

Original Research Article

Technology Adoption in Broiler Farming-A Methodical Study among the Broiler Farmers of Sonitpur District of Assam

ABSTRACT

The study undertaken is an attempt to investigate and analyse the level of technology adoption across different size groups of broiler farms in Sonitpur district of Assam during 2011-12. The study was conducted with a sample of 100 numbers of broiler farms using specially designed pre-tested schedules and questionnaires through personal interview with the respondent farmers. Sampling design followed for the study was stratified random sampling design. The results of the study reveal that the entire sample followed scientific rearing and management practices right from housing and feeding to utilization of equipments to medication and vaccination, with some deviation from the recommendations. However, large sized farms were more technology oriented than the small farms. In terms of adoption of recommended stocking density, vaccination, utilization of equipments etc. the level of adoption is satisfactory for the entire sample, while in regard to housing, utilization of litter and lime, feeding and nutrition, large sized farms were close to recommendation than the smaller farms. Financial self-sufficiency, education, exposure to the outer world, decision making capacity etc. were the factors that determined the level of adoption of recommended technologies by the broiler farmers. Lack of proper training and awareness along with poor financial condition stood as a hinder for the small sized farms in adopting scientific rearing practices while large sized farms with sound financial condition and good awareness adopted scientific rearing practices as per recommendations

Keywords: Technology Adoption, Broiler Farming, Stocking Density, Feeding and Nutrition

1. INTRODUCTION

Poultry today is one of the fastest growing segments of the agricultural sector in India. Broilers are the main type of chicken produced by modern integrated poultry raising facilities due to their high feed-meat conversion ratio. Broiler is a type of chicken which is scientifically raised using various technologies for the sole purpose of meat production. Adoption of technologies generated through various researches assumes paramount importance in reduction of cost of production, mortality, disease intensities, and feed - meat conversion ratio thereby reducing cycle duration, enhancing meat production and ultimately increasing net return. The level of technology adoption in broiler farming right from housing to stocking densities to the inputs used play a very crucial role and is one of the deciding factor of profitability.

Broiler farming forms an integral part of farming system in the state of Assam and plays an increasingly important role in improving socio-economic status of rural community and employment in the state. In spite of being a very lucrative enterprise, commercial scale broiler enterprises in the state are yet to compete with that of the rest of the nation both in number and scale. Even though technology adoption plays a special role in increasing production, productivity and profitability from broiler enterprise, very little is known at the micro level about technology adoption in broiler farming in the state of Assam. Keeping this in view the present study was undertaken to highlight various aspects of technology adoption in broiler farming concerning profitability and economic viability in Sonitpur district of Assam.

2. METHODOLOGY

The study was conducted in Sonitpur district of Assam. The sampling design followed for the study was stratified random sampling design. A list of all the commercial broiler farms in Sonitpur district was prepared and out of the 513 farms, 20 per cent of the farms accounting for approximately 100 in numbers were selected at random for the study. The selected broiler farms were then stratified by cumulative frequency distribution method. The stratification was as follows:

Group I	:	0 - 500 birds
Group II	:	501 – 1500 birds
Group III	:	1501 – 3000 birds
Group IV	:	3001 and above birds

The relevant primary data were collected from the selected broiler farmers of the sample farms with the help of specially designed pre-tested schedules and questionnaires through personal interview with the respondent farmers. Collected data were compiled and tabulated for the purpose of analysis. The data collected pertains to the year 2011-12. In the study, data on technology adoption relate to one production cycle. In case of broiler farms, one production cycle consists of 5 to 6 weeks [1]. In the current study, relevant calculations were done considering one production cycle of 6 weeks, thereby in a year there were 8 production cycles.

3. RESULTS AND DISCUSSION

3.1 System of Rearing

The recommended system to rear broiler scientifically is 'all in and all out system'. The entire sample followed this system of rearing in ideal condition. However, sometimes due to marketing problems, some farmers could not sell the whole lot together as for purchasing a large lot of birds requires large wholesalers. A very few farms have more than one house and as such they can keep two lots of different age at the same time in two separate houses. Keeping birds of different age together in one house is not scientific as it leads to high disease intensity, high mortality, low weight gain which ultimately leads to low profit. As far as intensive, semi-intensive and free-range rearing system is concerned; all broiler farms adopted intensive system of rearing. Broilers in the intensive system of rearing are basically reared in floor rearing system or deep litter system. In the sample, all the farmers used deep litter system of broiler rearing.

