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Hematological evaluation and reproductive rejuvination of culled quail (*Coturnix japonica*)

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Abstract

The study aimed to investigate the effects of forced molting techniques, specifically fasting and low-protein diets, on the hematological parameters and reproductive performance of culled Japanese quail (*Coturnix japonica*). Five different treatments were tested: fasting, cracked corn, cracked rice, rice bran, and commercial feed. The study focused on assessing feed consumption, body weight changes, egg quality, and hematological parameters before, during, and after the molting process. Results showed significant differences in feed consumption, with quail fed commercial feed consuming the most during both pre- and post-molting stages. In terms of egg weight, quail fed cracked rice and rice bran produced the heaviest eggs, while those subjected to fasting had the lightest eggs. Egg shell thickness did not significantly differ between the treatments, and there was no significant impact on yolk color. The laying percentage post-molt was highest in the fasting group. The proximate analysis revealed differences in the crude protein, fiber, and moisture content of eggs based on the feed type. Despite these differences, all treatments resulted in negative net income due to the low market prices for quail eggs during the study period. The findings suggest that forced molting techniques can affect reproductive performance and egg quality in quail, but cost-effectiveness remains a challenge.

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Introduction

The Japanese quail (*Coturnix japonica*) has become an increasingly important species in modern agriculture, valued for its rapid growth, small body size (80–300 g), high reproductive potential, and disease resistance. In addition to being a source of uniquely flavored meat and eggs, quail require minimal maintenance and exhibit a short generation interval, allowing for three to four generations annually. These traits also make them suitable laboratory animals for research purposes. However, as noted by Babatunde *et al.* (2016), their specific nutritional requirements particularly in tropical regions are still not fully understood.

The productive lifespan of a Japanese quail typically ranges from one year to eighteen months. Similar to laying hens, aging in quail leads to a decline in both egg production and egg quality (Albino and Barreto, 2012). To counteract this natural decline, the poultry industry has increasingly explored forced molting—a practice aimed at rejuvenating the reproductive system, enhancing post-molt productivity, and extending the laying cycle.

Molting is a natural biological process in birds, associated with feather renewal and the cessation of egg production. It allows birds to maintain feather quality for thermoregulation and flight. In commercial settings, induced or forced molting mimics this natural process to reset the bird's reproductive physiology, typically resulting in improved egg quality and shell strength during subsequent cycles (Scherer *et al.*, 2009).

Induced molting is achieved through various strategies, including feed and water deprivation, photoperiod manipulation, nutrient restriction, or hormonal treatments. While effective, some traditional methods—particularly fasting—have raised animal welfare concerns due to their potential to cause stress and physiological disruption (Sandhu *et al.*, 2010; Khan *et al.*, 2011). Nevertheless, feed withdrawal remains one of the most widely used techniques, owing to its simplicity and low cost (Khoshoei and Khajali, 2006).

In poultry, induced molting is used to prolong the reproductive lifespan and improve flock efficiency. Though this practice is common in commercial layers, its application in Japanese quail remains limited, primarily due to a lack of comprehensive data and industry-standard protocols (Laurentiz *et al.*, 2005). Understanding the effectiveness and feasibility of forced molting in quail is essential to improving their productivity and economic value in both small- and large-scale operations.

This study aimed investigate the effect of fasting and low protein diet as molting techniques on the hematological parameters and reproductive performance of culled Japanese quail (*Coturnix japonica*). Specifically, the study aimed to examine the effects of induced molting during both the pre- and post-molting periods, by measuring feed consumption and changes in body weight.

In addition, the research sought to evaluate the quality of eggs produced after molting, with attention to egg weight and yolk color, and to analyze the nutritional composition of the eggs in terms of crude protein, crude fiber, crude fat, moisture, and ash content. The study also investigated changes in the hematological characteristics of the birds particularly their complete blood count (CBC) before, during, and after the molting process. Furthermore, it aimed to determine the total number of eggs laid post-molting to assess overall reproductive longevity, and to evaluate the return on investment (ROI) in using these molting techniques in culled quail for continued egg production.

Materials and methods

Materials

The study used 200 heads of culled Japanese Quail layer hens (425 days of age), local feed stuff (rice bran, cracked corn, cracked rice), layer feeds, weighing scale, experimental cages, lighting equipment, record notebooks, water and feed containers.

