

Behavioral Interaction of Male and Female Canaries (*Serinus canaria*) During the Reproduction Period

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Abstract: The study aimed to describe the interaction between male and female bird canary (*Serinus canaria*) during reproduction. Study This uses the ad libitum sampling method, namely observing activity act in demand bird canary male and female (*Serinus canaria*) during mating. Study This was done 6 days on Sunday, the first (2 days) introduction bird canary, and Sunday, the second and third (4 days) matchmaking bird canary. Research results show various Acts in demand reproduction of bird canaries during mating. Observation results show that bird canary males use tweets and appearances and physiques for interesting attention female, temporary females choose partners based on tweets male and mark fitness other. After the introduction process, birds canary mated males and females collaborate in the guard nest and raise children. The study still has limitations on the relative sample, as it only uses two pairs of bird walnuts and the duration of the observations is limited to three Sundays. This matter does not fully represent all the variations in existing behavior in the population of bird canaries. Apart from that, the factors influencing the environment and conditions and other specific aspects of on-site research must also be considered when interpreting results.

Keywords: Canaries, marriage, behavior interaction

INTRODUCTION

Various types of birds in Indonesia have diverse ecological, economic, and socio-cultural values (Sekercioglu, 2006; Rumanasari et al., 2017; Teuscher et al., 2015). Many birds are kept as pets and bred for their song, feather color patterns, and attractive body shape. The variety of chirps that are considered attractive is one of the main factors in keeping songbirds. Several types of birds that are popularly kept as pets include magpies, canaries, cucak rowos, lovebirds, and others (Iskandar, 2015; Fikriyah, 2015; Haryoko, 2010). Birds interest many people because of their colorful feathers or attractive chirping sounds (Nurdin, Nasihin, & Guntara, 2017; Rahmawati, 2015).

The canary (*Serinus canaria*), originally from Europe, has spread widely in Indonesia and is known for its distinctive plumage and melodious song. Despite the presence of various types in the market (e.g., Yorkshire, F1, F2, F3), they are all favored for their vocal performance and visual appeal (Sitanggang, 2010; Faiz Nashiruddin, 2014). Canaries feed primarily on seeds and are known for their high adaptability and ease of breeding in captivity (Sujono & Bimo, 1994; Garcia-Fernandez et al, 2013; Akrom et al, 2020).

Male canaries are especially noted for their complex and structured songs, composed of motifs and phrases with communicative functions such as mate attraction and territorial defense (Marler & Slabbekoorn, 2002; Dos Santos et al, 2023). Their popularity is largely driven by these traits, as well as their relatively simple care requirements (Rusli T., 2010). Mating behavior in canaries involves a series of ritualized interactions, including song production, visual displays, and coordinated nesting behaviors (Silverin, 1996; Trösch et al, 2017).

Although several studies have focused on vocal learning and song structure in canaries (e.g., Julita et al., 2015), there is limited research that systematically observes and documents the sequence of courtship and mating behaviors in male and female canaries under controlled

conditions. Most existing studies emphasize the acoustic aspects of courtship or physiological factors affecting breeding success, leaving a gap in behavioral observation data across mating periods.

Furthermore, few studies in Indonesia have explored the behavioral interactions between male and female canaries during the pairing process in a structured and time-bound observational setting. This represents a significant gap, especially considering the popularity of canaries in domestic breeding practices and their importance in avian behavioral ecology.

This study aims to fill that gap by observing and analyzing the detailed courtship and mating behavior of canaries across three weeks of pairing. The novelty of this research lies in its sequential documentation of behavioral patterns including mutual interaction, flight, vocalization, mating readiness, and post-mating behaviors which may contribute to the understanding of reproductive strategies and improve management practices in aviculture.

By understanding the behavior during the mating period of canaries in more depth, breeders and researchers can develop better breeding programs, enhance reproductive success, and support conservation strategies. This research also provides a basis for understanding the influence of environmental factors on the mating behavior of *Serinus canaria* and may serve as a reference for further behavioral ecology studies.

