

Factors Influencing Duck Mortality in Smallholder Households of Upper Kuttanad Villages Niranam and Kadapra of the Pathanamthitta District, Kerala, India

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ABSTRACT

Changes in precipitation patterns and devastating recurrent floods have seriously affected the agriculture and animal husbandry sectors of Kerala State. The most affected are the small or medium-scale household rural farmers. Forty smallholder backyard poultry farmers from the significant duck farming villages, Niranam and Kadapra in the Pathanamthitta district of Kerala, were surveyed for the study. Out of the 3900 ducks owned by the farmers, 2114 were reported dead, with 54.21% mortality and a 45.79% survival rate during the study period from 2021-22. Flood was the most significant factor contributing to 57.05% of duck mortality, followed by the bacterial diseases Riemerellosis 21.10%, and Colibacillosis 10.12%. Heat stroke was another significant factor that contributed to 5.49% of death in the farms. Once

prevalent in the region, Pasteurellosis and duck plague were effectively controlled by vaccination, with a mortality rate of 3.88% and 0.85%, respectively. Other factors that contributed to mortality included predators 1.04% and parasites 0.47%. The rural duck farmers are not getting insurance coverage to compensate for their loss during natural catastrophes or disease outbreaks, as duck farming is not included under any insurance scheme of the State. The Government has to give appropriate consideration to support the duck farming sector and the downtrodden poultry farmers of the State.

Keywords Recurrent floods, Duck farming, Mortality, Riemerellosis, Colibacillosis.

INTRODUCTION

Most Indian farmers in rural areas raise the common breed of duck. About 10% of the nation's poultry production comes from duck farming, contributing between 6% and 7% of the nation's total egg production (Mathew and Alias 2020). Ducks are effective converters of agricultural waste, including food scraps, seeds, grains, garden leftovers, insects, green grasses, and any other human reject that would otherwise go to waste. In Kerala, backyard poultry farming has better egg and meat production prospects. It is another viable option for meeting the livelihood of the rural population. The farmers of the Kuttanad region- 'the Granary of Kerala,' along with the paddy

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cultivation rear local variety of ducks, the 'Chara' and 'Chemballi' in the semi-intensive system as an economic enterprise. Ducks are traditionally raised under scavenging by the smallholders in coastal and low-lying areas, with little or no feed supplementation.

Anthropogenic climatic variations, such as significant temperature rises and altered rainfall patterns throughout the world, have also affected natural and artificial ecosystems, including various farming practices. Climate change poses the greatest threat to small or medium-scale farms, such as smallholder households (Fatoki *et al.* 2020). Climate change alters global disease distribution affects poultry feed intake, as well as encourages disease outbreaks, all of which affect poultry output and production costs. Heat stress has an immune-suppressing effect on poultry birds, lowering their resistance to infectious illness in hotter climates (Ghazi *et al.* 2012). Additionally, this could lengthen transmission cycles, increase the importation of animal reservoirs, and increase insect vectors.

During the last five years, changes in precipitation patterns and devastating recurrent floods have seriously affected Kerala States Agriculture and animal husbandry sectors, including rural livestock production. In addition to the increased prevalence of infectious diseases during monsoon season, the sudden occurrence of extreme and devastating floods happened in Kerala during the last five years has resulted in increased mortality of ducks in smallholder farms of the rural sector. It is necessary to understand the factors leading to mortality in duck farms to reduce the huge economic loss for the farmers by taking suitable preventive measures time and again. Only a few studies have been done so far to analyze the influence of climatic fluctuations and disease outbreaks (Saha *et al.* 2022) on ducks and their mortality. The present study conducted in an attempt to understand the different diseases and climatic factors affecting duck mortality in smallholder household duck farms of Niranam and Kadapra panchayaths of Kerala.

MATERIALS AND METHODS

Study area

Two main villages Niranam (Latitude: 9.324°N, Lon-

gitude: 76.519°E) and Kadapra (Latitude: 9.265°N: Longitude: 76.857°E) of Pathanamthitta district of Kerala falling under the upper Kuttanad wetland ecosystem were selected. Kuttanad wetland ecosystem is the downstream deltaic formations of five rivers originating in the Western Ghats confluence to Vembanad Lake, one of the largest brackish-water lakes in the country. Due to the proximity of the Western Ghats Rivers Pampa and Manimala, the villages Niranam and Kadapra get flooded annually during the monsoon season and, at the same time, experience a severe shortage of fresh water during the summers. The main occupation of the villagers is paddy cultivation and duck farming. Most of the households having traditional duck farms are raised under the scavenging system without artificial feeding (Figs. 1- 3). The women of the village are mostly engaged in duck farming as an additional income to support their families.

