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The Production of Superior Hybrid Jawa Super Chicken as a Food Security Strategy During COVID-19 Pandemic in Ngoro-Oro Village, Patuk, Gunung Kidul, Yogyakarta

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Abstract During the COVID-19 outbreak, economic sectors slowed down and caused a significant impact on almost any level of society, especially the middle to lower class income. Thus, a strategy needs to be developed to overcome this situation. The Ngoro-Oro Village has potency in the livestock sector, especially in the development of superior hybrid Jawa super chicken. Therefore, the purposes of our community service in the Ngoro-Oro Village were to develop superior hybrid Jawa super chicken and use black soldier fly larvae as an alternative feed for chicken. We distributed 105 Jawa super hens aged ± three months and 21 superior free-range roosters. Furthermore, the hens and rooster were mated at the age of ± six months with a ratio of 5:1. The hybrid chickens were evaluated for their body weight and morphometric measurements until the age of four months. We also monitored the farmer community's use of black soldier fly larvae as an alternativ e feed for chickens. The hybrid chicken at the age of 4 months old has a body weight of about 971.64 ± 271.06 grams with a height of about 41.73 ± 5.87 cm, head's length of 5.01 ± 0.44 cm, body length of 22.82 ± 3.14 cm, body width of 10.68 ± 1.49 cm, wing's length 19.14 ± 2.67 cm, thigh's length 11.95 ± 1.71 cm, and leg's length is about 7.91 ± 1.41 cm. Moreover, Ngoro-Oro farmers can improve the community's economy by selling superior hybrid Jawa super chicken at a price 75,000 – 85,000 rupiahs per head. Through all of this community service program, it could be concluded that superior hybrid Jawa super chicken is potential to be developed as broiler, and the farmer community could develop black soldier fly larvae as an alternative feed for chicken.

1. INTRODUCTION

The COVID-19 outbreak is still a threat around the world. Various efforts have been made to prevent the spread of COVID-19, one of which is vaccination. However, total eradication of the COVID-19 outbreak takes time.This resulted in the recovery of economic conditions, especially for the lower middle class, to be hampered. Gunung Kidul regency, especially the Ngoro-Oro Village, Patuk is one area affected by the COVID-19 pandemic. Therefore, an effort is needed to develop the potential of the area in order to improve economic conditions. For instance, to increase food security. Livestock is one sector that could be developed in the village of Ngoro-Oro to enhance food

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security.

Ngoro-Oro Village has a wide yard and a critical area. Those areas can be used for the development of the livestock sector. In addition, many residents in Ngoro-Oro Village are of productive age. The community service program we carried out in 2021 is the 3rd year. In 2019 and 2020, we focused on developing food security by increasing the productivity of Jawa super hens that have the potential to lay eggs. For the last 2 years, we have found that Jawa super hens have a higher egg-laying ability than free-range hens. Therefore, Jawa super hens have the potential to be developed as laying hens (Saragih et al., 2019). Following up on these results, we came up with the idea to develop super java hens as a producer of hybrid chicken, and later on, these chickens can be developed as superior hybrid Jawa super chicken with qualities like local broilers. The step taken is crossing Jawa super hens with superior free-range roosters.

The development of local chickens has an important role in improving rural communities' welfare in developed and developing countries (Padhi, 2016).The development of local chickens is very promising because local chickens have unique characteristics, one of which is related to the quality of the meat produced (Choo et al., 2014). For reasons of healthier food, consumers are more interested in local chicken meat. Crosses between china local chickens (Erlang mountain chicken) can increase the productivity of local chickens in China (Yin et al., 2013). Local chickens are used to supply the needs of meat and eggs as local food security. The population of both purebred and local laying hens had increased every year (Direktorat Jenderal Peternakan dan Kesehatan Hewan, 2018). The Jawa super chicken was the result of a cross between a rooster and a laying hen (Setiawan et al., 2018). The Teknologi Tepat Guna program in 2019 and 2020 that we carried out found that Jawa super chickens can lay around 25 eggs/individual/month with proper care and feeding (Saragih et al., 2020).

These results indicate that Jawa super chickens can express egg-producing genes inherited from the hens. Based on this result, we tried to explore the potential of Jawa super hens by crossing it with a superior free-range rooster. Crosses between Jawa super hens and superior free-range roosters are expected to produce offspring with free-range chickens' characteristics but faster growth.

