The 1st
International Vocational Agriculture Symposium
Volume 1 Nomor 1 April 2026

The Effect of Age and Feeding on Egg Production and Hen Day Production of Kub-2 Janaka Agrinak Laying Hens at Iami Banten

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History Article:
- Submit: Juli 2025
- Publish: April 2026

Keyword:
Egg Production, KUB-2 Janaka Agrinak, Laying, Superior

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Abstract
The aim of this study was to analyze the effect of the age of KUB-2 Janaka laying hens and feed on egg production and hen day production. The study used a quantitative approach with a sample of 183 hens aged 6-18 months. The data on hen age, egg production, and hen day production were collected from documents related to KUB-2 Janaka chicken development activities at IAMI Banten from August 1, 2024 to August 31, 2025. The data was analyzed using a repeated measures ANOVA test to determine the significance of differences in hen age with egg production and hen day production, while the effects of hen age were analyzed using simple linear regression utilizing SPSS software. The results are as follows: 1) there is a significant difference (Sig. 0.00 < 0.05) in egg production and hen day production among laying hens aged 6-18 months; 2) the age of laying hens significantly affected egg production in a negative direction with a total effect of 63.3%; and 3) the age of laying hens significantly affected hen day production in a negative direction with a total effect of 44%. The increase in egg production and hen day production only occurred up to 36 weeks of age. The results indicate that egg production increases at specific age.

INTRODUCTION

The Ayam Kampung Unggul Balitbangtan (KUB)-2 Janaka Agrinak chicken is a native laying hen released based on the Decree of the Minister of Agriculture No. 768/KPTS/PK.020/M/12/2021. The KUB-2 Janaka Agrinak chicken originated from the selection of the KUB-1 through genetic improvement to increase egg production and has yellow shank legs (Sartika & Iskandar, 2021). The production of the KUB-2 Janaka Agrinak chicken is up to 200 eggs per year (Harifuddin et al., 2024), and that potential is higher than the KUB-1 chicken and kampong chicken. The production of the KUB-1 chicken is 160–180 eggs per year (Sitndaon et al., 2020), and that of kampong chicken using a traditional farming system is 41–44 eggs per year (Rajab et al., 2012). Another

difference between KUB-2 and KUB-1 is based on the onset of egg-laying age. The onset of egg-laying for KUB-1 is at 22–24 weeks of age (Soeharsono, 2019), while KUB-2 Janaka Agrinak chickens lay eggs earlier at 20 weeks (Malik et al., 2024) or around 20–21 weeks (Kertawirawan, 2025). Beyond genetic factors, feed also influences the age at first lay. A deep analysis shows that crude protein consumption affects the age at first lay (Pratomo, 2021).

The presence of the KUB-2 Janaka Agrinak chicken adds to the choices available to farmers for farming native chickens that excel in egg production. Research by Kartika et al. (2016) describes that farmers' preference for local chickens is higher than for other varieties of chickens because they are adaptive and more familiar, even though their production is relatively low (17.61 eggs per period). Thus, the uniqueness of KUB chickens is in their high egg production potential, which can be an alternative for farmers in supplying limited native chicken eggs. Discussion on KUB-2 Janaka Agrinak chicken egg production and the factors that influence it need to be studied in more depth, and the dissemination of information related to breeding, breeding standards, and business opportunities also needs to be accelerated. The dissemination of applied research results on KUB-2 Janaka Agrinak chickens as a superior variety and breed can increase the limited literacy of farmers (Rusdiana & Soeharsono, 2020). The comprehensive information regarding potential and research findings will explicitly demonstrate the advantages of KUB-2 Janaka Agrinak over KUB-1. Laraswati and Nuruliya (2024) analyzed the feed consumption of KUB-1 layers, showing that standardized feed intake increased Hen Day Production (HDP) to 50%. Utami (2023) reported that KUB-2 exhibits superior HDP (70–75%) compared to KUB-1 (44–70%). The research findings clarify that the genetic improvement from KUB-1 to KUB-2 is directly proportional to its HDP performance.