Preparation of cages

The birds were housed in a masonry poultry house measuring 4 meters wide and 12 meters long.

Twenty cages, each measuring 100 cm in length, 34 cm in width, and 16 cm in height, that can accommodate 20 birds per cage. Each cage compartment is equipped with a nipple drinker and a trough feeder placed in front of the cage.

Procurement of stock

A total of (200) heads of culled layers 425 days of age will be procured from Better Bater Quail Farm at Piat, Cagayan.

Experimental design and treatments

The Randomized Complete Block Design with five treatments and five (5) replications was used in the study. Eight (8) heads of culled quails were used per replication to evaluate the different growth and reproductive parameters. The following treatments were as follows:

Treatment 1- Fasting
Treatment 2- Cracked corn
Treatment 3- Cracked rice
Treatment 4- Rice bran
Treatment 5- Commercial feed

It is important to emphasize that in Treatment 1, animals were not provided with any feed until they lost 26% of their total body weight. In contrast, animals in the other treatment groups were given feed but were still required to reduce their body weight by the same percentage. During the induced molting period, all birds were exposed to natural photoperiods and received experimental diets according to their assigned treatments.

Once the birds had lost 26% of their body weight based on the average mature body weight of Japanese quail (120 grams), as recommended by the Agricultural Training Institute Techno-guide, they were transitioned to a production diet. This diet was initially restricted to 6, 13, and 20 grams per bird per day over three consecutive days. From the fourth day onward, birds were given 23 grams of commercial feed per bird daily. Water was provided ad libitum. A lighting program of 14 hours per day was implemented, with weekly increments of 30 minutes until a total photoperiod of 16 hours per day was achieved.

During the pre-molting stage, birds were weighed on days 0, 3, 7, 10, 14, 17, 21, 28, 31, and 35, and continued until they reached a 26% reduction in body weight. These measurements were used to monitor changes in body weight. Feed intake and egg weight were also recorded weekly to assess the impact of body weight loss.

The following parameters were evaluated during the induced molting period: feed intake, body weight changes, hematological parameters, and the cost of pre-molt production. Culled layers were further assessed individually for post-molting performance, including feed intake, laying interval per bird, cost of post-molt production, and egg quality (measured through egg weight, eggshell thickness, and yolk color). Hematological changes were monitored throughout the birds' total production cycle.

Results and discussion

Feed consumption during pre molting stage

The average feed intake of quail before molting is shown in Fig. 1. Analysis of variance reveals that there exists highly significant difference among the different treatment tested. On comparison among means, quails fed with commercial feeds recorded to have the highest feed consumed before they started to molt with a mean of 5.34 kilograms. The ranking was followed by animals fed with rice bran with a mean of 4.5 kilograms. On the other hand, animals fed with crack rice consumed about 2.55 kilograms before starting molting and was not statistically different when compared to those animals fed with crack corn with a mean of 2.3 kilograms.

Animals under fasting was not introduced with any feed material to induce molting.

The result of the study could be due to the nutrient composition of the different feed material thus delaying the period for the test animals to molt. The result of the study conforms with Brake and Thaxton, 1979; Andrews *et al.*, 1987 who claimed that the body weight loss could be due to a reduction of adipose tissue and regression of visceral organ.

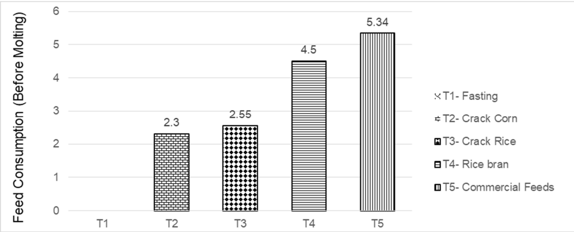

Fig. 1. Total feed consumed by the experimental animals before molting

Body weight change prior to induce molting

Fig. 2 illustrates the reduction in body weight of quail prior to molting. Treatments 4 and 5 required the longest duration to achieve a 26% reduction in body weight, with an average of 35 days. In contrast, quail fed cracked corn (Treatment 2) reached the same level of weight reduction within 14 days, while those fed cracked rice (Treatment 3) and those subjected to fasting (Treatment 1) reached this target in just 10 days. Analysis of variance (ANOVA) revealed significant differences among the treatment groups ($p < 0.05$). Post-hoc comparisons indicated no significant difference between Treatment 4 and Treatment 5 but were significantly different from Treatments 1, 2, and 3.

