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An Assessment of Economic Losses due to Avian Flu in Manipur State

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Abstract

The impact of 2007 outbreak of avian flu in the state of Manipur has been reported. The loss due to the disease has been found to be 14 per cent of the total value of livestock outputs in the entire state. More than 3 lakh birds were culled and 24 tonnes of poultry feed was destroyed post-flu. It has been found that the more affected were the producers and the input industry than traders and retailers. In dealing with such eventualities, compensation should be adequate and timely so as to ensure better compliance for effective control and stamping out of the disease. The study has suggested that the compensation rates may be fixed as per the prevailing economic condition of less-developed states like in the North-Eastern region, taking into consideration flock size, family size of farmers, proportion of income from poultry to total family income, level of nutritional security achieved from family poultry and border status of the state.

Introduction

The threat of avian flu has received a great deal of attention globally in recent years. Ever since the 1996-discovery of the highly pathogenic H5N1 strain of avian flu in China, the virus spread rapidly across Asia, Europe, and Africa. In fact, the presence of the virus has been confirmed in birds or humans in more than 55 countries (World Organization for Animal Health, 2007). As of mid-June 2007, there were 313 human cases of avian flu reported from 12 countries, resulting in 201 deaths (WHO, 2007). Highly Pathogenic Avian Influenza (HPAI) is an infection caused by avian (bird) influenza (flu) Type A viruses. Outbreaks of avian flu are increasingly becoming frequent, probably as a result of intensive agricultural practices, high virus transmissibility and the presence of natural reservoirs in migratory birds. The principal means of transmission to humans has been through direct and close contact with infected live poultry or surfaces that have been contaminated with secretions or excretions from infected birds (USDA 2006a; WHO, 2006). However, concerns about the seriousness of the disease and the possibility that genetic mutations in the virus could make it more easily transmissible among humans (Claas *et al*., 1998) have led national and international health agencies to take actions on both preventing and preparing for the possibility of a pandemic. Some have predicted that the consequences of such a pandemic could be comparable to those of the 1918 "Spanish Flu" epidemic, which resulted in tens of millions of deaths and severe social and economic disruptions (Trampuz *et al.*, 2004; Hien *et al.,* 2004).

Yet, while most of the focus has been on the potential impact of pandemic influenza in humans (Meltzer *et al.*, 1999), little attention has been paid to the economic losses that have already resulted from the appearance of the highly pathogenic H5N1 avian flu in wild and domestic birds. These include direct financial losses, resulting from the deaths of infected birds and from measures designed to control the spread of the virus, especially the destruction and disposal of bird flocks. For example, according

to the Food and Agriculture Organization (FAO), in 2003 and 2004, the avian flu outbreak in Vietnam resulted in the death or destruction of 44 million birds, amounting to nearly 17.5 per cent of the poultry population in that country. During the same period, an outbreak of avian flu in Thailand resulted in the death or destruction of 29 million birds, amounting to approximately 14.5 per cent of its poultry population. Overall, the FAO has estimated that H5N1 avian flu has led to the death or destruction of more than 200 million birds worldwide, resulting in economic losses of over $20 billion (Harris, 2006).

Consumer responses to outbreak of avian flu in birds have also been immediate and dramatic, resulting in additional economic losses. In most of the countries in Asia, Europe, and Africa, the detection of H5N1 avian flu in either wild or domestic birds has resulted in sharp declines in sales, prices, and consumption of poultry. In Europe, the resulting declines in consumption ranged from 20 per cent in Germany, Ireland, and Slovania to 30 per cent in France, Cyprus and Austria, and to 50 per cent decreases in poultry consumption in Greece and Italy (European Commission, 2006). The economic impacts of avian flu in birds have extended beyond the shores of the countries, where infected birds have been discovered. For example, in the United States, export prices dropped by 13 per cent as a result of declining shipments to Eastern Europe and Central Asia in November and December of 2005 (USDA, 2006b).