The development of KUB-2 Janaka Agrinak chickens depends on the availability of standardized breeding. The Implementation Agricultural Modernization Institute (IAMI) of Banten, also known as BRMP Banten, an organization within the Ministry of Agriculture, has been striving since 2023 to produce standardized breeding. Malik et al. (2022) reported clearly that IAMI Banten has implemented SNI 8405-2:2023, which requires parent birds aged 25–72 weeks to have eggs with a minimum weight of 39 grams and to produce day-old chicks (DOC) with an average weight of 30.8 grams (> 26 grams). The DOC of the KUB-2 Janaka Agrinak is called KURI.

The existence of IAMI Banten not only disseminates information about KUB chickens but also contributes to providing superior DOC breeds. This achievement further complements the existence of breeding centers. Strengthening the KUB chicken breeding system that prioritizes the principles of productivity, efficiency, competitiveness, and sustainability is urgently needed to maintain the stability of quality breed availability. The development of breeding centers can be carried out at the farmer level through collaboration between the government, private sector, educational institutions, farmer groups, and community groups who are concerned with livestock development (Rusdiana & Soeharsono, 2019). Small-scale farmers should be involved in the breeding system because sustainable chicken farming can increase productivity and livestock business yields, contributing to economic profits (Mustafa et al., 2023).

The activity and scope of standardized breeding stock at IAMI Banten provide the background for the importance of research on the effect of the age of KUB-2 Janaka Agrinak chickens and feed on egg production and hen day production (HDP). Specific research on the effect of the age of KUB-2 Janaka Agrinak chickens on egg production and hen day production has not been widely conducted, so the discussion in this research is expected to enrich scientific knowledge. The discussion of the research continues to utilize the results of previous studies on KUB-1 chicken, local kampong chicken, and laying hens. As reported by Saputra et al. (2019), the age of KUB chickens affects egg productivity and fertility. More comprehensively, a study by Dameanti et al. (2020) reported that the productivity of KUB chickens is influenced

by environmental factors. Wind speed, lighting, humidity, and temperature together affect the productivity of KUB chickens by 31.4%.

RESEARCH METHODOLOGY

The study used a quantitative approach at IAMI Banten in Singamerta Village, Ciruas Subdistrict, Serang Regency. The research material consisted of 183 KUB-2 Janaka laying hens aged 24 to 72 weeks, feed, and their daily egg production. The study period coincided with the implementation of KUB chicken breeding activities from August 2024 to August 2025. The data collected included the laying hen age, feed, egg production, and hen day production (HDP). The study applied a plot-based quantitative research design, adapted to the management practices of KUB-2 Janaka Agrinak chickens at IP2MP Singamerta. The hens were raised intensively in two poultry houses using a flock system (comprising 24 units/plots) under controlled and uniform environmental condition. The feed treatment focusses on nutrition which each plot showed a repeat of two feed treatments. The treatment at different times, so the utilised analysis describes a comparison egg production between before and after consumption of two feeds.

Data Collection Technique for KUB Janaka-2 Agrinak Hen Age

The unit of measurement for the age of KUB-2 Janaka Agrinak hens is weeks. The KUB-2 Janaka Agrinak hens were raised using a flock system, so age was recorded from the recapitulation of the age of each flock every month. Referring to SNI 8405-2:2023, the age requirement for a standard breeding center is 25 to 72 weeks, so the age of the KUB-2 Janaka Agrinak chickens in this study was calculated from 24 weeks in August 2024 to 72 weeks in August 2025. The detailed tabulation of the KUB-2 Janaka Agrinak chicken age based on time is shown in Table 1.

Table 1. The Nutrition of Feed A and Feed B Consumed by KUB-2 Janaka Agrinak Chickens

Nutritional Composition	Feed A	Feed B
Water content Max. (%)	13	12
Crude Protein (%)	17	13-15
Crude fat Min. (%)	3	4
Calcium (%)	3,25 – 4,25	0,9-1,2
Aflatoxin (µg/kg)	50	50

Feed Data Collection Technique

The feed provided was commercial complete feed, and during the laying phase (19–72 weeks), the hens were fed with different nutritional compositions. The feeding of KUB-2 Janaka Agrinak chickens with different nutrients served as a treatment, with a repetition of the number of hens (183 chickens). The details of feed A and feed B nutrition are shown in Table 2, while the timing of feed A and feed B is shown in Figure 1.