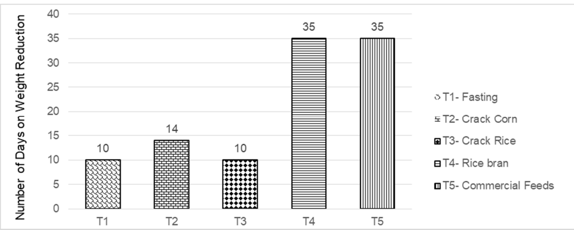

Fig. 2. Average number of days for weight reduction prior to induced molting

The result of the study explains that experimental animals were used to eat commercial feeds causing several adjustments specifically to those animals fed with crack corn and crack rice. It is believed that animals fed with rice bran has the same performance with that of commercial feeds maybe due to its color and size of the said feed material.

Feed consumption after molting stage

Fig. 3 presents the average feed consumption of quail during the post-molting stage. Statistical analysis revealed a highly significant difference among the treatment groups ($p < 0.01$). Quail fed with commercial feed (Treatment 5) demonstrated the highest feed intake, with a mean consumption of 25.5 kilograms. This was followed by quail in Treatment 1, which consumed an average of 23.5 kilograms of feed. However, this amount was not statistically different from those in Treatments 2 and 3, both recording a total feed consumption of 22.5 kilograms. The lowest feed intake was observed in Treatment 4, with a total of 20 kilograms consumed.

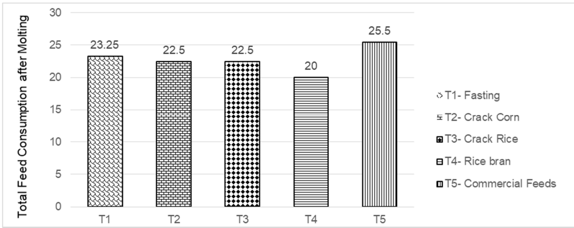

Fig. 3. Total feed consumed by the experimental birds after induced molting

These findings suggest that commercial feed is more palatable to quail than cracked corn, cracked rice, or rice bran. The higher intake observed in Treatment 5 may be attributed to its balanced formulation, texture, and flavor enhancers, which are specifically designed to maximize feed acceptability and nutritional value. Previous studies have shown that feed palatability plays a critical role in voluntary feed intake and overall performance in poultry (Leeson and Summers, 2001; Ahmad *et al.*, 2016). The relatively lower intake in birds fed cracked grains and rice bran may be due to the coarser texture, higher fiber content, or less favorable flavor profile.

Egg weight

Fig. 4 illustrates the average egg weight of culled quail as influenced by induced molting. Analysis of variance revealed a highly significant difference among the treatment groups ($p < 0.01$). Among the treatments, Treatment 3 (cracked rice) yielded the heaviest average egg weight at 12.14 grams. This was followed by quail fed rice bran (Treatment 4), which recorded an average egg weight of 10.88 grams. Although slightly lower, the egg weight in quail fed with commercial feed (Treatment 5) was not significantly different, averaging 10.44 grams. Treatment 2 (cracked corn) produced eggs with an average weight of 10.13 grams. The lightest eggs were recorded in Treatment 1 (fasting), with a mean weight of 5.29 grams.

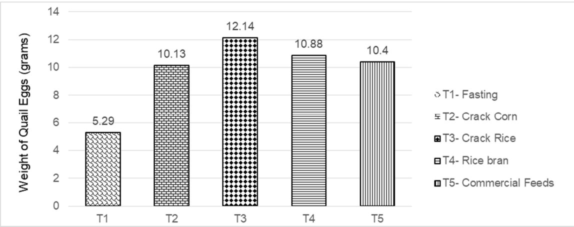

Fig. 4. Egg weight of quail eggs after induced molting

These findings suggest that quail fed with either locally available feedstuffs (such as cracked rice and rice bran) or commercial diets produce significantly heavier eggs than those subjected to fasting. The improved performance in egg weight among non-fasted groups could be attributed to the consistent nutrient supply, which is essential for optimal egg formation. In contrast, fasting may cause temporary regression of the reproductive system, negatively impacting post-molt egg quality and weight.

