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Gross and histopathological studies of co-infection of Marek's disease and lymphoid leucosis in layer chicken

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Abstract
The present study reports the co- infection of Marek's disease (MD) and lymphoid leucosis (LL) in fourteen layer chickens of 39 weeks age and the flock size was 30,000. The cumulative mortality from 27 to 39 weeks (13 wks) was 6%. Affected chicken showed inactivity, anorexia, paralysis and emaciation. Necropsy examination of suspected dead bird's visceral organs like liver, spleen and kidney revealed severe enlargement and numerous greyish tumourous spots / foci on surface. Microscopic examination of liver, spleen and kidney sections revealed mixed lymphoid cell infiltration which is suggestive of co-infection of MD and LL.

Keywords: Layer chicken, Marek's disease, lymphoid leucosis, necropsy, microscopic

Introduction
Marek's disease (MD) is one of the most common neoplastic disease of chicken and is caused by serotype 1 oncogenic MDV, a member of alpha herpesvirus which causes permanent immunosuppression It affects primarily T lymphocytes and produces pleomorphic lymphoid cell tumours in various organs (Othman and Aklilu, 2019) [5].
Avian Leucosis viruses (ALV) is also called as leukosis/sarcoma viruses, the L/S group, cause a group of leukoses, sracomas and related neoplasms. *Lymphoid leucosis* (LL) had been the most common form of leucosis/sarcoma group of diseases seen in the field flocks (Nair and Fadly, 2013) [3]. Serotype 2 MDV was found to enhance the development of LL in certain lines of chickens following exposure to ALV after hatching (Fadly and Witter, 1993) [1] by the mechanism of increasing gene expression of ALV. Incidence of LL was reported in 5.20% chicken flocks (Ravikumar *et al.,* 2019) [7].
The main aim of the present paper is to describe the co-infection of MD and LL in layer chicken.

Materials and Methods
Fourteen dead birds of 39 wks age were examined with a history of inactivity, anorexia, paralysis and emaciation and 4% production loss with 6% mortality for a period of 13 weeks. The death (0.4% per wk) was noticed from 27 to 31 weeks of age and it increased at the age of 32 weeks from 0.4% to 0.5% per wk. The cumulative death for a period of 13 weeks (27 to 39 wks) was 6%.
A detailed necropsy of all birds was carried out and the gross lesions were photographed. The tissue samples were fixed in 10% neutral buffered formalin and a routine histological technique was performed. Briefly, tissues were dehydrated in ascending grades of alcohol, cleared in xylene (2 changes) and embedded in paraffin. Sections were cut with a thickness of 5-µm and stained with hematoxylin and eosin and mounted with Distyrene plasticizer xylene (DPX) for histopathological examinations (Suvarna *et al.,* 2013) [9].

Results and Discussion
Gross examination of organs
Grossly, liver revealed diffuse enlargement with a few greyish tumourous foci/spots and rounded borders (Fig. 1). Spleen showed severe enlargement with numerous greyish tumourous foci (Fig. 2). Kidney showed distinct enlargement with irregular greyish areas and disfigured lobes (Fig. 3). Similar observations was also made by Ravikumar *et al.,* (2019) [7].

Histopathological examination

Microscopic sections of co-infection of MD and LL suspected liver showed confluent moderate mixed lymphoid cell infiltration in hepatic parenchyma (Fig. 4). Spleen showed moderate lymphoid depletion in spleenic parenchyma (Fig. 5). In kidney moderate mixed lymphoid cell infiltration in renal parenchyma and crystals in tubules were seen (Fig. 6). These findings is in accordance with earlier workers (Ravikumar *et al.*, 2016, Haridy *et al.*, 2019, Ravikumar *et al.*, 2022) [6, 2, 8].

Fig 1: Chicken- MD and LL - Liver showing diffuse enlargement with a few greyish tumourous foci/spots and rounded borders

Fig 2: Chicken- MD and LL - Spleen showing severe enlargement with numerous greyish tumourous foci

Fig 3: Chicken- MD and LL- Kidney showing distinct enlargement with irregular greyish areas and disfigured lobes

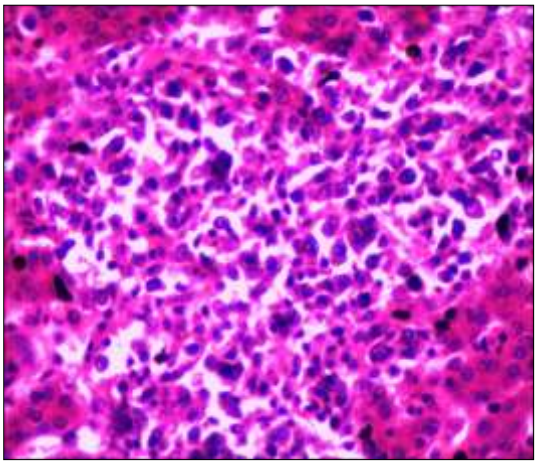

Fig 4: Chicken- MD and LL – Liver - Confluent moderate mixed lymphoid cell infiltration in hepatic parenchyma - 400X

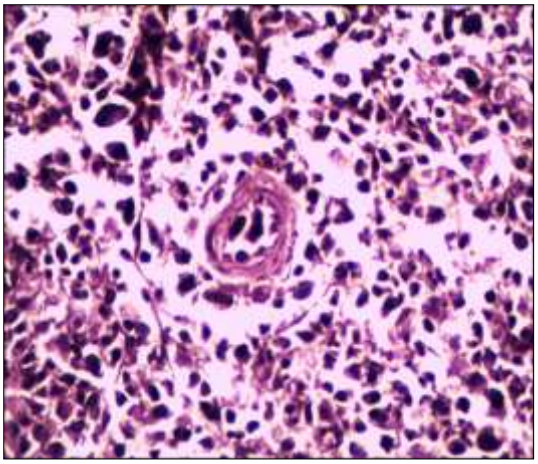

Fig 5: Chicken- MD and LL – Spleen - Moderate lymphoid depletion in spleenic parenchyma - 400X

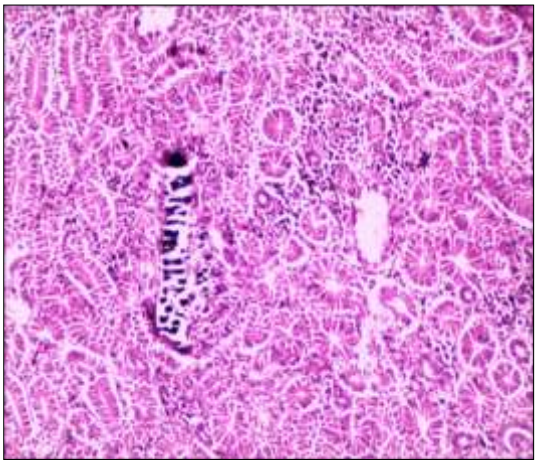

Fig 6: Chicken- MD and LL – Kidney - Moderate mixed lymphoid cell infiltration in renal parenchyma and crystals in tubules- 100X

Conclusion

Co-infection of MD and LL was diagnosed in layer chicken at 39 weeks age which leads to tumour development in visceral organs and causes immunosuppression. Further its may favour various poultry pathogens and result in vaccination failure, secondary bacterial complications, decreased production performance and heavy mortality of commercial poultry, which in turn incurs heavy economic loss to the poultry producers (Nouri *et al.*, 2001) [4]. So early diagnosis of MD

and LL infection is at most importance to increase the profitability of the poultry farmers.

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