

## Analysis of Hatching Success of Tiktok Eggs and Mojosari Duck Eggs with Variations in Egg Size at UPT PT HMT Kediri

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### ABSTRACT

*The purpose of this study was to analyze the hatching success of TikTok (crossbreed of female Mojosari and male Muscovy duck) and Mojosari duck eggs, considering variations in egg size. A total of 600 eggs were classified into three size classes (small, medium, large) and incubated artificially at the UPT PT HMT Kediri. Data was analyzed using Chi-Square tests to investigate relationships between egg size, egg type, and hatching success. Results showed significant differences in hatchability related to egg size and type, contributing valuable information for optimizing artificial hatching methods in duck farming.*

**Keywords:** *Keywords one; Hatching Success, Keywords two; Egg Size, Keywords three; Tiktok and Mojosari Ducks.*

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### INTRODUCTION

Duck farming is a crucial component of Indonesia's livestock production system, serving as a source of animal protein through meat and eggs. Mojosari ducks are a local poultry germplasm with a reputation for high egg production, while TikTok ducks are a crossbreed developed for improved fertility and hatchability. Artificial hatching technology plays a strategic role in increasing hatching success through the control of environmental variables, particularly temperature and humidity, during incubation. This study aimed to assess the effect of egg size and duck type on hatchability, as an effort to improve breeding efficiency and support the development of the national poultry industry.

### METHOD

The research was conducted at the UPT PT HMT Kediri, East Java, from September to October 2023 and continued in March 2025. The research material consisted of 600 eggs from Mojosari and TikTok ducks. Eggs were grouped by size into three categories: small (<60 g), medium (60–70 g), and large (>70 g). All eggs were hatched using an automatic incubator equipped with temperature and humidity controls to ensure stable incubation conditions throughout the study period.

Embryonic development was monitored using the candling method on days 7, 14, and 21 to periodically evaluate embryo growth. Parameters recorded included fertility rate, hatchability, embryo mortality, and hatch weight as an indicator of hatching performance. Statistical analysis using the Chi-Square test was applied to determine the relationship between the categorical variables studied, so that the research results can provide a valid scientific understanding of the influence of egg size and duck type on hatching performance.

### RESULT AND DISCUSSION

The results showed that the highest hatchability was achieved in medium-sized eggs, with 85% for Tiktok eggs and 76% for Mojosari duck eggs, while small-sized eggs had the lowest hatchability at 68% for both types. This difference occurs because medium-sized eggs have an optimal balance between egg volume and shell surface area, which supports gas exchange, heat distribution, and nutrient availability for the embryo. Small-sized eggs are limited in nutrient reserves and easily dehydrated due to their high surface-to-volume ratio, while large-sized eggs face the problem of uneven heat distribution and suboptimal gas exchange. Tiktok eggs consistently demonstrated a higher hatchability than Mojosari duck eggs across all size categories, possibly due to genetic advantages from crossbreeding (heterosis), more optimal shell structure, and better embryo adaptation to artificial hatching conditions.

The Chi-Square test results show a value of 11.3437 which is greater than the critical value of 11.070 in the table, so the null hypothesis is rejected and there is a significant relationship between egg size, egg type, and hatchability. This finding indicates that egg selection for hatching cannot be done randomly, but must consider the type of poultry and the optimal egg size. The interaction between egg size and type shows a consistent pattern where medium eggs from Tiktok produce the best hatchability, while growth affects the response pattern to incubation conditions. Thus, the strategy of selecting medium-sized eggs from good genetically quality poultry types is the main key to increasing hatching efficiency and the quality of Day Old Duck (DOD) produced in duck farming.

**Result**

**Hatching Percentage**

The research results show that the highest hatchability percentage was found in medium-sized eggs for both types, namely 85% for Tiktok eggs and 76% for Mojosari duck eggs. Small eggs had the lowest hatchability percentage at 68% for both types. Large eggs showed hatchability of 78% for Tiktok and 72% for Mojosari. These differences relate to biological factors such as nutrient volume in the yolk, surface-to-volume ratio of the shell, and physiological genetic characteristics of the eggs. Tiktok eggs have superior hatchability compared to Mojosari due to heterosis effects, more optimal shell characteristics, and better embryo adaptation to artificial incubation conditions.

