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A PRELIMINARY REPORT OF SUBGROUP J AVIAN LEUKOSIS VIRUS-INFECTION IN IMPORTED BROILER PARENT CHICKENS

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SUMMARY

Three imported broiler parent farms suffering from high incidence of tumor mortality were investigated. Gross pathological lesions were suggestive of the novel subgroup J of avian leukosis virus (ALV) infection. Serological examination of random blood samples for specific antibodies to ALV - J and other viruses confirmed exposure of these farms to infection with ALV - J, reticuloendotheliosis virus and chicken anemia virus. The impact of intercurrent infections, especially with immunosuppressive viruses, was discussed and general control measures were highlighted.

INTRODUCTION

Avian leukosis viruses (ALVs) from chickens are classified serologically into six subgroups (A, B, C, D, E and J) by their viral envelope antigens (Payne and Fadly, 1997). Unlike the acute avian leukemia viruses, exogenous ALVs, belonging to subgroups A, B, C, D, and J and endogenous ALVs (subgroup E) are not genetically defective but lack host oncogenes. Exogenous ALVs induce a variety of neoplasms, but endogenous ALVs are rarely oncogenic.

ALV-J is a newly emerged subgroup, which was first described in the United Kingdom and found to be associated with myeloid leukosis (ML) in meat-type chickens (Payne et al., 1991). Recently, Fadly (1998) reported the recovery of several ALV-J strains from broiler breeder and commercial broiler flocks in the United States experiencing a relatively high incidence of ML at 4 weeks of age and older.

During the last few years a high incidence of tumor mortality was observed in broiler breeder farms in Egypt, which in 1998 / 1999 resulted in a marked crisis in the availability of commercial broiler chicks. The present paper describes a preliminary diagnosis of ALV-J infection in three of such farms based on gross pathology and serological examination.

MATERIAL AND METHODS

Farm History:

Imported broiler parent chickens on three farms in two different localities were the subject of this investigation. Two farms (A & B) aged 45 and 57 weeks in one locality of the same breed suffered from tumor mortality of 0.8 up to 2.0 % weekly, starting from 14-17 weeks of agr. In addition, both farms showed non-peaking (peaks reached were 65.2 and 66.5%, respectively) and 3-4% lower hatchability. The third farm in another locality of 45 weeks of age also suffered from tumor mortality which started at 12 weeks of age and reached 6.5 % by onset of production and 37% by the 45th week. Egg production and hatchability were relatively lower than targets and broiler performance was unsatisfactory.

Samples for examination:

Live and freshly dead birds were taken from the three farms for postmortem examination. In addition, random blood samples were collected from each farm for serological examination.

Serological examination:

Blood samples from the three farms were checked by ELISA for antibodies to various virus infections including ALV as well as ALV-J, using commercial ELISA kits supplied by IDEXX laboratories, Inc., Westbrook, ME 04092. Application and interpretation of the test were according to the instructions of the kits producer.

RESULTS

Gross lesions:

Postmortem examination of dead and sacrified birds revealed moderately to markedly emaciated carcasses, variable degrees of enlargement of liver, spleen and kidney with diffuse or noduler whitish infiltration (Fig. 1). Very characteristic were creamy and friable or cheesy, and diffuse or nodular tumors, often found at the costocondral junctions of the ribs and inner surface of the keel

Fig. (1): Broiler parent chicken showing whitish nodular infiltration in enlarged liver and multiple creamy nodules on the inner surface of the keel bone, costocondral junctions of the ribs and mesentery.

Table (1): Results of serological examination of broiler parent farm for antibodies against various virus infections.

Farm	House No.	ELISA LLV (pos./exam.)	ELISA ALV-J (pos./exam.)	ELISA REV (pos./exam.)	ELISA CAV (mean titer)	ELISA IBV (mean titer)
	1	0/10	6/10	0/5	1681	8506
	3	1/10	1/10	1/5	2148	6546
	7	2/9	2/9	5/5	2584	3648
	9	2/10	5/10	5/5	2197	4878
A	Total	5/39 (12.8%)	14/39 (35.94%)	11/20 (55%)		
	2	1/10	2/10	0/5	1891	6414
	5	1/10	0/10	1/5	2633	6208
	8	1/10	4/10	0/5	2124	3081
B	Total	3/30(10%)	6/30(20%)	1/15(6.7%)		
	1	1/17	3/7	0/7	nd	nd
C	2	3/10	10/10	1/10	nd	nd
	3	2/9	8/9	2/9	nd	nd
	4	2/10	4/10	4/10	nd	nd
	5	3/10	8/10	6/10	nd	nd
	Total	11/46 (23.9%)	33/46 (71.7%)	13/46 (28.2%)		

LLV= Lymphoid leukosis virus; ALV-J = avian leukosis virus subgroup J; REV = reticuloendotheliosis virus; CAV = chicken anemia virus; IBV = infectious bronchitis virus; nd = not done.

