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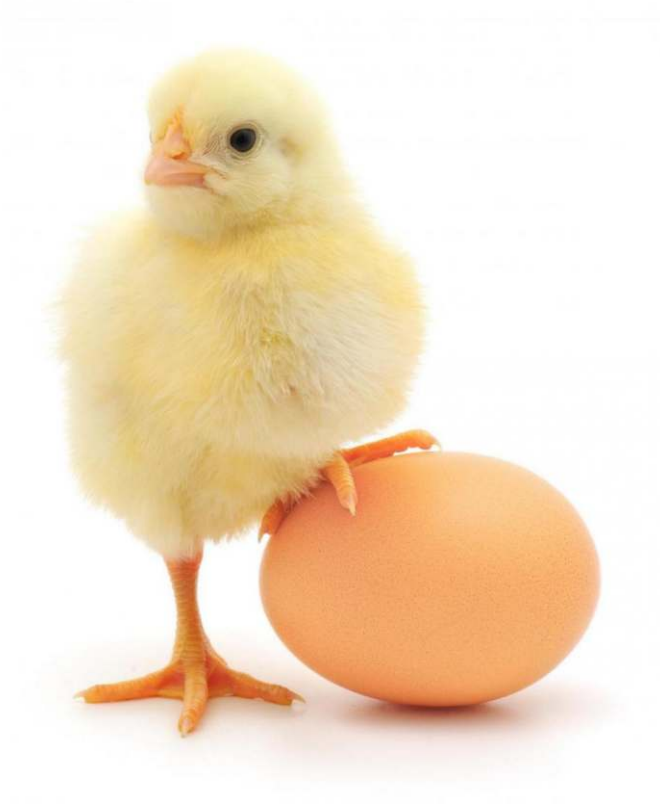

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Mortality in Chicks Associated with Economic Impact and Prospect of Layer Chick Rearer Package Programme of the Participatory Livestock Development Project in Bangladesh

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Abstract: The Participatory Livestock Development Project (PLDP) has been implemented in Bangladesh for the alleviation of poverty through livestock production, employment, income generation and intake of nutrition in rural people. The management and disease problems with cost-benefit analysis of the layer chick rearer package programme of the PLDP have been evaluated in randomly selected 10 layer chick rearing units (n=3100 chicks) from day-old chicks up to 60 days to marketing of Muktagacha areas in the district of Mymensingh during the period from August to December 2002. It appears from the results of this study that 12.87% chicks died within 60 days of age inspite of chick reared in intensive management system and provided vaccines against common infectious diseases. The diagnosed diseases associated with mortality of chicks included infectious bursal disease (37.6%), coccidiosis (13.28%), chronic respiratory disease (13.28%) and other conditions (35.84%). The highest mortality rate (37.6%) in layer chicks, caused by infectious bursal disease (IBD), which were double vaccinated with Nobilis® Gumboro D-78 vaccines (Intervet) that indicates vaccination failure against IBD which deserve further investigation. Cost-benefit analysis of the outcome of the 10 layer chick rearing units varied, and it was found loss in one unit (-3.17%) and the highest profit of 45.66% with an average profit of 27.33%. However, profit was recorded in all the layer chick rearing units except one unit due to outbreak of IBD which could be due to vaccination failure. Therefore, it may be concluded from the results of this study that the 'layer chick rearer package programme' could be economically prospective for the alleviation of poverty of rural people if the major infectious diseases of poultry are controlled in Bangladesh.