Table 2. The Age of KUB-2 Janaka Agrinak Chickens Based on Time

Time	2024					2025							
(Year/Month)	8	9	10	11	12	1	2	3	4	5	6	7	8
Hen's age (Minggu)	24	28	32	36	40	44	48	52	56	60	64	68	72

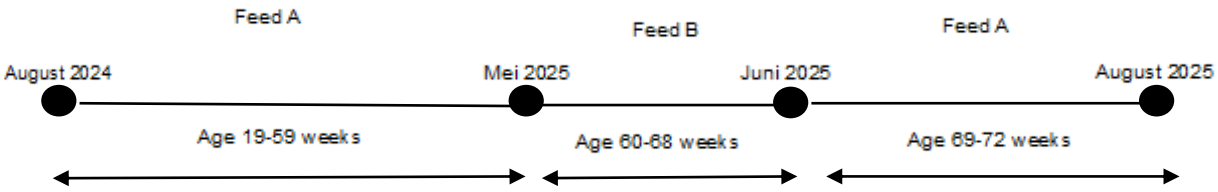

Figure 1. The Feeding of feed A and feed B Based on Age of KUB-2 Janaka Agrinak

Egg collection technique

Egg collection from each flock was conducted twice daily, in the morning and evening. Daily egg production records were made once, resulting in a monthly summary of egg production data.

Hen Day Production (HDP) Calculation

The HDP data was derived from comparing the daily count of eggs with the count of KUB-2 Janaka hens. The HDP formula was as follows:

$$HDP = \frac{\text{The daily caunt of eggs}}{\text{The caunt of KUB} - 2 \text{ Janaka hen}} \; x \; 100\%$$

Statictical Analysis

In the study, the normality assumption was examined with the Shapiro-Wilk test ($p > 0.05$). To determine the differences in egg production and HDP based on the age of the hens (6–18 months), a repeated measures ANOVA test was used. The egg production and HDP for each age group differed significantly, as shown by the significance of Mauchly's Test of Sphericity (Sig. < 0.005). To determine the differences in egg production before and after two feeds (A and B), a related-samples T-test was used. To analyze the effect of age and feed on egg production and HDP, a regression test was used. The significance of the effect of age on egg production and HDP was based on the significance of the coefficient (Sig. < 0.005). The magnitude of the effect was obtained from the Model Summary (R Square), while the direction of the effect (positive/negative) was determined based on the coefficient value. All statistical procedures were performed using SPSS 26. The representative of the regression result entered in the statistical formula as follows:

$Y=\alpha+ \beta X$

Y = egg production
α = constanta
β = regrression coefficient
X = hen age / feed

The comprehensive regression results were evaluated by direction of the relationship. The positive coefficient value clarified that the older hen and feed appropriate for need, the higher the egg production. Otherwise, the negative coefficinet value discribed that the younger hen, the higher its egg production.

RESULTS AND DISCUSSION

The KUB-2 Janaka Agrinak chickens were raised at IAMI Banten using the flock system. The livestock farming used intensive system in closed house and the amount of feed given during the laying phase (starting at 19 weeks of age) was 100 grams per day. The intensive management system has proven suitable for laying hens as it increases egg production and improves feed efficiency, effectively optimizing production costs (Salihin, 2025). The housing comfort has a positive impact on the production efficiency of laying hens (Nuriyasa et al., 2010). In tropical regions, comfortable poultry housing reduces metabolic heat gain, enabling

birds to optimize feed intake and avoid excessive water consumption. Additionally, intensive livestock management mitigates environmental factors that trigger heat stress (Nuriyasa et al., 2010).

The amount of feed consumed in this study was the same as that given to KUB chickens in Bogor (T. Sartika & Iskandar, 2019) that 100 gram/day and Solok, because feed amounts ranging from 100 to 150 grams did not significantly affect egg production (Harmaini et al., 2022). The nutritional requirements were adequately met, as the feed provided was complete feed with the following composition: moisture content (13%), crude protein (17%), crude fat (3%), calcium (3.25–4.25%), and aflatoxin (50 µg/kg). Feeding less than the livestock's requirement affects egg production, according to a report by Anene et al. (2023) which explains that the lack of appropriate feed amounts for chickens affects the quantity and quality of egg production.

