, Perkiraan Total Penjualan dan Bonus, Perkiraan Laba Kotor, Pertambahan Bobot, Rataan Bobot Panen, % Depleksi, FCR, FCR, Standar FCR, IP, RHPP.*

b. Output Requirement Analysis

The information system for daily performance analysis generates the following types of output data:

- b. 1. Charts of *Total Pembelian dan Total Penjualan dan Bonus* on daily basis in selected farm and selected period.
- b. 2. Charts of *RHPP* on daily basis in selected farm and selected period

4.2.3 Business Intelligence

After analyzing the needs for the system, the following stage is to create a visual representation of the business intelligence platform. Sherman (2015) outlined a 6-step procedure for developing a DIY BI tool based on his study. Scope and planning, analysis and defining, architecture and design, construction testing and refining, implementation, and deployment and rollout are the six stages. The study is still in the design phase and has not yet reached the implementation phase, hence the deploy and rollout phases were not carried out. Below are the four steps of self-service BI.

4.2.3.1 Scope and Plan

The topic will be reviewed and discussed with relevant parties at Grogol Broiler before the researcher decides the extent of the system design for business intelligence. These describe the system's scope:

1. All Farming Period History
2. RAG Analysis
3. Farming Performances
4. Harvest Setting

The scopes of the system design and development are the four mentioned spheres of control. Grogol Broiler daily data analyzed for usage in this business intelligence system. Grogol Broiler will use the dashboard to undertake analysis, farm management, and performance monitoring, among other tasks.

After defining the parameters of the research and developing a strategy for the business intelligence system, the researcher collaborated with Grogol Broiler to conduct the validation. Validation attempts to ensure that the study object is a good fit for the proposed business intelligence system's scope and development strategy.

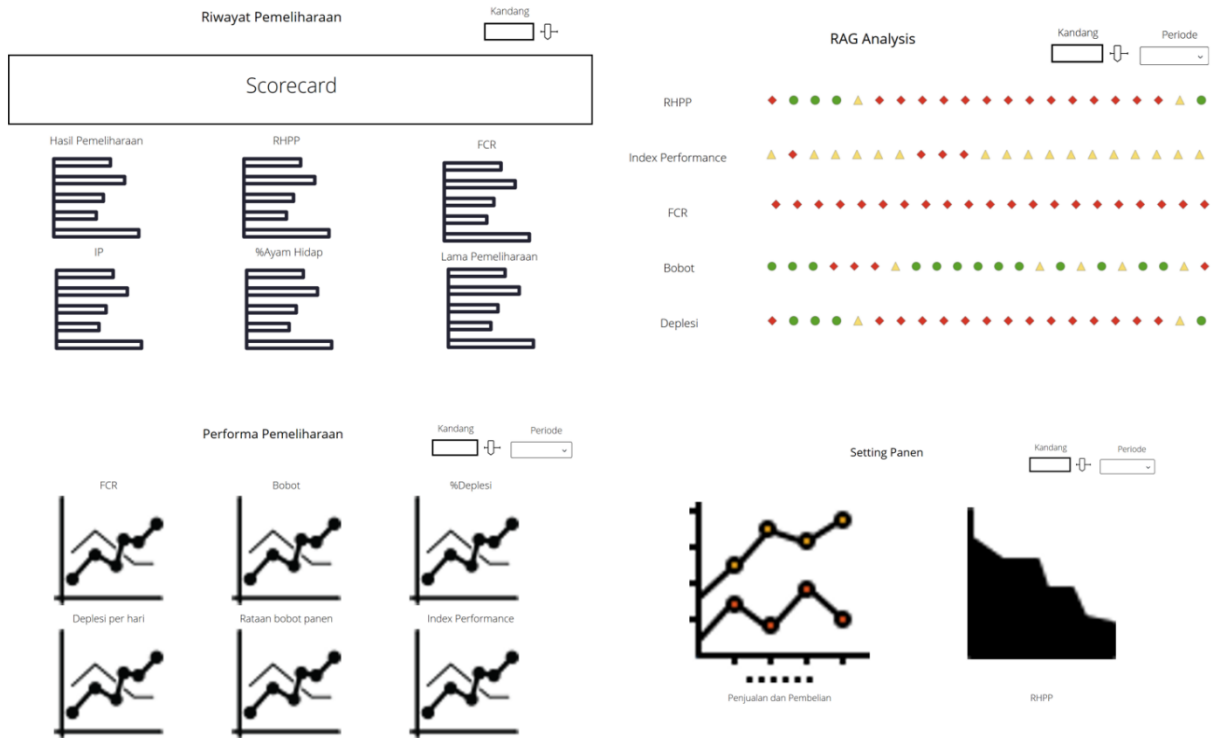


Figure 4. 2. Validated Dashboard Design

Validation is conducted in partnership with Grogol Broiler's owner. The consultation bridges the gap between the researcher's design conclusions and the business intelligence system's needs. Figure 4.2 shows validated prototypes of three alternative dashboards.

4.2.3.2 Analyze and Define

Once building a dashboard, researcher only retrieved information already available inside the farm. Grogol Broiler farm management and performance measurement dashboard was developed using data from the daily paper on 27th, 28th, and 29th period for Farm A; 1st and 2nd period for Farm B. Below is actual example of daily recap of 28th period for Farm A:

REKAPAN

PERIODE: 28
WAKTU: 2 Juli 2012 s/d

TOL	UMUR	DEPLESI				PAKAN				VAKSIN OBAT	KETERANGAN
		MATI	APRR	JML	TOTAL	KIRIM	JML	TERPAKAI	SISA		
0	15	-	15	15	160	-	51	109			
1	53	-	53	88			8	127	53		
2	63	-	63	131			19	107	43		BW 0.23
3	117	43	159	200			12	95	67		
4	55	20	75	365			23	72	88		BW 0.120
5	43	11	44	409			18	54	106		
6	39	35	74	483	160	320	36	18	142		BW 0.180
7	24	4	28	511			24	152	168		BW 0.215
8	25	22	47	558			38	114	206		
9	22	15	37	595	140	700	40	74	246		
10	20	19	39	634			40	119	246		0.347
11	17	16	33	667			48	146	334		0
12	15	21	46	713			62	79	401		
13	14	5	20	733	110	140	48	51	440		
14	29	13	42	775	-	-	87	124	516		
15	38	2	45	820	160	800	52	67	573		BW 2.653
16	30	18	48	868	160	860	65	163	638		
17	19	20	39	907			75	247	713		
18	24	30	54	961			73	172	788		0.762 0.2618
19	35	23	58	1019			89	98	868		
20	28	14	42	1061	160	1120	87	10	950		BW 0.262 0.272
21	19	31	50	1111	160	1280	100	78	1050		0.272
22	22	11	38	1149			96	134			1.018
23	29	15	44	1193	160	1440	87	52	1228		1.2
24	39	11	50	1243			108	104	1336		
25	32	8	40	1283	160	1600	101	3	1437		1.347
26	37	29	61	1344	160	1760	112	57	1599		
27	31	15	46	1390			128	109			1.077
28	30	11	42	1433	160/160	1920	97	172	1631		
29	23	21	44	1477	160	2080	106	237	1894		1.07
30	22	20	42	1519			124	113	1928		
31	22	24	46	1565			116	152	2074		1.742 (1644) 6
32	32	25	57	1622	160/160	2498	79	58	2193		1.82 (1644) 16
33	26	8	34	1657			77	139	2230		2.072 (1644) 6
34	24	40	64	1721			56	143	2324		2.102 (1644) 6
35	32	26	58	1779			22	181	2348		2.24 (1644) 6
36	27	23	50	1829			3	189	2391		
37											
38											
39											
40											

Cirebon,2012

H. SUHARSO

Figure 4. 3. 28th Period Farm Daily Recap

Farm data processing are required, and the research investigate coverage responses: farm management and performances measurement. New information, once processed, can serve as a warehouse database for Grogol Broiler BI system. The farm data is exported to Excel, and once it is been cleaned up to fit the specifications, then the data be imported to Tableau.

4.2.3.3 Architect and Design

a. Data Warehouse Model

The researcher is now making use of the data warehouse constructed in the system requirements subsection. Lists from the data warehouse follow below.

Table 4. 1. Farm Data Warehouse

No	Data	Form	Explanation
1	Kandang	Performa	Specified Farm
2	Periode	Kandang	Farming Cycle Order
3	Lantai	Per	Specified Floor of Farm
4	Tanggal	Lantai	Farming Operation Date
5	Umur		Age of Chickens in Specified Periods
6	Kematian		Total Mortality in Specified Time
7	Afkir		Total Defect in Specified Time
8	Depleksi		Total Depletion in Specified Time
9	Total Depleksi		Cumulative Depletion in Specified Time
10	Pakan Terpakai		Used Feed in Specified Time
11	Total Pakan		Cumulative Used Feed in Specified Time
12	Bobot (Kg)		Chicken Body Weight in Specified Time
13	Standar Bobot (Kg)		Chicken Body Weight Standard in Specified Time
14	Tonase Pakan Terpakai		Cumulative Tonnage Used Feed in Specified Time
15	Pertambahan Bobot		Weight Difference in a Day
16	% Depleksi		Cumulative Depletion Percentage in Specified Time
17	Kandang	Performa	Specified Farm
18	Periode	Kandang	Farming Cycle Order
19	Lantai	All	Specified Floor of Farm
20	Tanggal		Farming Operation Date
21	Umur		Age of Chickens in Specified Periods
22	Kematian		Total Mortality in Specified Time
23	Afkir		Total Defect in Specified Time
24	Depleksi		Total Depletion in Specified Time
25	Total Depleksi		Cumulative Depletion in Specified Time
26	Pakan Terpakai		Used Feed in Specified Time
27	Total Pakan		Cumulative Used Feed in Specified Time
28	Bobot (Kg)		Chicken Body Weight in Specified Time
29	Standar Bobot (Kg)		Chicken Body Weight Standard in Specified Time

No	Data	Form	Explanation
30	Ayam Tersisa		Total Chickens Left
31	Tonase Ayam Tersisa		Total Tonnage Chickens Left
32	Jumlah Panen		Total Harvested Chickens in Specified Time
33	Tonase Panen		Total Tonnage Harvested Chickens in Specified Time
34	Jumlah Terpanen		Cumulative Harvested Chickens in Specified Time
35	Tonase Terpanen		Cumulative Tonnage Harvested Chickens in Specified Time
36	Tonase Pakan Terpakai		Cumulative Tonnage Used Feed in Specified Time
37	Perkiraan Ekor Terjual		Estimated Total Chickens Sold
38	Perkiraan Tonase Penjualan		Estimated Total Tonnage Chickens Sold
39	Umur Tangkap		Harvested Time
40	% Ayam Hidup		Percentage of Healthy Chicken from Initial Population
41	Pembelian Pakan		Total Estimation of Feed Expenditure
42	Total Pembelian		Total Expenditure for Core Company
43	Perkiraan Total Penjualan dan Bonus		Total Sales and Bonuses
44	Perkiraan Laba Kotor		Estimated Gross Profit
45	Pertambahan Bobot		Weight Difference in a Day
46	Rataan Bobot Panen		Average of Harvested Body Weight
47	% Depleksi		Cumulative Depletion Percentage in Specified Time
48	FCR		Feed Conversion Ratio in Specified Time
49	Standar FCR		Feed Conversion Ratio Standard in Specified Time
50	IP		Index Performances in Specified Time
51	RHPP		RHPP or IOFCC in Specified Time
52	Kandang		Specified Farm
53	Periode		Farming Cycle Order
54	Populasi Kontrak		Initial Population Based on Partnership Contract
55	Lama Pemeliharaan		Total Time Taken of Specified Farming Period
56	Jumlah Terpanen		Cumulative Harvested Chickens in Specified Time
57	Tonase Pakan Terpakai		Cumulative Harvested Chickens in Specified Time
58	Tonase Terpanen		Cumulative Tonnage Harvested Chickens in Specified Time
59	FCR	Feed Conversion Ratio in Specified Time	

No	Data	Form	Explanation	
60	% Ayam Hidup		Percentage of Healthy Chicken from Initial Population	
61	Rataan Bobot Panen		Average of Harvested Body Weight	
62	Umur Tangkap		Estimated Total Tonnage Chickens Sold	
63	IP		Index Performances in Specified Time	
64	Total Pembelian		Total Expenditure for Core Company	
65	Perkiraan Total Penjualan dan Bonus		Total Sales and Bonuses	
66	Perkiraan Laba Kotor		Estimated Gross Profit	
67	RHPP		RHPP or IOFCC in Specified Time	
68	Kandang		Notes	Specified Farm
69	Periode		Farming Cycle Order	
70	Lantai		Specified Floor of Farm	
71	Populasi Kontrak		Initial Population Based on Partnership Contract	
72	Populasi Bonus		Initial Contract Population With 1% For Risk Compensation	
73	Rataan Harga DOC		Average DOC Prices	
74	Pembelian DOC	Total Estimation of DOC Expenditure		
75	Rataan Harga OVK	Average of Drug, Vitamin, and Chemicals Prices		
76	Rataan Harga Pakan	Average Feed Prices		
77	Rataan Bonus	Average Bonuses		
78	Rataan Harga Jual/Kg	Average Chickens Prices per Kilo		
79	Pakan Kg/sak	Average Feed Kilo per sack		

b. Visualization Design

b. 1. *Riwayat Pemeliharaan*

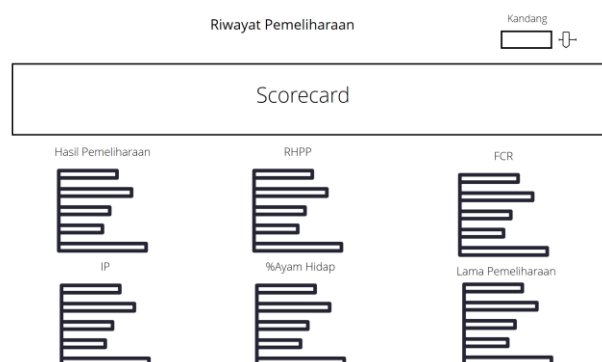


Figure 4. 4. *Riwayat Pemeliharaan Dashboard Design*

The dashboard design blueprint for Riwayat Pemeliharaan was shown in figure 4.4. The user makes an option to choose which farm is used using *Kandang* user selection. The scorecard would include such metrics as the the initial contract population, total chickens harvested, total farming time, total tonnage of used feed, total tonnage of chickens harvested, FCR, IP, gross profit, and RHPP. Afterwards, the Riwayat Pemeliharaan dashboard provided several performance measures in the form of bar charts.

