

International Journal of Agriculture Extension and Social Development

Volume 9; Issue 6; June 2026; Page No. 824-828

Received: 11-03-2026
Accepted: 15-04-2026

Indexed Journal
Peer Reviewed Journal

Performance of Kamrupa Birds reared in Machang type and deep litter housing in flood prone areas of Dhubri district of Assam, India

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DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i6k.3779>

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Abstract

As an intervention measure to mitigate the effect of flood on small scale poultry production, an elevated stilt housing (Machang type house) was introduced to rear Kamrupa birds. Kamrupa is a dual purpose multi-coloured dual purpose bird suitable for backyard poultry developed by Assam Agricultural University. For the study, two flood prone villages namely Sreegram and Udmari of Dhubri district was selected. Sixteen farmers from the two villages were chosen and distributed with 320 Kamrupa day old chicks where each farmer received 20 day old chicks. Out of total sixteen farmers eight farmers were provided with necessary inputs for construction of Machang type house while other eight farmers rear the chicks in deep litter system. The birds were reared up to 72 weeks. Results of the experiment revealed that birds reared in Machang type house had significantly higher body weight at 8th, 40th and 52nd week compared to those reared in deep litter house. The age at first egg production was found to be 185.56±1.16 and 187.50±1.18 day for machang type house and deep litter house respectively. Birds in Machang type house laid 137.73±1.02 and those in deep litter laid 137.73±1.02 nos. Mortality rate also found to be lower in Machang type house (8.75%) than deep litter house (14.38%). Economic analysis revealed higher benefit cost (B:C) ratio in birds those reared in Machang type house (1.54) than those in deep litter house (1.44). Higher net profit also calculated for Machang type house (Rs. 54150.00) than those in deep litter house (Rs. 40200.00). Lastly, the birds reared in Machang type house (Rs.338.43) showed higher profit/bird than those reared in deep litter house (Rs. 251.25). Thus, from the findings of the study it may be conclude that Machang type of birds can be better option for the backyard and small scale poultry farmers in flood prone areas of Assam.

Keywords: Kamrupa bird, machang type house, egg production, mortality, economics, B:C ratio

Introduction

Backyard poultry farming in Assam contributes immensely in providing nutritional need and livelihood security to a vast majority of rural resource poor farmers. Traditionally, a large number of rural farmers maintain a small flock of 15-20 numbers of indigenous fowls within their house. The farm families fulfill regular nutritional requirements in terms of meat and eggs and sometimes their financial need from the small flock of fowl (Islam *et al.* 2014) [5]. Flood is a regular feature of Assam and it occurs almost every year in this region. Livestock and poultry rearing during and after flood become vulnerable as major part of the region submerged under water, destroying pasture, forage land and contaminating the water sources by the flood water (Singh *et al.*, 2023) [11]. This in turn results in disease outbreak in

livestock including poultry resulting in heavy mortality in animals and poultry impacting the rural economy and the nutritional security of the farmer. Traditionally, the poultry keepers rear the poultry within their own housing facility on earthen floor. At the time of flood their houses get submerged under water and poultry rearing become almost impossible experiencing heavy mortality of bird. As a measure of intervention in flood prone areas an elevated floor/Machang type system for small scale poultry production is gaining popularity. This type of house popularly known as 'Chang Ghar' which are flood-adaptive stilt house made of locally available material with raised platform in flood prone areas of Assam (Choudhury and Chetty, 2023) [4]. Some farmers are also constructing such type housing for poultry rearing keep the birds above

floodwaters. The birds can be reared very comfortably in Machang type houses even during the time of flood without affecting the performance of the birds. In Assam, a multi-coloured, dual purpose improved bird 'Kamrupa' has been developed by AAU which perform very good and well adapted to this region (Kalita, *et al.*, 2016) [7]. Most of studies have been conducted in birds on management systems viz., backyard poultry farming, intensive, semi-intensive or rearing of birds in free range system. However, in flood prone areas of Assam no work has been focused on housing design of poultry as an intervention measure during flood. In view of the above, the present experiment was aimed to compare the productive and reproductive performance and economic benefit of rearing Kamrupa birds in Machang type house vs. deep litter house at the selected flood prone areas of the district.

Materials and Methods

Location of the study

The study was conducted by Krishi Vigyan Kendra, Dhubri during the year 2023-24 in two villages, namely, Sreegram and Udmari of Dhubri district of Assam where more than 80 per cent people depend on agriculture and allied sector. Every year flood is a regular feature in this region affecting the agriculture and livestock production thus disturbing socio-economic condition of the people. Small backyard poultry keepers are also affected badly due to the flood. Therefore, it has been thought of an improved housing design for the poultry as a resilient measure in the flood affected areas of the district.

