Physical Education, Health and Social Sciences

https://journal-of-social-education.org E-ISSN: 2958-5996

P-ISSN: 2958-5988

Comparative Evaluation of Growth Efficiency, Morphometric Development, and Carcass Yield among Three Naked Neck Chicken Varieties at Different Parental Ages

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DOI: https://doi.org/10.63163/jpehss.v3i4.902

Abstract

Poultry production is a very important activity in sustaining food security and providing some income, as well as fostering sustainable livestock production in developing nations. The current research paper identifies a detailed comparative analysis of growth efficiency, morphometric development, and carcass yield of three varieties of indigenous Naked Neck chicken raised on parents of different ages. Growth efficiency, skeletal development, and carcass traits were measured independently and then formulated to give an integrated interpretation to establish varietal response to parental age. In general, parental age has had a significant effect on the performance of progeny. Offspring of the aged parents showed an enhancement in growth efficiency and better morphometric development, which indicated better skeletal growth and morphometric conformation. Conversely, offspring of younger parents exhibited relatively high dressing percentage, indicating that there is a disparity in body composition and balance in edible portions distribution. There were also varietal differences that were observed in all categories of traits. Black Naked Neck chicken continued to perform better than the light brown and dark brown types in growth efficiency, morphometrics, and carcass yield, which means that there was a positive genetic potential for producing meat. The results have highlighted the need to assess a combination of various performance characteristics as opposed to separately when making breeding and management strategies with indigenous poultry.

Keywords: Naked Neck chicken, parental age, varietal comparison, growth efficiency, carcass yield

1. Introduction

Indigenous poultry production is significant in terms of food security, generation of income, and sustainable livestock production in developing nations. It is especially useful that local chicken breeds are flexible and able to withstand extreme conditions of the environment, diseases, and can work in low input production system [1]. Naked Neck chicken has been getting much coverage among the indigenous breeds because of the existence of the Na gene that decreases the feather coverage and allows them to endure heat, hence higher productivity in tropical and subtropical climates [2].

A complicated combination of genetic, environmental, and parental factors determines the productivity of poultry. The age of parents has been well-known as one of the crucial non-genetic factors that affect the performance of progenies by its impacts on the egg properties, embryo development, and post-hatching growth [3, 4]. The process of breeder age advancement is largely linked with the larger size of eggs and better nutrient deposition, which may lead to improved growing efficiency and skeletal growth of offspring. Nevertheless, the age of parents can as well affect body composition and yield of carcasses, leading to trade-offs between growth performance and meat yield [5].

Along with the age of parents, genetic diversity among native poultry stocks is the cause of variation in growth efficiency, morphometric development, and carcass traits. In Pakistan, Naked Neck chicken comes in a variety of phenotypes, which include light brown, black, and dark brown [6]. These varieties can vary in terms of genetic capacity to grow, skeletal growth, and meat production. Knowledge of these varietal differences is needed to develop breeding and management strategies to enhance the productivity of indigenous poultry [7].

The majority of the existing studies on the native poultry concentrate on the individual performance characteristics, including growth rate, morphometric measurements, or the carcass yield, independently. Although this kind of study is an excellent source of information, the isolation of the traits can also fail to reflect the general output, especially in indigenous breeds where the desired output is the optimization of performance and adaptability [8]. A combined measure that would be able to look at the growth efficiency, skeletal growth, and carcass yield can give a more global view of what production can be achieved and what biological trade-offs can be made among traits [5].

Consequently, the current research was implemented to offer a comparative and combined assessment of growth efficiency, morphometric development, and carcass yield in three types of Naked Neck chicken as a result of parents of different ages. Through the synthesis of trait-based responses between parental age groups and varieties, this study will determine varietal strengths and provide breeding and management choices on sustainable enhancement of the indigenous Naked Neck chicken production systems.

2. Materials and Methods

2.1 Experimental Location and Ethical Considerations

The experimental trial was conducted at the Indigenous Chicken Genetic Resource Center (ICGRC), Department of Poultry Production, University of Veterinary and Animal Sciences (UVAS), Pakistan. All experimental procedures involving birds were carried out in accordance with institutional guidelines for animal care and welfare. Birds were handled humanely throughout the experiment, and slaughter procedures were performed following standard halal practices.