b. 2. *RAG Analysis*

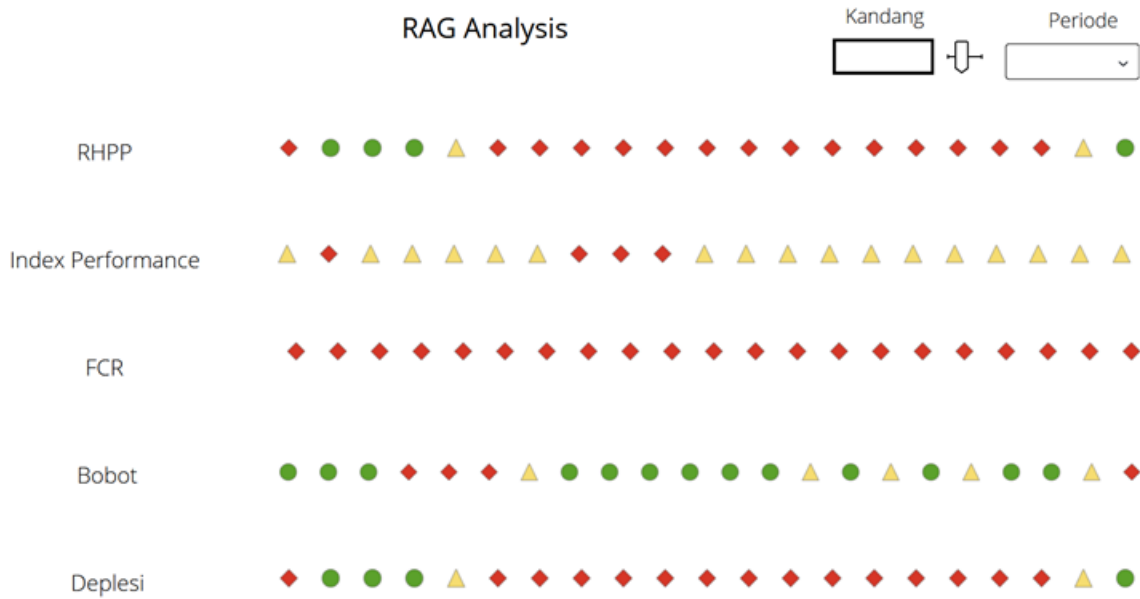


Figure 4. 5. *RAG Analysis Dashboard Design*

Two user selections made for the *RAG* analysis dashboard design. Furthermore, for several performances indicators without standard served with user parameter to control the upper and lower limit.

b. 3. Performa Pemeliharaan

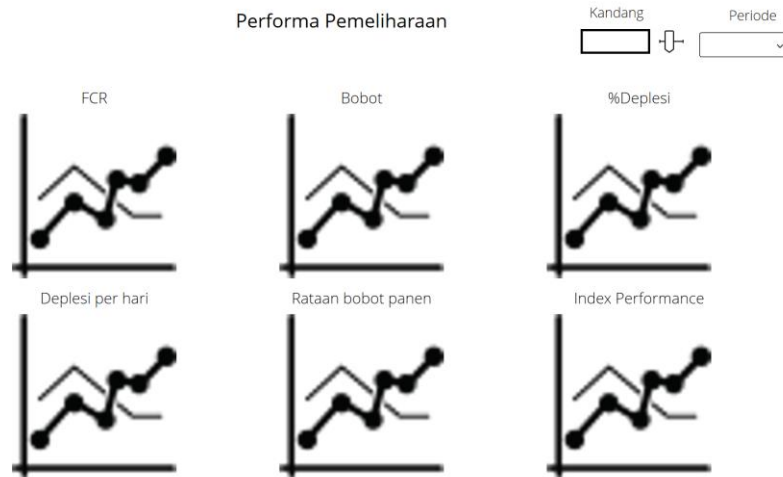


Figure 4. 6. Performa Pemeliharaan Dashboard Design

Two user selections made for the *performa pemeliharaan* dashboard design. The dashboard provide a snapshot of six key metrics for farm operations, including FCR, body weight, % depletion, daily depletion, harvested body weight, and Index Performance. The performances result of the farm and periods then presented with the line chart.

b. 4. Setting Panen

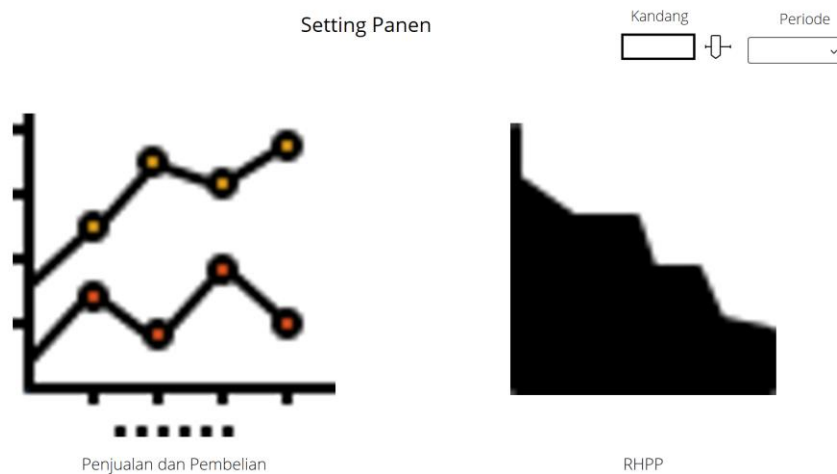


Figure 4. 7. Setting Panen Dashboard Design

The style of the setup panen dashboard displays all expenses and total revenues, together with their bonuses. In addition, the dashboard for RHPP forecast that harvesting must be completed in a single day at a certain time.

4.2.3.4 Build and Test Phase

4.2.3.4.1 Extract, Transform, and Load Data (ETL)

Multiple passes of data processing allow researcher to build a data warehouse. Due to the fact that Tableau only supports a small subset of data types (Excel, SQL, and Python), the first step is to convert the farm data to Excel. The paper-based farm summary data will be entered into an electronic spreadsheet. For data already in Excel format, the study will utilize the ETL (Extraction, Transformation, and Load) process to clean the data (eliminate superfluous information) and partition the data into portions suitable for the research (transformation). The goal of this process is to create a warehouse database that works properly with the software. After ETL, the warehouse database is in a usable state to be loaded into Tableau.

4.2.3.4.2 Importing Data

In order to input data into Tableau must be compatible with the system in terms of connectivity and format in order to be used. A warehouse database is the collective term for all of these records. Researchers may process the obtained data in many steps to build a warehouse database, including the following:

- a. Due to the limited number of data formats that Tableau supports (namely, Excel, SQL, and Python), converting the paper recap format to Excel is essential. A paper copy of the farm report's information will be entered into an electronic spreadsheet.
- b. The ETL (Extraction, Transformation, and Load) procedure will be used to data that is already in Excel format in order to clean the data (remove information that is irrelevant to the study purpose) and then split the data into manageable chunks (transformation). The goal of this process is to create a warehouse database that works with the software.

- c. Once the ETL procedure is complete, the warehouse database may be loaded into Tableau. In the following diagram represent importing data to Tableau desktop.

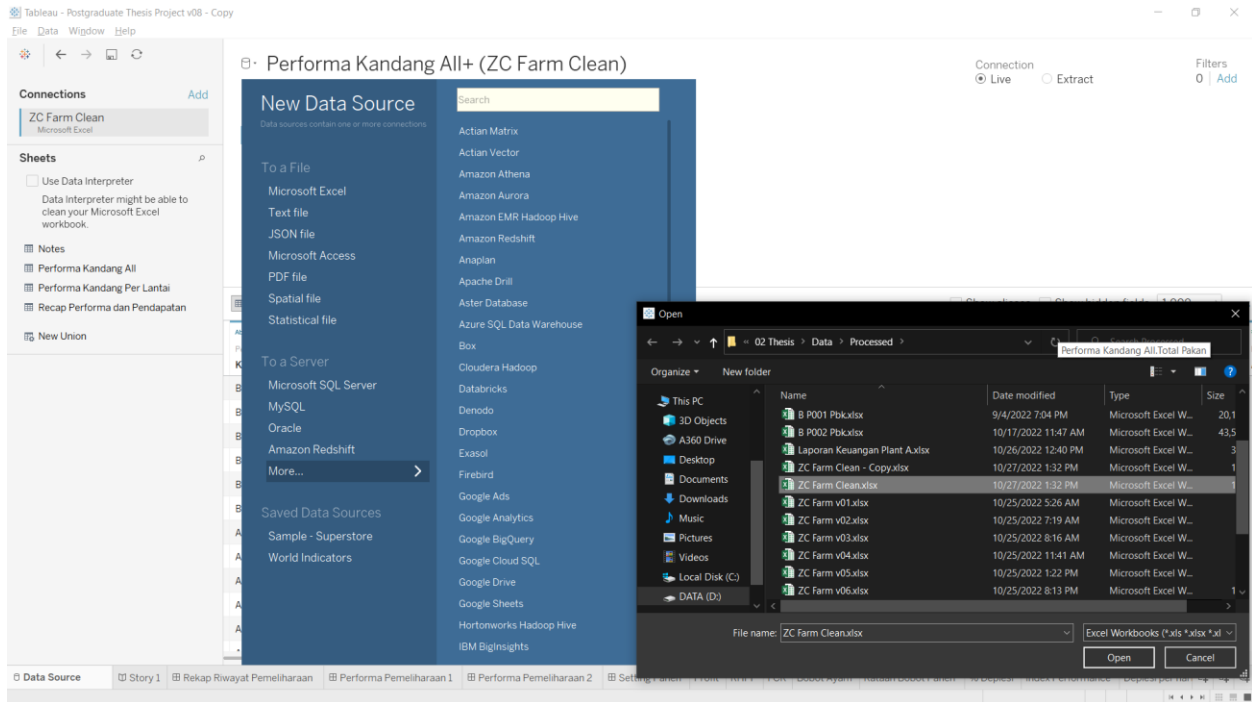


Figure 4. 8. Data Importing Process

4.2.3.4.3 Data Slices and Joins

Tableau prompts the user to specify data associations, slices, and joins once the warehouse's data have been built and imported. This is crucial since entity relationships may be used to control the interdependencies across tables in the data mart. Detailed joins and data slices for data warehouse provided below.

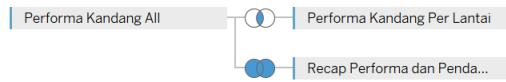


Figure 4. 9. Warehouse Data Slice and Join

A farm data warehouse is built using two different data tables. Measuring and managing farm performance yielded numerical results for a number of key metrics. There was an inner join type for one and a complete outer join type for the other. When a value in one table does not match its counterpart in the other, the value is dropped totally in an inner join, but in a full outer join, the values from both tables are added together. A null value appears in the join results if a value in one table does not have a corresponding value in the other database.

4.2.3.4.4 Dashboard Development

The data warehouse may be seen via the development of a dashboard as the last step of the build and test phase. The three dashboards developed which consist of:

a. Riwayat Pemeliharaan Dashboard

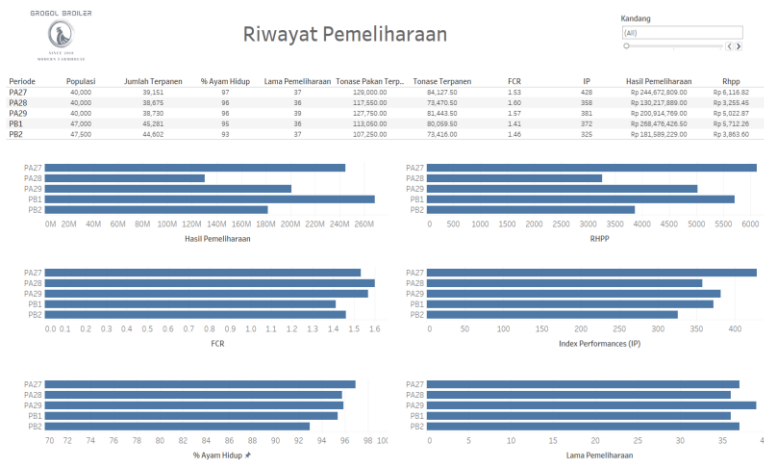


Figure 4. 10. Riwayat Pemeliharaan Dashboard

The farming activities were depicted in a cumulative history dashboard. Because of the available filter, users may choose the farms that best suit their needs. Multiple choices exist for the kind of farm specified to choose. Figure 4.9., for instance, may show users which farm, among all farms, has the greatest RHPP value during the last five periods.

b. *RAG Analysis Dashboard*

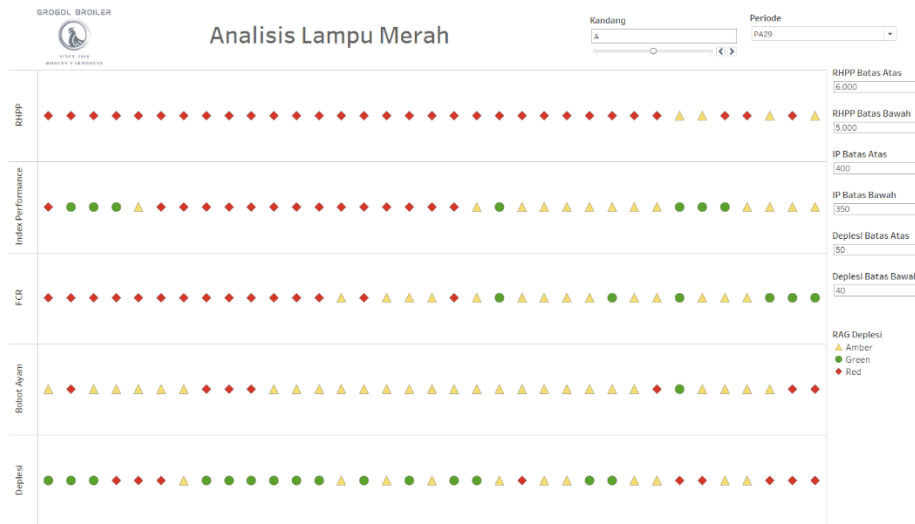


Figure 4. 11. *RAG Analysis Dashboard*

The RAG analysis dashboard comes in at number two. Users have the ability to set the farm and time frame. Furthermore, users able to set individual preferences of lower and upper limit for several farm performances indicators namely *RHPP*, index performances, and daily depletion. The goal of the dashboard can aid the user for simpler decision support without detailed information.