Selection of farmers and sampling

Krishi Vigyan Kendra, Dhubri, Assam Agricultural University, under the NICRA (National Innovations in Climate Resilient Agriculture) project carried out the study. For the study, sixteen farmers from the two adopted villages having experience on poultry rearing were chosen and provided three days training on scientific poultry management prior to the study. A total of 320 Kamrupa day-old chicks were distributed to 16 farmers where each farmer received 20 nos. of chicks. As per the experimental design, eight farmers were provided with required input for construction of Machang type house and rest of the farmers were reared in traditional system on deep litter system. Machang type houses were constructed using locally available cheaper material like bamboo and wooden planks allowing a gap of 1-1.5 cm to pass through the excreta down. In deep litter system, saw dust, sand/dust was used as litter material. Out of the total 320 chicks, 160 were reared in Machang type house (*Chang ghar*) and remaining 160 chicks were reared in deep litter house.

Management of birds

The day old Kamrupa chicks were brooded for a period of 2 weeks. Heating source was ensured during the brooding period for providing optimum condition during brooding. Up to 4th week, chicks were managed intensively and provided with broiler starter ration. On completion of 4th week chicks were reared in semi-intensive system where birds were allowed to feed on forages, insects, food grains, kitchen waste and agricultural waste outside the house during the day time. In evening, the birds came back to their respective houses and were provided with little broken rice and wheat bran throughout their productive life. Standard vaccination schedule is followed against the prevalent diseases. Other management practices viz., periodical sanitization of inside and outside premises of the coop, periodical deworming of the birds, cleaning the floor, cleaning the feeders and drinkers, racking litter material in deep litter system etc. were carried out on regular basis.

Collection of data

The data on body weight sat 0 day, 4, 8, 12, 16, 20, 40 and 52 weeks of age were recorded. Age at first egg, egg production up to 30, 40, 52 and 72 weeks were recorded. Mortality rate was recorded at 0-4, 5-8, 9-30 and 31-52 weeks. On completion of 20 weeks, cocks were sold out; while, the hens were retained for egg production up to 72 weeks. The eggs were sold to vendors and in the local market and after 72 weeks all birds were sold out and the economics was calculated.

Statistical analysis

The data so collected during the study period were tabulated and analyzed statistically by the method described by Snedecor and Cochran (1995) [12].

Results and Discussion

Body weight

Average body weights of birds at different ages reared in both Machang type house and deep litter house were depicted in table 1. The average body weights of birds reared in Machang type house and traditional deep litter system at 0 day was 31.57±0.29 and 31.97±0.26 g respectively. Body weight of birds those recorded on 8th and week for Machang type house and deep litter house was 495.25±5.10 and 470.79±9.10 g respectively, were differed significantly ($P<0.05$). Similarly, body weights at 40th week for Machang type house and deep litter house was 1858.21±13.62 and 1811.03±11.39 g which also differed significantly ($P<0.05$). Moreover, the data on body weights recorded at 52nd week for

Table 1: Performance of Kamrupa birds reared in Machang type house and deep litter house

Parameters	Machang type house	Deep litter house	P value
Body weights (g) at			
0 day	31.57±0.29	31.97±0.26	NS
4week	211.89±1.26	210.10±1.94	NS
8 week	495.25±5.10 ^a	470.79±9.10 ^b	$P<0.05$
12week	691.75±9.97	676.17±12.14	NS
16week	906.51±8.54	886.72±9.71	NS
20 week	1337.73±16.46	1316.62±18.84	NS
40 week	1858.21±13.62 ^a	1811.03±11.39 ^b	$P<0.05$

52 week	1922.52±9.42 ^a	1840.13±11.15 ^b	$P<0.001$
Age at first egg (days)	185.56±1.16	187.50±1.18	NS
Egg Production numbers (up to)			
32week	21.98±0.64	20.47±0.41	NS
40 week	41.40±0.63	33.90±1.13	$P<0.0001$
52week	82.77±1.07	73.57±0.76	$P<0.0001$
72week	137.73±1.02	127.10±1.03	$P<0.0001$
Mortality (%)			
0-4 week	3.75±1.25	5.00±1.34	NS
5-8 week	2.5±0.94	3.13±0.91	NS
9-20 week	1.25±0.82	3.75±1.25	NS
21-52 week	1.25±0.82	2.5±0.94	NS
Total mortality (%)	8.75	14.38	