Key words: Layer chicks, mortality, economic impact, management system

Introduction

Poverty, malnutrition, ill-health and illiteracy are the main features of the rural people in Bangladesh. Commercial poultry farming for egg and meat production is an efficient way to bridge this nutritional gap in a faster rate than by other livestock sources. Accordingly, poultry rearing have become a growing and perspective industry in Bangladesh to alleviate poverty by generating employment opportunity as well as by encouraging unemployment youths to take up this type of farming as a means of self-employment. The Participatory Livestock Development Project (PLDP) has considered different activities of the beneficiaries as a package programme and provided assistance to group members for their adoption and income generation. 'Chick rearer' is one of the groups of beneficiaries identified for the project who buys some 300 high-yielding variety day-old layer chicks from government hatcheries or from mini hatcheries and raise the chicks in confinement. These chicks are sold at the age of 8 weeks (the duration to raise a batch) to key rearers who rear them for egg production. There seems to be no published reports on the evaluation of performance of the chick rearing units of the PLDP, and this paper describes the economic impact and prospect of this chick rearer package programme of the PLDP to provide guidance to those who wish undertaken such chick rearer programme.

Materials and Methods

The study was conducted at 10 different chick rearing units in the Participatory Livestock Development Project (PLDP) area of Muktagacha in the district of Mymensingh during the period from August to December 2002. In the chick rearing units, day-old chicks of Fayoumi breed, purchased from Govt. Poultry Farm, Mirpur, Dhaka, were reared up to the age of 8 weeks and then marketed to the key rearers who rear them for egg production. Therefore, this experiment included the observations of each unit from day-old up to marketing of 8 week-old chicks. The management system of these chick rearing units and the disease problems or conditions were recorded in detail by visiting them at regular intervals and from the respective owner of the unit in a prescribed form. Besides, flock size, name of the hatchery from which day-old chicks were purchased, rearing system, immunization records, types of supplied feeds, name of the feed additives and vitamin-mineral premix, date of outbreak occurred, number of dead birds and treatment

Table 1: Management practices of the different layer chick rearing units of Participatory Livestock Development Project (PLDP) area of Muktagacha in Mymensingh district

Unit No.	No. of chicks reared	Housing & Feeding[1-5]	Floor space (sq. ft / bird)	Litter	Footbath with PPM (%)
1.	300	Intensive, straw roof, brick floor	0.5 - 1	Saw dust, 3" depth	0.01
2.	300	Earthen ground floor	0.5 - 1	Saw dust, 3" depth	0.01
3.	300	Intensive, straw roof, brick floor	0.5 - 1	Saw dust, 3" depth	0.01
4.	300	Intensive, straw roof, brick floor	0.5 - 1.25	Rice husk, 4" depth	0.01
5.	300	Intensive, straw roof, brick floor	0.5 - 1.25	Rice husk, 4" depth	0.01*
6.	300	Intensive, straw roof, brick floor	0.5 - 1.25	Saw dust, 3" depth	0.01
7.	300	Intensive, straw roof, brick floor	0.5 - 1.25	Rice husk, 3" depth	0.01
8.	400	Intensive, straw roof, brick floor	0.5 - 1.25	Rice husk, 4' depth	0.01
9.	300	Intensive, straw roof, brick floor	0.5 - 1.25	Saw dust, 3" depth	0.01
10.	300	Intensive, straw roof, brick floor	0.5 - 1.25	Saw dust, 3" depth	0.01

[1]Each of house of the chick rearing units was disinfected with Iosan® (Novartis) spray @ 5 ml/liter of water and fumigated with PPM and formalin @ 40g and 80 ml/100 cft respectively. [2]Brooding of all the chick rearing units was performed with plane sheet chick guard and two bulbs (100 watts). [3]Lighting of all the chick rearing units was provided throughout the 24 hours period during the experiment. [4]Feeding with coarse flour of wheat and crushed rice for 1st 3 days then with hand mixed (open-market) feed in all the units. No coccidiostat was used in the Units No. 4 and 6. [5]Adequate fresh tubewell water was supplied *ad libitum* in all the chick rearing units.
*1st 15 days footbath was not used.

measures if taken etc. were also recorded. The dead and moribund chicks were collected and brought to the laboratory at the Department of Medicine, BAU, Mymensingh for diagnosis. Diagnosis of each of the disease/condition was based on the history (provided by the respective owner of the chick rearing units), clinical findings, characteristic gross lesions and finally laboratory examination of the samples. Necropsy examination was performed as soon as the dead birds were collected and gross tissue changes were observed and recorded carefully. Diagnoses of certain diseases were made on these recorded characteristic lesions as described by Calnek *et al.* (1997). Cost-benefit analysis of each chick rearing unit was made after completion of marketing by following conventional methods.