2.2 Experimental Population and Parental Age Groups

The experimental population comprised indigenous Naked Neck chicken progeny produced from parent stocks of two age groups, 45 weeks and 55 weeks. These parental ages were selected to

represent relatively younger and older breeder stages commonly used in indigenous poultry production systems. The choice of these age groups allowed evaluation of the physiological effects of breeder maturity on progeny performance.

Progeny belonged to three phenotypic varieties of Naked Neck chickens:

- Light brown
- Black
- Dark brown

These varieties are widely distributed in local production systems and differ in physical appearance and genetic background.

2.3 Experimental Design and Rearing Management

The general experimental design was a 3× 2 factorial design, where Naked Neck chicken variety (light brown, black, dark brown) and parental age (45 and 55 weeks) were taken as the key factors. The birds were kept in the same housing, feeding, and health management conditions to reduce the environmental variation.

The brooding of the chicks was done, and then rearing was done under semi-controlled environmental conditions. The rearing period was followed by normal sanitary management, proper temperature control, ventilation, lighting, and sanitation. Birds received commercial diets which had been developed to satisfy nutrient requirements at various stages of growth, and feed and water were given ad libitum. All groups of treatment were treated equally in terms of vaccination and biosecurity protocols.

2.4 Trait Categories and Data Collection Framework

The experimental trial involved data collection that included three large categories of performance traits, which in separate studies on traits and in the current paper were analyzed and combined:

2.4.1 Growth Efficiency Traits

The growth efficiency traits had parameters expressing the body weight development and feed consumption during rearing. These characteristics were employed to determine the extent of growth and performance efficiency of offspring of varying parents age and varieties.

2.4.2 Morphometric Development Traits

Linear body measurements were used as morphometric development parameters by measuring skeletal growth and body conformation. These characteristics gave an idea of the structural development, body strength and flexibility of the birds.

2.4.3 Carcass and Meat Yield Traits

The carcass characteristics were measured at 20 weeks old using the slaughter analysis. These characteristics were carcass yield, dressing percentage, relative cut-up parts weights, and choice internal organ and intestinal traits, which all have an indicator of meat production.

2.5 Statistical Considerations

Growth performance, morphometric characteristics, and carcass characteristics were analysed statistically using suitable analysis of variance models, which were used in earlier papers based on the same experimental trial.

3. Results

3.1 Comparative Growth Efficiency among Varieties and Parental Ages

The growth efficiency of progeny of parents with older age (55 weeks) was always the best in comparison with progeny of parents with younger age (45 weeks). Such trends are manifested by cumulative growth performance indicators presented in Table 3.1.

Table 3.1. *Effect of Two Parental Ages on Progeny Growth (20 Weeks) Among Three Varieties of Naked Neck Chickens*

cc		Weight gain (g)		Feed Intake (g)		FCR (feed/gain)	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**
Light Brown		1393.00^{a}±27.60	1070.07^{b} ±19.84	4324.65±16.69	4324.65±16.69	3.11^{b} ±0.06	4.08^{a} ±0.08
Black		1315.21^{ab}±50.76	1150.14^{a} ±20.77	4319.08 ±14.64	4319.08±14.64	3.37^{a} ±0.14	3.79^{b} ±0.07
Dark Brown		1275.86^{b}±24.92	1063.68^{b} ±13.25	4293.26±14.48	4293.26±14.48	3.39^{a} ±0.06	4.06^{a} ±0.06
Parental age group							
45 weeks		1274.57^{b}±25.54	1070.20^{b}±12.49	4290.46^{b}±10.49	4290.46^{b}±10.49	3.42^{a} ±0.08	4.03±0.05
55 weeks		1381.48^{a}±31.86	1119.05^{a}±18.16	4334.20^{a}±13.57	4334.20^{a}±13.57	3.15^{b} ±0.07	3.92±0.07
Variety × Parental age group							
Light Brown	45 weeks	1327.86^{ab} ±28.86	1033.29^{b}±22.35	4306.54±14.73	4306.54 ±14.73	3.25^{bc} ±0.08	4.20^{a}± 0.10
	55 weeks	1458.14^{a}±32.48	1106.86^{ab} ±30.46	4342.75±29.82	4342.75±29.82	2.97^{c} ±0.07	3.96^{ab}±0.12
Black	45 weeks	1167.86^{c}±37.14	1096.50^{b}± 25.27	4299.34±18.48	4299.34 ±18.48	3.76^{a} ±0.14	3.95^{ab}±0.09
	55 weeks	1462.57^{a}±50.49	1203.79^{a}±26.66	4338.81±22.12	4338.81±22.12	2.98^{c} ±0.09	3.63^{b}±0.09
Dark Brown	45 weeks	1328.00^{ab} ±38.24	1080.86^{b}±13.08	4265.50±20.22	4265.50 ±20.22	3.27^{bc} ±0.10	3.95^{ab}± 0.05
	55 weeks	1223.71^{bc} ±17.97	1046.50^{b}±22.65	4321.02 ±18.54	4321.02±18.54	3.50^{ab} ±0.05	4.16^{a}±0.10
***P*-value**							
Variety		0.0076	0.0007	0.2919	0.2919	0.0086	0.0042
Parental age		0.0008	0.0149	0.0134	0.0134	0.0010	0.1364
Variety × Parental age		<.0001	0.0114	0.8878	0.8878	<.0001	0.0155