c. *Performa Pemeliharaan I Dashboard*

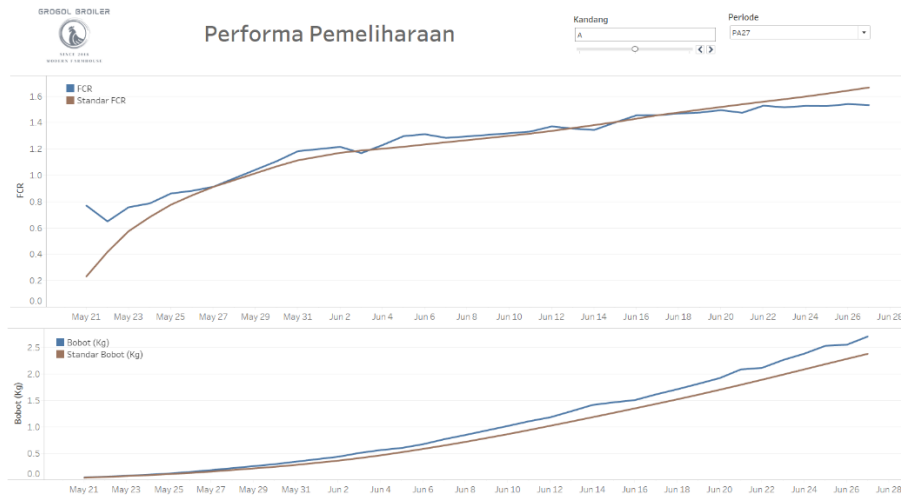


Figure 4. 12. *Performa Pemeliharaan I Dashboard*

A *performa pemeliharaan I* dashboard aims to visualize FCR and body weight throughout a farming period. There are two different representations of the data and two filters to choose from, making the interactive display and comprehension of the data much more straightforward. In order to evaluate daily performance, a reference standard for FCR and body weight is supplied.

d. *Performa Pemeliharaan II Dashboard*

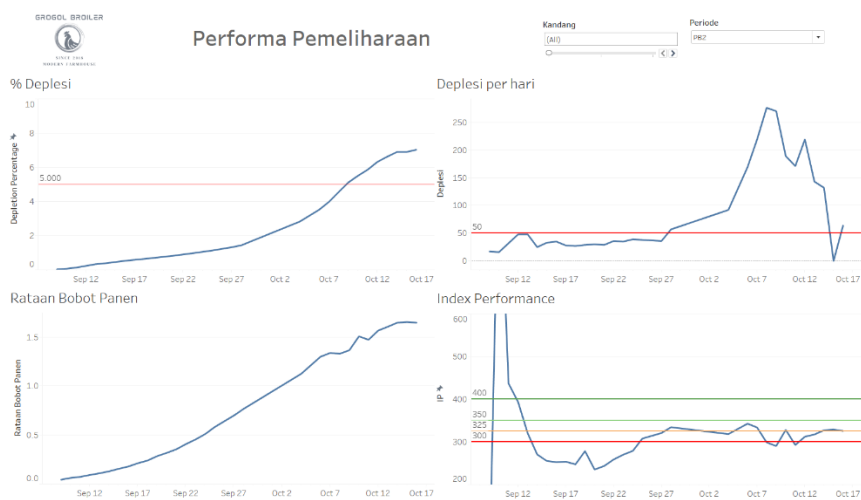


Figure 4. 13. *Performa Pemeliharaan II Dashboard*

A *performa pemeliharaan II* dashboard has same purpose within *performa pemeliharaan I* dashboard to visualize various performances namely depletion percentage, depletion, harvested body weight, and Index Performance throughout a farming period. There are four different representations of the data and two filters to help with the display and comprehension. Furthermore, standard for depletion percentage, daily depletion, and Index Performances are provided.

e. *Setting Panen* Dashbaord

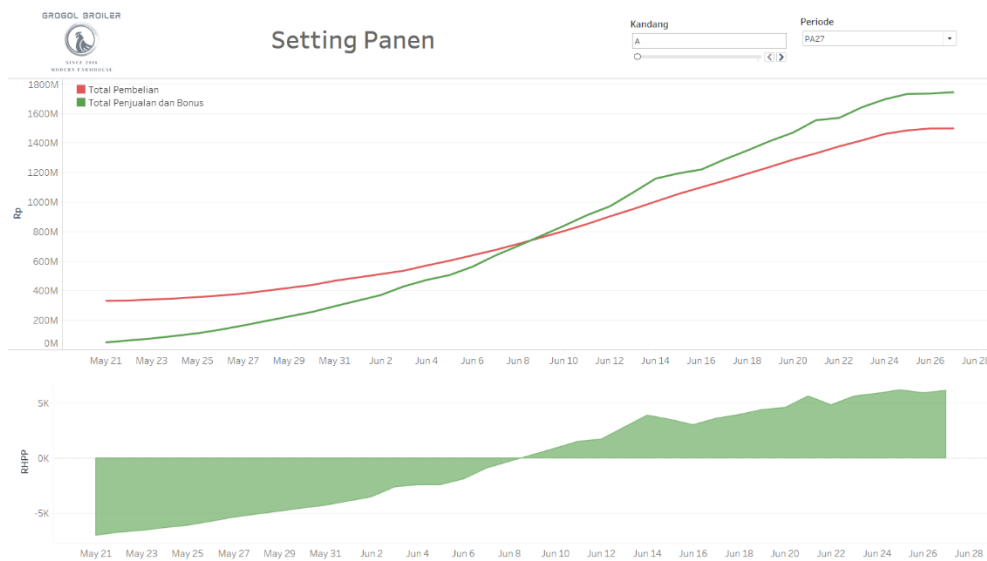


Figure 4. 14. *Setting Panen* Dashboard

The final dashboard is the *setting panen* dashboard. Users have the ability to set the farm and time frame. The goal of the gross profit gain line chart is to give a bird's-eye perspective of daily expenses and total income.

CHAPTER V

RESULT AND DISCUSSION

5.1 Result

The research primary objective is to address a pressing issue in the business. Lack of resources to back up decision-making, especially in farm management, can be identified as a central problem on farms. Multiple performance criteria for evaluating performances are also included. Therefore, the report model on the business intelligence dashboard may prove useful in finding solution. The story is created to facilitate easy transitions between the dashboards. The following diagram illustrates the four dashboards featured in the story.

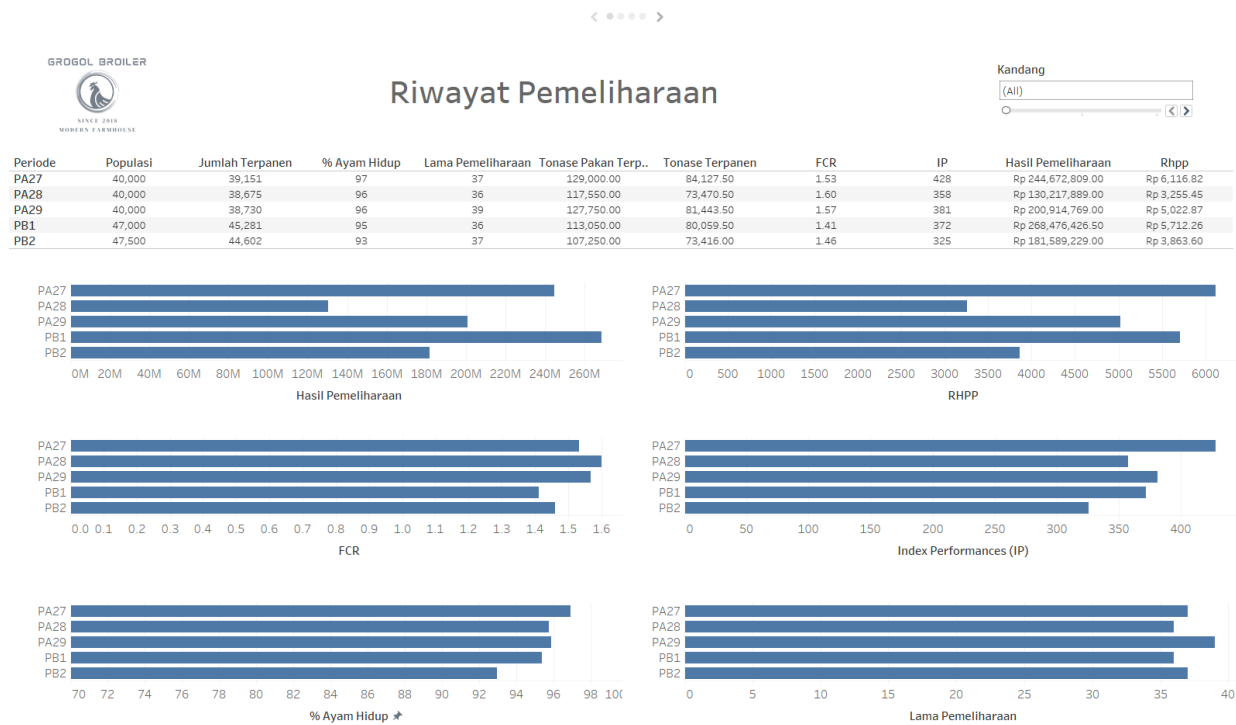


Figure 5. 1. Tableau Story Visualization

After designing and developing the four Tableau dashboards indicated in the prior section and a story that integrates each of them, the results may be uploaded to the Tableau Online site for

distribution to the business and core firm. Here is a dashboard representation of the story from Tableau Online.

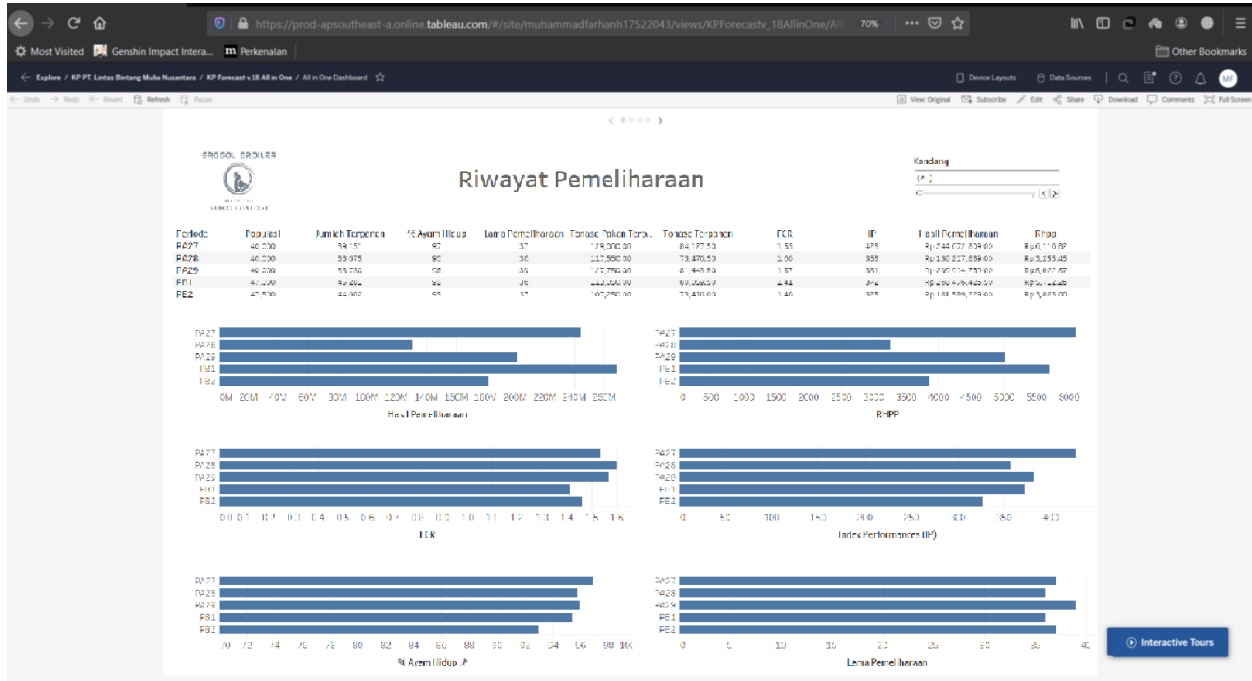


Figure 5. 2. Story Visualization on Tableau Online

The BI-based dashboard concept allows the farm to process the raw data from the daily paper summary into useful information that assessed for decision-making. Data about the farm's daily operations gathered through business intelligence. Making this decision would be less difficult because of the emphasis on data based for use in farm management and performance evaluation.