Results and Discussion

The thorough investigation of the 10 layer chick rearing units has identified a number of risk factors and diseases associated with mortality of chicks up to 8 weeks of age. The management systems of the randomly selected 10 chick rearing units are presented in Table 1.

The diseases and conditions associated with mortality in chicks and vaccination schedule performed in the 10 chick rearing units are shown in Table 2. Vaccines against Ranikhet disease (BCRDV®, LRI and RDV®, LRI), Gumboro disease (Gumboro D-78®, Intervet) and Fowlpox (FPV®, LRI) have been used to control these diseases in the chick rearing units.

The disease profile was studied in each of the 10 chick rearing units which counting of 3100 chicks, of which 399 (12.87%) chicks died up to 60 days of age of rearing period (Table 2). Of the 399 dead chicks, 150 (37.60%) died due to infectious bursal disease (IBD), 13.28% due to coccidiosis, 13.28% due to chronic respiratory disease (CRD) and 35.84% due to miscellaneous etiology (Table 2). Age-wise incidence of diseases in chicks along with proportionate mortality rates are presented in Table 3. Although the occurrence of CRD was recorded in all age groups except 29 to 42 days-old groups of chickens up to 60 days of age but IBD and coccidiosis were recorded only at the age between 29 to 42 days-old groups (Table 3).

Among the viral diseases, only infectious bursal disease (IBD) was detected as the most common prevalent malady. The IBD was found to be responsible for death of 150 (50%) layer chicks in unit no. 5 at the age group between 29 to 42 days. The overall proportionate mortality rate of chicks due to IBD was found 37.6% (Table 2 and 3). This finding of high mortality among layer chicks supports the recent inland reports where IBD causing 28.57% mortality in cockerels (Sil *et al.*, 2002), 19.16% mortality (Talha *et al.*, 2001), 7.2 to 16.73% mortality (Rahman *et al.*, 1996) and 10.99% mortality (Bhattacharjee *et al.*, 1996) in chickens. This observation also supports the earlier report of Hongjib *et al.* (1996) and Pramanik and Bhattacharya (1987) who reported 27.3 and 21.95% mortality in chickens due to IBD respectively but contradict with 9.1% mortality reported by Anjaneyulu *et al.* (1998) in comparison to 37.6% recorded in this study. The IBD was found to be appeared at the age of 33 days, although, these chicks were vaccinated with Gumboro D-78® (Intervet) at 12 (primary) and 28th (booster) days of age. In this unit, the

Table 2: Vaccination schedule and occurrence of diseases in layer chicks reared in different poultry model components in PLDP area of Muktagacha in Mymensingh district

Unit No.	No. of chicks	Immunized with	Age at vaccination (days)	Route	Diseases associated with mortality (%)				Total	
					CRD	IBD	Coccidiosis	Others*	No.	%
1.	300	BCRDV	4 & 20	IO	39	-	-	3	42	14.00
		Gumboro-D-78®	12 & 24	IO	(13.0)			(1.0)		
2.	300	BCRDV	5	IO	-	-	-	6	06	02.00
		Gumboro-D-78®	10 & 28	IO				(2.0)		
3.	300	BCRDV	4 & 21	IO	-	-	-	15	15	05.00
		Gumboro-D-78®	11 & 25	IO				(5.0)		
		FPV	33	WWP						
4.	300	BCRDV	5 & 22	IO	-	-	14	11	25	08.33
		Gumboro-D-78®	11 & 25	IO			(4.67)	(3.67)		
		FPV	45	WWP						
		RDV	57	IM						
5.	300	BCRDV	4 & 23	IO	-	150	-	19	169	56.33
		Gumboro-D-78®	12 & 28	IO		(50.0)		(6.33)		
6.	300	BCRDV	4 & 21	IO	-	-	39	6	45	15.00
		Gumboro-D-78®	12 & 26	IO			(13.0)	(2.0)		
7.	300	BCRDV	4 & 23	IO	-	-	-	12	12	04.00
		Gumboro-D-78®	13 & 27	IO				(4.0)		
8.	400	BCRDV	3	IO	14	-	-	31	45	11.25
		Gumboro-D-78®	14 & 27	IO	(3.5)			(7.75)		
9.	300	BCRDV	8 & 27	IO	-	-	-	30	30	10.00
		Gumboro-D-78®	13 & 30	IO				(10.0)		
		FPV	41	WWP						
10.	300	BCRDV	4 & 24	IO	-	-	-	10	10	03.33
		Gumboro-D-78®	11 & 27	IO				(3.33)		
		FPV	33	WWP						
Total	3100	-	-	-	53	150	53	143	399	12.87
					(13.28)	(37.6)	(13.28)	(35.84)		