Interestingly, while this study shows significant variation in egg weight among feeding treatments, previous research by Yousaf (2006) and Mejia *et al.* (2011) reported that different induced molting methods did not significantly affect egg weight when compared to non-molted birds. This discrepancy may be due to differences in species, feed types, or molting protocols used in those studies.

Egg shell thickness

Fig. 5 presents the eggshell thickness of culled quail as influenced by induced molting. Based on the results of the analysis of variance, no statistically significant differences were observed among the various treatment groups ($p > 0.05$). This finding suggests that the type of feed provided whether commercial or locally available alternatives such as cracked rice, cracked corn, or rice bran did not have a notable impact on the eggshell thickness following molting.

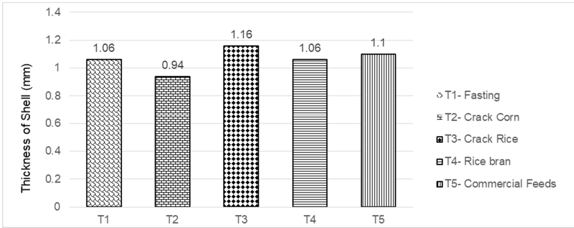

Fig. 5. Thickness of quail eggs after induced molting

The recorded eggshell thickness across all treatments ranged from 0.94 mm to 1.16 mm, indicating relatively consistent shell quality regardless of diet. These results imply that while feed composition may influence certain production parameters such as egg weight or feed intake, it does not appear to significantly affect shell formation during the post-molting period. It is suggested that factors such as calcium availability, age, and overall mineral balance may play a more crucial role in determining shell thickness than the base feed type alone (Roberts, 2004; Zhang *et al.*, 2005).

Egg yolk color

Fig. 6 illustrates the distribution of egg yolk color grades among the different treatment groups. Across all treatments, egg yolk colors ranged from a high of grade 10 to a low of grade 14, with no significant differences detected among treatments based on analysis of variance ($p > 0.05$). This indicates that the type of feed administered during the induced molting period did not statistically influence yolk pigmentation.

Among the groups, Treatment 1 (fasting) produced the highest number of eggs with a yolk color grade of 10, followed closely by Treatments 2 (cracked corn) and 5 (commercial feed). Conversely, Treatment 3 (cracked rice) yielded the lowest number of high-grade yolk colors, indicating a potential difference in yolk pigmentation quality, although not statistically significant.

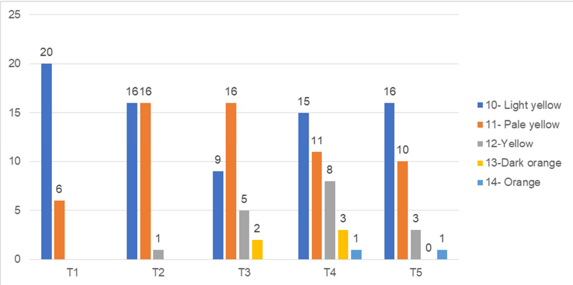

Fig. 6. Yolk color of quail eggs as affected by induced molting

These results suggest that yolk color may be more influenced by the nutritional composition of the feed, particularly the levels of fat-soluble pigments and protein, rather than the molting method alone. Agustantikaningsih *et al.* (2015) reported that yolk color in quail eggs is affected by the fat and protein content of the egg, which contribute to both yolk thickness and pigmentation intensity. Diets rich in carotenoids and xanthophylls, commonly found in corn-based and commercial feeds, have also been associated with more intensely pigmented yolks in poultry species.

Laying percentage

Fig. 7 presents the laying percentage of culled quail following induced molting. Statistical analysis revealed no significant differences among the treatment groups ($p > 0.05$), indicating that the various feeding strategies implemented during the molting period did not significantly affect post-molt laying performance.

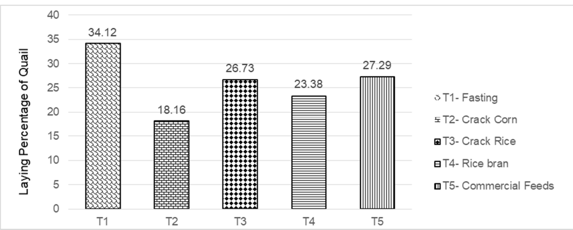

Fig. 7. Laying percentage of quail as affected by induced molting

Among the treatments, Treatment 1 (fasting) recorded the highest laying percentage at 34.12%. This was followed closely by Treatment 5 (commercial feed) with 27.29%, Treatment 3 (cracked rice) with 26.73%, and Treatment 2 (cracked corn) with 23.38%. The lowest laying percentage was noted in Treatment 4 (rice bran), with a value of 18.61%.

