Evaluation of Economic Losses due to Coccidiosis in Layer Birds in Tarai Region of Uttarakhand

Sachin Pant1*, Prakash Bhatt2, S. Shekhar3* and Gopal Krishna4

1 Udham Singh Nagar Dairy Cooperative limited, Khatima, Uttarakhand, India
2 Department of Veterinary Clinics, C.V.A.Sc., GBPUAT, Pantnagar, India
3 Veterinary Science., Krishi Vigyan Kendra, Koderma, Jharkhand, India
4 Department of Animal Husbandry, Himachal Pradesh, India

*Corresponding author

Abstract

Economic impact assessment due to coccidiosis was conducted in commercial layer farms during the period from June, 2015 to January, 2016. A total of 6 poultry farms which were screened for coccidiosis, 3 layer farms (L1, L2 and L3) were found to be positive and among these 3 farms, in farm L1 and L2 no subclinical form of coccidiosis was recorded with maximum economic loss being due to mortality followed by chemotherapy and chemoprophylaxis. While in farm L3, no chemoprophylactic drug was used with maximum loss due to chemotherapy cost followed by loss in egg production and mortality. Vaccination was not used in any of the layer flocks.

Keywords
Economic impact, Coccidiosis, Subclinical form

Introduction

In India, poultry production exists in both traditional extensive system of backyard farming as well as modern intensive system. Ministry of Food Processing Industries mentioned that, both organized and unorganized poultry sectors contribute 70% and 30%, respectively, with chicken followed by ducks being the two most popular species dominating with more than 99% to the total poultry production, while other avian species like guinea fowl, geese, quails, pea fowl, etc. account for less than 1% (Jadhav and Nikam, 2014). Inspite of the fact that coccidiosis is probably the most frequently reported disease in chicken worldwide (Biggs, 1982), there are many hurdles in arriving at a trusted figure for the specific financial losses and thus there are only occasional reports on the economic losses of poultry due to coccidiosis (Oyekole, 1984; Braunius, 1987; Graat, 1996). The estimation of economic losses by different countries differs because of the variability in factors included in the study and very few estimates are available for India.
Materials and Methods

Type of bird considered for the calculation

Commercial layer flocks positive for poultry coccidiosis were considered for the assessment of economic loss.

Data collection

Records of the commercial poultry farms were analysed for the value of major inputs and outputs and were supplemented with questionnaire designed to obtain additional information from poultry farmers.

Lifespan of birds

Lifespan for commercial layer life span was taken as 72 weeks.

Overhead cost

Overhead cost of bird was assumed as per prevailing rates. It consisted of electricity, management and labour cost excluding the cost of chick and feed.

Market value of day old chick (DOC), poultry meat and eggs

The market price of chicks for commercial layer and egg were taken as per prevailing rates mentioned in farm records and were further supplemented by NECC (National Egg Coordination Committee) and www.Poultrybazaar.com.

Anti coccidial vaccine

The cost of each dose was taken as per prevailing rates mentioned in farm records (If used).

Feed requirement and cost

The cumulative feed requirement (kg/bird) for commercial layer was taken. Cost of feed was taken as per prevailing rates mentioned in farm records.

Economic models

The model developed by Williams (1999) to estimate the losses due to poultry coccidiosis were used in the study with slight modification as required.

Commercial layer

The major economic parameters which were estimated for commercial layer were

Vaccination

Birds kept in deep litter system for first 16 weeks and then transferred to the cage system in those cases birds are to be vaccinated and the model for calculation was:

\[
CV \text{ (cost of vaccination)} = NBV \times CV
\]

\[
NBV = \text{no. of birds vaccinated}
\]

\[
CV = \text{cost of vaccine per dose}
\]