HPAI would have strong micro-impact, particularly in regions where smallholders are dependent on poultry production and would have difficulties in overcoming the costs of culling and restocking in the face of an outbreak (Verbiest and Castillo, 2004). They face immediate loss of income and assets from the death of infected poultry and the culling of other birds. Additional income losses occur in the period between an outbreak and re-stocking. Production costs are likely to rise following the introduction of avian flu control strategies. The value chain for poultry is a complex one involving several activities, viz. breeding, feed production, input supply (feed, breeding chicks, medicines), production, collection and trade (of eggs or live birds), slaughter, processing, final sale and consumption. Hence, besides business threat to small poultry holders, there is also shrinkage of consumer-base to chicken outlets, leading to loss of employment to the persons involved in the entire value chain from production to consumption; threat to food and nutritional security; and negative impact on subsidiary sectors like feed, chick, medicine, hatchery, transport, etc. and thereby, threat to poultry industry as a whole.

Though there are several studies on the economic impact of diseases and disorders, such as mastitis, foot and mouth disease (FMD), *Peste des Petits Ruminants* (PPR) and reproductive disorders in cattle and some selected common diseases of layers, especially to farmer-producers in the past (Thirunavukkarasu and Prabaharan, 1999 and 2000; Jeyakumari *et al.,* 2003 and 2004; Prabu *et al.*, 2004; Kumar, 2004; Selvam *et al.,*2004 and 2006; Thirunavukkarasu and Kathiravan, 2006a and 2006b), work on these aspects due to outbreak of one of the emerging transboundary poultry disases of the world such as avian flu on the entire value chain of the sector covering producers, traders, input suppliers, etc. is scarce, particularly in our country. The estimates from these kinds of studies are not only important for a description of the actual situation, but also to answer questions like (i) how to limit poultry losses to the minimum for all stakeholders; (ii) what is the actual compensation required for all those involved in the entire sector; (iii) what minimum contingency funds should be kept in the central / state budget to tackle the event of an outbreak. The present study is an attempt in this direction, and has assessed the economic loss to the poultry sector due to a recent outbreak of avian flu in the border state of Manipur in the North-Eastern part of our country with the following objectives: (i) to quantify the impact of avian flu on the entire poultry value chain; (ii) to assess the magnitude of loss to the poultry industry; and (iii) to suggest suitable policy measures for adequate compensation, better mitigation, control and surveillance of this dreaded disease.

Data and Methodology

The state of Manipur was chosen for this study as there was an outbreak of avian flu in the state in July, 2007, causing a massive culling of about 3.39

lakh birds after it was notified by the Govt. of India. The study is based on poultry farmers (30 each of different species and farm sizes), chick and poultry traders, integrators, private hatcheries and chicken retail outlets. The data were collected from farmers both from the infected zone (0-5 km radius from the affected site, Chinmeirong village of East Imphal district) and the surveillance zone (5-10 km radius outside the infected zone) through a structured interview schedule through personal visits to farm areas.

Traders of chicks and feed were also interviewed, besides the members of All Manipur Poultry Farmers & Traders Association. Data were collected on average weekly chick and feed sales, number of truck loads coming into the Manipur state and the labour per truck, etc. were collected through Focussed Group Discussion. Similarly, the poultry integrators (contractors), who supply chicks and feed to the farmers and take back the final produce in the form of live birds, were also contacted to assess loss of their business as a result of the event. There are about 6 private small-scale hatcheries, catering to the needs of small dual-purpose poultry farmers, who in turn supply chicks to the smaller backyard poultry farmers in the rural areas of Manipur. We also visited them and collected information on the capacity of the unit, number of poultry farmers under them as customers, charges for incubation of egg, their turn-over, etc. Further, a sample of 15 chicken retail outlets each in the Imphal city region and outside the Imphal region and 6 egg trading agencies in Imphal city were visited and data such as average daily sales, average daily margin and loss of business days in the light of flu outbreak were collected to assess the impact of the avian flu outbreak.

Secondary data were collected from the Directorate of Veterinary & Animal Husbandry Services, Government of Manipur; these included number of birds (chicks, layers, broilers, ducks) culled, number of poultry farms disinfected, mopped and cleaned; quantity of feed materials destroyed, amount of compensation disbursed, etc. In addition, secondary data on livestock and poultry population during different census periods, production of livestock and poultry products, infrastructure facilities available in Manipur for veterinary and animal husbandry services, animal health care activities performed, etc. were also collected from Directorate of Economics and Statistics, Govt. of Manipur. The data were analysed to assess losses due to avian flu in the entire value chain.