MATERIALS AND METHODS

This research is an exploratory descriptive study carried out by observing the mating behavior of canaries of the *Serinus canaria* species, both male and female, directly based on observations of the observed behavior. The method used is ad libitum sampling, where all observed activities of canaries are monitored using behavioral duration obtained from field observations.

The research was conducted over a three-week period, from May 1 to May 22, 2024, with observations carried out twice a week. During the first week, introductory interactions between the canaries were facilitated, followed by pairing sessions in the second and third weeks aimed at matching male and female individuals. This research was conducted at one of the *Serinus canaria* bird farms in Tlobong Village, Delanggu, Klaten, Central Java. The *Serinus canaria* canary used is a bird that has a yellow and green body. The age of male canaries is 1 year and over and females are 9 months old and ready to mate. This sample used 2 pairs of *Serinus canaria* birds for research. The pairs of birds were then coded, namely pair 1 (female: A1, male: A2) and pair 2 (female: B1, male: B2).

The tools used included 2 pairs of bird cages made of wood with dimensions of 38 x 43 cm, stationery for recording research results, DSLR cameras for documentation, 4 places to eat and drink, 2 pieces of pineapple fiber weighing 5 grams. The experimental subjects consisted of two pairs of *Serinus canaria*, each aged 1 year and 9 months. The supporting materials included mixed millet and canary feed (1 kg for one month, given every morning), mustard greens (administered once daily in the morning), and eggs. To stimulate an increase in estrogen levels and induce quicker reproductive readiness, fresh drinking water was provided every morning.

The procedure for observing the mating behavior of male and female *Serinus canaria* birds is illustrated in Figure 1

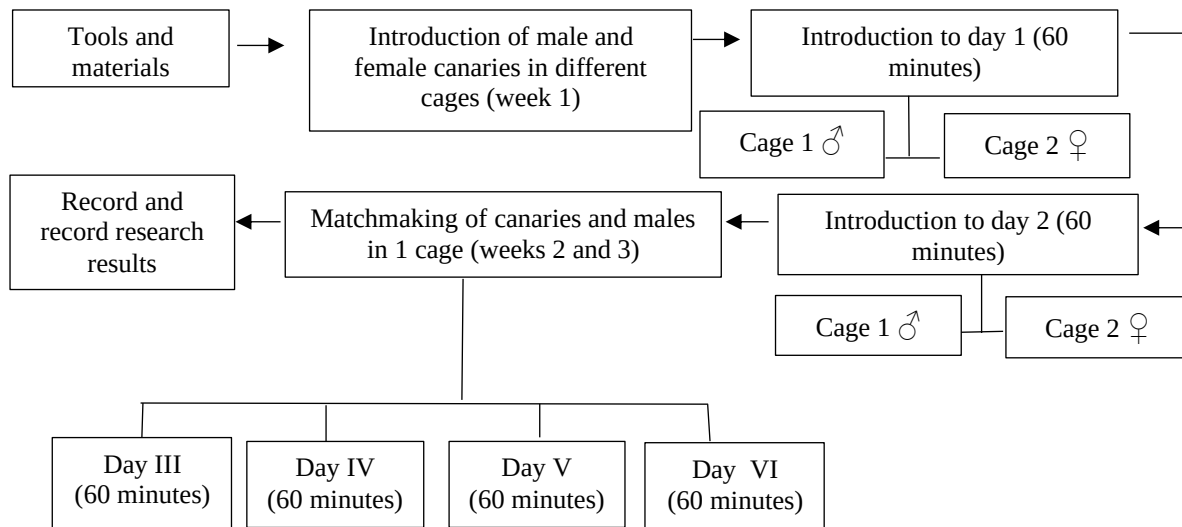


Figure 1. Scheme of research procedures

Figure 1 can be explained as follows: Initially, research tools and materials were prepared to support the observational activities. Male and female *Serinus canaria* birds were first observed separately in individual cages to prevent early interaction prior to the pairing phase. Each pair of canaries, aged approximately 9 months to 1 year, was then placed into two separate rectangular wooden cages measuring 38×43 cm.