2. METHOD

This community service program was conducted in Ngoro-Oro Village, Patuk, Gunungkidul, Daerah Istimewa Yogyakarta. This program was carried out through several stages. The first stage is the distribution and maintenance of the Jawa super hens and superior free-range roosters aged ± three months. We distributed 105 birds of Jawa super hens and 21 superior free-range roosters to 21 farmers in Ngoro-Oro Village. The ratio of mating hens to roosters = 5:1. The mating process was carried out when the chickens were ready to mate, at the age of ±six months old. In this program, the chickens are also given alternative feed from black fly larvae and commercial feed. The eggs that are produced from the mating of java super hens and superior free-range roosters are then hatched. The offsprings were weighed and measured by their body morphometry until the age of 4 months old. The measurement process is carried out once a month to monitor the growth pattern of hybrid chicken resulting from a cross between Jawa super hens and superior free-range roosters. The parameters used to measure body morphometry were chicken height, head length, body length, body width, wing length, thigh length, and leg length. The results of body weight measurements and body morphometry were then averaged to study the growth from hatching age until four months old.

3. RESULT AND DISCUSSION

This community service program has entered its 3rd year. This program started in 2019, and 2020, and continues in 2021. In 2019, 2020, and 2021 there were 10, 15, and 21 farmer groups respectively involved in this program. In 2020, the Ngoro-Oro Village community was able to make a medium for growing black soldier fly larvae. Black soldier fly larvae have the potential as an alternative feed to increase egg production from Jawa super hens. In 2020, some hens in Ngoro-Oro Village, which are fed with mixed black soldier fly larvae and commercial feed, can produce up to 25 eggs/individuals/month with proper care management (Saragih et al., 2020).

Figure 1 . The distribution of Jawa super hens and superior free-range rooster to farmer groups in Ngoro-Oro Village: (a) Jawa super hens aged 3 months; (b) handover of Jawa super hens and superior free-range roosters to farmer in Ngoro-Oro Village

3.1 The distribution of Jawa super hens and superior free-range rooster and the use of alternative feeds from black soldier fly larvae as an alternative feed for chicken in Ngoro-Oro Village

In 2021, 105 Jawa super hens and 21 superior free-range roosters were distributed to farmer groups in Ngoro-Oro Village. Twenty-one farmer groups received chickens with a ratio of five Jawa super hens to one superior free-range rooster (Figure 1).

The hens and roosters that have been received by 21 members of the Ngoro-Oro Village farmer group are then kept in the cages that have been provided. In the process of rearing, members of the farmer group in Ngoro-Oro Village use an alternative feed made from the black fly larvae (Figure 2). Alternative feeding of black soldier fly larvae was intended to optimize the egg-laying potential of Jawa super hens. This was carried out in the previous year's program, where feeding with a mixture of black fly larvae can increase the productivity of Jawa super hen eggs. Jawa super hens fed with a mixture of black soldier fly larvae can produce up to 25 eggs/individuals/month (Saragih et al., 2020). In the 2021 program, alternative feeds from black soldier fly larvae are expected to increase the production of Jawa super hen eggs as in the previous year. This is due to the protein content of 20.81% in black soldier fly larvae (Saragih et al., 2020). In addition, by providing alternative feeds from black soldier fly larvae, the growth of chicken resulting from crosses between Jawa super hens and superior free-range rooster is expected to increase. Black soldier fly larvae that are used as alternative feed can provide benefits to improve chicken performance and reduce organic waste around us (El-Hack et al., 2020).

Figure 2 . The utilization of alternative feed made from black soldier fly larvae

3.2 Monitoring the development of chickens raised by a saveral farmer group in Ngoro-Oro Village

The monitoring process is carried out once a month to evaluate the development and health of hens and roosters. In addition, the monitoring process is also carried out to determine the number of hens that have started laying eggs and incubating eggs resulting from crossing a Jawa super hen with a superior free-range rooster (Figure 3).

3.3 Weighing and body morphometric measurements of hybrid Jawa super chicken

The newly hatched chickens were then weighed, and their body morphometry was measured (Figure 4). Weighing and body morphometric measurements were carried out once a month. Weighing and body morphometric measurements were carried out to determine the growth of the saplings of the crosses every month. The chickens from a cross between a Jawa super hens and a superior free-range rooster were fed using an alternative feed made from black soldier fly larvae. Black soldier fly larvae have the potential to be used as a protein source in poultry feed. The high and low protein content of black soldier fly larvae depends on the type of growth medium (Purnamasari et al., 2019).