Results and Discussion

Poultry Industry and Avian Flu in Manipur

Poultry population of Manipur state was about 29.41 lakh as per the 17th Quinquennial Livestock Census, 2003. Though 56 per cent of the total poultry of the state were *desi* fowls reared under backyard conditions, the sector witnessed the growth of organized commercial farming in recent years. The major driving forces behind the growth of organized poultry are rising demand for animal protein, changing consumption behaviour and life-style, increased disposable income among the population, emergence of contract farming / poultry integrators, enhanced availability of input services in the state, etc. The quick income-generating nature of poultry than other livestock is another major factor contributing to the growth of this sector as a fledging rural agricultural enterprise in this remote state.

The outbreak of avian flu in Manipur has become a major deterrent for the growth of poultry sector. Though this flu has been reported in 70 countries across 4 continents since the present wave commenced in Hongkong in 1997, its outbreak in the neighbouring countries like China, Pakistan, Myanmar, Bangladesh and Afganistan is more dreadful for India. Since Manipur is bordering with Myanmar, it is highly vulnerable to the entry of avian flu into Indian territory. Though India had experienced an outbreak of avian flu in Maharashtra in February 2006, it was eventually controlled in August 2006, and no fresh outbreak was reported since then. An unusual mortality in poultry was reported from a small unit in the East Imphal district of Manipur (village Chinmeirong) where 132 birds died in a period of 6 days from 7 July, 2007 onwards. After verification[1], the Department of Animal

[1] The samples were forwarded to High Security Animal Disease Laboratory (HSADL), Bhopal and National Institute of Virology, Pune, for testing. Samples were tested positive for HPAI as per their reports.

Husbandry, Dairying & Fisheries, Ministry of Agriculture, Govt. of India, notified the outbreak of HPAI in Manipur to the global community through Office International des Epizootis (OIE) (World Organization of Animal Health) on 25 July, 2007.

Control and containment operations were undertaken around the infected area in Chinmeirong village in Manipur. These included culling of birds; disposal of birds and infected materials; quarantine and restrictions in the operational area, clean-up, disinfection and sanitation, followed by post-operation surveillance in and around the Chinmeirong village. Poultry was culled within a radius of 5 km and surveillance was carried out in a further radius of 5-10 km for 90 days, as per the protocol laid down by IOE to regain freedom from avian influenza. The number of culled birds and other infected materials in Manipur due to the outbreak of avian flu has been reported in Table 1.

Table 1. Number of culled birds and disposed materials in Manipur after outbreak of avian flu, 2007

Species / Material	Number
Chicken	3,14,801
Ducks	24,600
Eggs	28,475
Feed (kg)	23854
Others (egg trays, contaminated material in the infected zone)	166 farms

Source: Directorate of Veterinary & Animal Husbandry Services, Govt. of Manipur.

Impact of Avian Flu in Manipur

The impact of avian flu was estimated in the entire value chain and loss to poultry industry at different stages is discussed below:

(i) Poultry Farmers

The poultry farmers of Manipur are small to marginal in their farm size[2] and operation, as compared to other leading states in poultry farming in India. There is backyard system of rearing poultry in the rural areas, while semi-organized layer and broiler farming exist in the urban and peri-urban areas. Backyard farmers have their own stock; and they multiply them by natural brooding and incubation. Layer parent stock farmers receive their chicks initially from the ICAR Complex; rear them; hatch their eggs at private hatcheries; and sell the chicks to other small backyard farmers. Broiler farmers receive their chicks from traders, who buy them from Kolkata or Guwahati market. Most of the poultry farmers buy commercial poultry feeds from traders, who also act as contract agents in the case of broilers especially.

The economics of their farming, both for layers and broilers, was worked out and the results have been presented in Table 2. In Manipur, the small farmers on an average were found keeping 300 birds and large farmers, 600 birds. The small and large layer farmers were able to get a monthly income of around Rs 16880 and Rs 37800 and broiler farmers around Rs 4370 and Rs 11130, respectively. The net income generated from a layer was about Rs 1010 and 1130 for small and large farmers and from a broiler about Rs 21.80/bird and Rs 33.40/bird, respectively. The layer farmers were found to hatch about 74 per cent of eggs into chicks from private hatcheries (PDP, 2005) for further sale to small backyard farmers, thereby generating more income than selling eggs in the market.