Feeding and watering were carried out daily at 07:00 a.m. Each cage received 80 grams of a mixed diet consisting of millet and canary seed, as well as fresh mustard greens (*Brassica rapa*) once per day. Additionally, the birds were sunbathed every morning for 15 to 30 minutes under direct sunlight to stimulate hormonal readiness related to reproductive activity.

Observations of reproductive behavior including social interaction, mating readiness, courtship, and copulation were conducted twice a week on designated observation days. All observed behaviors were systematically recorded and documented for subsequent analysis. Behavioral data is taken by observation using observation notes and documentation tools (recording mating behavior). The collected data was analyzed using descriptive analysis techniques in the form of describing the behavior seen in male and female *Serinus canaria* birds during mating that appeared during observations.

RESULTS AND DISCUSSION

Implementation observation about study interaction Act in demand bird canary males and females during the mating period carried out in Tlobong Village, Delanggu, Klaten, were obtained results research in the form of Act mating behavior bird canary namely (1) activity introduction, (2) flying around, (3) readiness female or chirping, (4) chirping, (5) standing still, (6) climbing body or mating process, (7) moving body or sway after marry. Observation result Act mating behavior bird canary can seen in table 1.

Table 1. Data on mating behavior of canaries (*Serinus canaria*)

Week	Behavior (TL)													
	TL 1		TL 2		TL 3		TL 4		TL 5		TL 6		TL 7	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
1 day 1	A1	A2	A1	A2	A1	-	-	A2	A1	-	-	A2	-	A2
	B1	B2	B1	B2	B1	-	-	B2	B1	-	-	B2	B1	B2
1 day 2	A1	A2	A1	A2	-	-	-	-	A1	A2	-	A2	-	A2
	B1	B2	B1	B2	B1	-	-	B2	-	-	-	B2	B1	B2
2 day 3	A1	A2	A1	A2	A1	-	-	-B2	A1	-	-	A2	-	-
	B1	B2	B1	B2	B1	-	-	-	-	B2	-	B2	-	B2
2 day 4	A1	A2	A1	A2	A1	-	-	A2	A1	-	-	A2	-	A2
	B1	B2	B1	B2	-	-	-	B2	B1	-	-	B2	A1	B2
3 day 5	A1	A2	A1	A2	-	-	-	A2	-	-	-	A2	-	A2
	B1	B2	B1	B2	-	-	-	B2	B1	B2	-	B2	-	-
3 day 6	A1	A2	A1	A2	A1	-	-	A2	-	-	-	A2	-	A2
	B1	B2	B1	B2	-	-	-	-	B1	-	-	B2	-	B2

Information: A1 – A2 sample 1, B1 – B2 sample 2. Behavior: TL 1: carrying out introductory activities, TL 2: flying – flying, TL 3: female readiness, TL 4: chirping, TL 5: position still, TL 6: riding the body (mating process), TL 7: moving the body (swaying after mating).

Based on the observational data, similar patterns of mating behavior were exhibited by both pairs of *Serinus canaria* (A1–A2 and B1–B2) across the three-week study. In each observation session (conducted twice a week), the interaction sequence generally began with mutual social interaction, followed by flying around the cage. This behavior was consistently observed in both pairs as an initial phase before mating readiness. The female birds (primarily A1 and B1) typically showed signs of reproductive readiness after flying, which was followed by vocal responses—chirping—by the male birds (A2 and B2). Once placed in the same cage, the male canaries would mount the females to initiate copulation. Post-mating behavior also showed consistency: female birds tended to remain still, while the males frequently exhibited body-swaying movements. Although minor variations in individual behaviors were noted (e.g., differences in which female first displayed mating readiness), the overall sequence and behavioral indicators remained consistent throughout the observation period.