Method

Forty farmers having backyard poultry farms were selected from both villages, and the survey was conducted using prepared questionnaires. The questions asked were related to different factors causing the mortality of ducks in household farms. These included climatic factors like flood, heat stroke, different pathogenic diseases, sudden outbreaks, parasites, and predators. Data was collected for the period 2021 February to

Table 1. Duck mortality/survival rate in Niranam and Kadapra household duck farms during the year 2021 – 2022.

Factors causing duck mortality	Number of ducks lost years (2021-22)	Mortality rate in %
Flood	1206	57.05
Riemerellosis	446	21.10
Colibacillosis	214	10.12
Heat stroke	116	5.49
Pasteurellosis	82	3.88
Predators	22	1.04
Duck plague	18	0.85
Parasites	10	0.47
Total number of ducks owned (2021-22)	3900	
Number of ducks died	2114	54.21%
Number of ducks survived	1786	45.79%



Fig. 1 - 2. Duck scavenging system.
Fig. 3. Local breeds of ducks.

2022 January. Primary data were collected from 40 farmers from both villages. The secondary data was obtained from the Government Veterinary Hospital of Niranam Panchayat, the Niranam Government Duck Farm and from Kudumbashree Mission of Pathanamthitta collectorate. The questionnaire was administered through personal interviews with the farmers at their convenience. Pie charts and excel graphs were used to represent the data for analysis.

RESULTS AND DISCUSSION

Out of the 3900 ducks owned by the 40 smallholder poultry farmers in Niranam and Kadapra Panchayaths, 2114 ducks were reported dead during the year 2021 to 2022. Flood was the most significant factor contributing to 57.05% of duck mortality, followed by the disease Riemerellosis at 21.10% and Colibacillosis at 10.12%. Heat stroke was another significant factor contributing to 5.49% of death in poultry birds on household farms. The other factors that contributed to mortality included Pasteurellosis, 3.88%, predators 1.04%, duck plague 0.85%, and parasites 0.47% (Table 1 and Figs 4-6).

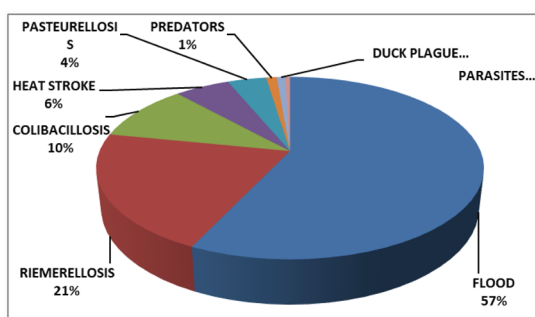


Fig. 4. Pie chart showing the duck mortality rate due to different factors in Niranam and Kadapra household farms during the year 2021 - 2022.

The ducks of the upper Kuttanad regions of the neighboring districts Alappuzha and Kottayam were seriously affected by Avian Flu causing mass mortality during the years 2019 to 2022, but not from the Niranam and Kadapra regions (Gavin 2022). The death of the ducks in Niranam and Kadapra panchayaths was due to Riemerellosis. The causative organism for the disease was identified as *Riemerella anatipestifer*. PCR array-based diagnostic tests to detect *R. anatipestifer* were conducted at the Avian Disease Diagnostic Laboratory in Manjadi, Pathanamthitta (The Hindu 2021). Ducks contracted the disease through their respiratory system or when *R. anatipestifer* is introduced into webbed foot sores. Multiple serotypes are frequently found in one location, and co-infections are possible. The rate of duck mortality in infected areas increases as a result of the use of vaccinations for certain serotypes that may not offer cross-protection from serotypes not covered by these biologics (Gavin 2022).