Below is the hatchability percentage table from Chapter 4:

Egg Size	Egg Type	Hatched	Not Hatched	Total Samples	Percentage (%)
Small	Tiktok	68	32	100	68%
Small	Mojosari	68	32	100	68%
Medium	Tiktok	85	15	100	85%
Medium	Mojosari	76	24	100	76%
Large	Tiktok	78	22	100	78%
Large	Mojosari	72	28	100	72%

**Small egg**

Small eggs exhibit the lowest hatchability due to limited nutrient reserves, particularly smaller yolk volume, which is unable to support optimal embryo development. A high surface-to-volume ratio causes faster water evaporation, triggering humidity instability and the risk of embryo dehydration. These findings align with those of Deeming (2011), Abiola et al. (2008), and King'ori (2011), who stated that small eggs are less ideal for hatching due to nutrient limitations and physiological disturbances during incubation.

**Medium egg**

Medium-sized eggs exhibit the highest hatchability due to their optimal balance of white and yolk volumes and an ideal surface-to-volume ratio. This balance supports nutrient availability, heat distribution, and internal moisture stability during incubation. These conditions facilitate smoother embryonic respiration, resulting in optimal organ development, consistent with the findings of Puspitasari et al. (2018) and Wulandari et al. (2019). Research by Santoso et al. (2021) also explains that medium-sized eggs not only produce high hatchability but also produce chicks with uniform birth weights and better survival rates.

**Large egg**

Large eggs have a second-highest hatchability after medium-sized eggs. Despite their higher volume and nutrient reserves, this can lead to excess amniotic fluid and albumen, which inhibits yolk absorption and increases the risk of late-stage embryonic death, as explained by Tona et al. (2004). The imbalanced surface-to-volume ratio and suboptimal gas exchange make embryos vulnerable to oxygen deprivation. Heat distribution in large eggs is also less even, resulting in slower heat transfer to the center of the egg, which can impact metabolic and embryonic development (Wilson, 2010).

This study shows that TikTok duck eggs have a higher hatchability than Mojosari duck eggs of all

sizes. TikTok's superiority is influenced by the vigor of crossbred embryos that are more adaptive to changes in incubation conditions, in accordance with the findings of Suprijatna et al. (2008) and Purba et al. (2019). In contrast, the hatchability of large Mojosari eggs is lower because their physiological characteristics are more focused on egg production, as well as the presence of shell pores that tend to be small, which inhibits gas exchange and worsens heat distribution (Deeming, 2011).

#### **Relationship between Egg Size, Hatching Rate, and Egg Type**

The Chi-Square statistical test yielded a value of 11.3437, greater than the critical value of 11.070, indicating a significant relationship between egg size, egg type, and hatchability. This highlights the importance of selective choice by size and type of eggs to enhance hatching success. Interaction between egg type and size shows a consistent pattern where medium eggs produce the best hatchability results, with TikTok eggs outperforming Mojosari eggs at the same size. These findings provide an important basis for farmers and hatcheries to apply optimal egg selection management to increase the efficiency of producing high-quality Day-Old Ducks (DOD).

#### **Relationship between Egg Size and Hatchability**

Egg size plays a crucial role in hatching success, with medium-sized eggs having an optimal balance between the contents volume and the shell surface area, thus supporting gas exchange, heat distribution, and nutrient availability for the embryo. Medium-sized eggs exhibit the highest hatchability percentage due to efficient humidity regulation and heat transfer during incubation, while small eggs have limited nutrient reserves that increase embryo mortality, and large eggs face surface-to-volume ratio issues that hinder gas exchange and water evaporation, resulting in lower hatchability. Therefore, medium-sized eggs are the most ideal size to support stable embryo development until hatching (Puspitasari et al., 2018; King'ori, 2011; Tona et al., 2004; Narushin and Romanov, 2002).