The consistency of feed provision shows that KUB-2 Janaka Agrinak chickens begin laying eggs at 20 weeks of age. The age at first egg laying in this study is earlier than reported by Sartika and Iskandar (2019), who found that the average age at first egg laying for KUB-2 chickens was 22 weeks. In addition to higher production potential, the age of KUB-2 hens at first egg laying was also earlier than the age of KUB-1 hens at first egg laying, which was 163.75 ± 14.49 days, or around 21–25 weeks (Iskandar & Tike, 2014).

The total egg production of KUB-2 Janaka chickens at IAMI Banten over a one-year period (2024–2025) was 19,301 eggs. The total egg production came from three categories. First, eggs with weight, shape, and shell thickness that met hatching requirements. Second, eggs that were discarded due to cracks. Third, eggs that were not discarded but did not meet hatching requirements. Egg production was dominated by 75.51% of eggs suitable for hatching with a minimum weight of 39 grams, in accordance with SNI 8405-2:2023. Eggs were rejected at 1.43%, and the remaining 23.06% were eggs unsuitable for hatching. The unfit egg hatchery because of weight under 39 grams or overweight (extreme weight), abnormal shape, and thin eggshell. Zurriyati et al. (2021) defined that the KUB chicken unfit egg hatchery has characteristics: (a) variance of weight under or over 37-45 grams, (b) the eggshell is not smooth, even surface, and thin, (c) the shape is not oval, and (d) the egg index under or more 74%.

The selection of eggs is crucial as it directly influences hatching weight. Harahap et al. (2025) demonstrated that the egg shape index significantly affects hatching weight. Research on eggs in the 40–49 gram range indicates that egg weight is positively correlated with hatching weight; lighter eggs produce smaller hatchlings and heavier eggs produce larger ones (Harifuddin et al., 2024) A normal egg shape is typically oval, rather than circular or overly pointed. The egg weight is positively correlated with hatching weight due to the larger supply of nutrients from the egg white and yolk for the embryo (Herlina et al., 2022). The egg production data based on age and number of laying hens are shown in Figure 1. Hen day production data based on age and number of laying hens are shown in Figure 2.

Figure 1 shows that the highest egg production (3,612 eggs) occurred when the hens were 28 weeks old, while the lowest (295 eggs) occurred when the hens were 64 weeks old. The highest egg production based on chicken age in this study differs from the findings of Sartika & Iskandar (2019), who explained that the highest egg production occurs at 24 weeks old. Looking more closely at Figure 1, KUB-2 Janaka Agrinak chickens at IAMI Banten at 68 weeks and 72 weeks of age experienced an increase in egg production. This is why it was important to conduct an in-depth analysis of feed so that we can understand why egg production can decrease and increase not only the highest egg production, the hen was at 28 weeks also had highest HDP (62,45%). The lowest HDP was at 60 weeks old (Figure 2). The HDP Results in this study were lower than those reported by Sartika&Iskandar (2019) who stated that the

peak HDP production at 35 weeks was 75,4%, but higher than result Malik et al., (2024) who reported an HDP range of 47-57% for KUB-2 Janaka Agrinak chickens.