5.2 Discussion

Five dashboards developed as part of the study to help with managerial decisions on farms. The planned dashboards include *riwayat pemeliharaan*, RAG analysis, *performa pemeliharaan I*, *performa pemeliharaan II*, and setting *panen*. Subsequently, next section spoke about the outputs of the four proposed dashboards:

5.2.1 Riwayat Pemeliharaan Dashboard

Riwayat pemeliharaan dashboard is used to examine the whole farming record. The *riwayat pemeliharaan* dashboard includes the following six graphs and a scorecard, and their respective descriptions are as follows:

1. *Rekap Hasil Pemeliharaan*

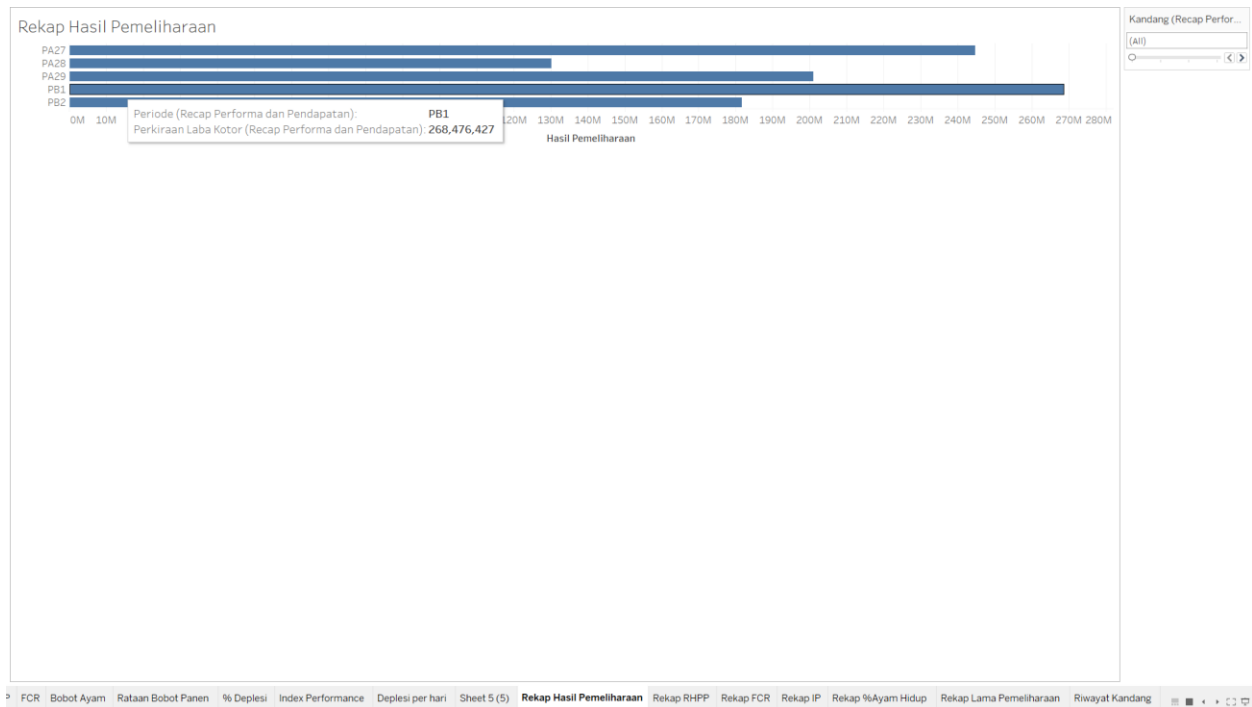


Figure 5. 3. *Rekap Hasil Pemeliharaan* graph

Every farming cycle ever recorded by both farm is plotted in current graph. The selection of farms is used as a filter to build the graph. User may choose between a single farm and both farms to see which farming outcome was achieved in the past. A kandang filter in the form of a single-value dropdown allows users to choose their specified farm. According to figure 5.3, the 1st period of Farm B generates the highest gross profit of any period nor farm.

2. RHPP

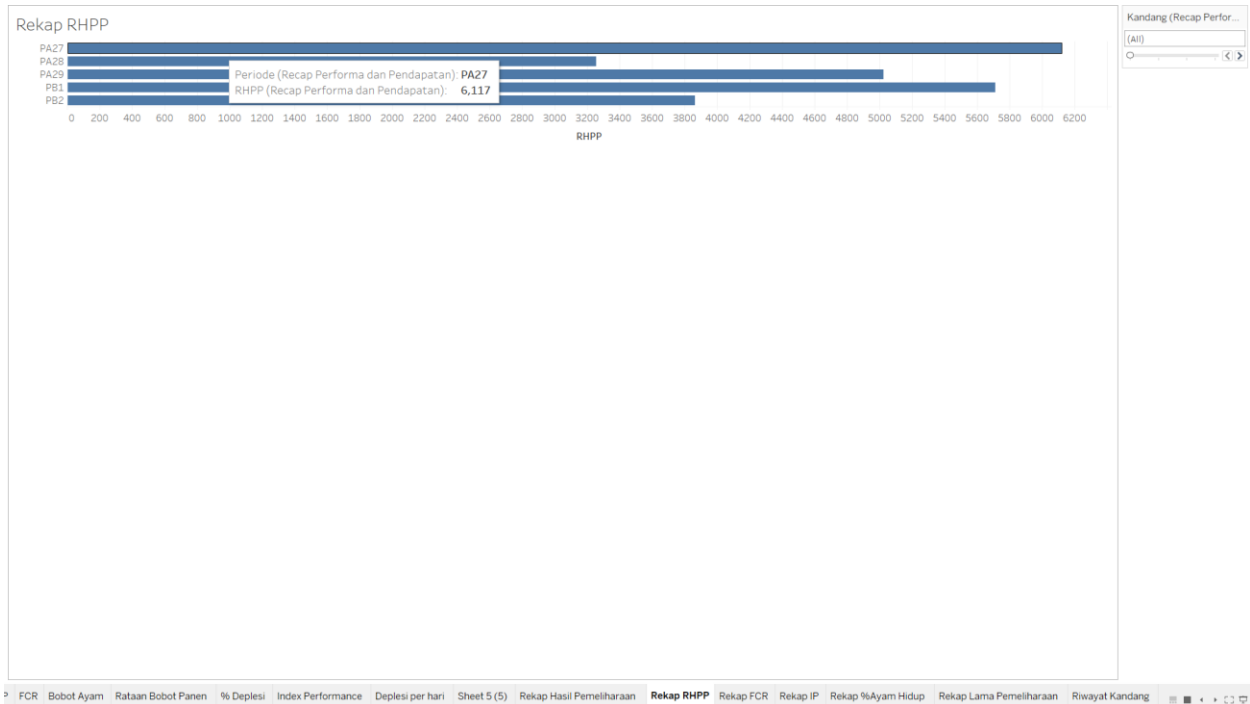


Figure 5. 4. Rekap RHPP Graph

A *rekap* RHPP graph compares and contrasts the cumulative RHPP or IOFCC value over all time intervals for both farms. The farm was selected using a single filter. The graph may help businesses analyze the period with the greatest RHPP values, indicating optimal harvest timing, minimal depletion, and other excellent-managed farming practices. According to figure 5.4, the RHPP value on farm A is maximum during the 27th period. Farm B's first period has the higher gross profit, but since Farm B has more chickens living there, the RHPP calculation for Farm A has a greater impact on the valuation. The other performances indicator for highest RHPP nor gross profit can be used for future period as the beneficial role to acquire better result.

3. FCR

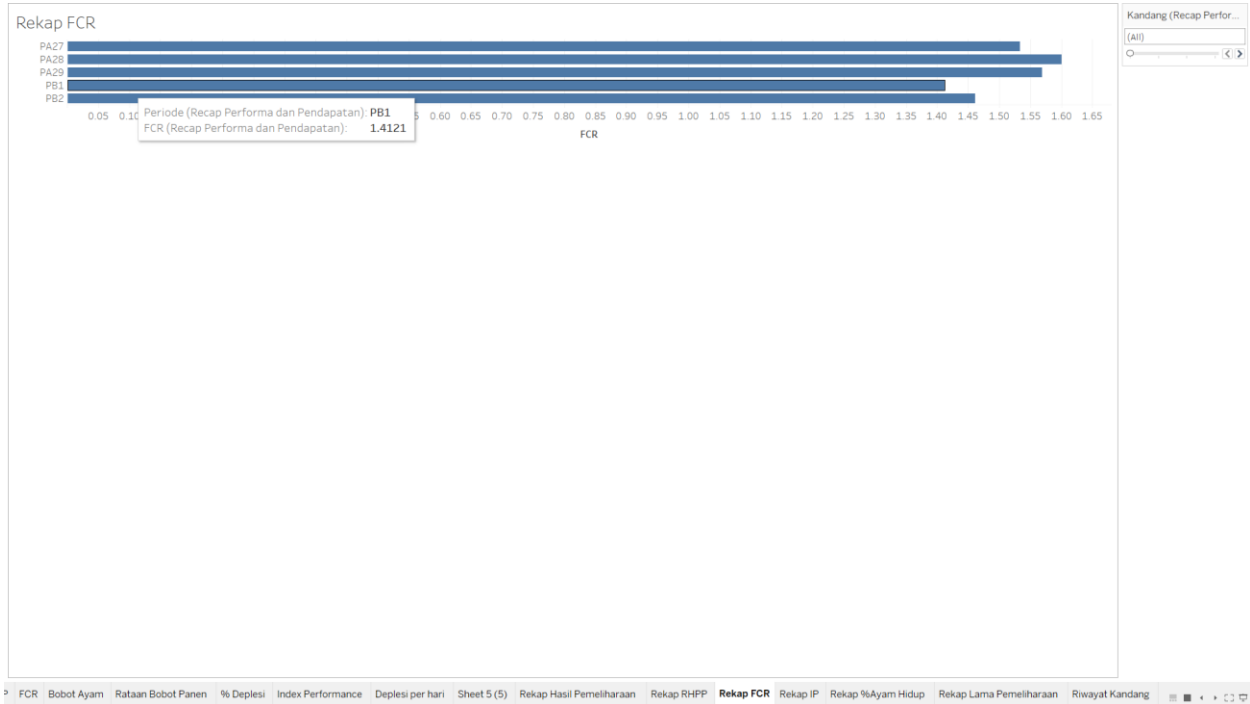


Figure 5. 5. Rekap FCR Graph

All of the graphs in the current dashboard, including the graph of rekap FCR, use the same filter and are shown in the same stacked bar chart style. Figure 5.5 shows that across all farms and periods, farm B's first period had the lowest FCR. Additionally, because Farm B is aiming for a maximum weight of 2 kg for the harvest, the FCR is lower throughout both times on Farm B compared to Farm A.

4. Index Performances

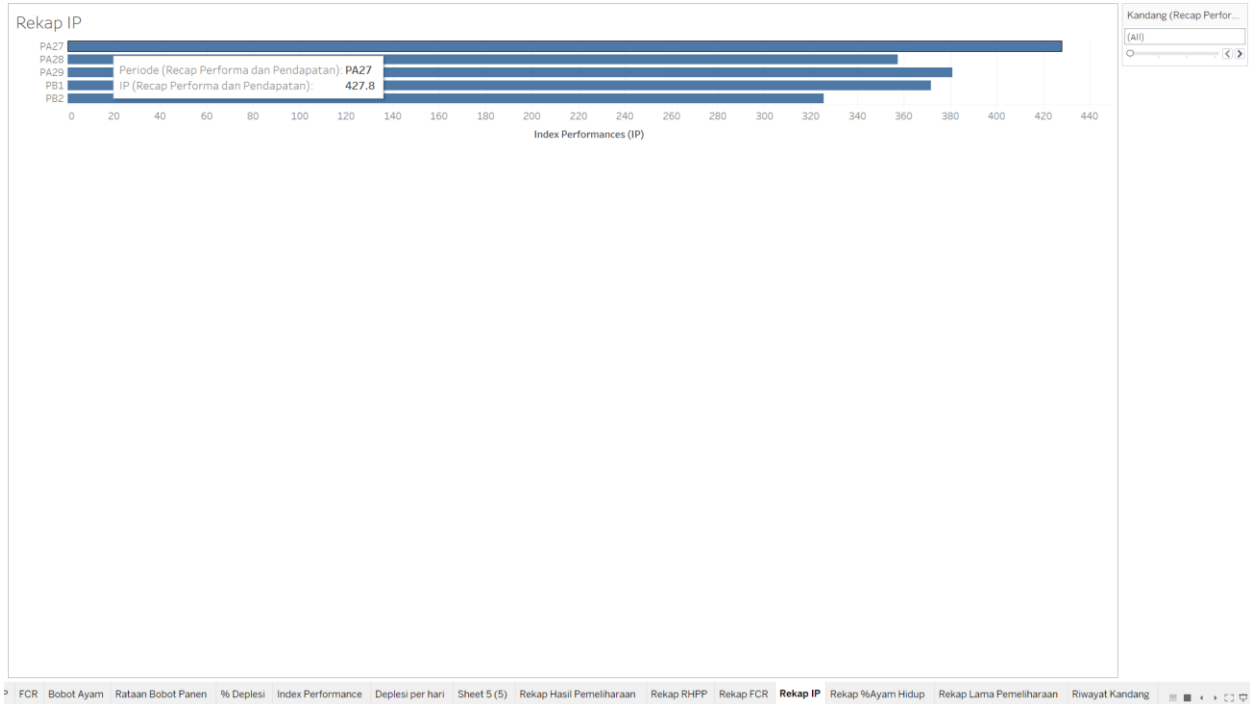


Figure 5. 6. Rekap Index Performances Graph

Index performances throughout all farming cycles and farms are shown in the graph. Specifically, "farm selection" is the filter that is used to build the graph. Determining which farm's performance user want historical index to be based on, or choose both farms. With the use of a *kandang* filter shown as a single-value selection, users may choose their speciefied farm. According to Figure 5.6, the greatest IP of 427.8 is found in period 27 of farm A.