3.2 Housing

Apart from balanced feed, good chick breed and proper health coverage, a successful broiler farmer will need a scientifically appropriate house for rearing the birds. In the sample (Table 1), 18% of the farms have concrete walled house with wire netting. The table also reveal that majority of the farms (58%) had bamboo walled house with wire netting. Ideally, a concrete house is more hygienic and recommended scientifically for broiler rearing. The flooring of the broiler shed should be such as to prevent dampness and to keep away vermins including rats etc from burrowing themselves inside the house. As such the best flooring consists of cement concrete and is recommended over mud floor. In the surveyed sample, 45% per cent of the farms used concrete floor. The roof of the shed should give protection to birds with minimum stress under different climatic condition. Different types of materials such as tin, thatch, asbestos etc. can be used as roofing material in broiler shed. However, a very satisfactory and durable roofing material is cement asbestos. The findings reveal that, majority of the farms (57%) used thatch as roofing material.

71 **Table1: Distribution of broiler farms according to the types of housing (number)**

Size group	Number of farms	Types of housing			
		Brick/concrete walled with wire netting	Bamboo walled with wire netting	Wooden walled with wire netting	Bamboo walled without wire netting
Group I	25	-	14 (56.00)	2 (8.00)	9 (36.00)
Group II	26	3 (11.54)	17 (65.39)	2 (7.69)	4 (15.39)
Group III	26	7 (26.92)	15 (57.69)	-	4 (15.39)
Group IV	23	8 (34.78)	12 (52.17)	-	3 (13.04)
Pooled	100	18 (18.00)	58 (58.00)	4 (4.00)	20 (20.00)

72 *Figures within parentheses indicate percentage to total farms*

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74 In addition to a scientifically designed house, a commercial scale broiler farm should have some other
75 provisions related to housing like water channel, foot bath, feed godowns and raised house floor etc. In
76 the sample, 80% of the farms had raised house floor, 32% have the provision of foot bath, 30% of the
77 farms have feed godowns and only 10% have water channel.

78 **3.3 Stocking density**

79 Overcrowding is not desirable in broiler houses, as it gives rise to heavy mortality due to easy spread of
80 diseases, less intake and excessive dampness of the litter. Similarly if more than adequate floor space is
81 given per bird, there is greater loss of energy in the form of feed intake due to unnecessary movement of
82 the birds for unproductive purposes. Maximum number of broilers that can be reared at a time in one
83 house or room depends upon the age up to which they will be reared or up to how much weight they will
84 be kept. A broiler reared for 6 weeks or 42 days of age yield 2.25 to 2.50 kg if managed properly. For a
85 broiler of this weight 0.08 to 0.093 square metre or 0.9 to 1 square foot area is required and considered
86 sufficient [1]. Saikia in his study inferred that birds performed well in the stocking densities of 1 square
87 feet per bird [2]. From table 2 it was observed that stocking densities of bird in the entire sample was
88 almost within the recommended level, except in group II, where the floor spacing provided per bird was
89 slightly above the recommended level (1.30 square feet per bird). On an average the stocking density
90 adopted by the sample was 1.06 square feet per bird.

92 **Table 2.:Stocking density adopted by various size groups of sample farms (Square feet per bird)**

Size group	Number of farms	Total number of birds	Average number of birds per farm	Total floor space of the farms (sq. ft.)	Average floor size of one farm (sq. ft.)	Stocking density (sq. ft./bird)
Group I	25	9700	388.00	9117.50	364.70	0.94
Group II	26	28400	1092.31	36912.50	1419.50	1.30
Group III	26	64000	2461.54	68269.50	2625.75	1.07
Group IV	23	125000	5434.78	126286.10	5490.70	1.01
All farms	100	227100	9376.63	240585.60	9900.65	1.06

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94 **3.4 Use of broiler chick**

95 Chick is the primary contributing input in broiler farming. For commercial scale broiler farming, day old
96 chicks of high quality hybrid stock should be used. Different breeds of broiler chick were found to be used
97 by the sample farmers. Table 3 shows the distribution of broiler farms according to different commercial
98 breeds of broiler chick used. The data reveals that six different commercial breeds namely Cobb-400,
99 Vencobb, Hubbard, Avion-34, Anak-2000 and Samrat were used by the farmers across different size
100 groups. Cobb-400 was found to be the most widely adopted broiler breed with 57% of the broiler farms
101 using it.

102 **Table 3: Percentage distribution of broiler farms according to different commercial breeds of**
103 **broiler chicks used**

Size group	Farms using different commercial breeds of broiler (percent)					
	Cobb-400	Vencobb	Hubbard	Avion -34	Anak-2000	Samrat
Group I	44	36	12	16	20	0
Group II	50	61.54	50	0	0	19.23
Group III	69.23	42.31	38.46	26.92	15.38	11.54
Group IV	65.22	52.17	65.22	26.09	30.43	21.74
Pooled	57	48	41	17	16	13

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106 **3.5 Feeding and nutrition**

In today's intensive system of broiler rearing, the role of feed is considered very important aspect of broiler production. Since, in this system birds are not allowed to roam outside for feed, thus, all the nutrient ingredients required for them needs to be provided thorough feed. In regard to feed source, it was observed that the whole sample of broiler farms surveyed used commercial, company manufactured readymade broiler feed and none used homemade feed prepared by mixing ingredients. Yhome also found out that 96.67% of the respondents in Kohima and 89.17% in Dimapur fed their chickens with commercial feed [3]. As far as feeding pattern is concerned the entire sample adopted unrestricted feeding for the broilers and they provide feed for 4 to 5 times a day. Recommendations say that in broiler management, the birds should be fed as much amount as they want. Because, the more they feed, the more will be their growth and so the profitability of the farm [1].