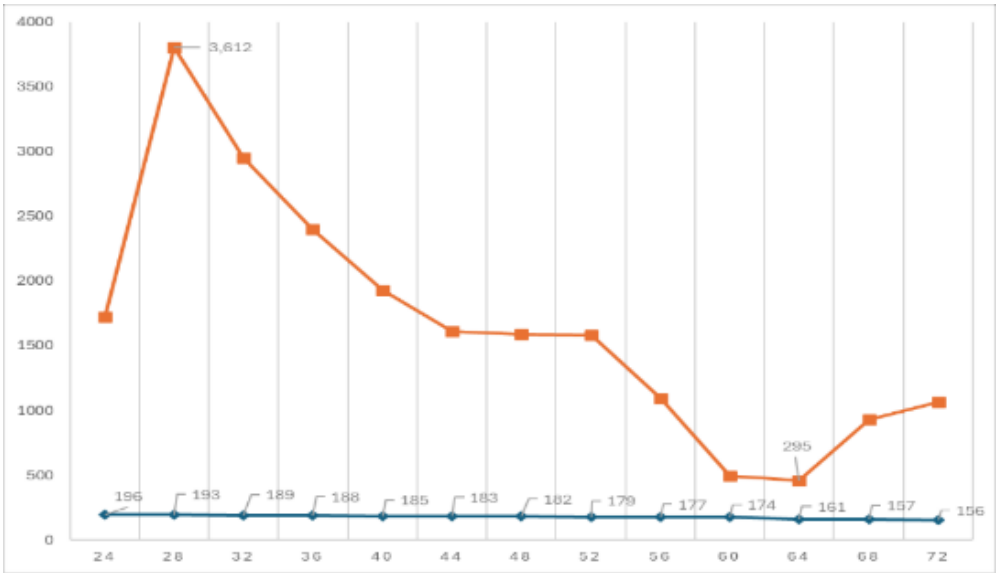

Figure 2. Egg Production Based on Age and Count of Hen KUB-2 Janaka

Differences in Egg Production and Hen Day Production Based on Age and Feed Provided.

The age and nutrition are pivotal factors in the development of KUB chickens. Throughout the livestock life cycle, feed requirements must be met in terms of both quantity and quality. In case, there were two types of feed with different nutrients consumed by KUB-2 Janaka Agrinak hens. Feed type A was consistently given from 19 to 59 weeks. Feed type B was given when the hens were 60–64 weeks old. The change in feed actually reduced egg production, so it was necessary to return to the nutrition provided by feed type A as soon as possible. The egg production when KUB-2 Janaka Agrinak laying hens consumed feed B was significantly different ($p < 0.05$) from egg production when the hens consumed feed A. Based on the results of the paired sample correlation test, there was a significant relationship ($p < 0.05$) between feed B and feed A with a correlation coefficient of 0.375. The fundamental differences between feed A and feed B are based on their protein and calcium percentages. The use of different feed compositions affects protein digestibility; as noted by Fitasari et al. (2016), lower protein content results in lower digestibility. Calcium contribution is associated with eggshell formation. Laying hens that consume feed with high calcium and phosphorus levels will produce thicker eggshells (Fadillah, 2024).

The next statistical test compared egg production and hen day production. A detailed tabulation of the comparison of egg production and HDP based on the age of KUB-2 Janaka Agrinak laying hens is shown in Table 3. The age of the KUB hen is a critical factor, as it is directly related to reproductive organ maturity, hormonal cycles, and nutritional management. The age is a critical factor influencing egg production, with increasing age typically leading to a decline in output (Seto, 2025). As hens age, the frequency of moulting increases, leading to a natural decline in egg production (Jacob et al., 2018). While a chicken's age physiologically influences its hormonal balance, this can be managed through intensive husbandry and genetic selection. KUB chickens, developed through superior genetic selection, are specifically bred to maintain reproductive performance over an extended age range. This explains why their fertility does not decline as drastically as that of common local chickens, even as they age (Saputra et al., 2019).

Table 3. The Egg Production and HDP Based on The Age of KUB-2 Janaka Agrinak Chickens

Age (Week)	Egg Production (Eggs)	Han Day Production (%)
6	1.524	25
7	3.612	62
8	2.763	47
9	2.212	39
10	1.745	30
11	1.430	25
12	1.405	28
13	1.400	25
14	914	17
15	318	6
16	295	6
17	773	16
18	910	31

Source: Processed Primary Data, 2025

Table 3 further confirms that peak egg production and the highest HDP were achieved at 28 weeks, but egg production and HDP were lowest at different ages. This difference was the basis for considering the importance of conducting a difference test. Based on Table 4 and Table 5, it was clear that egg production and HDP based on the age of KUB-2 Janaka Agrinak hens are significantly different ($p < 0.005$). The trend of peak egg production is consistent with the findings of Rifaid (2018), where peak production occurs between 18 and 29 weeks of age, followed by a decline starting at 50 weeks until the end of the production cycle. The egg production remains high and stable between 26 and 56 weeks, after which production rates begin to decline significantly with increase hen age (Şekeroğlu et al., 2024).