$^{a-c}$Superscripts on different means within column show significant difference ($P \leq 0.05$)

The black Naked Neck chicken exhibited the best growth efficiency between the two age groups of parents, and then the light brown variety followed by the dark brown variety recorded relatively lower growth efficiency. The ranking of varietal efficiency in growth was similar in all the parental age groups in terms of the relative growth summary in Table 3.1.

3.2 Comparative Morphometric Development

Table 3.2. *Effect of Two Parental Ages on Progeny Beak, Neck, and Body Length (20 Weeks) Among Three Varieties of Naked Neck Chickens*

Variety		Body length (cm)		Beak length (cm)		Neck length (cm)	
		Male	Female	Male	Female	Male	Female
Light Brown		64.62±0.42	61.74^{ab}±0.52	3.61±0.09	3.38±0.04	15.77±0.20	14.39±0.18
Black		67.41±0.78	62.65^{a}±0.51	3.59±0.08	3.29±0.04	16.23±0.31	14.49±0.15
Dark Brown		64.46±0.94	60.90^{b}±0.60	3.56±0.06	3.31±0.05	15.78±0.28	14.46±0.16
Parental age group							
45 weeks		65.34±0.33	62.80^{a}±0.40	3.45^{b}±0.07	3.31±0.04	15.60^{b}±0.25	14.64^{a}±0.13
55 weeks		65.60±0.87	60.71^{b}±0.45	3.68^{a}±0.04	3.34±0.04	16.17^{a}±0.20	14.25^{b}±0.13
Variety × Parental age group							
Light Brown	45 weeks	65.20 ±0.90	62.51±0.69	3.43±0.12	3.34±0.06	15.38±0.38	14.42±0.30
	55 weeks	64.15±0.10	60.97±0.74	3.76±0.10	3.42±0.06	16.09±0.06	14.35±0.22
Black	45 weeks	65.38±0.55	63.21±0.76	3.33±0.13	3.24±0.05	15.33±0.57	14.75±0.15
	55 weeks	68.58±0.93	62.08±0.68	3.74±0.06	3.33±0.07	16.75±0.17	14.23±0.26
Dark Brown	45 weeks	65.42±0.45	62.68±0.64	3.55±0.12	3.36±0.08	15.93±0.41	14.71 ±0.25
	55 weeks	63.65±1.70	58.64±0.63	3.57±0.07	3.26±0.05	15.64 ±0.42	14.14±0.16
***P*-value**							
Variety		0.0665	0.0241	0.8312	0.3229	0.6916	0.8986
Parental age		0.8910	0.0002	0.0035	0.6296	0.0515	0.0450
Variety × Parental age		0.0706	0.0973	0.0950	0.2993	0.0658	0.4965

[a-b]Superscripts on different means within column show significant difference ($P \leq 0.05$)

Morphometric development was positively influenced by parental age across all varieties. Progeny from older parents exhibited enhanced skeletal development, indicated by superiors.
Varietal comparison revealed that black Naked Neck chickens consistently exhibited superior morphometric development compared to light brown and dark brown varieties. Enhanced skeletal dimensions in the black variety suggest a stronger structural framework. Light brown variety showed moderate morphometric development, whereas the dark brown variety generally exhibited comparatively lower values for several skeletal traits, as indicated in Table 3.2.