5. % Ayam Hidup

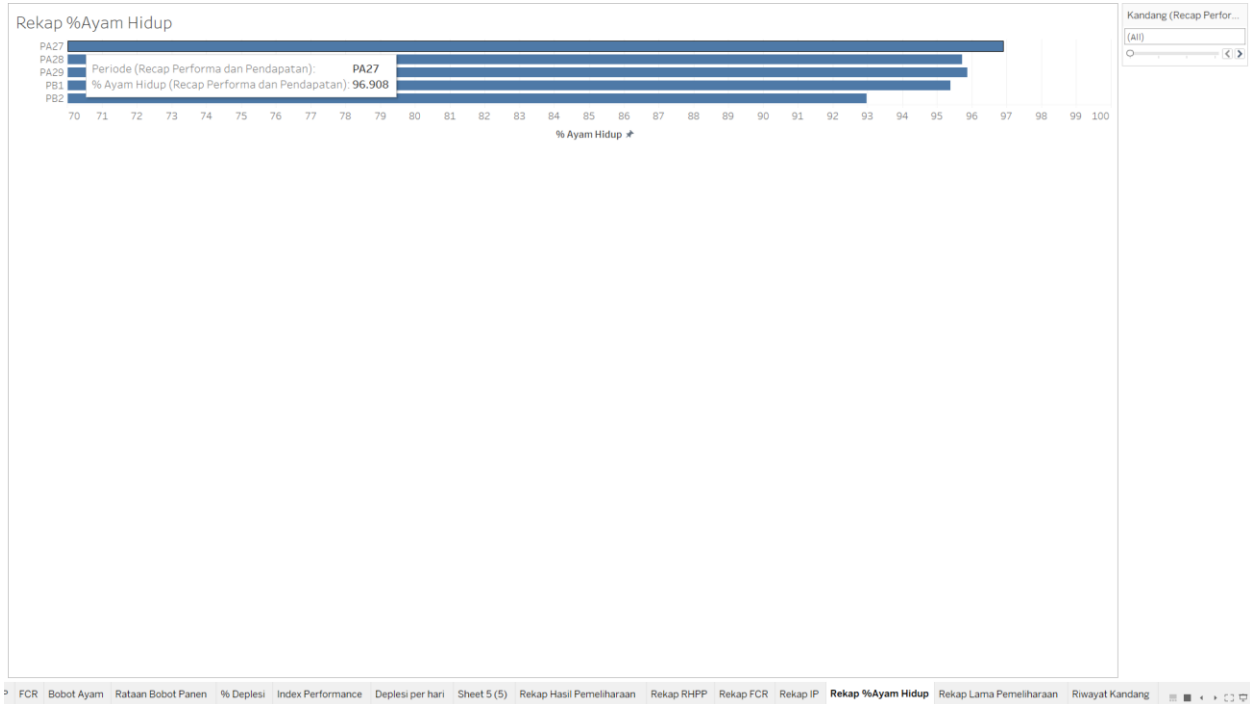


Figure 5. 7. Rekap % Ayam Hidup Graph

Rekap % ayam hidup graph compare the proportion of harvested chickens to the original population over all time periods for both farms. The graph's farm was selected using a single filter. The graph can aid business in analyzing the highest percentage of harvested chicken indicating excellent farm management with low depletion value. The lowest rate of chicken harvested indicated poorly managed farms with high depletion value. The highest proportion of chickens taken from Farm A during the 27th period is shown in figure 5.4. However, the 2nd period of farm B has lowest percentage of harvested chickens.

6. Lama Pemeliharaan

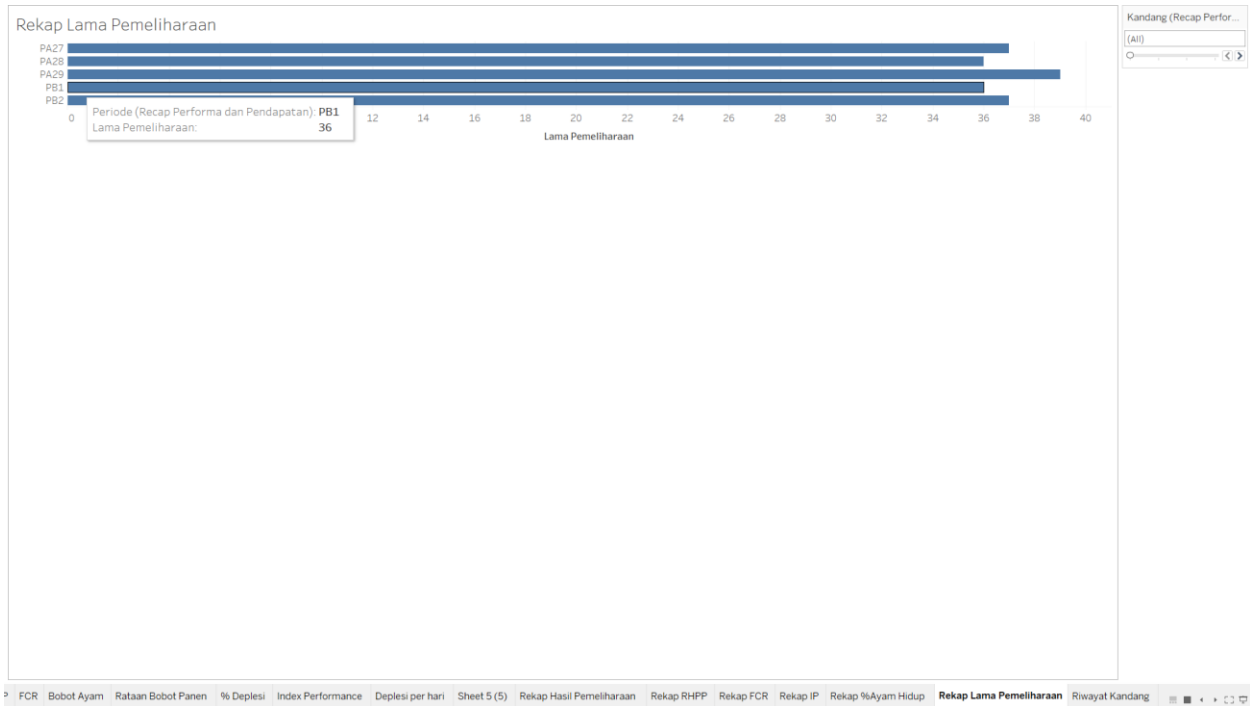


Figure 5. 8. Rekap Lama Pemeliharaan Graph

All graphs of rekap pemeliharaan dashboards use the same filters and display data in the same style, a stacked bar chart. figure 5.5 shows that the shortest farming times were attained in the 1st period of farm B and the 28th period of farm B.

7. Riwayat Kandang Scorecard

Periode	Populasi	Jumlah Terpanen	% Ayam Hidup	Lama Pemeliharaan	Tonase Pakan Terp...	Tonase Terpanen	FCR	IP	Hasil Pemeliharaan	Rhpp
PA27	40,000	39,151	97	37	129,000.00	84,127.50	1.53	428	Rp 244,672,809.00	Rp 6,116.82
PA28	40,000	38,675	96	36	117,550.00	73,470.50	1.60	358	Rp 130,217,889.00	Rp 3,255.45
PA29	40,000	38,730	96	39	127,750.00	81,443.50	1.57	381	Rp 200,914,769.00	Rp 5,022.87
PB1	47,000	45,281	95	36	113,050.00	80,059.50	1.41	372	Rp 268,476,426.50	Rp 5,712.26
PB2	47,500	44,602	93	37	107,250.00	73,416.00	1.46	325	Rp 181,589,229.00	Rp 3,863.60

Figure 5. 9. Riwayat Kandang Scorecard

Final result on farm performance compiled in a scorecard known as the *riwayat kandang*. Similar to previous graphs, one filter is utilized. The greatest gross revenue, highest RHPP value, highest IP, lowest FCR, and longest farming time may all be determined during five periods across all farms, as shown by the scorecard.

5.2.2 RAG Analysis Dashboard

RAG analysis dashboard enables its users for obtaining insight into various farm performances in without detailed information (many number shown). Furthermore, upper limit and lower limit preferences are provided for some indicators to enable the user to set its own target.



Figure 5. 10. RAG Analysis

5.2.3 Performa Pemeliharaan I Dashboard

Performa Pemeliharaan I dashboard visually provides two farm performances, FCR and body weight, are graphically shown on *performa pemeliharaan I* dashboard. As can be seen on the *performa pemeliharaan I* dashboard, there are two charts provided.

1. FCR

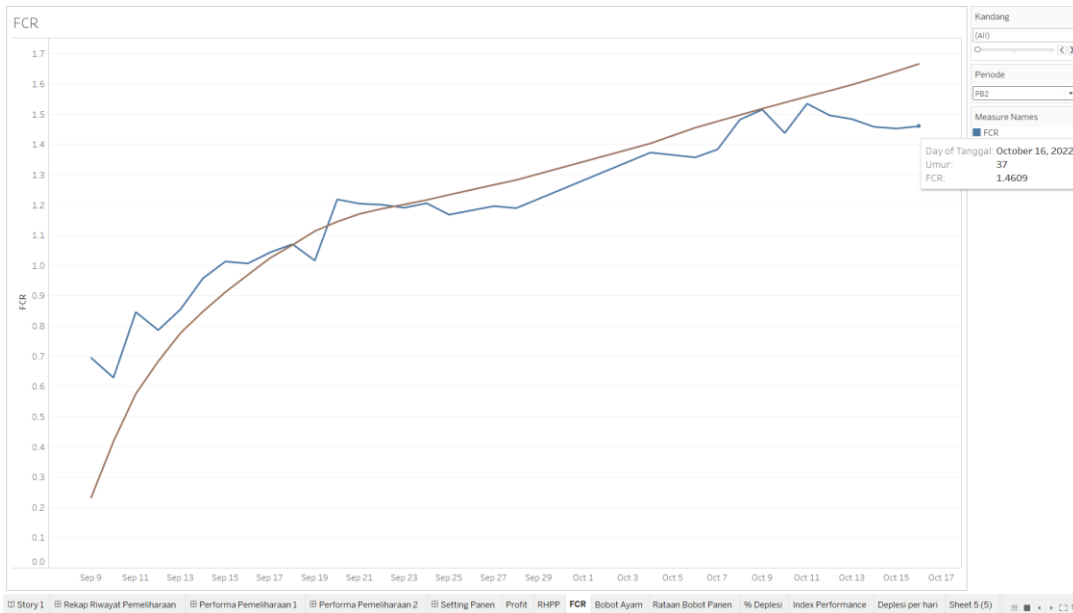


Figure 5. 11. FCR Graph

The line graph represents the FCR value. The FCR value for a certain farm and time period is estimated using daily data points. The *kandang* filter narrows the results to specified farm, while the period filter narrows it down to certain farming cycle. As can be seen in the chart, farm B's FCR was above standard at the beginning of the second period, but it dropped below standard by the end of cycle.

2. *Bobot (Kg)*

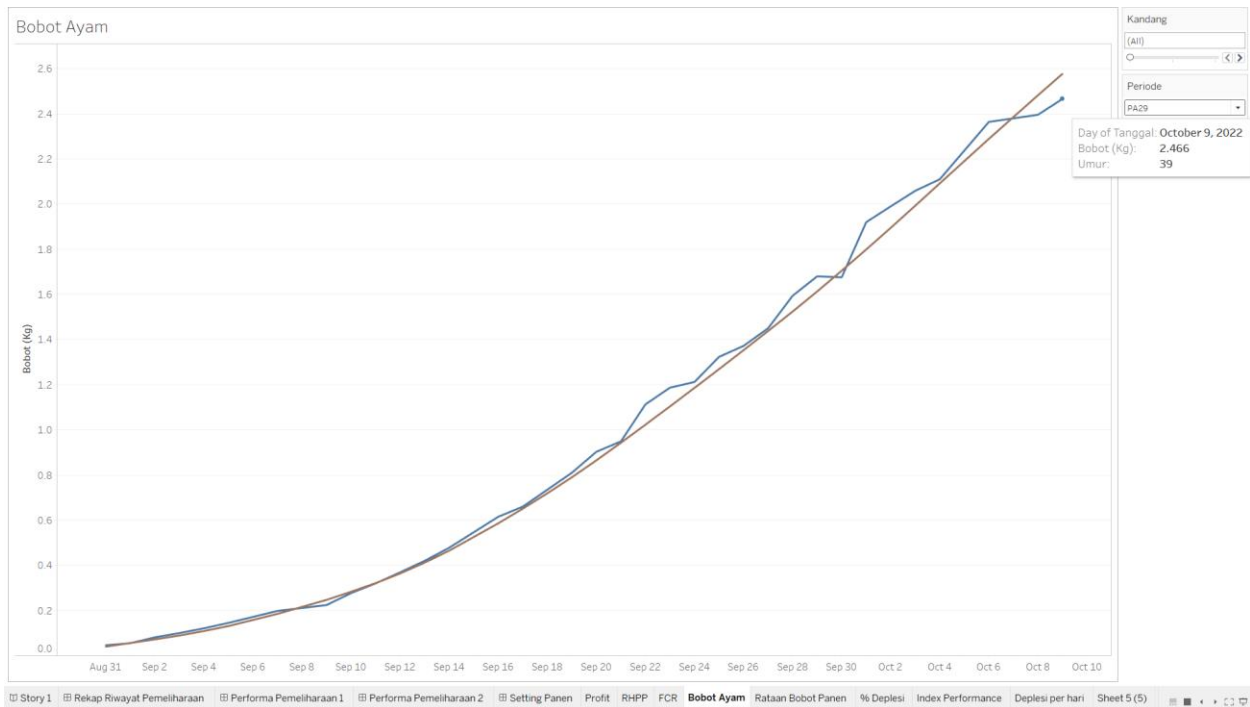


Figure 5. 12. *Bobot (Kg)*

The line graph represents a continuous value of body weight and the standard body weight. The graph is equipped with a standard, which maintains track of any daily body weight measured. A warning is triggered when the results depart unexpectedly from the standard. It was made using the same filters as the FCR graph.

5.2.4 Performa Pemeliharaan II Dashboard

The functionality of the *performa pemeliharaan II* dashboard is identical to that of the *performa pemeliharaan I* dashboard. The most noticeable difference is that *performa pemeliharaan II* has four graphs, each of which depicts a different kind of performance indicator relevant to farm management.