The outbreak of avian flu had resulted in a major blow to the producers, as 43-79 per cent of their total household income was from poultry farming, which was maximum among all income sources (Table 3).

The immediate financial loss due to avian flu outbreak on producers was worked out by taking into account the number of birds culled, their average body weight at the time of culling and their market prices, and results have been presented in Table 4. The figures were compared with the actual

[2] Normal unit size varied from 300-500 in case of layers, 300-600 in broilers and 50-100 in backyard farming. In the entire state, there was only one farm with the capacity of 30,000 broilers per cycle, which was outside 5 km radius from the site of outbreak in the recent episode. Poultry farmers rear their birds either in backyard or under semi-intensive system with low inputs. They rear commercial strains in case of broilers and Vanaraja, Giriraja and Girirani breeds as layers, which is a well established dual-puprose poultry developed by the Project Directorate of Poultry, Hyderbad, suitable for rural India under harsh environment and least managemental conditions.

Table 2. Economics of poultry farming in Manipur before outbreak of avian flu

(in Rs)

Particulars	Layer		Broiler	
	Small (Size = 300 birds)	Large (Size = 600 birds)	Small (Size = 300 birds)	Large (Size = 500 birds)
Total cost	2,40,329	4,85,443	32,600	64,546
Total income	5,44,243	11,65,906	39,150	81,248
Net income / batch	3,03,914	6,80,463	6,550	16,699
Net income / month	16,884	37,804	4,367	11,133
Net income / layer	1,013	1,134	21.83	33.40

Source: NCAP Socio-economic Survey, August 2007

Table 3. Annual income of the poultry farmers in Manipur prior to avian flu outbreak

(in per cent)

Source	Layer farmers	Broiler farmers
Farm		
Agriculture	3.96	11.31
Poultry	79.16	43.44
Non–farm		
Service	6.33	15.39
Business (Chicken retail outlets / Handloom / Automobile / Shop / Hawker)	10.55	29.86
Total	100	100

compensation received from the Government at the rate of Rs 10/chick, Rs 30/broiler and Rs 40/layer (*http://www.dahd.ni.in*). It could be seen from Table 4 that the producers had a loss of about Rs 316 lakh, while they could receive only Rs 99.13 lakh, which worked out to be 31.13 per cent only of the total financial loss to them.

Such an inadequate compensation to the poultry farmers would lead to two consequences: (i) it would affect the livelihood and sustenance of poultry farmers and their families, particularly in a difficult and disturbed area like Manipur, and (ii) poor compliance in culling and disinfection operations and hence lack of eradication of disease outbreak shall have more serious implications. World Bank in its study in 2006 has pointed out that though there should be uniform rates across the country for different classes of poultry, the compensation rates should be no less than 50 per cent of the reference market value of the suspected birds at the farm gate. In Manipur, it was found that the farm gate price was around Rs 56 for broilers, whereas the farmers received only Rs 30 per boiler. And surprisingly, there is no mechanism at present to compensate for the loss of eggs through destruction, which needs to be looked into. Similarly, the birds lost during mopping operations were also not compensated in Manipur.

The impact of avian flu on smallholder-producers, whose livelihood was largely dependent on poultry farming in Manipur, was worked out by taking into account the number of birds (only layers and broilers) actually culled by the Government agencies as a part of stamping out the disease from the state and the net profit derived by small farmers from these farming estimated during this study and subtracting it from the actual compensation received by them. The results thus arrived have been presented in Table 5. It was noted that the poultry farmers were hit hard by this epidemic as they had suffered a loss of income of about Rs 944 lakh, which was derived without taking into account the loss of other birds and materials. Moreover, they would require more capital to restart the enterprise again.