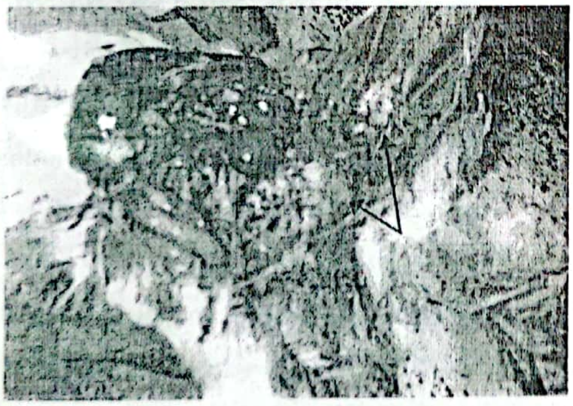

Fig. (2): Broiler parent chicken showing extensive, multiple creamy nodules on the costochondral junctions of the ribs, inner surface of the keel bone, pleura, mesentry, thigh muscles and in the liver.

bone (Fig. 2). In few cases soft creamy tumors were seen on the mesentery, serous covering of the intestines and even on the surface of the muscles of the breast and thigh, which sometimes have a thin layer of bone over them that was easily to be cut through.

Serological results:

The results of serological examination of blood samples from farm (A) and (B) are shown in table (1). From this table, it is evident that, with the exception of samples from house No. (1) in Farm (A), one or two blood samples out of ten from houses No. 3, 9 and 7 reacted positively for ALV - antibodies, but higher percentage of samples from all four houses (No. 3, 9, 1 and 7) gave positive results for ALV-J antibodies.

In farm (B), one (No. 5) of three houses examined gave low percentage of reactors (1/10) for ALV and all samples were negative for ALV-J antibodies. The other two houses (No. 2 and 8) were positive for both ALV and ALV-J antibodies with higher incidence for the latter.

In addition, reticuloendotheliosis (REV) antibodies were found in 3 out of 4 houses of farm A and in 1 out of 3 houses of farm B, while all houses were positive for chicken anemia virus (CAV) antiobdies.

In farm (C), antibodies to ALV were detected in random blood samples taken from all five houses with varying incidence which averaged 23.9%. On the other hand, antibodies to ALV-J were also found in all houses but with higher incidence which averaged 71.7%, while REV antibodies could be demonstrated in 4 out of 5 houses with variable incidence (Table 1).

DISCUSSION

During the last few years several reports on the emergency of a novel subgroup J of ALVs in meat-type chickens came from different countries, which was associated with high incidence of tumors, mainly of the myeloid type and other types of neoplasms (Fadly, 1998; Fadly and Smith, 1998; Goodwin et al., 1998a; Payne et al., 1991). ALV infections adversely affect breeder flock performance (Payne and Fadly, 1997) and the production performance of broilers from breeders with ALV-J tumors as well (Goodwin et al., 1998b).

In Egypt, poultry producers have been suffering from high incidence of tumor mortality in their meat-type chickens since the last two years. This resulted in broiler chick-crisis, especially during 1988/1999).

In the present paper we investigated three imported broiler breeder farms in two different localities suffering from tumor mortality which started at 14-16 weeks of age and varied in incidence from farm to farm and even between different houses on the same farm. This observation also holds true for batches of birds of the same breed and company of origin. Moreover, observations have shown that females suffered higher incidence than males in one batch and the opposite was encountered in another batch suggesting differences in the virus shedding rates of the supplying grand parent lines.

The gross pathological lesions, particularly the creamy, soft nodular tumors at the inner surface of the keel bone and the costochondral junctions of the ribs, were strongly suggestive of ALV-J infection. The results of serological examination for ALV antiobdies (Table 1) revealed variable incidence among the three investigated farms (12.8, 10.0 and 65.2%, respectively in farms A, B, and C). However, higher incidence of ALV-J specific antibodies (Table 1) was respectively determined (35.9, 20.0 and 71.7%) in these farms which confirmed exposure of the flocks to ALV-J infection, most probably through horizontal transmission from immune tolerant viremic chickens.

It was interesting to find serum antibodies also against REV in the three farms with variable incidence (55.0, 6.7 and 28.2% respectively in farms A, B and C) and against chicken anemia virus (CAV) in two farms (A and B) examined for this virus infection. The impact of REV and CAV infections on ALV-J tumor incidence and virus shedding is not clear. Payne (1998) speculated the role of intercurrent infections by immunosuppressive viruses or vaccines as predisposing factors in the field which influence ALV-J diseases incidence.

The results reported herein would draw the attention of the veterinary authorities to the serious consequences of importation of infected breeders as day-old chicks or hatching eggs and contaminated vaccines on the local poultry industry. Importation licences should be issued conditioned by freedom from ALVs including the novel ALV-J and other vertically transmitted poultry pathogens. National diagnostic and vaccine quality control laboratories should be aware of using specific diagnostic reagents for ALV-J detection and antibody assay (Lamichhane et al., 1998; Venugopal et al., 1997). The understanding of the problem and its impact on the local poultry industry by the local breeder companies and their cooperation with the veterinary authorities is also necessary to prevent or at least limit the introduction and horizontal spread of infection.

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