Although differences were not statistically significant, the numerical trends suggest that birds subjected to fasting (Treatment 1) and those fed commercial diets (Treatment 5) may have recovered more quickly or maintained better reproductive function post-molt. This aligns with previous research suggesting that nutrient availability and the physiological reset provided by molting can influence laying performance (Brake, 1992; Yousaf, 2006).

Hematogical of culled quail before and after molting

The present study evaluated the hematological responses of subjects subjected to five dietary treatments, including fasting (T1), cracked corn (T2 and T3), rice bran (T4), and commercial feed (T5). Parameters measured included red blood cell count (RBC), packed cell volume (PCV), platelet count (PLT), and mean corpuscular volume (MCV), both before and after molting (Table 1).

Across all treatment groups, a marked reduction in RBC and PCV values was observed post-treatment, indicating a consistent suppression of erythropoiesis or enhanced erythrocyte degradation irrespective of diet. This trend was most pronounced in the fasting group (T1), where RBC count decreased drastically from 2.85 $\times 10^6/\mu L$ to 0.85 $\times 10^6/\mu L$ and PCV plummeted from 45.77% to 3.72%. These findings suggest that complete nutrient deprivation severely compromises red blood cell production, likely due to a lack of essential precursors such as iron, folate, and vitamin B12. Furthermore, the increase in MCV from 159.95 fL to 182.15 fL may indicate a regenerative response, possibly characterized by the release of larger, immature erythrocytes (macrocytes) into circulation.

The cracked corn groups (T2 and T3) demonstrated divergent responses. While T2 maintained a relatively stable RBC count (2.20 to 2.16 $\times 10^6/\mu L$), PCV dropped precipitously from 50.07% to 4.02%, and

MCV fell sharply from 168.7 fL to 93.95 fL. This implies the development of microcytic anemia, potentially due to a diet lacking sufficient iron or protein. T3 showed a decrease in RBC and MCV, similar to T2, but an unusual increase in PCV (41.4% to 4.67%) raises the possibility of a typographical or data entry error, as such a pattern contradicts physiological expectations. Of particular interest was the dramatic elevation in PLT from 35.25 to 217.75 $\times10^3/\mu L$ in T3, suggesting a thrombocytosis response possibly triggered by systemic inflammation or nutritional imbalance.

The rice bran treatment (T4) also led to reductions in RBC (2.81 to 1.32 $\times10^6/\mu L$), PCV (43.77% to 4.37%), and PLT (45.5 to 34.75 $\times10^3/\mu L$), alongside a modest decrease in MCV. This may indicate a generalized bone marrow suppression or nutrient deficiency resulting from rice bran's known anti-nutritional factors such as phytates, which can chelate iron and inhibit its absorption, contributing to anemia and thrombocytopenia.

Surprisingly, the commercial feed (T5), which would conventionally be expected to support optimal hematological function, resulted in a significant reduction across all measured parameters. RBC dropped from 3.38 to 0.97 $\times10^6/\mu L$, PCV from 49.62% to 4.07%, PLT from 59.75 to 30 $\times10^3/\mu L$, and MCV from 148.77 to 77.47 fL. These changes suggest that the commercial feed either lacked essential hematopoietic nutrients or contained components that exerted a deleterious effect on bone marrow function. The concurrent decrease in MCV further implies microcytic anemia, reinforcing concerns regarding dietary quality.