(ii) Input Dealers

Various supply chains of poultry marketing exist in Manipur; some of the prominent ones are:

- Producer - Retailers - Consumers
- Producer - Hatchery - Producer - Backyard poultry farmers

Table 4. Financial loss of poultry farmers due to avian flu outbreak

Item / Species	No.	Actual value (Rs in lakh) (@ Av. Wt of 1.6 kg / bird)	Compensation received (Rs in lakh)	Difference (Loss suffered) (Rs in lakh)
		Culling of birds		
Chicks	71,554	17.12	7.16	9.96
Broilers	1,34,304	150.42	40.29	110.13
Layers	99,050	89.15	39.62	49.53
Ducks	24,600	44.20	9.82	34.38
Others	2,136	3.42	0.85	2.57
Sub-total		304.31	97.74	206.57
		(100.00)	(32.12)	(67.88)
		Destruction of other materials		
Eggs	28,475	0.85	-	0.85
Feed	23,854	3.24	1.39	1.85
		4.09	1.39	2.70
		(100.00)	(33.99)	(66.01)
		Mopping operation		
Chicks	264	0.06	-	0.06
Broilers	4032	4.52	-	4.52
Layers	943	1.70	-	1.70
Ducks	828	1.32	-	1.32
Sub-total		7.60	-	7.60
		(100.00)		(100.00)
Grand total		316.00	99.13	216.87
		(100.00)	(31.13)	(68.63)

Note: Figures within parentheses indicate percentages to actual value

Source: 1. Directorate of Veterinary & Animal Husbandry Services, Government of Manipur, and
2. All Manipur Poultry Farmers & Traders Association

- Producer - Wholesaler - Retailer - Consumer
- Producer - Trader - Military
- Producer - Trader - Retailer - Consumer

A wide array of traders operating at various scales distribute inputs and poultry in Manipur, including distributors of feed and chicks, assemblers collecting live poultry at farm-gate, and wholesalers and retailers selling both live and processed birds. There are about 15 traders in chick and feed sales; each has 15-20 retailers associated with it. Most of the distributors of feed represent large companies, while other traders mostly operate independently. The HPAI epidemic had affected traders (in both urban and rural areas), particularly due to the prohibitions on selling live poultry in cities, the general collapse of poultry production/demand and the consequent decline in market sales. Moreover, traders who extended credit to farmers before the epidemic, were typically unable to recover these loans.

The impact of avian flu on input dealers, who sell mainly chicks, feed and medicine, was estimated by taking into account the quantity not sold during the period and their market value during the period between confirmation and official declaration and the surveillance period (90 days) and the results have been presented in Table 6. It was found that the total loss to the poultry input industry was of Rs 1196.17 lakh. Unfortunately, there is no compensation

Table 5. Impact of avian flu on poultry farmers in Manipur: 2007

Particulars	Value (Rs)
Layer farmers	
Average net profit / layer	1,074
Total layers culled	99,993
Loss of income	1073.92 lakh
Broiler farmers	
Average net profit / broiler	27.62
Total broilers culled	1,38,336
Loss of income	38.21 lakh
Total loss to the producers	1112.13 lakh
Actual compensation received by them	99.13 lakh
Net loss of income to poultry farmers	1013 lakh

Source: 1. NCAP Socio-economic Survey, August 2007
2. Directorate of Veterinary & Animal Husbandry Services, Govt. of Manipur

Table 6. Impact of Manipur avian flu on input industry: 2007

Items	Quantity not sold	Value (in lakh Rs)
Period between confirmation and official declaration (21 days)		
Feed	2,520 tonnes	396.00
Chick	75,000	11.25
Medicine & Vaccine	-	1.12
Sub-total	408.37	
Period of 90 days after declaration (Surveillance period)		
Feed	4725 tonnes	742.50
Chick	2,70,000	40.50
Medicine & Vaccine	-	4.80
Sub-total		787.80
Total loss to input industry		1196.17

Source: All Manipur Poultry Farmers & Traders Association

mechanism in place to compensate for their losses in the country or elsewhere.

(iii) Egg Trading and Hatchery

There were about 6 dealers of eggs in Manipur, all located at Imphal. Similarly, there were 6 small-scale private hatheries in the state, which provided hatching facilities to the bigger layer farmers, who used to keep their eggs for hatching for further distribution to smaller backyard farmers in the rural areas of Manipur. They also suffered financial losses, causing impact on their business for about 4 months.