Chemoprophylaxis

Commercial layer reared under cage system do not require prophylaxis. But, in some of the farms birds also maintained in deep litter system where chemoprophylaxis is required and the economic model for commercial layer was:

\[
TCCP \text{ (total cost of chemoprophylaxis)} = N \times CFR \times MU \times CM
\]

\[
N = \text{no. of birds placed}
\]

\[
CFR = \text{cumulative feed requirement for each bird (ton)}
\]

\[
MU = \text{medicine used, kg/ton of feed}
\]

\[
CM = \text{cost of medicine (Rs/kg)}
\]

Chemotherapy

The occurrence of clinical coccidiosis in commercial layer is not uncommon. The economic model used was:
TCCT (total cost of chemotherapy) = NTB×RW×2×(M1+M2) ×CM
NTB= number of treated birds
RW= requirement of water, L/day/bird
M1= medicine mixed with water in first half of treatment, kg/L
M2 = medicine mixed with water in second half of treatment, kg/L
CM= cost of medicine in Rs/kg
*Modified as per the drug used

Egg production loss

The model for egg production loss was:

TLEP (Total loss due to reduced egg production) = [NEH×CEH] + [NET×CET]
NEH= no. of hatching egg loss
CEH=cost of single hatching egg
NET=no. of table egg loss
CET=cost of single table egg

Loss due to mortality

The model for economic calculation was:

LM (loss due to mortality) = BDL×(VC+CCF+OC)
BDL= no. of layer birds died
VC= value of layer chick
CCF= cost of cumulative feed
OC= cost of single table egg

Results and Discussion

A total of 6 layer farms were screened during the study period out of which 3 farms were confirmed to be positive for coccidiosis and to evaluate the economic loss in the positive farm, a questionnaire survey was done which was further supplemented with the farm records available (Table 1). Based on these economic loss occurred in the farm was calculated. The details of the layer farms are given in Table 2.

| Name of farm: Poultry farm (L1) |
|---------------------------------|
| 1. TCCP (total cost of chemoprophylaxis) = N×CFR×MU×CM |
| = 1200× 0.00085× 0.5×300 |
| = Rs 153 |
| 2. TCCT (total cost of chemotherapy) = NTB×RW×5× (M1+M2) ×CM |
| = 1100×0.3×5×0.001× 1325 |
| = Rs 2186 |
| 3. LM (loss due to mortality) = BD×(VC+CCF+OC) |
| = 110× (22+17.50 +3.00) |
| = Rs 4675 |
| Total economic loss assessed = 153+2186+4675= Rs 7014 |

| Name of farm: Poultry farm (L2) |
|---------------------------------|
| 1. TCCP (total cost of chemoprophylaxis) = N×CFR×MU×CM |
| = 600× 0.001× 0.5×200 |
| = Rs 60 |
| 2. TCCT (total cost of chemotherapy) = NTB×RW×5× (M1+M2) ×CM |

383
= 536×0.350×5×0.002×1350
= Rs 2533

3. LM (loss due to mortality) = BD×(VC+CCF+OC)

= 84×(25+18+3.50)
= Rs 3906

Total economic loss assessed = 60+2533+3906= Rs 6499

2. TCCT (total cost of chemotherapy) = NTB×RW×5×(M1+M2)×CM

= 4040×0.825×5×0.001×1470
= Rs 24,498

3. LM (loss due to mortality) = BD×(VC+CCF+OC)

= 70×(23+15.25+33.75)
= Rs 5040

4. TLEP (total loss due to reduced egg production) = [NEH×CEH] + [NET×CET]

= 0 + [4030×3.25]
= Rs 13,098

Total economic loss assessed = 0+24498+5040+13098= Rs 42,636

Name of the farm: Poultry farm (L3)

TCCP (total cost of chemoprophylaxis) = N×CFR×MU×CM

= 4100×0.012×0
= Rs 0

| S. no. | Parameters for Layer                  |
|--------|--------------------------------------|
| 1.     | Chemoprophylaxis cost                |
| 2.     | Cost of chemotherapy                 |
| 3.     | Loss due to mortality                |
| 4.     | Egg production loss                  |
| 5.     | Vaccination cost                     |