A major global concern for the agriculture sector at the moment is climate change. Changes in environmental parameters such as temperature, rainfall, relative humidity, wind speed, and solar radiation have an effect on livestock productivity both directly and indirectly (Lara and Rostagno 2013, Prabhat *et al.*

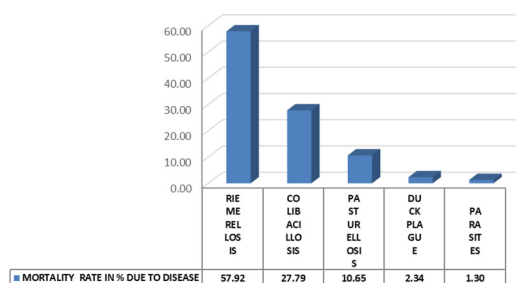


Fig. 5. Duck mortality due to diseases.

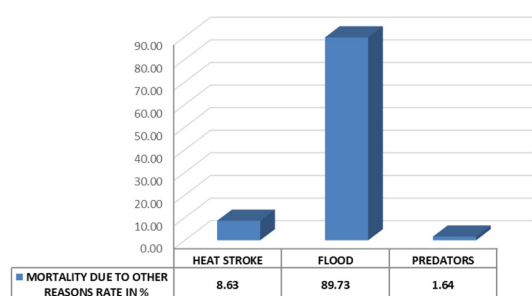


Fig.6. Duck mortality rate due to flood, heat stroke and predators.

2021). The recurrent floods that have been occurring in the state from 2018 onwards during the monsoons have affected the low-lying Niranam and Kadapra villages of the Pathanamthitta district. About 1.76 crore poultry, 46,000 cows, and 20,000 goats were washed away in the extreme flash fed of 2018 in Kerala (Abdul 2018).

Flooding boosts pathogen migration, increasing the incidence of infectious diseases in addition to the significant loss of animals being washed away. Farmers also encounter problems with a lack of feed, clean water, and shelter for the ducks during the floods. Ducks are more likely to have *E. coli* infections during rainy seasons when there is water contamination from residential sewage after the flood (Amit 2022, The Hindu 2020). The increased mortality rate of ducks reported due to colibacillosis in the study region during monsoon is in accordance with the above finding. Colibacillosis is caused by a type of *E. coli* called avian pathogenic *E. coli*, the majority of which are virulent and carry extensive virulence plasmids. Due to extensive antibiotic resistance among APEC, limitations on the use of antimicrobial agents in poultry, and a lack of vaccinations to protect against all forms of APEC that cause colibacillosis, controlling the disease is difficult (Lisa 2022). Pasteurellosis, once prevalent in the region before the year 2018, causing massive death of ducks, was presently found to be controlled by vaccination which has been in accordance with 3.88% mortality reported during the study period (Azhaguraja *et al.* 2020). Duck plague in the region was found to be controlled due to the timely administration of the vaccine, administered to birds between the ages of 8 and 12 weeks. Although there is no cure for these viral infections, a subsequent

infection should be avoided (Kuldeep *et al.* 2017). Roundworms, tapeworms, and flukes are some of the internal parasites (Shrestha 2020), and ticks, fleas, and lice mites are the external ones affecting the duck's red blood cells, reducing their ability to absorb nutrients, resulting in anaemia (TNAU 2021). The common predators were river otters, wild cats and hawks contributed to 1.04% of mortality.

The high temperature, when coupled with humidity, stresses the bird's homeostasis resulting in decreased productivity and high mortality. According to Indian Council for Agricultural Research (ICAR) (2010), ambient temperatures significantly influence the survivability and performance of poultry production. The ducks under the open scavenging system in the study regions were exposed to extreme temperatures, up to 39 to 40°C, and the shortage of water during the summer season (Valappil *et al.* 2022) experienced heat stress-related decreased productivity and mortality, which in accordance with the results reported by Tiruneh and Tegene (2018).

CONCLUSION

The recurrent and devastating floods occurring annually were found to be the major factor causing duck mortality in the smallholder households of Niranam and Kadapra panchayath of the Pathanamthitta district. The problems domestic poultry farmers encountered after the flood were a lack of veterinary care services, illness outbreaks, and a lack of finance and insurance to restore the flocks. The rural duck farmers of the State are not getting any insurance coverage to compensate for their poultry loss during natural catastrophes or disease outbreaks as the insurance coverage is only applicable for the loss of milk cows in the farms. This has to be taken into consideration by the government authorities to support the duck farming sector and the downtrodden poultry farmers of the State.

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