*Extreme cold stress, sinking in waterer, killing by rat, ammonia intoxication, etc. IBD = Infectious bursal disease, CRD = Chronic respiratory disease, BCRDV = Baby Chick Ranikhet Disease Vaccine (LRI, Mohakhali, Dhaka), RDV= Ranikhet Disease Vaccine (LRI, Mohakhali, Dhaka), FPV= Fowl pox vaccine (LRI, Mohakhali, Dhaka), Gumboro D-78® = Infectious bursal disease vaccine (Intervet), IO= Intraocular, WWP= Wing web pricking, IM= Intramuscular.

vaccination was done in cold weather and before vaccination, vitamin-mineral premixes were not supplied to the chicks. Gumboro vaccine was done at the age of 12 and 28th days of age, which was not unexpected. So, it may be assumed that this malady was due to the problem in the vaccine with high maternal antibody of the chicks. It is noted that footbath of PPM (0.01%) was not used in that unit which might contribute as a supportive cause in the outbreak of the disease. Bhattacharjee *et al.* (1996) recorded highest mortality of chickens due to infectious bursal disease (10.99%) diagnosed at the Central Disease Investigation Laboratory, Dhaka, whereas Rahman *et al.* (1996) recorded 7.2 to 16.73% mortality due to IBD in the Central Poultry Farm at Mirpur, Dhaka. Talha *et al.* (2001) and Sil *et al.* (2002) recorded 19.16 and 28.57% mortality of chickens respectively due to this malady. The present finding indicates that IBD infection has re-emerged with enhanced virulence in our country and causes highest mortality of chickens. The clinical signs and gross lesions noted in IBD were similar to those described by Talha *et al.* (2001) and Sil *et al.* (2002).

Coccidiosis, the only recorded protozoal disease was found to cause an outbreak in chicks at age group of 29 to 42 days (Table 3). The coccidiosis was found to be responsible for death of 53 (13.28%) layer chicks among which 14 (4.67%) chicks from unit no. 4 and 39 (13.0%) from unit no. 6 (Table 2). The overall proportionate mortality rate of chicks due to coccidiosis was 13.28%. This observation supports the earlier reports of Sarker (1976); Ahmed (1977); Anjum (1990) and Bhattacharjee *et al.* (1996) who reported 12, 20, 15 and 9.4% mortality respectively but contradict with 26.27, 55.55, 5.51 and 0.8% mortality reported by Babu *et al.* (1974); Rai *et al.* (1989); Talha *et al.* (2001) and Sil *et al.* (2002) respectively in comparison to 13.28% recorded in this study. The present study showed an increase in incidence of coccidiosis. It is necessary to mention here that no coccidiostat was used in the feed in units no. 4 and 6. Litter was not changed up to 57 days of age in these two units also. The disease was manifested by typical clinical signs and gross pathological lesions as described by Babu *et al.* (1976); Samad and Chakraborty (1993); Talha *et al.* (2001) and Sil *et al.* (2002).