Machang type and deep litter house was 1922.52±9.42 and 1840.13±11.15g respectively, found to be highly significant ($P<0.001$). In the present experiment, birds with same germplasm showed significantly higher mean body weights reared in Machang type house than those reared in deep litter might be due to the impact of housing design of Machang type house. However, body weights of birds that recorded during other different period viz., 4th, 12th, 16th and 20th week showed slightly higher that were reared in Machang type house than in deep litter houses but the difference were non-significant. In the present study, the average body weight of Kamrupa birds those managed in Machang type house was found to be 1858.21±13.62 g which is in similar line as reported by Kalita *et al.* (2016)^[7] where the body weight of Kamrupa birds at 40th week of age was 1800.57±136.45 g reared in semi-intensive system of management. The scientific literatures on rearing Kamrupa birds in Machang type house in flood prone areas of Assam are very scarce. However, the present study revealed an option for the small-scale poultry producers to rear chickens in Machang type house in flood prone areas of the state. Bhattacharyya *et al.* (2020)^[2] also reported an average body weight of Kamrupa bird as 1.41 kg at 24th week of age which were maintained in backyard system. Slightly lower body weight was recorded by the mentioned by the researchers above might be due to the fact that the birds were maintained fully on scavenging system without providing any supplemental feed. In the present experiment, birds were provided little unconventional feed like broken rice, household agricultural and kitchen wastes etc. in addition to scavenging system. These extra feed provided to the birds might resulted in exhibition of their full genetic potential and comparatively little higher body weight could be obtained. In yet another study by Sarma *et al.* (2020)^[9] compared the performance of Vanaraja, Kamrupa and Desi birds in tribal community of Lower Brahputra Valley zone of Assam and reported the body weight of Kamrupa bird at 52nd week as 1957.34±9.71 g resembling the finding of the present study.

Age at first egg production

In the present study, mean age at first egg production of Kamrupa birds reared in Machang type house and deep litter system was recorded at 185.56±1.16 and 187.50±1.18 days, respectively (Table 1). Slightly early age at first egg production was recorded in birds reared in Machang type house, however, the difference is found to be non-significant. The previous study also reported the age of

sexual maturity of Kamrupa birds as 164.54±3.76 and 185.37±4.61 days reared in intensive system and free range system, respectively (Kalita *et al.*, 2016)^[7]. A study carried out by Bharali *et al.* (2023)^[1] in similar line also reported age at first egg laying as 178.50±1.25 days. Chakraborty *et al.* (2023)^[3] reported age at first egg laying as 179 days for Kamrupa bird reared in backyard system. In another study conducted by Sarma (2024)^[8] stated that the age of first egg production of Kamrupa bird was 174.59±8.26 days while evaluating the varied economic traits of Kamrupa birds reared in backyard system.

Egg Production

Mean egg production of Kamrupa birds reared in Machang type house at 40th, 52nd and 72nd week differed significantly ($P<0.001$) than those maintained in deep litter system. At 72nd weeks mean egg production of Kamrupa birds those reared in Machang type house was recorded as 137.73±1.02 nos. and those which were reared in deep litter system was recorded as 127.10±1.03 nos. and the difference was found to be highly significant ($P<0.0001$). In the present study birds reared in Machang type house laid more eggs and this might be due to the housing design of Machang type house. On the other hand, birds reared in deep litter house showed poor performance in terms of total egg laid. As the present study was conducted in the flood prone areas, the impact of flood might affect adversely on the egg production of birds those reared in deep litter system. Sarma *et al.* (2020)^[9] reported slightly higher mean egg production (140.50±0.80 nos.) in Kamrupa birds at 72nd weeks which was conducted in tribal areas of Lower Brahmaputra Valley Zone of Assam. Another study conducted by Islam *et al.* (2022)^[6] on small scale Kamrupa birds where they reared in three different system of management and observed that birds in intensive system up to 72nd week of age laid 185 nos., those reared in semi-intensive system produced 160 nos. and those reared in scavenging system produced 120 nos. of eggs.

Mortality rate

Average mortality rate of birds reared in Machang type house was comparatively lower than those reared in deep litter system. However, no significant ($p>0.05$) difference was observed (Table 1). Although not significant but a lower mortality rate was recorded for birds those reared in Machang type house than those in deep litter housing. This might be the effect of housing design of Machang type house that impact in reduction of mortality rate in birds. The present finding on mortality rate of Kamrupa birds are in

agreement with the reports of Islam *et al.*, (2014) ^[5] and Niranjana and Singh (2005) ^[13], who had reported the mortality rate of Kamrupa birds under different management system ranges between 0-15 percent. Much lower mortality rate of Kamrupa bird was also reported in the study of Kalita *et al.*, (2016) ^[7] and Sarmah *et al.*, (2024) ^[10] compared to the present study.