1. % Depleksi

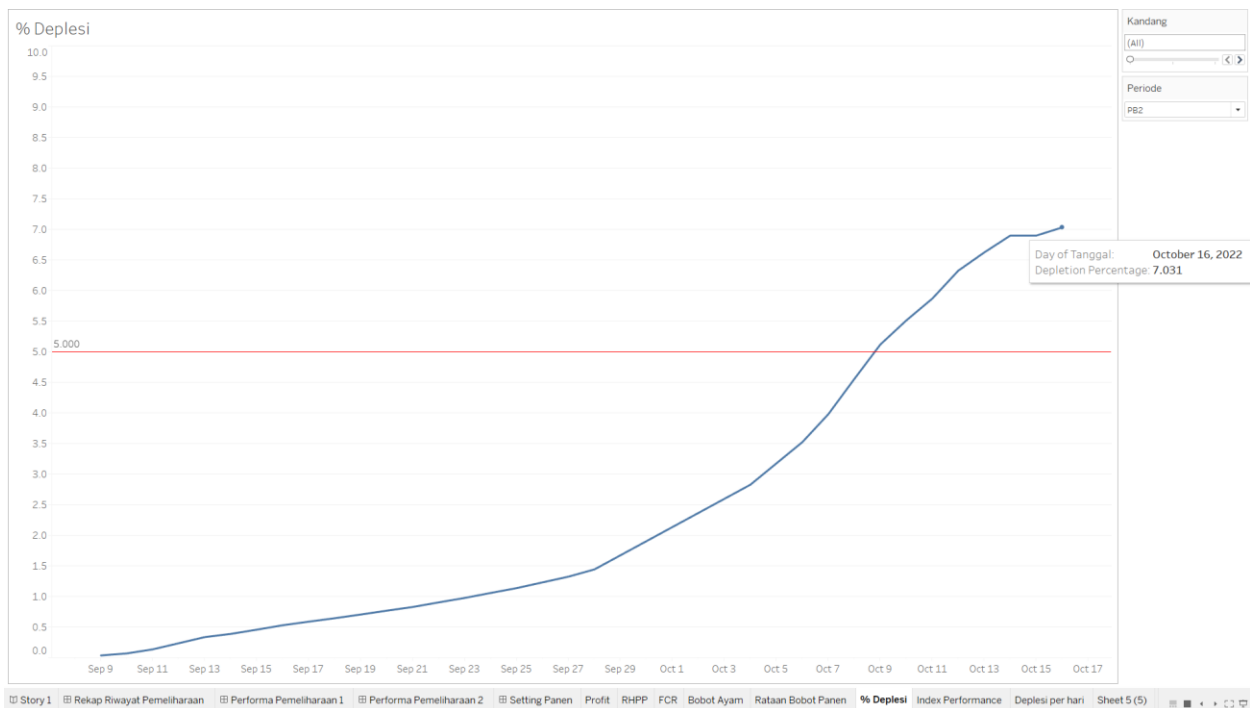


Figure 5. 13. % Depleksi Graph

The cumulative depletion rate is shown as a line chart in the graph. Daily data point represents a percentage of depletion that may be used to calculate a cumulative depletion rate that should be kept below 5%. This graph's filters are *kandang* filter, which specifies the farm, and *periode*, which specifies the farming cycles. According to the figure above, farm B's depletion rate in the second period was 7%, which is higher than the recommended total depletion rate of 5%.

2. Depleksi per hari

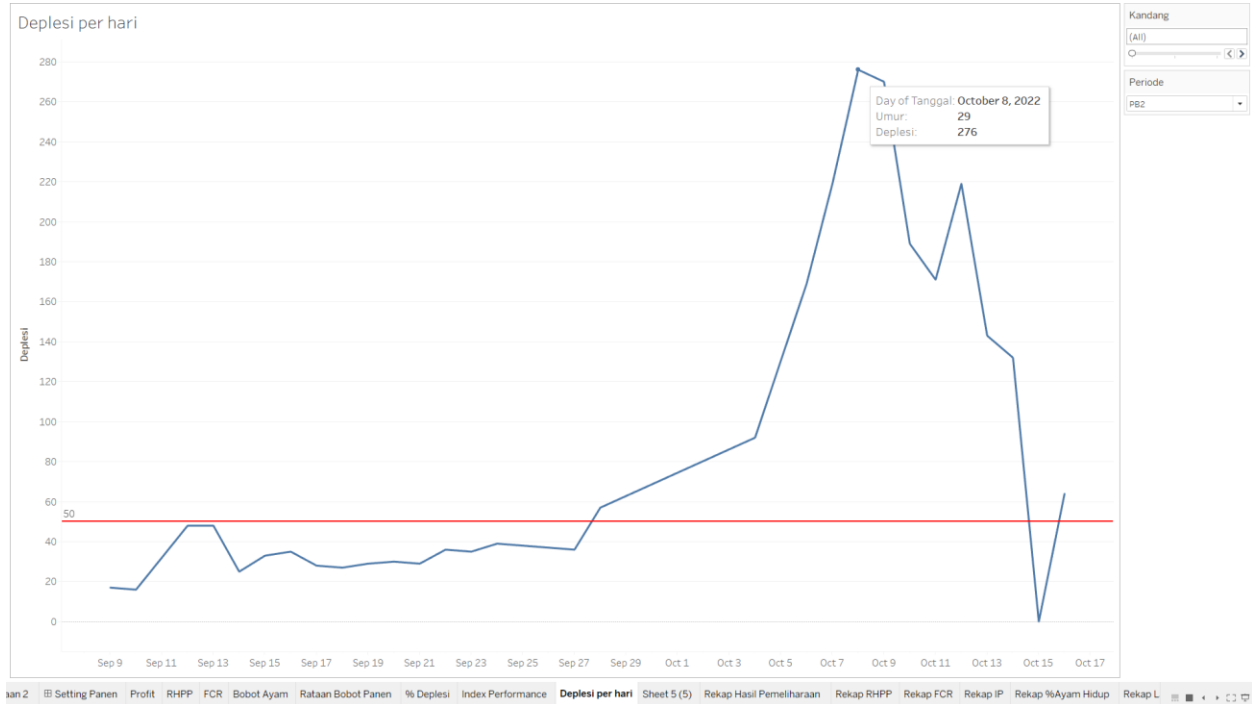


Figure 5. 14. Depleksi per hari Graph

The line graph depicts the daily depletion rate and the standard for 5% depletion rate. *Kandang* and *periode* filters were utilized. A large number of daily depletions over the standard were seen in the second period, as shown by the figure 5.13. Furthermore, the depletion was 276 in only one day for chickens of the age of 29 days.

3. Rataan Bobot Panen

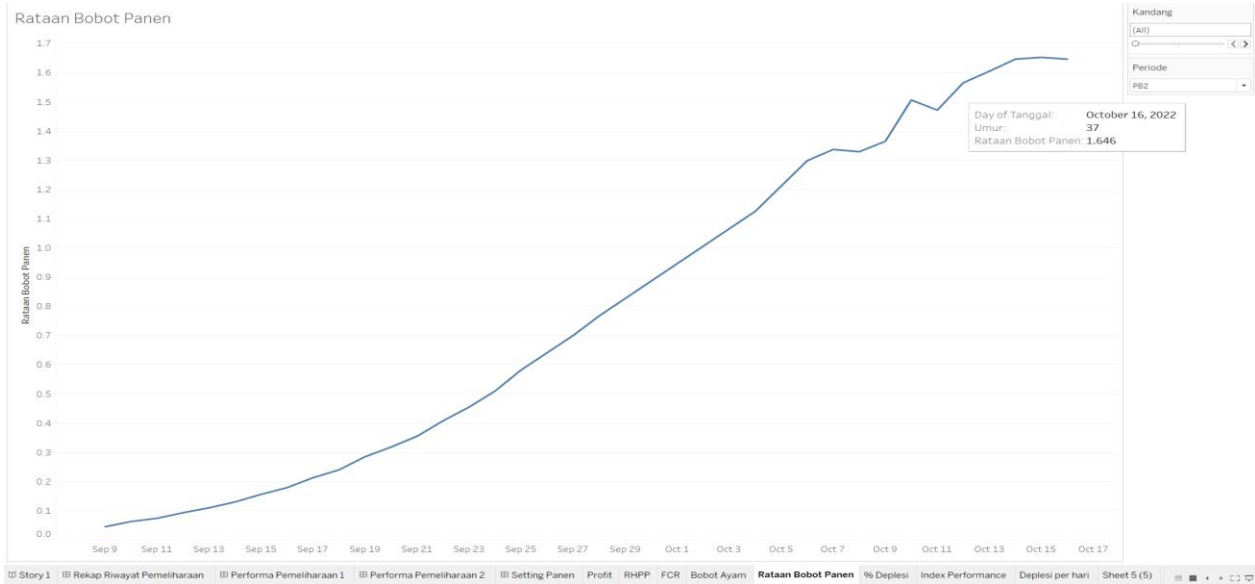


Figure 5. 15. Rataan Bobot Panen Graph

The graph of a *rataan bobot panen* analyzes the body weight average of harvested chickens. Double filter employed for the graph for selecting farm and specified periods. The graph can aid business in analyzing the appropriate harvesting time. Figure 5.14 indicating 2nd period of farm B has degradation of average harvested body weight if the harvesting postponed for longer time.

4. Index Performance

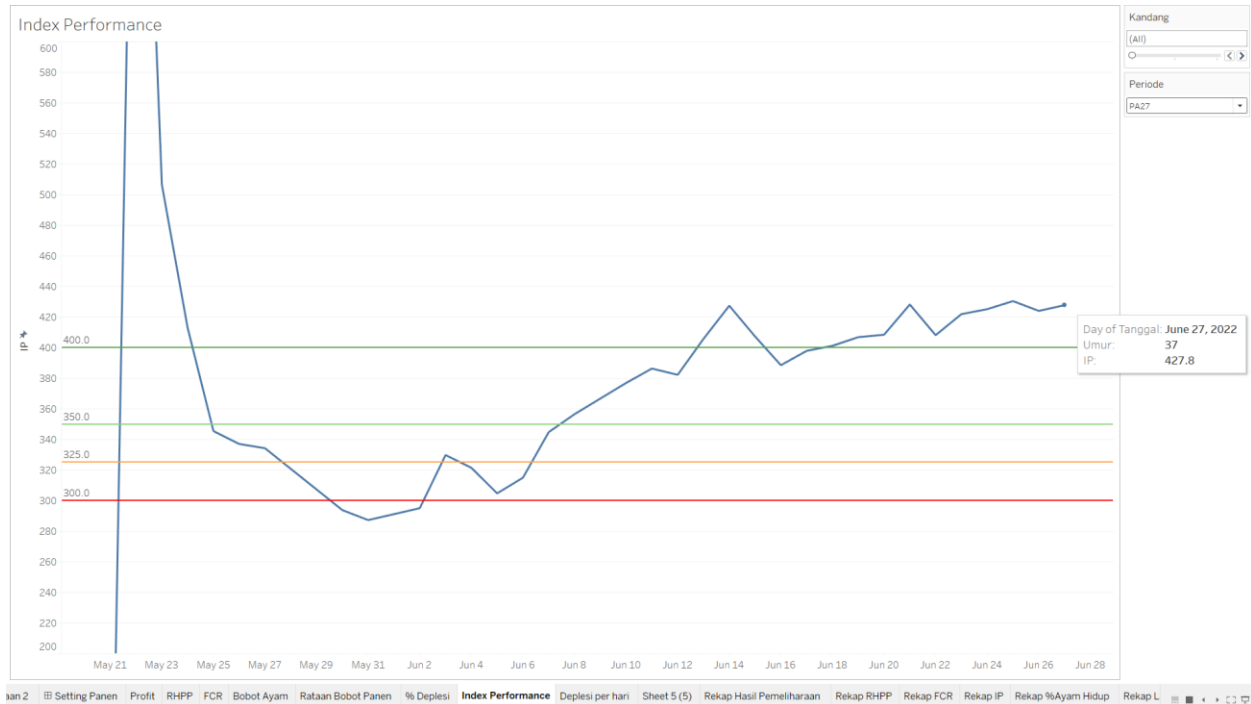


Figure 5. 16. Index Performance Graph

The graph of index performance employed identical filters and is presented in the same line chart format with all graph of *rekap pemeliharaan* dashboard. Furthermore, the constant line lie on index performance of 300, 325, 350, and 400 represented the grouping of specified index performance. According to figure 5.15, 27th period of farm A has final index performances of 427.8 which categorized as excellent criteria.

5.2.5 Setting *Panen* Dashboard

Setting *Panen* dashboard enables its users for obtaining insight into determining appropriate harvest time. Furthermore, daily increment nor decrement of total expenditure and total sales with bonuses estimation provided. In order to maximize profits while decreasing costs, knowing the optimal time to harvest broiler is crucial for farms engaged in the business of broiler meat production (Topal & Bolukbasi, 2008).