In this present study, chronic respiratory disease (CRD) was found to be responsible for death of 53 (13.28%)

Table 3: Age-wise mortality in layer chicks (n = 3100) caused by different diseases

S/N	Age of chickens (days)	Causes of mortality (%)				
		IBD	Coccidiosis	CRD	Others*	Total
1.	0-7	-	-	07	29	36 (9.02)
2.	8-14	-	-	14	44	58 (14.54)
3.	15-28	-	-	22	16	38 (9.52)
4.	29-42	150	53	-	05	208 (52.13)
5.	43-60	-	-	10	49	59 (14.79)
	Total	150 (37.6)	53 (13.28)	53 (13.28)	143 (35.84)	399 (12.87)

*Extreme cold stress, killing by rat, sinking in waterer, ammonia intoxication, etc., IBD = Infectious bursal disease, CRD = Chronic respiratory disease.

Table 4: Cost-benefit analysis of the poultry model components in PLDP area of Muktagacha in the district of Mymensingh

Unit No.	No. of chicks	Investment (Taka)					Total income* (Tk.)	Total profit / loss (Tk.)	+ Profit / - loss (%)
		Total price of day-old chicks[1]	Feed costs[2]	Vaccines, Premix & Drugs	Others[3]	Total			
1.	300	2640	5930	470	100	9140	12262	3122	+34.16
2.	300	2640	6012.50	595	100	9347.50	13567.50	4220	+45.66
3.	300	2640	4581	875	125	8221	11301	3080	+37.47
4.	300	2640	7478	568	410	11096	13182	2086	+18.80
5.	300	2640	3829	450	100	7289	7058	-231	-03.17
6.	300	2640	4751	965	150	8506	12000	3494	+41.08
7.	300	2640	5758	702	100	9200	11420	2220	+24.13
8.	400	3520	8121	668	100	12409	14910	2501	+20.15
9.	300	2640	5239	698	140	8717	10109	1392	+15.97
10.	300	2640	4045	400	100	7195	10040	2845	+39.54
Total	3100	27280	55744.5	6391	1425	91120.5	115849.5	24729	Av. = 27.33

[1]@ Tk. 8/chick & including insurance costs (10%), [2]@ Tk. 8-10/ kg feed (Hand mixed-Open market), [3]Including litter, bulbs, electric bill etc, *Obtained from sale, Av. = Average.

layer chicks in more or less all age groups, of which 39 (13%) were died from unit no. 1 and 14 (3.5%) from unit No. 8 (Table 2). This finding supports the earlier reports of Byrne and Lowndes (1975) and Talha *et al.* (2001) who reported 3 and 11.56% mortality of chicks from chronic respiratory disease but contradict with 1.7% mortality reported by Balani (1983). The disease was observed more in chicks of age group between 8 to 14, 15 to 28 and 43 to 60 days (Table 3). The clinical signs and gross pathological lesions were found similar to those described by Yoder (1984); Chauhan and Roy (2000) and Talha *et al.* (2001).

Death due to extreme cold stress, killing by rat, sinking in waterer and ammonia intoxication were observed in 81 (56.64%), 49 (34.27%), 5 (3.5%) and 8 (5.59%) cases, out of 143 other conditions. These results could not be compared due to lack of similar reports in the available literatures.

The cost-benefit analysis of the 10 randomly selected chick rearing units is presented in Table 4.

It appears from this Table 4 that highest percentage of profit over a period of 2 months was recorded in the units no. 2, 6, 10 and 3 that were 45.66, 41.08, 39.54 and 37.47%. There was no outbreak of any disease in the units No. 2, 3 and 10. Although in the unit No. 6, there was an outbreak of coccidiosis, the Insurance Company compensated the losses. In the unit No. 5, there was a loss (-3.17%) due to outbreak of IBD. Overall, all the chick rearing units showed more or less profit except the unit no. 5 due to outbreak of IBD.

It indicates from this study that various disease problems are still present in the layer chicks and the patterns of occurrence of various diseases have changed in the present days. Infectious bursal disease should get priority in the prevention and control strategies in future. Mass immunization with proper vaccines in consideration with maternally derived antibodies and maintenance of appropriate cold-chain system is necessary to prevent the most devastating disease, infectious bursal disease. Therefore, the chick rearer package programme of the PLDP could be an economically beneficiary and prospective programme if the mortality of chicks is controlled.