3.3 Comparative Carcass Yield and Meat Distribution

Carcass evaluation revealed contrasting effects of parental age on meat production traits. Progeny derived from older parents attained higher live body weight at slaughter, whereas progeny derived from younger parents exhibited improved dressing percentage. These trends are summarized in Table 3.3, which presents slaughter and dressing characteristics at 20 weeks of age.

Table 3.3. *Effect of two Parental Ages on Progeny live body and dressed weight (20 weeks) among three varieties of Naked Neck chickens*

Variety		Live body weight		Dressed weight	
		Male	**Female**	**Male**	**Female**
Light Brown		1364.67± 48.45	1068.00±32.73	793.00±45.37	594.00^{b} ±34.43
Black		1403.67±46.67	1230.67 ±60.38	800.33±21.59	706.97^{a} ±24.94
Dark Brown		1364.00±40.93	1170.00± 56.25	759.67±13.81	672.67^{ab}±30.43
45 weeks		1308.22^{b}±23.20	1130.22±27.13	791.78 ±29.25	693.76^{a} ±18.52
55 weeks		1446.67^{a}±30.55	1182.22±59.20	776.89±18.44	622.00^{b} ±32.14
Light Brown	45 weeks	1289.33± 48.25	1056.00±16.65	828.00±87.87	646.67±23.67
	55 weeks	1440.00± 61.10	1080.00±70.24	758.00±36.66	541.33±50.92
Black	45 weeks	1334.00±51.59	1194.67±41.07	782.67±28.85	712.60±32.96
	55 weeks	1473.33±58.12	1266.67±123.47	818.00±34.43	701.33±44.64
Dark Brown	45 weeks	1301.33±30.60	1140.00±44.60	764.67±25.46	722.00±28.00
	55 weeks	1426.67±59.25	1200.00±113.72	754.67±16.75	623.33±37.56
Variety		0.6957	0.1548	0.6364	0.0298
Parental age		0.0072	0.4335	0.6908	0.0370
Variety × Parental age		0.9713	0.9509	0.5171	0.4031

[a-b]Superscripts on different means within column show significant difference ($P \leq 0.05$)

Varietal differences were evident in carcass yield and meat distribution. Black Naked Neck chickens demonstrated superior dressed weight and better yield of major cut-up parts compared to light brown and dark brown varieties.

Table 3.4. *Effect of two Parental Ages on Progeny relative giblets weight% (20 weeks) among three varieties of Naked Neck chickens*

Variety	Heart weight %		Liver weight %		Gizzard weight %	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Light Brown	0.61±0.04	0.55±0.01	2.17±0.16	2.47±0.19	1.83±0.09	1.77±0.15

Black		0.59±0.03	0.54±0.05	2.06±0.15	2.07±0.11	1.70±0.09	1.72±0.11
Dark Brown		0.68±0.06	0.63±0.02	1.83±0.06	2.72±0.19	1.58±0.21	1.86±0.11
Parental age group							
45 weeks		0.63±0.04	0.61[a]±0.03	2.00±0.13	2.49±0.17	1.79±0.12	1.89±0.08
55 weeks		0.63±0.04	0.53[b]±0.03	2.04±0.10	2.35±0.15	1.61±0.10	1.68±0.09
Variety × Parental age group							
Light Brown	45 weeks	0.62±0.02	0.57±0.01	2.03±0.28	2.65±0.37	1.76±0.05	1.96±0.20
	55 weeks	0.59±0.10	0.53±0.00	2.30±0.21	2.29±0.03	1.90±0.18	1.58±0.18
Black	45 weeks	0.59±0.07	0.62±0.07	2.23±0.25	2.06 ±0.15	1.76±0.17	1.85±0.16
	55 weeks	0.59±0.02	0.47±0.05	1.89±0.13	2.08±0.20	1.63±0.06	1.58±0.11
Dark Brown	45 weeks	0.66±0.12	0.64±0.04	1.74±0.11	2.75±0.25	1.85±0.39	1.86±0.13
	55 weeks	0.70±0.03	0.61±0.01	1.92±0.03	2.68±0.36	1.31±0.02	1.86±0.19
***P*-value**							
Variety		0.4146	0.1083	0.2228	0.0714	0.4495	0.6957
Parental age		0.9710	0.0435	0.8301	0.5241	0.2857	0.1337
Variety × Parental age		0.8739	0.2916	0.2523	0.7419	0.2478	0.5216

These findings indicate that genetic background plays a significant role in determining carcass characteristics, and varietal selection can influence overall meat production efficiency.