Initial courtship behaviors were often initiated by the male, consistent with findings by Wijayani et al. (2023), who reported that mating in birds is generally initiated by males using sound or movement to attract females. The second act flying around was a common method of attention-seeking. Similar behavioral strategies have been documented in other species, such as visual and motor cues performed by males to engage females (Desmudzat et al., 2016). However, females do not always respond positively to such displays (Darda et al., 2016; Wijaya & Irfan, 2022). This suggests that sexual selection plays an important role in canary interactions, where males develop behavioral strategies such as vocalizations and body movements to increase their chances of mating success (Garcia-Fernandez et al., 2013). In this context, Zahavi's theory of the handicap principle can also be applied, whereby male birds that display complex vocal signals display good body condition and genetics and are thus preferred by females (Zahavi, 1975; Trösch et al., 2017).

The third behavior observed was female readiness, which often involved the female encircling or staying close to the male. This was followed by chirping from the male to attract the female. Julita et al. (2015) emphasized that canaries produce distinct and complex songs as one of the main reproductive cues. The appearance of these readiness behaviors and vocal responses can be attributed to the phenomenon of mutual assessment, in which both males and females evaluate their partner's readiness through continuous behavioral interactions (Marler & Slabbekoorn, 2002; Fishbein, et al, 2019). In this study, the appearance of TL 3 (readiness) behavior before TL 4 (chirping) supports the idea that vocalizations serve as a confirmation of mating readiness rather than an initial trigger.

This was followed by a still posture, particularly in females, and then the mating act where the male mounted the female. Female stillness is considered a behavioral signal indicating readiness to copulate (Wijayani et al., 2023; Iskandar, 2014), and such behavior has also been reported in Javan barn owls (*Tyto alba*) (Hadi, 2008; Séchaud, et al 2021). Interestingly, after the mating process (TL 6), TL 7 behavior (body movement or sway) is only shown by male birds. This is in line with the findings of Nugroho et al. (2022) in lovebirds, where post-mating movements indicate the completion of the copulation process and may serve as a signal to the female or a physiological marker of post-mating hormonal changes.

Nest-building behavior was not observed in this study, which may be attributed to the lack of nesting materials in the cages. Previous studies have shown that such behavior is an integral part of the male's reproductive strategy in several bird species (Darda et al., 2016; Masyud, 2007). The absence of nesting materials might have suppressed the natural expression of this behavior, highlighting the importance of considering this factor in future research. In addition, the current study was limited by several variables including cage conditions, diet, age of the canaries, and environmental factors. More thorough preparation regarding these elements is necessary, as they may significantly influence mating behavior in canaries.

Overall, these findings suggest that canaries have a relatively consistent sequence of mating behavior, which can be used as a basis for evaluating reproductive readiness and mate quality in captive breeding practices. This study reinforces the importance of observational approaches to avian ethological studies, especially for domesticated species such as *Serinus canaria*, which are both hobby commodities and conservation objects.

Further research is needed by paying attention to these factors so that it is possible to obtain comprehensive data. Research on the interaction of canary behavior during the mating period contributes to knowledge about the behaviors that appear in canaries for reproduction in terms of maintenance and reproduction of canaries.



Figure 2. (a) introduction, (b) flying around, (c) female readiness, (d) singing.

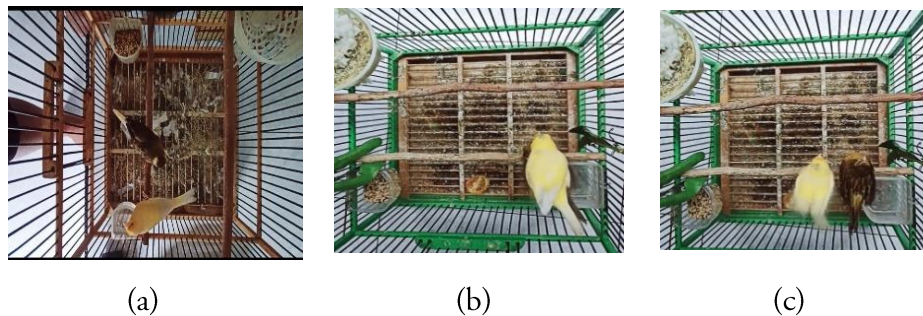


Figure 3. (a) in still position, (b) climbing the body (*mating process*), (c) moving the body