Three different types of feed are used to feed broiler depending upon their age namely Prestarter feed, Starter feed and finisher feed. In the present survey, it was revealed that 86% of the total farms used prestarter feed while 100% used both starter and finisher feed. All the farms in higher size group (Group III and IV) were observed to use Prestarter feed. On an average, feed utilization by the sample in terms of quantity, as worked out is well within the recommended level.

Efficient feed utilization and conversion to meat, wastage reduction, reduction of disease intensity, uniform nutrition of the whole lot, space requirement for feeding and ultimately the profitability of the farm depends, also upon the form of broiler feed, in addition to other parameters. For feeding broilers raised in commercial scale three different types of manufactured feed are available with their respective advantages and limitations. They are – mashed feed, pellet feed and crumble feed. Mashed feed has many disadvantages. Crumble feed is the most developed feed among all. Even though, pellet feed cannot be fed to younger chick, it is profitable to use pellet feed than mashed feed after around first week of the birds. The findings show that mashed feed was used by majority of the farms (96%), while pellet feed was used by 58% and crumble feed by 42% of the farms. Pellet and crumble feeds were used by higher proportions of farms in group IV, following an increasing trend along the increasing farm size group. It was found out that pellet form was the most popular form in the sample in terms of amount utilized.

Feed additives are special nutritional supplements other than a basic feed stuff present in feed which are added in the feeds to cover nutritional imbalances. Feeds with different kinds of additives and supplements like vitamins, minerals, antibiotics, pellet binders *etc.* were used by the sample surveyed. In the sample all the farms in all groups used feed supplied with vitamins and minerals. While 97% of the farms used antibiotic supplemented feed, probiotics supplemented feed were used by 69% of the farmers, being highest in group IV. In the sample 90% of the farms used coccidiostat supplemented feed and 86% of the total farms used feed with pellet binders as additives.

3.6 Equipments

High quality scientifically designed equipments are unavoidable part of a broiler farm. Depending upon size and age, broiler needs different equipments for their management such as brooder, chick guard, feeder, waterer, sprayer, spade, bucket *etc.* In floor rearing or deep litter system of broiler rearing, a brooder is used to provide right amount of artificial heat (warmth) to the newly hatched chick for the first few weeks of age of the chicks. Five types of brooders namely gas brooder, battery brooder, basket brooder, bukhari's brooder and hover brooder were found to have been used by the sample. Data reveals that hover brooder was the most widely adopted brooder throughout the sample and was used in 74% of the farms. Gas brooder and battery brooder were not widely used by the sample as they were comparatively more expensive. Feeder is used to feed the broilers. Three types of feeders namely chick feeder, grower feeder and adult feeder were used by the sample depending on age of the birds. Numbers of feeders of all types, utilized per hundred birds were more in smaller size groups than the large sized group. This was due to the fact that, larger farms generally used feeders of higher capacity in more judicious and cost effective way. Feeders generally come in two different types: longitudinal feeders and hanging feeders. Longitudinal feeders are used to feed chicks and sometimes grower as well. Hanging feeders are generally useful for adult birds. It was observed that hanging feeder was the most popular

feeder in the sample, which accounted for 92.46% of the total feeder utilized. A waterer or watering trough is used to provide water to the birds reared. While chick and adult waterer were used by all the farms in the sample, grower waters were used by 83% of the total farms. Pan and jar type waterer were used by all the farms in the sample, while pan and grill type by 87%, bucket and wooden frame type by 17% of the sample farms. Besides brooder, feeder and waterer the sample broiler farmers were found to utilize other equipments like chick guard, forked spade, sprayer, bucket, table fan *etc.* Sprayers and table fans were mostly used by large sized farms.

3.7 Medicine and health cover

Rearing broilers in disease free and healthy condition requires a number of medicines, disinfectants and other health cover measures. The life cycle of broilers is only 5 to 6 weeks and thus it needs to be vaccinated against Ranikhet disease, Gumboro disease and Marek's disease. The chicks need to be vaccinated against Marek's disease just after hatching and in general, the chick supplying companies arranges for such vaccination. Lasota F₁ vaccine is given for the prevention of Ranikhet disease. Gumboro disease is prevented by the application of Gumboro live vaccine. From the survey, it was found out that the entire sample used both Lasota F₁ and Gumboro live vaccine. Among all health care measures, proper cleaning and disinfection of the broiler house stands as the most important measure. Disinfectants like Detol, Phenol, Disfect-S, Malathion-50-EC, bleaching powder, detergents *etc.* were found to be utilized by the sample. Apart from vaccines and disinfectants the sample also used vitamins, antibiotics, glucose *etc.* as a part of health care measure. Utilization of medicines and other health care measures were as per recommendations mostly for the large sized farms.