Table 1. Hematological result of culled quail before and after induced molting

Treatment	RBC		PCV		PLT		MCV	
	Before	After	Before	After	Before	After	Before	After
T1- Fasting	2.85	0.85	45.77	3.72	69.5	106.25	159.95	182.15
T2- Cracked corn	2.20	2.16	50.07	4.02	67.25	75.5	168.7	93.95
T3- Crack rice	1.91	1.45	41.4	4.67	35.25	217.75	151.45	85.15
T4- Rice bran	2.81	1.32	43.77	4.37	45.5	34.75	155.82	146.47
T5- Commercial	3.38	0.97	49.62	4.07	59.75	30	148.77	77.47

Table 2. Proximate analysis of albumen (egg white) laid by culled quail as affected by induced molting

Treatment	Crude protein%	Crude fiber%	Crude fat%	Moisture %	Ash %
T1	72.03	0.135	2.44	11.215	6.14
T2	67.92	0.045	2.46	14.895	5.97
T3	71.25	0.065	2.835	11.105	6.125
T4	67.69	0.025	3.175	13.305	5.925
T5	72.89	0.615	2.235	9.82	5.985
CV	1.77	6.44	11.78	3.74	2.31
LSD	1.99	0.02	0.50	0.72	0.22
Result	*	ns	ns	*	ns

Proximate analysis of egg white

Table 2 presents the proximate analysis of quail egg white as influenced by induced molting. In terms of crude protein content, Treatment 5 (commercial feed) recorded the highest value with a mean of 72.90%. However, this was not significantly different from Treatment 1 (fasting) and Treatment 3 (cracked rice), which showed means of 72.04% and 71.25%, respectively. The lowest crude protein values were observed in Treatments 2 (cracked corn) and 4 (rice bran), with 67.92% and 67.70%, respectively; these were statistically similar to each other.

This outcome may be attributed to the quality and protein availability in the feed, with commercial feeds likely offering a more complete amino acid profile. Notably, Siriwong *et al.* (2013) found that most nutrient contents—particularly proteins and fats—are generally higher in egg yolks than in egg whites, which aligns with the current findings.

In terms of crude fiber content, a highly significant difference was observed among the treatments ($p < 0.01$). Treatment 5 again recorded the highest crude fiber at 0.62%, followed by Treatments 1 (0.14%), 3 (0.07%), and 2 (0.05%). The lowest crude fiber was recorded in Treatment 4 with a value of 0.03%. These differences are likely influenced by the fiber content of the feed ingredients consumed, with commercial feed being more nutritionally balanced.

According to Thomas *et al.* (2016), quail eggs typically contain about 13.30% crude protein, 0.63% crude fiber, and 11.99% crude fat, along with a wide array of vitamins and minerals.

For moisture content, results showed a highly significant difference among treatments. Treatment 4 (rice bran) had the highest moisture content at 2.04%, followed by Treatment 2 (1.64%) and Treatment 3 (1.29%), which were not statistically different from each other. The lowest moisture level was recorded in Treatment 1, with a value of 0.11%. These variations may be associated with differences in feed moisture absorption or water retention influenced by dietary fiber levels.

In terms of ash content in egg white, no significant differences were found among treatments, with values ranging from 5.93% to 6.14%. A similar result was noted for crude fat content, with no significant differences observed; values ranged from 2.24% to 3.18% across treatments.

These findings suggest that molting and feed type did not notably impact mineral or fat deposition in the egg white.

Proximate analysis of egg yolk

Table 3 presents the proximate analysis of quail egg yolks as influenced by induced molting. Results showed no statistically significant differences among the treatments in terms of crude protein, crude fat, moisture, and ash content. Specifically, crude protein ranged from 28.95% to 29.60%, crude fat from 57.13% to 59.04%, moisture content from 4.58% to 5.28%, and crude ash from 4.57% to 5.40%. These findings suggest that induced molting and the corresponding dietary treatments did not have a considerable effect on these major nutrient components in the yolk.

Table 3. Proximate analysis of egg yolk laid by culled quail as affected by induced molting

Treatment	Crude protein%	Crude fiber%	Crude fat%	Moisture %	Ash %
T1	28.95	0.23	58.525	4.58	4.72
T2	29.68	0.32	58.66	4.705	4.79
T3	28.995	0.215	59.035	9.23	5.155
T4	29.93	0.115	58.18	4.93	5.395
T5	28.95	0.44	57.125	5.275	4.565
CV %	4.36	11.61	1.49	14.44	11.11
LSD	3.27	0.08	2.24	1.78	1.4
Results	ns	*	ns	ns	ns