Table 4. The Results of Egg Production Tests Based on the Age of KUB-2 Janaka Laying Hen

Mauchly's Test of Sphericity[a]							
Measure: Eggs							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Age	.000	188.025	54	.000	.337	.391	.100

Tabel 5. The Results of Hen Day Production Tests Based on the Age of KUB-2 Janaka Laying Hen

Mauchly's Test of Sphericity[a]							
Measure: Hen Day Production							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Age	.000	353.305	54	.000	.271	.304	.100

Effect of KUB-2 Janaka Agrinak Laying Hen Age on Egg Production

The regression test results showed that the age of the hen has a significant negative effect ($p < 0.05$) on egg production. The age factor of KUB-2 Janaka Agrinak hens affects egg production by 62.3%, with the remaining 37.7% being influenced by other factors. The magnitude of this effect was based on the R-squared value (0.623). The negative regression direction can be seen from the coefficient value (-48.249), which explains that each increase in the age of the hen reduces egg production by 48.249.

The decline in egg production with increasing age was because KUB-2 Janaka Agrinak hens experience an increase in egg production until it peaks between 24 and 28 weeks (Figure 2). These findings show that peak production occurred earlier than reported by Nurhayu et al. (2021) in Maros, where peak production was observed at 36 weeks.

The fluctuations in egg production at each age of the hens then complement the results of this study, which showed a positive regression direction (121.5) at the age of 24 to 36 weeks, but the results were not significant ($p > 0.05$). This effect was not significant, with a factor of 32% (R-squared: 0.32). The two regression tests reinforce each other because, in reality, hens aged 24 to 72 weeks still produce eggs with increasing age and peak production at a certain age. The results of this study reinforce the report by Scherbatov & Artem (2021) that egg production and laying interval had a negative relationship, while a positive relationship was formed between egg production and the length or duration of the laying cycle. The egg quality is influenced on the hen's age. The older hens tend to produce heavier eggs, but with thinner shells and faded shell coloration (Wijayanto, 2024). Naturally, chickens have a biological rhythm for producing eggs that is related to the number and duration of their laying cycles. This was in line with research by Tumova & Goust (2012) who proved that age, chicken type, and temperature significantly affect egg production. The magnitude of the effect of age on young hens was 75.4%, while on older hens it was 62.6%.

The Effect of Feed on Egg Production

The feed is the primary component of livestock farming. The feeding is crucial because feed costs account for 70% of total production costs (Purnamasari et al., 2022). Providing nutrition according to requirements supports animal health and optimizes production. In layers specifically, a precise nutritional balance is essential to maximize egg production. Evaluating nutritional balance is essential as it enhances egg production and serves as a key strategy for increasing the livestock population (Arbiantara&Desy, 2024). This study utilized commercial feed that strictly meets nutritional standards. The commercial rations with standardized protein content have a more significant effect on the weight gain of KUB chickens (Pomolango et al., 2026). The nutritional adequacy of such feed significantly influences egg quality, which in turn determines farm profitability (Fadillah, 2022). The protein in this study showed that the feed consumed by KUB-2 Janaka Agrinak hens significantly ($p < 0.05$) affected egg production. The feed factor affected egg production by 71.3% (R-squared: 0.713). The effect is positive, meaning that the higher the nutritional content of the feed, the greater the egg production.

The feed nutrition that meets the needs of livestock in this study is Feed A, which had higher protein and calcium content than Feed B. The results were in line with the findings reported by Laraswati and Nurulia (2024), who confirmed that crude protein (16.73%) and crude fat (3.91%), in accordance with SNI 8290-5:2024, meet the feed intake standards with HDP of 50%. The research by Maslami et al. (2023) explained that protein is the feed nutrient that most affects HDP. These results are reinforced by Fadillah's research (2022), which stated that the nutritional content of commercial feed (mainly crude protein and crude fat) affects the quality of the egg interior (egg yolk weight), while protein, calcium, and phosphorus affect the quality of the egg exterior. Protein-rich feed sources come from grains. Macelline et al. (2023) explained that sorghum is an appropriate choice of ingredient for broiler chicken diets while still being able to increase body weight. Bread waste can also be considered as a source of crude protein that can reduce feed cost (Subiharta et al., 2024).

The consistent feeding tailored to requirements is the key to success in livestock farming. High-quality feed enhances egg production and increases the yield of day-old chick (DOC), ensuring the sustainability of the KUB chicken business. Protein requirements escalate at the onset of lay. Insufficient dietary protein or an imbalance in essential amino acids will

adversely affect both egg production and hatchability. Calcium particle size affects the absorption of shell-forming nutrients; this process occurs optimally when birds are not actively feeding (Jacob et al., 2028). Ultimately, higher egg and DOC production leads to increased income (Rusdiana dan Soeharsono, 2019).