CONCLUSION

This study identified seven distinct behavioral patterns exhibited by *Serinus canaria* during courtship and mating: (1) initial social interaction, (2) mutual flight activity, (3) female display of mating readiness, (4) male vocalization to attract females, (5) still posture predominantly by females, (6) the mating act marked by the male mounting the female, and (7) post-mating body movements by males. These behaviors were consistently observed across all pairs and followed a sequential pattern, indicating a structured mating interaction. The results underscore the importance of specific behavioral cues in facilitating successful mating among canaries. In particular, mutual flight and vocal signaling play key roles in stimulating and responding to reproductive readiness.

Future research should examine the influence of external environmental variables—such as light exposure, cage size and structure, temperature, and social setting—on the expression of mating behaviors. It is also recommended to explore the nutritional impact of specific dietary components (e.g., protein-rich vs. seed-based diets) on hormonal and behavioral responses. In addition, comparative studies involving different breeds or genetic lines of canaries may help to identify variation in courtship behavior, which could be useful for selective breeding programs or improving reproductive success in captive bird populations.

REFERENCES

- Akrom, AM, Indarjulianto, S., Yanuartono, Y., Susmiati, T., Nururrozi, A., Raharjo, S., ... & Sitompul, YY (2020). Swab Bukal Sebagai Bahan Sexing Piyikan Burung Kenari (*Serinus canaria*) dan Burung Merpati (*Columba livia*). *Jurnal Sain Veteriner*, 38(1), 31-36. <https://doi.org/10.22146/jsv.49032>.
- Darda, RI, Effendi, M., & Pratomo, DS (2016). Perilaku Harian Dan Kawin Poksai Kuda (*Garrulax Rufifrons Rufifrons*) di Cikananga Conservation Breeding Centre, Sukabumi. *Ecologia : Ekologia: Jurnal Ilmiah Ilmu Dasar dan Lingkungan Hidup*, 16(1), 24-30. <https://doi.org/10.33751/ekol.v16i1.59>
- Dos Santos, E. B., Ball, G. F., Logue, D. M., Cornil, C. A., & Balthazart, J. (2023). Sex differences in song syntax and syllable diversity in testosterone-induced songs of adult male and female