1. Total Penjualan dan Total Pengeluaran

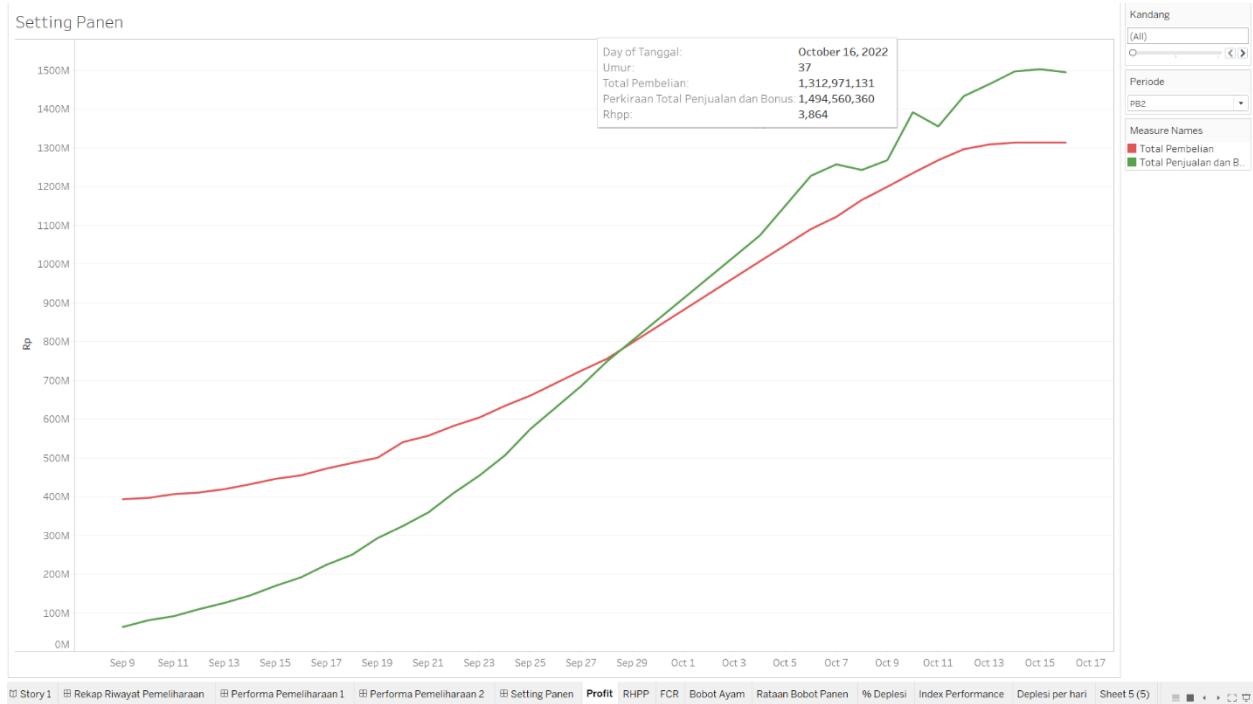


Figure 5. 17. Total Penjualan dan Pengeluaran Graph

The *total penjualan dan pengeluaran* graph takes the form of a dual line chart to identify the total expenditure and total sales included its bonuses in daily basis. The graph employed two filters namely *kandang* and *periode*. Users have the option of determining the farm through *kandang* filter. A *periode* filter in the form of a single values dropdown allows users to select a preferred farming periods. Figure 5.16 represents within 2nd period of farm B, profit area become smaller since the total revenues started to be linear the decreased.

2. RHPP

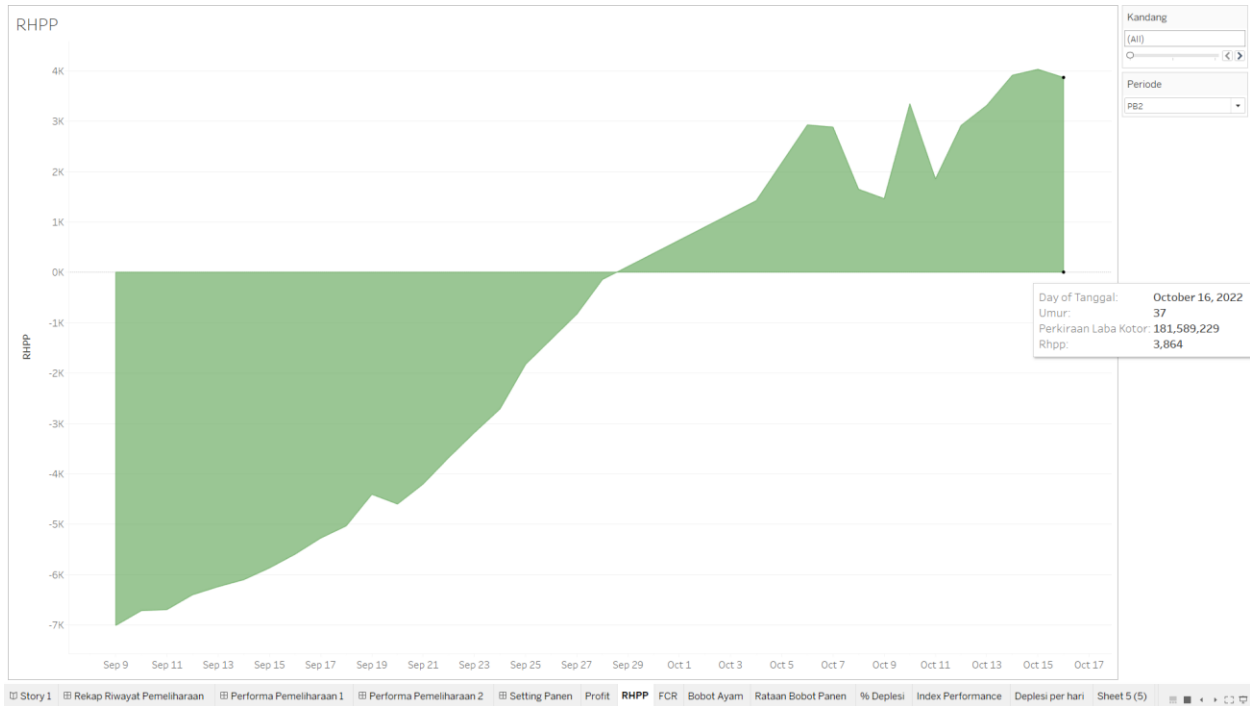


Figure 5. 18. RHPP Graph

The graph is a line area chart that displays the RHPP or IOFCC value with its gross revenue. Dual filters used which is similar to the *total penjualan dan pengeluaran* graph that came before. RHPP represented by daily data points that used to determining appropriate harvesting time.

5.3 Performance Standard References

5.3.1 RHPP / IOFCC

RHPP is a process used to collect and record data on the agricultural yields of individual farmers, typically in the poultry, livestock, or fisheries sectors. The data collected includes information on the type and quantity of crops, poultry, or fish produced, as well as the weight and quality of the harvest. RHPP/IOFCC data can vary depending on the region and time period.

There are no universal or standardized guidelines for calculating IOFCC in the poultry industry, as the inputs and costs can vary depending on the production system, region, and market conditions. However, IOFCC can be calculated using generally accepted accounting principles and methods for financial analysis. For example the study by Mech, et al., (2019), the authors surveyed broiler chicken farmers across the United States to gather data on a variety of topics related to on-farm welfare practices, including financial performance measures such as IOFCC. The authors reported an average IOFCC value of USD 0.25 or IDR 3,750 per bird for the surveyed farmers. A study by Zulkifli, et al., (2018) reported an average IOFCC value of USD 0.52 or IDR 7,790 per birds produced in Malaysia. Another study by Baracho, et al., (2014) reported an average IOFCC value of USD 0.19 or IDR 2.850 per broiler chicken produced in Brazil.

There is limited published research on average IOFCC values for broiler chicken production in Indonesia. However, there have been some studies that have reported IOFCC values for specific production systems or regions within Indonesia. For example, a study by Dewei, et al., (2017) reported an average IOFCC value of IDR 8,662 per bird produced in West Java, Indonesia. Another study published in the same journal by Lukman, et al, (2016) reported an average IOFCC value of IDR 4,478 per broiler chicken produced in Central Java, Indonesia. Furthermore, Putra (2018) reported IOFCC value for Bali region at IDR 5,285 per broiler chicken produced and Budiarsa & Kusumandari (2017) discovered that IOFCC for Lampung on average of IDR 7,414 per kg of broiler chicken produced. Overall, more research is needed to provide a comprehensive understanding of the average IOFCC values for broiler chicken production in Indonesia.

5.3.2 IP / EEF

IP is a measure of the overall performance of a broiler flock in terms of weight gain, feed conversion, and livability. It is typically calculated by dividing the total weight gain of the flock by the total feed consumed over a given period. IP is a useful tool for farmers to evaluate the effectiveness of their management practices and make adjustments as needed to improve the performance of their flock. It can also be used to compare the performance of different flocks or to benchmark against industry standards.

The categorization of IP values into performance categories below is a widely used industry standard, but it may not have a specific journal reference. One common categorization of IP values is as follows:

- IP value of less than 300: Poor performance
- IP value between 300 and 330: Fair performance
- IP value between 330 and 350: Good performance
- IP value above 350: Excellent performance

For Indonesia region, Santoso and Sudaryani (2009), the performance index can be categorized as follows:

- $IP \leq 299$ indicates poor performance
- $300 \leq IP \leq 325$ indicates fair performance
- $326 \leq IP \leq 350$ indicates satisfactory performance
- $351 \leq IP \leq 400$ indicates very satisfactory performance
- $400 \leq IP$ indicates excellent performance

Crucial to note that these categories are not universal and may vary depending on the context and the specific goals and priorities of the farmer as well as the local market conditions and core-company (Richards & Zheng, 2014). Additionally, the IP is just one of many indicators used in the broiler industry to evaluate performance, and it should be used in combination with other factors such as feed conversion ratio, depletion rate, and cost of production to get a comprehensive assessment of the farm performance.

5.3.3 FCR

FCR (Feed Conversion Ratio) is a commonly used metric in the broiler farming industry. It is a measure of the efficiency with which broiler chickens convert feed into body weight gain. A lower FCR indicates that the broiler chickens are converting feed into weight gain more efficiently, which can be beneficial for the profitability of the farm. According to Khan, Sardar, Aslam, and Ashraf (2017), the average FCR for broiler chickens can range from around 1.5 to 2.5, depending on factors such as genetics, diet, management practices, and environmental conditions.

Majority broiler farm in Indonesia applied FCR standard by its core company partner (Ramadhani, 2016). Below are some FCR Standard given by several core company:

Table 5. 1. Core-Company FCR Standard

Day	FCR Standard		
	PT Mustika Jaya Lestari	PT New Hope Indonesia	PT Multisarana Pakanindo
0			
1	0.232	0.242	
2	0.418	0.427	
3	0.576	0.583	
4	0.683	0.689	
5	0.777	0.783	
6	0.848	0.851	
7	0.912	0.912	0.856
8	0.969	0.968	0.885
9	1.025	1.022	0.914
10	1.068	1.063	0.943
11	1.114	1.107	0.972
12	1.145	1.136	1.001
13	1.171	1.16	1.030
14	1.188	1.175	1.083
15	1.202	1.187	1.112
16	1.217	0.201	1.140
17	1.234	1.216	1.169
18	1.251	1.231	1.198
19	1.267	1.245	1.226
20	1.283	1.26	1.256
21	1.3	1.274	1.284

Day	FCR Standard		
	PT Mustika Jaya Lestari	PT New Hope Indonesia	PT Multisarana Pakanindo
22	1.317	1.294	1.311
23	1.337	1.313	1.337
24	1.359	1.331	1.336
25	1.381	1.347	1.390
26	1.404	1.366	1.416
27	1.43	1.383	1.443
28	1.456	1.412	1.467
29	1.477	1.433	1.490
30	1.498	1.452	1.514
31	1.519	1.47	1.537
32	1.539	1.488	1.561
33	1.559	1.509	1.584
34	1.578	1.522	1.608
35	1.98	1.54	1.629
36	1.62	1.559	1.651
37	1.643	1.578	1.673
38	1.667	1.599	1.694
39	1.692	1.62	1.714
40	1.717	1.641	1.736
41	1.743	1.663	1.758
42	1.769	1.685	1.777

5.3.4 Depletion

Depletion in a broiler farm refers to the gradual reduction in the number of birds on the farm due to mortality, culling, or sales. It is a common occurrence in broiler farming and can have a significant impact on the profitability of the farm. There is no single standard depletion rate for broiler farms, as the rate of depletion can vary depending on a variety of factors, including the breed of bird, management practices, environmental conditions, and disease prevalence.

However, industry benchmarks can provide some guidance for farmers to assess their depletion rates and make improvements. In general, the industry standard for depletion rates in broiler farming is around 5-7%. This means that for every 100 birds placed on the farm, 5-7 birds are expected to be lost due to mortality, culling, or sales before the end of the production cycle. Hossain et al., (2017) investigated the depletion rates of broiler chickens in different areas of

Bangladesh and found that the rates ranged from 3.33% to 7.33%. The study provides some insight into the variability of depletion rates in different regions and highlights the importance of regular monitoring and management practices to minimize depletion rates.

An example given by core company PT Multisarana Pakanindo who published depletion standard for their plasma farm.

Table 5. 2. Core-Company Depletion Standard

Day	Depletion Standard by PT Multisarana Pakanindo		
	Rates (%)	Farm A (40000 Population)	Farm B (47500 Population)
7	1	400	475
8	1.107	443	526
9	1.214	486	577
10	1.321	528	627
11	1.428	571	678
12	1.535	614	729
13	1.642	657	780
14	1.75	700	831
15	1.857	743	882
16	1.964	786	933
17	2.071	828	984
18	2.178	871	1035
19	2.285	914	1085
20	2.392	957	1136
21	2.5	1000	1188
22	2.607	1043	1238
23	2.714	1086	1289
24	2.821	1128	1340
25	2.928	1171	1391
26	3.035	1214	1442
27	3.142	1257	1492
28	3.25	1300	1544
29	3.357	1343	1595
30	3.464	1386	1645
31	3.571	1428	1696
32	3.678	1471	1747
33	3.785	1514	1798
34	3.892	1557	1849
35	4	1600	1900

Day	Depletion Standard by PT Multisarana Pakanindo		
	Rates (%)	Farm A (40000 Population)	Farm B (47500 Population)
36	4.142	1657	1967
37	4.284	1714	2035
38	4.426	1770	2102
39	4.568	1827	2170
40	4.71	1884	2237
41	4.852	1941	2305
42	5	2000	2375

5.3.5 Average Body Weight

The average body weight gain for broilers can also vary depending on factors such as genetics, nutrition, environmental conditions, and management practices. In general, broilers are expected to have a high daily weight gain in order to reach their target harvest weight in a short period of time. According to industry standards, a typical broiler chick can gain an average of 42-56 grams (Zeng, et al., 2021) per day during the first 4-6 weeks of life. After that, the rate of weight gain may slow down slightly as the birds approach their target weight.