The Effect of KUB-2 Janaka Hen Age and Feed on Hen Day Production (HDP)

The purpose of calculating HDP is to determine the daily egg production percentage, monitor peak and decline periods, inform culling decisions, and analyze profit margins. The objective of HDP monitoring is to assess the egg-laying productivity of a flock at a given age (Wijayanto, 2024). This study showed that age significantly ($p < 0.05$) affects HDP. The R-squared value (0.44) indicated that hen age accounts for 44% of the factors affecting the HDP of KUB-2 Janaka Agrinak chickens. The direction of the effect of age on HDP is negative ($\beta = -0.668$), which indicates that increasing age decreases HDP. Increasing age does, however, increase HDP from 24 weeks to 28 weeks (Figure 3). Similar to egg production, the direction of the effect of age on HDP is positive ($\beta = 2.721$) in hens aged 24 weeks to 36 weeks. The magnitude of this influence is 51% (R-squared: 0.51), but it was not significant ($p > 0.05$). The HDP results are similar to those of egg production, where increasing age leads to a higher HDP, with the peak being at 28 weeks. This result is aligned with Rizzi's (2023) research, which states that the age of laying hens during the first laying period (26-33 weeks) affects HDP ($p < 0.05$) and forms a quadratic trend.

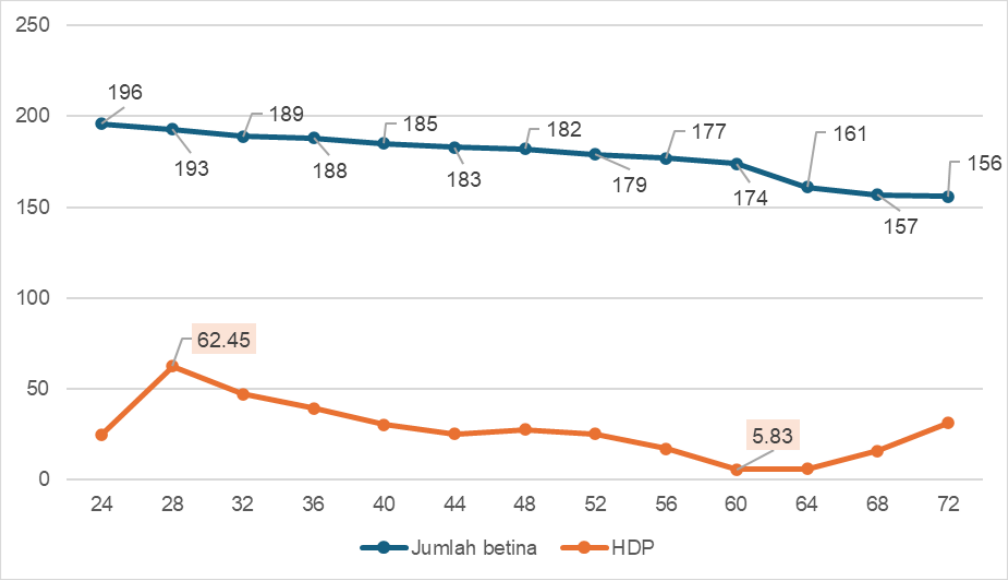

Figure 3. Hen Day Production Based on Age and Count of Hen KUB-2 Janaka

Similar to the age factor, feed intake significantly affects HDP ($p < 0.026$), contributing 44.4% to the variance (R-squared = 0.440). The positive correlation ($\beta = 25.560$) indicates that feeding according to nutritional requirements enhances HDP. The peak HDP (62.45%) was achieved with Feed Type A, while the lowest (5.83%) occurred with Feed Type B. This suggests that consistent, high-quality feed can reach a production potential of approximately 228 eggs/hen/year. These findings are consistent with the research by Laraswati (2024), which demonstrates that feed formulations at BSIP Yogyakarta—when aligned with intake standards achieve a minimum HDP of 50%.

CONCLUSIONS AND SUGGESTION

The age of KUB-2 hens and their nutritional intake significantly affect egg production and HDP. Age has a significant negative impact on these metrics, as production peaks at a specific stage before declining. The feed nutrients that meet specific requirements were shown to significantly enhance both egg production and HDP. Further studies are required to analyze other factors influencing these production parameters.

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