Table 3.5. Effect of two Parental Ages on Progeny intestinal weight% and intestinal length (20 weeks) among three varieties of Naked Neck chickens

Variety		**Intestinal weight%**		**Intestinal length (cm)**	
		Male	**Female**	**Male**	**Female**
Light Brown		4.53±0.39	5.06±0.35	58.65±2.23	55.65±3.26
Black		4.34±0.35	4.53±0.47	58.30±1.44	56.22±4.48
Dark Brown		4.04±0.18	5.22 ±0.34	55.00±1.30	55.58±3.14
Parental age group					
45 weeks		4.31±0.28	4.37[b]±0.28	57.97±1.49	51.97±1.23
55 weeks		4.29±0.24	5.50[a] ±0.24	56.67±1.40	59.67±3.42
Variety × Parental age group					
Light Brown	45 weeks	4.13±0.70	4.62±0.64	55.97±4.03	52.30±1.19
	55 weeks	4.93±0.36	5.49±0.12	61.33±1.20	59.00±6.35
Black	45 weeks	4.85±0.34	3.78±0.16	60.27±2.23	51.77±2.35
	55 weeks	3.82±0.48	5.28±0.72	56.33±1.20	60.67±8.67
Dark Brown	45 weeks	3.96±0.37	4.71±0.47	57.67±0.93	51.83±3.35
	55 weeks	4.13±0.16	5.73±0.31	52.33±0.67	59.33±4.91
***P*-value**					
Variety		0.5382	0.3316	0.1898	0.9908
Parental age		0.9575	0.0113	0.4541	0.0907
Variety × Parental age		0.1406	0.7876	0.0914	0.9767

Table 3.6. Effect of two Parental Ages on Progeny breast, thigh and drumstick weight% (20 weeks) among three varieties of Naked Neck chicken

Variety		Breast weight %		Thigh weight %		Drumstick weight %	
		Male	Female	Male	Female	Male	Female
Light Brown		12.05±0.74	13.23±0.40	10.85 ±0.36	9.34±0.50	9.69± 0.45	8.31±0.49
Black		13.16±0.60	14.03±0.97	10.58±0.33	9.91±0.36	10.11±0.33	8.86±0.19
Dark Brown		11.97±0.58	13.41±0.57	11.01 ±0.30	9.88±0.50	9.99±0.14	8.69±0.30
Parental age group							
45 weeks		12.47±0.50	12.95±0.60	10.71±0.28	9.54±0.36	9.76±0.32	8.66±0.24
55 weeks		12.31±0.58	14.16±0.42	10.92±0.25	9.88±0.37	10.10±0.20	8.57±0.32
Variety × Parental age group							
Light Brown	45 weeks	13.09±0.64	12.51±0.54	10.95±0.72	9.34±0.88	9.42±0.89	8.91±0.70
	55 weeks	11.02±1.13	13.94±0.10	10.75±0.35	9.34 ±0.68	9.96±0.39	7.72±0.58
Black	45 weeks	4.85±0.34	12.69±1.60	10.13±0.28	9.63±0.32	9.67±0.50	8.70±0.14
	55 weeks	14.06±0.29	15.36±0.64	11.04±0.52	10.19±0.69	10.56±0.31	9.02±0.38
Dark Brown	45 weeks	12.07±1.19	13.66±1.03	11.05±0.33	9.63±0.83	10.19±0.08	8.39±0.35
	55 weeks	11.87±0.52	13.17 ±0.71	10.97±0.58	10.12±0.70	9.78±0.23	8.98±0.47
***P*-value**							
Variety		0.3297	0.6566	0.6846	0.6714	0.6603	0.5146
Parental age		0.8241	0.1265	0.6068	0.5619	0.3974	0.8180
Variety × Parental age		0.1171	0.2472	0.4839	0.9111	0.3938	0.1679

4. Discussion

The current integrative exercise has shown that parental age and variance differences have a mutual effect on the growth efficiency, morphometric growth, and carcass yield of the indigenous Naked Neck chicken. Compared to the independent analyses of traits, the study gives a comprehensive view of productivity trends that cannot be well explained by independent traits analysis. The findings indicate that parental age as well as parental genotype (variety) is significant in defining the after-hatch performance, and there is some evidence of parental age and parental genotype

interaction with respect to various traits. These results point to the joint effects between maternal factors and genetic possibilities on growth and meat yield in naked neck chickens [9, 10].