Nones, et al., (2018) evaluated the growth performance and carcass characteristics of broilers subjected to different feed restriction programs. The study reported an average daily weight gain of 49.4 grams for broilers in the control group, which received ad libitum access to feed. Specifically for Indonesia region, below are the standard for daily body weight provided by several core-company:

Table 5. 3. Core-Company ABW Standard

Day	ABW Standard (Kg)		
	PT Mustika Jaya Lestari	PT New Hope Indonesia	PT Multisarana Pakanindo
0		0.042	
1	0.056	0.054	
2	0.072	0.07	
3	0.089	0.087	
4	0.109	0.107	
5	0.131	0.129	

Day	ABW Standard (Kg)		
	PT Mustika Jaya Lestari	PT New Hope Indonesia	PT Multisarana Pakanindo
6	0.157	0.155	
7	0.185	0.183	0.164
8	0.215	0.213	0.202
9	0.247	0.245	0.24
10	0.283	0.28	0.278
11	0.321	0.318	0.316
12	0.364	0.361	0.354
13	0.412	0.409	0.392
14	0.465	0.461	0.48
15	0.524	0.52	0.54
16	0.586	0.581	0.6
17	0.651	0.646	0.66
18	0.719	0.713	0.72
19	0.79	0.784	0.77
20	0.865	0.858	0.83
21	0.943	0.936	0.91
22	1.023	1.012	0.99
23	1.104	1.091	1.07
24	1.1186	1.174	1.15
25	1.269	1.259	1.23
26	1.353	1.345	1.31
27	1.438	1.435	1.39
28	1.524	1.513	1.48
29	1.613	1.602	1.56
30	1.709	1.633	1.65
31	1.799	1.787	1.74
32	1.895	1.882	1.83
33	1.993	1.979	1.92
34	2.092	2.078	2.01
35	2.191	2.177	2.09
36	2.289	2.274	2.18
37	2.386	2.371	2.27
38	2.482	2.466	2.36
39	2.577	2.56	2.44
40	2.671	2.655	2.53
41	2.764	2.748	2.62
42	2.857	2.84	2.69

5.4 Out of Standard Performances Solution

5.3.1 RHPP / IOFCC

A low IOFCC value can be caused by several factors, including high feed costs, low production efficiency, high chick costs, and low market prices for chicken products.

1. High feed cost

Feed costs are a major factor in IOFCC, as feed accounts for a 70% portion of total production costs (Munir, 2018). Factors that can contribute to high feed costs include fluctuations in the price of feed ingredients, transportation costs, and import/export tariffs. If feed prices are high or feed conversion efficiency is low, the IOFCC value can be negatively impacted.

2. Low productivity

Low production efficiency can also impact IOFCC, as it can result in lower weight gain and lower marketable chicken products, leading to reduced revenue (Sulandari, et al., 2020). Feed conversion ratio (FCR) is the amount of feed required to produce one kilogram of live weight. A high FCR means more feed is required to produce the same amount of meat, which increases production costs and reduces IOFCC. Factors that can contribute to low feed conversion efficiency include poor quality feed, poor management practice, disease outbreaks, and environmental stressors.

3. High chick cost

High chick costs can also contribute to a low IOFCC value, especially if chick mortality is high (Sulandari, et al., 2020). Factors that can contribute to high chick costs include breed selection, quality of breeding stock, and hatchery practices.

4. Low market prices

Low market prices for chicken products can result in a lower revenue stream, which can make it more difficult to achieve a positive IOFCC value (Yulianti, 2016).

It's important to note that these factors can vary depending on local conditions and production practices, and that multiple factors may be at play in any given situation. Therefore, it is crucial to identify and address the specific factors that are contributing to a low IOFCC value in order to improve profitability in broiler farm.

5.3.2 IP / EEF

There are several factors that can cause the European Production Efficiency Factor (EPEF) to become low. Here are some of the most common reasons:

1. Farm management practices

Poor management practices, such as inadequate biosecurity, poor sanitation, and improper use of medications or vaccines, can increase the risk of disease and negatively impact farm performance and IP.

2. Market demand

The market demand for broilers and their products can also impact IP. If market prices are low or demand is weak, farmers may not have sufficient resources to invest in optimal management practices, leading to lower IP values.

3. Long farm periods

A longer farm time until harvest can result in a lower IP, as it increases the risk of disease outbreaks, reduces feed conversion efficiency, and increases the cost of production. In addition, a longer farm time until harvest can also result in reduced feed conversion efficiency. Broilers have a specific growth rate and feed intake, and any delays in harvest can result in an increase in feed conversion ratio, leading to a decrease in IP.

4. Disease outbreaks

Diseases such as avian influenza, infectious bronchitis, and Newcastle disease can significantly reduce farm performance and lead to a decrease in IP (Hester, 2003). Disease outbreaks can cause reduced feed intake, poor weight gain, and increased mortality rates.

5. Environmental stress

Broilers are susceptible to heat stress, which can reduce feed intake, weight gain, and livability. Poor ventilation, overcrowding, and inadequate temperature control can contribute to environmental stress and a decrease in IP (Chambers & Ford, 2016).

Overall, there are many factors that can impact IP. By addressing these factors and implementing best management practices, farmers can improve broiler performance and achieve higher IP values including achieve and maintain high levels of productivity and profitability.

5.3.3 FCR

There are several factors that can cause a high value of FCR (Feed Conversion Ratio) in broiler farms, including:

1. Farm management practices
Poor management practices such as overcrowding, inadequate ventilation, or improper lighting can lead to stress and decreased feed intake, resulting in a high FCR. Inefficient processing practices such as inadequate cleaning and disinfection of feeders and waterers can lead to bacterial contamination, which can affect feed intake and a higher FCR (Yang, et al., 2019).
2. Inadequate water supply
Access to clean and fresh water is essential for broilers to digest their feed properly. If water is not available in sufficient quantities or is of poor quality, it can result in a high FCR (Dafwang & Bitto, 2015). Furthermore, poor water quality, such as high levels of bacterial contamination, can reduce feed intake and weight gain
3. Disease or illness
Broilers that are sick or infected with diseases may have difficulty digesting their feed, resulting in a high FCR.
4. Genetics
Broilers with poor genetics may have lower growth rates and less efficient feed conversion, resulting in a high FCR (Ospina, et al., 2017).
5. Poor feed quality
If the feed provided to broilers lacks essential nutrients or is of poor quality, it can result in a high FCR.
6. Parasites or pathogens
External and internal parasites, such as mites, lice, and worms, can reduce feed intake and weight gain and increase mortality rates.
7. Age
Older broilers generally have a higher FCR as they have slower growth rates and lower feed intake.
8. Stress

Stressful conditions such as overcrowding, poor ventilation, or inadequate lighting can lead to decreased feed intake and a higher FCR.

9. Feed wastage

Feed wastage due to improper feeding systems or feeding practices can result in a higher FCR.

10. Antibiotic use

Overuse or misuse of antibiotics in broiler production can lead to a higher FCR, as it can reduce the microbial diversity in the gut and affect feed digestion.

High FCR can lead to increased feed costs, lower profits, and decreased competitiveness in the market. It is important for broiler farmers to identify the underlying causes of high FCR and take corrective actions to improve the efficiency of feed conversion.

5.3.4 Depletion

High depletion rates in broiler farming can be caused by a variety of problems. Here are some potential factors that can contribute to high depletion rates:

1. Poor farm management

Poor farm management practices, such as inadequate monitoring of chick health or failure to provide appropriate treatment for sick chicks, can contribute to higher depletion rates in broiler farming.

2. Inadequate ventilation

Poor ventilation can lead to a buildup of harmful gases, such as ammonia and carbon dioxide, which can contribute to respiratory problems and other health issues in broiler chickens. This can increase depletion rates and reduce the overall (Silva, et al, 2018).

3. Drinking problem

Poor quality drinking water can lead to health problems in broiler chickens, such as bacterial infections and digestive issues (Dafwang & Bitto, 2015). This can increase depletion rates and reduce the overall productivity of the farm.

4. Biosecurity

Poor biosecurity measures can increase the risk of disease outbreaks, which can have a significant impact on depletion rates (Gadd & Pomroy, 2018). Effective biosecurity

measures, such as controlling access to the farm and properly disinfecting equipment, are essential for minimizing the risk of disease.

5. Environmental factors

Environmental factors such as temperature, humidity, and ventilation can all affect the health and well-being of broiler chickens. If these factors are not properly managed, it can lead to increased stress and higher depletion rates.

6. Disease outbreaks

Disease outbreaks can have a significant impact on depletion rates, as infected birds may need to be culled to prevent the spread of disease. If not properly managed, disease outbreaks can quickly lead to high depletion rates.

7. Poor nutrition

Inadequate nutrition can lead to poor growth and development in broiler chickens, making them more susceptible to disease and other health problems. This can increase depletion rates and reduce the overall productivity of the farm.

8. Genetics

The genetic makeup of broiler chickens can also play a role in depletion rates. Some breeds may be more prone to health problems or may have lower immunity, leading to higher depletion rates (Wideman, 2016).

These factors, emphasize the importance of effective management practices and early identification of potential problems in minimizing depletion rates and maintaining the health and welfare of broiler chickens.

5.3.5 Daily Average Body Weight

Several factors can contribute to a low value of average body weight in broiler chickens. Below are some possible causes:

1. Disease and health issues

Broilers are susceptible to various infectious and non-infectious diseases that can affect their growth and development. Diseases such as coccidiosis, Mareks disease, and respiratory infections can cause reduced feed intake, poor weight gain, and increased mortality (Dunnington & Siegel, 2019).

2. Water quality

Access to clean, high-quality drinking water is essential for broiler growth and development. Poor water quality can lead to reduced feed intake and poor weight gain.

3. Feed quality

The quality of the feed provided to broilers can impact their growth rates and body weight. Poor-quality feed that is contaminated or lacks essential nutrients can lead to slow growth and reduced weight gain.

4. Environmental stressor

Broilers are sensitive to changes in temperature, humidity, and air quality. Exposure to extreme heat, cold, or poor ventilation can lead to stress, reduced feed intake, and poor weight gain (Sogunle, et al., 2018).

5. Age

Broiler growth rates typically slow down as they age. Older birds may have lower feed intake and reduced nutrient absorption, which can lead to slower weight gain (Ribeiro, et al., 2019).

6. Farm density

Overcrowding can lead to stress, poor air quality, and reduced feed intake, which can negatively impact broiler growth rates (Katanbaf & Shivaprasad, 2019).

7. Medications

The use of antibiotics or other medications in broiler production can affect growth rates and body weight. Overuse or misuse of antibiotics can lead to antibiotic resistance and poor growth rates (Saleem, et al., 2020).

8. Genetics

The genetic makeup of broilers can also affect their growth rates and body weight. Some breeds may have lower growth potential or be more susceptible to certain health issues.

9. Nutritional deficiencies

Broilers require a balanced diet that provides adequate amounts of essential nutrients, such as protein, energy, vitamins, and minerals. A deficiency in any of these nutrients can lead to slow growth, poor weight gain, and reduced overall performance (Santoso, et al., 2004).

Broiler farmers should carefully manage all these factors to ensure optimal growth rates and body weight in their chickens. By monitoring the chicks closely and addressing any issues promptly, farmers can maximize the production potential of their broilers.

5.5 Limitations and Implications for Future Research

When interpreting the results and discussions of the research, as with the results of any other research, one must properly analyzed. To begin, the majority of the data extraction, transformation, and load processes are carried out in Microsoft Excel. As a direct result of this, the ETL process will consume a significant amount of time. Second, the business own internal data are the only ones that are used as the source of the information. Third, the desktop version of Tableau was utilized throughout the course of the dashboard's creation. As a result of the dashboard creation on other software, it is possible to encounter other procedures or approaches than those described in the present research. Fourth, the numerous performances analyses create the basis for the choices that will help the improvement of farm management. It is recommended that, in addition to monitoring farm performance, additional techniques be used, such as automated warning, feed automatic order, feed safety stock, et cetera.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Result

The following findings are drawn from the study, all of which are consistent with the initial purpose. *Riwayat pemeliharaan*, *RAG analysis*, *Performa Pemeliharaan I*, *Performa Pemeliharaan II*, and *Setting Panen* are five dashboards whose designs proposed and assembled in a Tableau story. With the use of the Self-Service Business Intelligence method, the resulting dashboard may be used to aid in managerial decisions on farms. The dashboards accessed from any internet-connected device, including smartphones. The daily paper-based recap data findings converted into useful information for assessing and enhancing the farm's productivity.

The *riwayat pemeliharaan* dashboard offers a comprehensive and overarching perspective of the history of all farming cycles included within its details. The farm is able to conduct direct assessments of the various farm performance indicators, such as FCR, body weight, depletion, harvested body weight, index performance, RHPP, gross revenue, and et cetera. The business is able to conduct a comparison of the performance result against the stated standard in order to monitoring the quality of the performance result. The setting *panen* dashboard is responsible for identifying the proper time to harvest who bring together the total expenditure and income acquired.

6.2 Recommendation

Following an analysis of the results of the research, the researcher hopes to provide some recommendations that will be of some aid to both the business and the academic community in the years to come, as well as to the public:

1. For the Business (Broiler Farm)
 - a. The business would need to provide the farm worker with training in order for them to be able independently handle data in purpose for them to be able to utilize the report and the dashboard that has been proposed.
 - b. In order to make informed decisions about the farm's future management, the owner or manager need either train to become a data storyteller or data story teller needs to be employed.
 - c. Farmer should investigated further reason or problem who caused one of or several performance indicator become poor.
2. For the Academic Community
 - a. Researchers of the future may create a more sophisticated dashboard using advanced BI technologies by combining Tableau with a SQL database, Python, Azure Machine Learning, and R. This will allow for more refined BI discoveries and a more manageable volume of data.
 - b. In addition to internal data, the next research may make use of external data.
 - c. The future researcher may compare the construction of the dashboard within the same framework of Self-Service BI on various programs than Tableau. One example of such an application is Microsoft Power BI.
 - d. It is possible that the future researcher may add more coverage, such as feed safety stock, auto order system, and so on, in order to enhance the analysis and performance assessment, which will ultimately result in a more comprehensive coverage of decision-making system.
 - e. The future research may act as conjunction between reason behind one of or some of farm performance has poor value and dug deeper on every factors who has relation to each other.

3. For the Public

- a. The current research is being done in the hopes that it will be able to assist other broiler farms who are involved in core-plasma partnerships and are experiencing the same difficulties in constructing their dashboards using the SSBI method for the purpose of improving farm performance.

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