#### **Relationship between Egg Type and Hatchability**

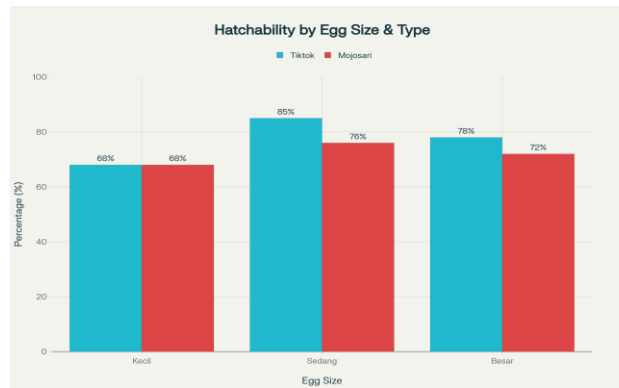
Egg type also significantly influences hatching success, with TikTok eggs showing higher hatchability than Mojosari duck eggs at all sizes. This superiority is influenced by genetic factors resulting from crossbreeding (heterosis), the physiological quality of the parents, and optimal shell structure for gas exchange and moisture balance during incubation, supporting embryo viability and survival (Sukmawati et al., 2020; Rachman et al., 2023; Zhang et al., 2022). Furthermore, pre-incubation management such as storage time, temperature, humidity, and the use of young eggs (<5 days old) also increase fertility and hatchability. Thus, the high hatchability of TikTok eggs is the result of a combination of genetic factors, egg quality, and hatching practices that support successful incubation (Neliti, 2020).

#### **Interaction of Egg Size and Egg Type**

Research shows an interaction between egg size and type in determining hatching success. In general, medium-sized eggs have the highest hatchability in both duck species, TikTok and Mojosari, but the hatchability percentage of TikTok remains higher than that of Mojosari. This indicates that in addition to size, genetic factors, embryo quality, and shell characteristics, influenced by the type of bird, also influence hatching success. Medium-sized eggs have an optimal surface-to-volume ratio for gas exchange and temperature regulation during incubation, while TikTok, as a crossbreed, exhibits heterosis, which increases the embryo's resistance to environmental fluctuations. Fertility factors and initial egg quality also strengthen the influence of egg size, so that egg size and type cannot be separated in determining hatchability. Thus, the combination of medium-sized eggs and birds with good genetic quality provides the most optimal hatching results, emphasizing the importance of considering both factors in an artificial hatching program.

#### **Discussion**

The graph above clearly shows a consistent pattern that medium-sized eggs are the optimal choice for hatching, with the highest hatchability rates for both egg types. Overall, TikTok eggs demonstrate consistent reproductive excellence across all size categories. These findings provide a strong scientific basis for farmers and hatcheries to implement more strategic egg selection to improve production efficiency and the quality of their Day-Old Duck (DOD) offspring.



**Figure 1. Hatching Power Graph of Mojosari and TikTok Duck Eggs**

The table shows that egg hatchability varies. This is influenced by several important factors, including egg size, egg type, environmental conditions during incubation such as temperature and humidity, and the genetics of the parent breed. Medium-sized eggs show the highest hatchability compared to small and large eggs, as they provide an optimal balance between nutrient volume and physiological conditions for embryo development. Crossbred Tiktok eggs show a higher hatchability than purebred Mojosari duck eggs, likely due to their genetic superiority and better adaptation to the artificial hatching system.

In addition to biological factors, hatching management, such as regulating incubation temperature and humidity, also plays a crucial role in achieving optimal hatchability. Eggshell cleanliness and the quality of the parent breed's feed also influence fertility and hatchability. Statistical tests show a significant relationship between egg size, egg type, and hatchability, so selecting eggs based on the correct size and type can increase the success of producing quality duck chicks.

## CONCLUSION

Based on the research results, it can be concluded that the highest hatchability of 85% was obtained in medium-sized eggs, indicating that egg size plays an important role in determining hatching success. In terms of egg type, the highest hatchability percentage was shown by Tiktok eggs, which consistently had better results compared to Mojosari duck eggs. Thus, it can be emphasized that there is a significant relationship between egg type, egg size, and egg hatchability, so that selecting superior egg types and appropriate egg sizes, especially medium-sized eggs, are important factors in increasing hatching success.

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