Table 7. Impact of avian flu on egg trading and hatchery in Manipur: 2007

Particulars	Value (in lakh Rs)
Period between confirmation and official declaration (21 days)	
Egg traders	
Turn-over / day / dealer	0.06
Total turn-over / day for all	0.36
Loss of business for 21 days	7.56
Hatchery	
Profit / month / hatchery	0.14
Total profit / month for all	0.70
Loss of business for 21 days	0.49
Period of 90 days after declaration (Surveillance period)	
Loss of business to egg traders	32.40
Loss of business to chick hatcheries	2.10
Total loss to egg traders and hatchery	34.50

Source: NCAP Socio-economic Survey, August 2007

The impact of avian flu on egg traders and hatcheries in Manipur was estimated by taking into account their daily turn-over and projecting them for the period between confirmation and official declaration and the surveillance period (90 days) and the results have been presented in Table 7. Unfortunately again, there is no compensation mechanism in place to compensate for their losses at present.

(iv) Chicken Retail Outlets

It was found that there were about 400 chicken retail outlets in Manipur of which about 150 were located in Imphal and its surrounding areas and the remaining were in rest of the state. They had also experienced financial losses, causing an impact on their business for about 4 months. The impact of avian flu on these chicken retail outlets was estimated by taking into account their average daily sales and margins and projecting them for the period between confirmation and official declaration and the

Table 8. Impact of avian flu on chicken retail outlets in Manipur: 2007

Particulars	Value (in lakh Rs)
Period between confirmation and official declaration (21 days)	
(Imphal and its surrounding areas)	
Average sales @ 100 kg / shop / day	0.075
Total sales for 150 shops / day	11.25
Total daily margin to chicken retail outlets @ Rs 10 / kg	1.50
Loss of business for 21 days	31.50
Period of 90 days after declaration (Surveillance period)	
(Imphal and its surrounding areas)	
Average sales @ 50 kg / shop / day	0.0375
Total sales for 150 shops / day	56.25
Total daily margin to the chicken retail outlets @ Rs 10 / kg	0.75
Loss of business for 90 days	67.50
(Outside Imphal)	
Average sales @ 50 kg / shop / day	0.0375
Total sales for 250 shops / day	9.38
Total daily margin to the chicken retail outlets @ Rs 10 / kg	1.25
Loss of business for 90 days	112.50
Total loss to the meat industry	211.50

Sources: 1. All Manipur Poultry Farmers & Traders Association
2. NCAP Socio-economic Survey, August 2007

surveillance period (90 days) and the results have been presented in Table 8. As in the case of other stakeholders, there is no compensation mechanism in place to compensate for their losses at present.

(iv) Consumers

There is no evidence worldwide that any human cases of avian flu have been acquired by eating poultry products (CDC, 2004). To date, there is no epidemiologial information to suggest that the disease can be transmitted through contaminated food or that products shipped from affected areas have been the source of infection in humans (WHO, 2004). However after the outbreak in Manipur, it was notified by the Govenrment that only dressed chicken from outside the infected zone could be sold in Imphal. In order to allay the fear among the consumers, the Directorate of Veterinary and Animal Husbandry Services, Govt. of Manipur, even organized a 'Free eating mela' of cooked chicken for them. In spite of all these, consumers were very much wary of consuming chicken in Manipur because of food-safety issues. As a result of this, the prices of chicken dropped below normal, in spite of short supply to the market. This indicated that biosecurity is not only the concern of consumers of developed countires, but also in a less-developed state like Manipur in India.

In fact, the financial impact was so severe on the chicken retail outlets that some of them had to divert to selling other meat products which are competetive to poultry meat such as fish and pork. The prices of chicken and its competetive products are given in Table 9. It was found that the price of

Table 9. Price of chicken and its competitive products in Manipur

(Rs / kg)

Product	Pre-flu	Post-flu	Change, %
Dressed chicken	75	65	-13.33
Fish	65	120	84.62
Pork	80	110	37.50

Source: NCAP Socio-economic Survey, August 2007

Table 10. Impact of avian flu across the chain of poultry sector in Manipur

Part of industry	Losers	Winners
Production	Small producers; Producers with high investments in fixed assets	Producers, not affected directly by avian flu;Pig and fish farmers
Supply industry	Feed industry;Day-old chick suppliers	Veterinary professionals;Vaccine producers
Marketing	Sole traders of poultry meat and egg	Traders of other livestock
Consumers	Urban poor;Rural poor in areas affected by avian flu	-

dressed chicken from disease-free zone slashed by 13 per cent post-flu, while those of fish and pork rose by a staggering 85 per cent and 35 per cent, respectively in the Manipur state.