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References

Ahmed, H.N., 1977. Incidence and control of poultry diseases in Libya Arab Republic. Agri. Res. Rev., 55: 115-121.

Anjaneyulu, Y., N.S. Babu and R.M. James, 1998. Mortality pattern in broilers in Prakasam district, India. Ind. J. Vet. Pathol., 22: 44-46.

Anjum, A.D., 1990. Prevalence of poultry diseases in and around Faisalabad and their relationship to weather. Pak. Vet. J., 10: 42-45.

Babu, K.H.J., S.J. Seshadri and S. Mohiyuddin, 1974. Study of mortality pattern in poultry. Ind. Vet. J., 51: 424-435.

Babu, K.H.J., S.J. Seshadri and S. Mohiyuddin, 1976. Studies on the pathology of field cases of coccidiosis in poultry. Ind. Vet. J., 53: 47-54.

Balani, D.K., 1983. Incidences of various poultry diseases in Rohtak and Sonepat districts (Haryana), India. Poult. Adv., 16: 21-33.

Bhattacharjee, P.S., R.L. Kundu, R.K. Biswas, J.U. Mazumder, E. Hossain and A.H. Miah, 1996. A retrospective analysis of chicken diseases diagnosed at the Central Disease Investigation laboratory, Dhaka. Bangl. Vet. J., 30: 105-113.

Byrne, P.J. and K.M. Lowndes, 1975. Avian diseases diagnosed in Ireland. Vet. Serv. Bull., 5: 3-14.

Calnek, B.W., H.J. Barnes, C.W. Beard, L.R. McDougald and Y.M. Saif, 1997. Diseases of Poultry. Iowa State University Press, Ames, USA.

Chauhan, H.V.S. and S. Roy, 2000. Poultry Diseases, Diagnosis and Treatment. New Age International (P) Limited, New Delhi, India.

Hongjib, K., K. Munil and C. Unik, 1996. Survey of enteric diseases in chickens. Korean J. Vet. Res., 36: 1007-1012.

Pramanik, A.K. and H.M. Bhattacharya, 1987. Diseases of poultry in three districts of West Bengal affecting rural economy. Ind. J. Vet. Med., 7: 63-65.

Rahman, M.M., A. Rahman, A.H.M.N. Islam, A.H. Miah, J.U. Mazumder and P.S. Bhattacharjee, 1996. Observation on outbreaks and subsequent control of infectious bursal disease in the Central Poultry Farm in Bangladesh. Bangl. Vet. J., 30: 13-17.

Rai, R.B., N.G. Poddar, R.N. Pal and V. Nagarajan, 1989. Mortality patterns and incidence of poultry diseases in Andamans. Ind. J. Poult. Sci., 24: 8-11.

Samad, M.A. and S.R. Chakraborty, 1993. Chemotherapeutic management of acute outbreaks of caecal coccidiosis in broiler birds in Bangl. J. Protozool. Res., 3: 140-143.

Sarker, A.J., 1976. The prevalence of avian diseases in Bangladesh Agricultural University Poultry Farm, Mymensingh. Bangl. Vet. J., 10: 61-66.

Sil, G.C., P.M. Das, M.R. Islam and M.M. Rahman, 2002. Management and Disease Problems of Cockerels in Some Farms of Mymensingh, Bangladesh. Int. J. Poult. Sci., 1: 102-105.

Talha, A.F.S.M., M.M. Hossain, E.H. Chowdhury, A.S.M. Bari, M.R. Islam and P.M. Das, 2001. Poultry diseases occurring in Mymensingh district of Bangladesh. Bangl. Vet., 18: 20-23.

Yoder, H.W. Jr., 1984. Mycoplasma gallisepticum infection. *In*: Hofstad , M.S. (Ed.), Diseases of Poultry. Iowa State University Press, Iowa, U.S.A., p: 195.