Economics of rearing Kamrupa birds on Machang type house and deep litter house

All the expenses on rearing of Kamrupa birds up to 72nd week both in Machang type house and deep litter housing are depicted in Table 2. Total cost for rearing Kamrupa birds in Machang type house and deep litter housing was calculated as Rs. 100610.00 and Rs.90360.00 respectively, while the total income was calculated as Rs. 154760.00 and Rs. 130560.00 in Machang type house and deep litter house,

respectively. Thus, a higher benefit cost ratio (B:C) was obtained in birds those reared in Machang type house (1.54) than those reared in deep litter house (1.44). Net profit and Profit/bird was calculated as Rs. 54150.00 and Rs. 338.43 for birds reared in Machang type house and Rs. 40200.00 and Rs.251.25 for those reared in deep litter house, respectively. Profit/bird was calculated higher by Rs. 87.18 in Machang type house than those reared in deep litter house. Findings of the present study on economics of rearing Kamrupa birds are in close proximity with the results stated by Islam *et al.*, (2022) ^[6] who calculated profit/Kamrupa bird reared in semi-intensive system as Rs. 321.81 and the B:C ratio as 1.45. Conversely, a higher B:C ratio (2.55) than the present study was reported by Sarmah *et al.*, (2024) ^[10]. Comparatively lower B:C ratio also reported by Kalita *et al.*, (2016) ^[7] in Kamrupa birds reared in semi-intensive and free range system.

Table 2: Economics in rearing Kamrupa birds in Machang type and deep litter house

Particulars	Machang type house	Deep litter house
A. Non-recurring expenses		
Land	Own	Own
Construction of coop	24000.00	Existing
Equipment	2400.00	2400.00
Total Non-recurring expenses	26400.00	2400.00
B. Recurring expenses		
Cost of day-old chick including transportation	4800.00	4800.00
Cost of feed (unconventional feed like broken rice, rice polish, wheat bran etc. @ Rs. 30.00/kg)		
• Up to 20 weeks feed intake 5 kg/bird for 150 birds (150×5×30)	22500.00	21000.00
• Up to 72 weeks feed intake 25 kg/bird for 77 birds (77×25×30)	57750.00	54000.00
• In deep-litter up to 20 weeks 5kg/bird for 140 birds (140×5×30)		
• Up to 72 weeks feed intake 25 kg/bird for 72 birds		
Cost of electricity (up to the end)	3200.00	3200.00
Labour cost (own labour)	0.00	0.00
Cost of medicine	5000.00	5000.00
Miscellaneous cost (litter material, curtain etc.)	1000.00	2000.00
Total recurring expenses (R)	94250.00	90000.00
C. Depreciation cost		
Poultry house @ 25%/year	6000.00	0.00
Equipment @ 15%/year	360.00	360.00
Total Depreciation (D)	6360.00	360.00
D. Income		
Sale of eggs @ Rs 10.00/egg (Machang type =137eggs/bird from 73 hens, Deep litter housing= 117 eggs/bird from 68 hens)	100010.00	79560.00
Sale of live birds @ Rs.250/kg (Average weight of male birds at 20 weeks and spent hens after completion of study was 1.5 kg/bird) (Machang type=73 cockerel and 73 spent hens Deep litter housing= 68 cockerel 68 spent hens) *considering mortality of birds (Table 1)	54750.00	51000.00
Total income (I)	154760.00	130560.00
Total cost of production (R+D)	100610.00	90360.00
BC ratio	1.54	1.44
Net profit (Rs.)= [I-(R+D)]	54150.00	40200.00
Profit per bird (Rs.)=	338.43	251.25

Conclusion

In the above study, it has been observed that performance of Kamrupa birds those reared in Machang type house was better in terms of body weight gain, total numbers egg production in a laying season than in the deep litter house. Lower mortality was also observed in birds reared in Machang type. Net profit and B:C ratio was found to be higher in birds reared in Machang type than in deep litter

house. Thus it may be conclude that Machang type house may be an alternative and better housing design for the small scale poultry farmers of flood affected areas enhancing livelihood support and nutritional security of the backyard poultry keepers.

Acknowledgement

The authors gratefully acknowledge the help and required

support provided by ICAR. Further, heartfelt thanks and gratitude are extended to Assam Agricultural University for constant support. Moreover, authors are also thankful to the farmers who engaged themselves to carry out the experiment.

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