Figure 3 . (a, b) Monitoring process to the members of farmer groups in Ngoro-Oro Village; (c, d) eggs produced by crossing Jawa super hens and superior free-range rooster

Figure 4 . Chicken resulting from crossing Jawa super chickens hens with superior free-range rooster: (a) DOC; (b) 1 month old; (c) 2 months old; and (d) 4 months old

In 2020, we conducted a proximate analysis of black soldier fly larvae grown in media derived from household waste. The results showed that black fly larvae had a protein content of 20.81%. Feeding with high protein content can increase the chicken's weight. The results of weighing and measuring body morphometry can be seen in Table 1 and Table 2 (Saragih & Daryono, 2012).

Table 1 . Average results of the morphometric measurements of hybrid Jawa super chicken

Age	Chicken Height (cm)	Head Length (cm)	Body Length (cm)	Body Width (cm)	Wing Length (cm)	Thigh Length (cm)	Leg Length (cm)
3 days	11.88±1.48	2.66±0.21	7.03±0.91	3.83±0.19	5.62±0.71	3.63±0.34	2.45±0.14
38 days	22.36±2.29	3.72±0.19	13.86±1.64	6.77±0.65	11.71±1.33	6.77±0.84	4.54±0.60
47 days	27.13±3.68	4±0.44	16.83±2.03	7.43±0.91	14.42±1.66	8.18±1.10	5.68±0.52
70 days	33.38±3.34	4.4±0.42	20.75±1.51	9.38±0.88	16.56±1.61	9.88±1.38	6.5±0.80
83 days	33.55±3.79	4.55±0.37	19.45±1.82	9.65±1.03	17.95±1.79	10.3±1.23	6.98±0.96
120 days	41.73±5.87	5.01±0.44	22.82±3.14	10.68±1.49	19.14±2.67	11.95±1.71	7.91±1.41

Table 2 . Average weight of hybrid Jawa super chicken

Age	Weight (grams)
3 days	41.75 ± 8.58
38 days	251,91 ± 61,54
47 days	363,75 ± 99,30
70 days	585,75 ± 154,76
83 days	649,70 ± 161,34
120 days	971,64 ± 271,06

The hybrid Jawa super chicken at the age of 4 months reached a body weight of 971.64 ± 271.06 grams. This weight is an ideal weight of chickens to be sold on the market and used for consumption. In addition, the crossbreed chickens have more dominant characteristics similar to free-range chickens, which can be seen from the color of their feathers and body stature. Body morphometry measurements were carried out to see the growth in several parts of the chicken's body. Based on the morphometry measurements, the results indicate that an increase in chicken body weight also offsets the increase in body size of chickens.

The phenotype characteristics of superior hybrid Jawa super chickens are similar to free-range chickens. Farmers in Ngoro-Oro Village have already tried to sell superior hybrid Jawa super chickens at the age of 4 months for 75,000 to 85,000 rupiah per head. This price tends to be lower than the price of free-range chicken on the market. The price of free-range chicken in Gorontalo reached 100,000 rupiahs per head (Anas & Fadwiwati, 2020). However, the selling price of superior hybrid Jawa super chickens tends to be more profitable considering the relatively fast growth of superior hybrid Jawa super chickens with relatively low feed and maintenance costs compared to free-range chickens. In addition, the price of superior hybrid Jawa super chickens is much higher than the price of broiler chicken which is only 37,000 per kilogram (Lestari, 2022). Superior hybrid Jawa super chickens farmers in Ngoro-Oro Village still need to develop the best marketing plan to raise the selling price of chickens economic level. Besides that, production should also be increased to meet the demand for superior hybrid Jawa super chickens on the market.

4. CONCLUSION

The Ngoro-Oro Village community can carry out the process of selecting Jawa super hens and superior free-range roosters and crossing hens and roosters independently. In addition, the people of Ngoro-Oro Village can use alternative feeds made from black soldier fly larvae as an alternative feed for hybrid Jawa super chicken. The Ngoro-Oro Village community can produce superior hybrid Jawa super chicken from crosses between Jawa super hens and superior free-range roosters. The sale of superior hybrid Jawa super chicken has the potential to boost the economic level of the Ngoro-Oro Village community.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests in this research publication.

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