- canaries. *Biology of Sex Differences*, 14(1), 49. <https://doi.org/10.1186/s13293-023-00533-8>
- Fikriyah, LI, Haryono, T., & Ambarwat, R. (2015). Identification Ectoparasites and endoparasites in birds canary (*Serinus canaria*) in captivity. *LenteraBio*, 4(1), 82-86.
- Fishbein, A. R., Lawson, S. L., Dooling, R. J., & Ball, G. F. (2019). How canaries listen to their song: Species-specific shape of auditory perception. *The Journal of the Acoustical Society of America*, 145(1), 562-574. <https://doi.org/10.1121/1.5087692>
- Garcia-Fernandez, V., Draganoiu, T. I., Ung, D., Lacroix, A., Malacarne, G., & Leboucher, G. (2013). Female canaries invest more in response to an exaggerated male trait. *Animal behaviour*, 85(3), 679-684. <https://doi.org/10.1016/j.anbehav.2013.01.007>
- Julita, U., Fitri, LL, & Fuadah, YT (2015). Ability learn sing to the birds walnut male young (*Serinus canaria* Linn). *revealed live -tutoring and tape-tutoring*. *Journal Istek*, 9(1).
- Hadi, M. (2008). Pola Aktivitas Harian Pasangan Burung Serak Jawa (*Tyto alba*) di Sarang Kampus Psikologi Universitas Diponegoro Tembalang Semarang. *Bioma: Berkala Ilmiah Biologi*, 6(2), 23-29. <https://doi.org/10.14710/bioma.10.1.23-29>
- Haryoko, T. (2010). Composition of Types and Number of Wild Birds Traded in West Java.
- Iskandar, J. (2014). Dilemma Between Hobby and Business Bird Trading and Bird Conservation. *Chimica et Natura Acta*, 2 (3): 180-185. <https://doi.org/10.24198/cna.v2.n3.9165>
- Iskandar, J. (2015). Benefit of various birds in the song-bird contest and its impact to bird conservation in nature: A case study in Bandung, West Java. In *Prosiding Seminar Nasional Masyarakat Biodiversitas Indonesia* (Vol. 1, pp. 747-752). <https://doi.org/10.13057/psnmbi/m010411>
- Masyud, B. (2007). Pola reproduksi burung tekukur (*Streptopelia chinensis*) dan puter (*Streptopelia risoria*) di Penangkaran. *Media Konservasi*, 12(2).
- Nurdin, Nasihin, I., & Guntara, AY (2017). Pemanfaatan Keanekaragaman Jenis Burung Berkicau Dan Upaya Konservasi Pada Kontes Burung Berkicau Di Kabupaten Kuningan Jawa Barat. *Wanaraksa*, 11(1), 1-5. <https://doi.org/10.25134/wanaraksa.v11i01.1063>
- Nurdin, N., Nasihin, I., & Guntara, AY (2017). Utilization diversity type bird Twitter and effort conservation at the contest bird Twitter in the Regency Brass, West Java. *Wanaraksa*, 11(01).
- Nugroho, AA, Rohmatin, N., Monawati, A., & Arsitasari, E. (2022). Study of Mating Behavior of Male and Female Lovebirds Species *Agapornis fischeri* Cobalt Variant. *Bioeksperimen : Journal Study Biology*, 8(2), 97-105. <https://doi.org/10.23917/bioeksperimen.v8i2.16563>
- Pratama, RA (2020). *Bird Feed Automatic With Using Arduino Uno Based on Android* (Doctoral dissertation, Indonesian Computer University).
- Rahmawati, A., Puspitasari, D., & Pradibta, H. (2015). Sistem Pakar Diagnosa Penyakit Pada Burung Kenari Dengan Metode Certainty Factor. *Jurnal Informatika Polinema*, 1(2), 49-49. <https://doi.org/10.33795/jip.v1i2.102>
- Séchaud, R., Schalcher, K., Machado, A. P., Almasi, B., Massa, C., Safi, K., & Roulin, A. (2021). Behaviour-specific habitat selection patterns of breeding barn owls. *Movement Ecology*, 9, 1-11. <https://doi.org/10.1186/s40462-021-00258-6>
- Teuscher, M., Vorlaufer, M., Wollni, M., Brose, U., Mulyani, Y., & Clough, Y. (2015). Trade-offs between bird diversity and abundance, yields and revenue in smallholder oil palm

- plantations in Sumatra, Indonesia. *Biological Conservation*, 186, 306-318. <https://doi.org/10.1016/j.biocon.2015.03.022>
- Trösch, M., Müller, W., Eens, M., & Iserbyt, A. (2017). Genes, environments and their interaction: song and mate choice in canaries. *Animal behaviour*, 126, 261-269. <https://doi.org/10.1016/j.anbehav.2017.02.006>
- Wijaya, AE, & Irfan, A. (2022). Sistem Cerdas Monitoring Kandang Kenari Berbasis Iot Dengan Algoritma C.45 Thingspeak. *Jurnal Teknologi Informasi dan Komunikasi*, 15(1), 10-24. <https://doi.org/10.47561/a.v15i1.220>
- Wijayani, A., Pratiwi, RH, & Fauzi, F. (2023). Analisis Perilaku Harian Burung Bayan(*Ecluctus roratus*) Di Taman Margasatwa Ragunan, Jakarta Selatan. *BIOMA: Jurnal Biologi dan Pembelajarannya*, 5(2), 20-28. <https://doi.org/10.31605/bioma.v5i2.2851>
- Zahavi, A. (1975). Mate selection—a selection for a handicap. *Journal of theoretical Biology*, 53(1), 205-214.