Table 1 Major parameters considered for estimation
Table 2 Data collected from commercial layer flock

| Name of the Farm                  | Code no. | Flock Strength | CFR (Tonne/bird) | Chemoprophylactic Drug Used | Dose (Kg/ton of feed) | Cost of Medicine (Rs/kg) | No. of Treated Birds | Water Requirement (Lit/day/bird) | Total Mortality | Chemotherapeutic Drug Used | Cost of Medicine (Rs/kg) | No. of table egg loss | Cost of single table egg (Rs) | Value of layer chick (Rs) | Overhead Cost (Rs) | Cost of cumulative feed (Rs) |
|----------------------------------|----------|----------------|------------------|-----------------------------|-----------------------|--------------------------|-----------------------|-------------------------------|------------------|---------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|------------------|-----------------------------|
| Poultry Farm (Uttarkashi)        | Farm L1  | 1200           | 0.00085          | Nicarbazine+ Maduramycin    | 0.500                 | 0.300                    | 1100                  | 0.300                         | 110              | Amprolium                 | 1325                     | -                        | -                        | 22                           | 3.00             | 17.50                      |
| Poultry Farm (Pantnagar)         | Farm L2  | 600            | 0.0010           | DOT                         | 0.500                 | 0.350                    | 536                   | 0.350                         | 84               | Amprolium                 | 1350                     | -                        | -                        | 25                           | 3.50             | 18.00                      |
| Poultry Farm (Khatima)           | Farm L3  | 4100           | .011             |                             |                       |                          | 4040                  | 0.825                         | 70               | Amprolium+ sulfaquinoxaline | 1470                     | -                        | -                        | -                            | -                | -                          |

Table 3 Assessment of economic loss in commercial layer flock

| Economic Parameters (Rs) | Farm Code |
|--------------------------|-----------|
| L1                       | L2        | L3          |
| Vaccination              | -         | -           | -                         |
| Prophylaxis              | 153 (2.18%) | 60 (0.92%) | -                         |
| Chemotherapy             | 2186 (31.16%) | 2533 (38.9%) | 24498 (57.45%)           |
| Mortality                | 4675 (66.65%) | 3906 (60.1%) | 5040 (11.82%)          |
| Egg production loss      | -         | -           | 13,098 (30.72%)          |
| Total loss               | 7,014     | 6,499       | 42,636                    |
In the present study, it was observed that in case of layers in farm L1 and L2, no subclinical form of coccidiosis and maximum loss occurred due to mortality followed by chemotherapy and prophylaxis. While, in farm L3 no prophylactic drug was mixed in feed and majority of loss was due to cost of chemotherapy, followed by loss in egg production and mortality. No vaccination was administered in any of the layer flocks. The further details are represented in Table 3.

Kinung’hi et al., (2004) studied that coccidiosis caused losses were due to mortalities, coccidostat costs, reduced weight gain and market value and reduced egg production in layers. In case of farm L1 and L2 in which no subclinical form was observed maximum loss occurred due to mortality and this coincides with the observation made by Kinung’hi et al., (2004) and the reason could be the presence of more clinical form as compared to other farms. While in case of L3 the present study contraindicated the observation made by Bera et al., (2010) that maximum losses occur due to chemoprophylaxis cost and loss of egg production. This variation may be due to the fact that in the studied farm (L3) no chemoprophylactic drug was administered and also due to the fluctuating costs of different commodities from those assumed by Bera et al., (2010).

In conclusion, based on the assessment of economic impact due to coccidiosis in commercial layer farms it was observed that layer farms incurred significant economic losses with major losses due to mortality, chemotherapy and chemoprophylaxis in farms in which no subclinical form of coccidiosis was recorded (L1 and L2). While in farm L3, subclinical coccidiosis was observed with major loss due to chemotherapeutic cost, loss in egg production and mortality. Prevention of coccidiosis via vaccination was not followed in any of the coccidiosis affected farms.

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