The age of the parents also played a major role in determining the growth performance of the progeny at an early age. Chicks whose parents were older or of prime age tended to have higher initial body weights and higher first growth rates in comparison to those of parents of younger age [11]. This observation is in line with the past research where eggs of older hens have been found to be larger and have more yolk reserves, which help to facilitate embryonic growth and early post-hatch growth. Weight gain at an earlier age in chicks of older parents could be observed to continue into subsequent growth stages, which would lead to enhanced efficiency of overall growth. In other instances, however, growth disparities across parental ages were found to decline with older age, implying the occurrence of compensatory growth in chicks of younger parents. [12].

The increase in efficiency of growth of progeny produced by older parents is an indication that the advancement in parental age has a positive effect on the potential growth after hatching. This advantage could be due to improved embryonic development that is linked to larger egg size and greater nutrient deposition in eggs of older breeders. Such results are in line with previous records that show that breeder maturity improves growth-related traits in poultry [13, 14].

Increased morphometric improvement in offspring of older adults also indicates parental age as an influence in skeletal development. A better linear body measurement is a sign of better structural development, and this could help achieve better adaptability and long-term performance in indigenous production systems. Nevertheless, the dressing percentage of the progenies of younger parents is relatively high enough, which indicates that the age of parents is not only a factor affecting the degree of growth but also the body structures and the proportions of edible parts [15, 16].

Clear varietal variations were observed in all the categories of traits. The black Naked Neck chicken breeds showed better growth efficiency, skeletal growth and carcass yield. This homogenous dominance is a sign of a higher genetic origin, which helps to efficiently process nutrients, a better skeletal structure and increased meat deposition [17]. The light brown variety was intermediate in most of its traits as compared to the dark brown variety, which tended to be lower in productivity. These disparities explain why genetic diversification in indigenous breeds is valuable and varietal factors should be taken into account in breeding and selection programs [18].

The multivariate analysis demonstrated that there were strong correlations between the growth efficiency, morphometric development and carcass yield. Increased skeletal development and growth efficiency in offspring born to older parents were linked to increased live body weight at slaughter. On the other hand, the increase in the percentage of dressing in the offspring of younger parents suggests that there is a possibility of a trade-off between the total body mass and the percentage of edible meat.

This excellent morphometric growth in Black Naked Neck Chickens possibly contributed to the better carcass output and this hints to the possibility that good skeletal growth gives a basis to higher production of meat. These interrelationships emphasize the significance of determining several characteristics concurrently in determining productivity. The research results of this study are significant to the breeding and management of indigenous Naked Neck chickens. Parental age can also be optimized, in a strategic way, to achieve a predefined goal of production, like a high growth efficiency or a high dressing percentage. Furthermore, the need to focus on better-performing varieties, especially black Naked Neck chicken, could be a key to the improvement of the productivity of the indigenous poultry systems.

5. Conclusion

The combined approach to assessing growth efficiency, morphometric development, and carcass yield in Naked Neck indigenous chicken has established that the age of parents as well as the varietal differences are significant in defining the overall productivity. Offspring of older parents had more efficient growth and had better skeletal development. On the contrary, descendants of younger parents exhibited a relatively greater percentage of dressing, which suggests a variation in the body structure and distribution of meat. Varietal comparison found no difference but a respective superiority of black Naked Neck chicken in growth, morphometric characteristics, and carcass properties, which establishes their promising genetic suitability in producing meat products. The intermediate performance was demonstrated in the light brown variant and the relatively reduced productivity in the dark brown variant in the majority of the characteristics studied. The correlation relationships that are observed among growth performance, skeletal development, and carcass yield indicate the need to consider the several categories of traits jointly and not individually. Parental age optimization coupled with purposeful selection of better-performing varieties, especially black Naked Neck chickens, can be used to improve the productivity and help the sustainable development of indigenous poultry production systems.