3.8 Utilization of litter and lime

In Assam the rearing system followed for broiler is mostly deep litter system. In commercial scale broiler farming, litter is required to rear the birds comfortably without getting any pressure and related discomfort. Three types of materials namely paddy husk, saw dust and sand were used as litter material throughout the sample, out of which paddy husk was used by the entire sample, whereas saw dust and sand were used by 24 and 4% of the farms respectively. Paddy husk is the most preferred and recommended litter material for broiler raising in Assam condition [4].

Broiler farmers in general replace litter materials with new and fresh litter periodically in order to get rid of dampness and to provide the birds a clean surrounding. In the sample surveyed all farms replaced litters for 7 to 8 times per cycle (42 days). Average replacement interval of litters in case of chick was 7 days and in case of adults litters were replaced with fresh ones after every 5.75 days. Table 4 shows litter replacement intervals in one cycle across the sample farms. The litters were replaced more frequently in the sample than recommendations, thus amount of litter material required were more affecting cost effectiveness.

Lime is used in broiler farming at a regular interval to prevent the litter from dampening. Among the farm groups, group I was the highest user of lime per bird and group IV was the lowest user. This indicates that the quantity of lime used decreased with the increase in size groups of the farms. This may be attributed to more judicious, cost effective use of resources in large sized farms and operation of economies of scale.

Table 4: Litter replacement interval per cycle followed by various size groups of sample farms (days)

Size group	Average replacement interval of litter (days)
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	Chick	Adult
Group I	7.00	4.50
Group II	6.50	5.00
Group III	6.00	6.50
Group IV	8.50	7.00
All farms	7.00	5.75

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200 3.9 Light and heat source

201 Light and temperature in adequate amount are unavoidable prerequisite for broiler rearing. Both as a
 202 source of light and warmth, electricity were used most commonly in broiler houses in the sample. In
 203 Assam electrically operated brooders are most common. In rural areas, where there is frequent electricity
 204 breakdown, it becomes difficult to follow the recommended lighting schedule. Big commercial farms have
 205 generators and invertors to compensate such situations. Small farms, devoid of such arrangements
 206 generally use kerosene stove, oil lamp, bukhari etc. to provide required warmth and light to the chicks up
 207 to 10 days. The findings reveal that the entire sample used electricity as a source of light and heat. In
 208 large sized farms electricity consumption was found to be more than the smaller sized groups. This may
 209 be because of more utilization of electrically operated equipments like table fan *etc.* Large sized farms
 210 have the provision of generators and inverters in the sample, while small ones mostly used oil lamp, stove
 211 etc. during electricity breakdown. The duration of time for which broiler shed should be kept illuminated is
 212 also one of the important factor in broiler rearing. In all the groups, broiler houses were illuminated for 24
 213 hours with artificial light at brooding stage during winter. On an average during summer 22 hours of light
 214 was provided during brooding stage and 14 hours during adult stage. Similarly during winter, average 24
 215 hours and 18.50 hours of artificial light was provided at brooding and adult stage respectively. However,
 216 recommendation say that for the first two days of the chicks, the broiler house should be kept illuminated
 217 for entire 24 hours and from third day onwards till the birds are ready to sell, they should kept under light
 218 for 23 hours [1].

219 4. CONCLUSION

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221 Meat production in broiler farming is governed by appropriate farm management practices through
 222 application of required resources at recommended level, time and doses and recommended techniques
 223 and practices of scientific rearing. Adoption of recommended technology in broiler farming has a direct
 224 relationship with the profitability of the enterprise. Unlike other agricultural and allied sectors, broiler
 225 farming requires scientific management. Improper rearing operation may cause complete ruin of the
 226 enterprise. Present study reveal that large sized farms with sound financial condition and good
 227 awareness adopted scientific rearing practices as per recommendations while, small sized, economically
 228 less sound farms deviated from recommendations in terms of rearing system, housing, utilization of lime
 229 and litter, feeding and nutrition *etc.* Lack of proper training and awareness along with poor financial
 230 condition stood as a hinder for the small sized farms in adopting scientific rearing practices. Proper
 231 emphasis on veterinary, training and extension facilities along with Government incentives could
 232 revolutionize this sector of agriculture in the state, which has so far remained a relatively neglected sub
 233 sector of agriculture.

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