Table 4. Cost and return produced by quail as affected by induced molting

Particulars	T1	T2	T3	T4	T5
Culled quail	800	800	800	800	800
Feed	674.25	721.5	729	656.5	894
Electricity	100	100	100	100	100
Water	50	50	50	50	50
Bulbs and wire	32.60	32.60	32.60	32.60	32.60
Labor cost	190.00	220.00	150.00	175.00	180.00
Contingency cost	92.34	96.21	93.08	90.71	93.848
Total production cost	1939.19	2020.31	1954.68	1904.81	2151
Total sales	2043.00	737.00	1584.00	1376.00	1563
Net income	103.81	-1283.31	-370.68	-528.81	-588
Return of investment	5.35	-63.52	-18.96	-27.76	-2739

However, a highly significant difference was observed in terms of crude fiber content in the egg yolks ($p < 0.01$). Quail in Treatment 5 (commercial feed) recorded the highest crude fiber level at 0.44%, followed by Treatment 2 (cracked corn) at 0.32%, Treatment 1 (fasting) at 0.23%, and Treatment 3 (cracked rice) at 0.22%. The lowest crude fiber content was noted in Treatment 4 (rice bran), with a mean value of 0.12%. The variation in fiber levels may reflect the different fiber content of the feed ingredients used during the molting period, particularly in diets with more formulated or fibrous components.

Overall, the results support the general nutritional profile of quail eggs, where the yolk contains higher concentrations of essential nutrients compared to the egg white. Tunsaringkarn (2013) reported that quail egg yolks are notably rich in ash, carbohydrates, fat, protein, and caloric value, making them a dense source of nutrients. This study aligns with such findings, reinforcing the idea that the yolk is the primary nutrient reservoir within the egg.

Cost and return analysis

Table 4 presents the cost and return analysis for culled quail subjected to various feed treatments: cracked corn, cracked rice, rice bran, commercial feed, and fasting during the induced molting period. The economic analysis was based on a production capacity of 200 birds and included feed consumption during both the pre-molting and post-molting phases over a period of 35 days under a 16-hour extended lighting regimen.

Among the treatments, Treatment 5 (commercial feed/control) incurred the highest total feed cost at ₱2,160.00. This was followed by Treatment 2 (cracked corn), which molted by day 10, with a feed cost of ₱2,020.31. Treatment 3 (cracked rice) had a cost of ₱1,954.68, Treatment 1 (fasting) incurred ₱1,939.19, and the lowest feed cost was recorded in Treatment 4 (rice bran) at ₱1,904.81. The higher cost associated with Treatment 5 is attributed to the use of commercial feed, which is more expensive due to its balanced formulation and nutrient density.

In terms of gross sales, Treatment 1 (fasting) recorded the highest revenue at ₱2,043.00, followed by Treatments 3 (₱1,584.00), 5 (₱1,563.00), 4 (₱1,376.00), and 2 (₱737.00). Despite these figures, all treatments resulted in negative net income. This outcome is primarily due to the relatively low prevailing market price of quail eggs during the study period, which was insufficient to offset the production costs.

Conclusion

The study demonstrated that induced molting using various feed restriction strategies significantly influenced the physiological and reproductive performance of culled Japanese quail. Among the treatments, commercial feed resulted in the highest feed intake during both pre- and post-molting stages, while cracked corn and cracked rice diets facilitated quicker achievement of the targeted 26% body weight loss. Egg weight was significantly affected by the type of feed provided, with cracked rice and rice bran producing heavier eggs compared to the fasting group, which yielded the lightest eggs. However, other egg quality parameters such as shell thickness and yolk color were not significantly influenced by the molting treatments. In terms of reproductive performance, fasting appeared to stimulate a higher post-molt laying percentage, although the differences across treatments were not statistically significant. The proximate composition of egg whites and yolks varied slightly among treatments, particularly in terms of crude fiber content, with commercial feed resulting in the highest levels. Despite some improvements in egg production and quality following molting, all treatment groups experienced negative net income, largely due to low prevailing market prices of quail eggs. This underscores the economic challenge in implementing such techniques without addressing broader market dynamics and production costs. Based on the findings, it is recommended that further research be conducted to explore more economically viable and welfareconscious molting techniques in Japanese quail. While fasting proved effective in stimulating post-molt laying performance, it is associated with animal welfare concerns and yielded lighter eggs. Therefore, alternatives such as nutrient-restricted diets or gradual feed reduction should be investigated to strike a balance between effectiveness and bird well-being.

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