Conflict of Interest

The authors declare no conflict of interest.

Author`s Contribution

All authors contributed equally.

Funding

None.

References

1. Fiorilla, E., et al., *Productive performances of slow-growing chicken breeds and their crosses with a commercial strain in conventional and free-range farming systems.* Animals, 2023. **13**(15): p. 2540.
2. Adomako, K. and L. Asamoah, *Effects of naked neck and frizzle genes on growth and egg-laying performance of chickens in the tropics in an era of climate change.* International Journal of Biometeorology, 2025. **69**(4): p. 709-724.
3. Djermanovic, V., M. Milojevic, and I. Bozickovic, *Possibilities of productive and reproductive performance improvement in geese: part II non-genetic factors.* World's Poultry Science Journal, 2024. **80**(2): p. 403-422.
4. Ori, A.K., *Review of the factors that influence egg fertility and hatchabilty in poultry.* International Journal of poultry science, 2011. **10**(6): p. 483-492.
5. Zerjal, T., et al., *Assessment of trade-offs between feed efficiency, growth-related traits, and immune activity in experimental lines of layer chickens.* Genetics Selection Evolution, 2021. **53**(1): p. 44.
6. Shafiq, M., et al., *Assessing growth performance, morphometric traits, meat chemical composition and cholesterol content in four phenotypes of naked neck chicken.* Poultry Science, 2022. **101**(3): p. 101667.
7. Padhi, M.K., *Importance of indigenous breeds of chicken for rural economy and their improvements for higher production performance.* Scientifica, 2016. **2016**(1): p. 2604685.

8. Mekonnen, K.T., et al., *A Review on production, reproduction, morphometric, and morphological characteristics of Ethiopian native chickens.* Journal of World's Poultry Research, 2023. **13**(3): p. 280-291.
9. Nasri, H., et al., *Interactions between egg storage duration and breeder age on selected egg quality, hatching results, and chicken quality.* Animals, 2020. **10**(10): p. 1719.
10. El Sabry, M.I., S. Yalçın, and G. Turgay-İzzetoğlu, *Interaction between breeder age and hatching time affects intestine development and broiler performance.* Livestock Science, 2013. **157**(2-3): p. 612-617.
11. Azhar, M., et al., *Effect of breeder age on the progeny performance of three naked-neck chicken phenotypes.* Brazilian Journal of Poultry Science, 2019. **21**(03): p. eRBCA-2018-0729.
12. Fisher, M.O., R.G. Nager, and P. Monaghan, *Compensatory growth impairs adult cognitive performance.* PLoS Biology, 2006. **4**(8): p. e251.
13. Depison, D., et al., *Integrating quantitative traits and growth hormone gene polymorphism in Indonesian crossbred chickens for genetic improvement and marker-assisted selection.* Veterinary World, 2025. **18**(8): p. 2169.
14. Podisi, B.K., et al., *Comparative analysis of quantitative trait loci for body weight, growth rate and growth curve parameters from 3 to 72 weeks of age in female chickens of a broiler–layer cross.* Bmc Genetics, 2013. **14**(1): p. 22.
15. AGBOOLA, L.O., *EFFECT OF SIRE STRAIN ON EARLY GROWTH TRAITS OF PURE AND CROSSBRED CHICKEN PROGENIES*. 2015, DEPARTMENT OF ANIMAL PRODUCTION AND HEALTH, FACULTY OF AGRICULTURAL SCIENCES ….
16. Assan, N., *Genotype and sex influencing dressing percentage, carcass parameters and meat quality properties in indigenous chickens.* Scientific Journal of Biological Sciences, 2015. **4**(6): p. 43-52.
17. Alam, M., et al., *Comparative growth, production, carcass characteristics and reproduction performance of Naked Neck, Black Australorp and their crossbred chicken.* Italian Journal of Animal Science, 2024. **23**(1): p. 1624-1634.
18. Sungkhapreecha, P., et al., *Combining abilities, heterosis, growth performance, and carcass characteristics in a diallel cross from black-bone chickens and Thai native chickens.* Animals, 2022. **12**(13): p. 1602.