Total Loss to Poultry Sector in Manipur

The overall impact of avian flu in the state of Manipur could be summarized by pointing that the losers were mainly poultry farmers, input industries, exclusive chicken retail outlets and even consumers, while the probable winners were veterinary professionals, vaccine producers, pig and fish farmers, and traders of other livestock (Table 10).

The overall financial impact on the poultry sector in Manipur was estimated to be around Rs 2455.17 lakh on account of avian flu outbreak (Figure 1), which was about 14 per cent of the total value of livestock outputs and 0.5 per cent of Gross State Domestic Product (CSO, 2007). It was really substantial considering the economy of the state. It was evident that producers and input industry were the worst sufferers. However, further invstigation needs to be done to assess the impact of avian flu on other subsidiary sectors like transport, hoteling, tourism, trade, etc. Thus, the overall impact would be much larger, which is very harsh for a small and developing state like Manipur.

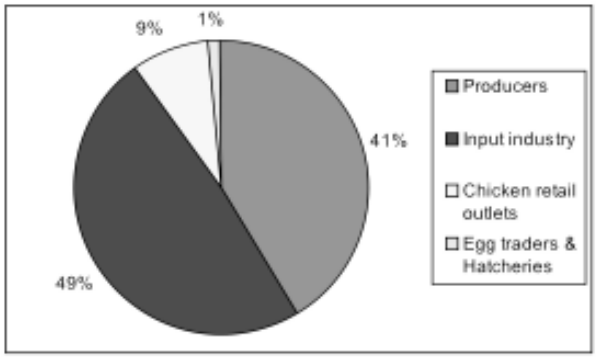

Fig. 1. Financial impact of avian flu on the poultry sector in Manipur: 2007

Conclusions and Policy Implications

The study has quantified the impact of avian flu in the entire value chain and finally to the poultry industry in Manipur. It has been found that financial loss to poultry farmers amounted to Rs 316 lakh, while compensation given was of Rs 99 lakh only. The impact of avian flu has been estimated as Rs 1013 lakh on poultry farmers, Rs 1196 lakh on input industry, Rs 34.5 lakh on egg traders and hatchery and Rs 212 lakh on retail outlets. The study has observed that most of the produers are small in nature in terms of scale of production and profitability in Manipur, and any kind of effect of such a dangerous infectious disease could leave a lasting impact on the livelihood of these farmers. Therefore, in dealing with such type of incidences, compensation should be adequate and timely so as to ensure better compliance for effective control and surveillance of the disease. Though Govt. of India follows uniform rates across states at present, the study has suggested that it may be fixed as per the prevailing economic conditions of different states as there is much variability in terms of resource endowments, entrpreneurship and scale of operation in less developed states like those in North-Eastern region. The study has found that the overall impact of such disease outbreaks could be much bigger than observed directly because of indirect losses on input industries, hatcheries, transport sector, hoteling, etc.

To mitigate the impact of such disease outbreaks in future, an appropriate insurance mechanism may be developed for the poultry farming in the country. While doing so, not only the flock size, but also the family size of farmers, proportion of income from poultry to total family income, level of nutritional

security achieved from family poultry and border status of the state should be taken into consideration.

The study has also suggested dissemination of factual information to the general public and consumers under such situations to instill confidence in consuming the dressed chicken, as there is no evidence of virus transmission to humans. Public agencies and press need to be proactive in this aspect. The study has advocated for an easier, hassle-free and security-less mechanism of credit support to the rural poor.

In general, policies towards avian flu outbreak must necessarily involve the rural poor. Surveillance mechanism should be stregthened, particularly in Manipur in order to prevent entry of wild and domestic birds from Myanmar which may carry the virus. In general, farmers need to be educated about the strict hygeinic practices and disinfection procedures to be follwed after every batch is replaced in their farm premises.

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