Persistent Mortality in a Commercial Pigeon Facility

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HISTORY

A facility with 2000 pairs of pigeons used to produce squabs for human food consumption reported a 100% mortality rate in 1-3 day old squabs. Mortality had been ongoing for three months. In the preceding three weeks, adult hens and, less commonly, male birds had also showed clinical signs. Both chicks and adult pigeons exhibited the same signs, which included open-mouthed breathing and cyanosis. Antibiotic therapy had made no impact and extensive questioning revealed no evidence that management changes had occurred.

DIAGNOSTIC FINDINGS

Complete blood counts were obtained for five squabs. White blood cell counts were extremely variable and ranged from 1,000-20,000 cells/µL. The bird with the low white blood cell count also had a degenerative left shift. The only consistent finding across all five birds was a marked degree of polychromasia. Seven squabs and three adults were necropsied. Retained yolk sacs were found in two of seven squabs. Lungs in all birds were moist and heavy and had reduced buoyancy in formalin. No other gross lesions were noted. Faecal flotations and wet preparations were negative. Faecal cultures for Salmonella were negative. Testing for pigeon paramyxovirus 1, and influenza A virus were negative. Bacterial cultures of the liver and yolk sacs of all squabs yielded *Escherichia coli* from three. Cultures from the adult birds were negative. Virus isolation attempts from lung tissue were unsuccessful.

Consistent microscopic lesions were only found in the lungs of the squabs and the adult hens. The lesions in the chicks were diffuse and typically involved the entire lung section. The normal air capillaries had either failed to develop fully or had been damaged and their walls were thickened and lined with cells resembling type two pneumocytes (Figures 1 and 2). Rarely, small patches of normal

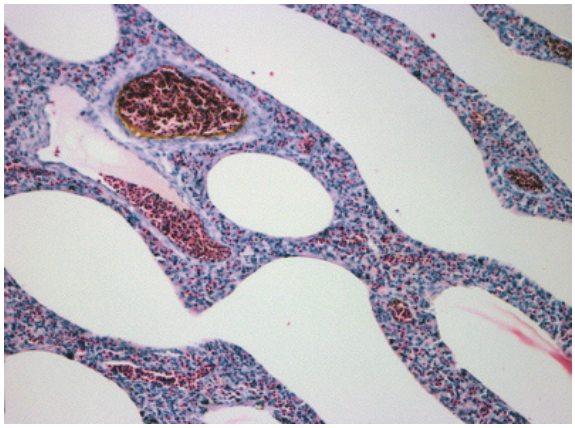

Figure 1. Low magnification of an H&E-stained lung from a squab with respiratory signs.

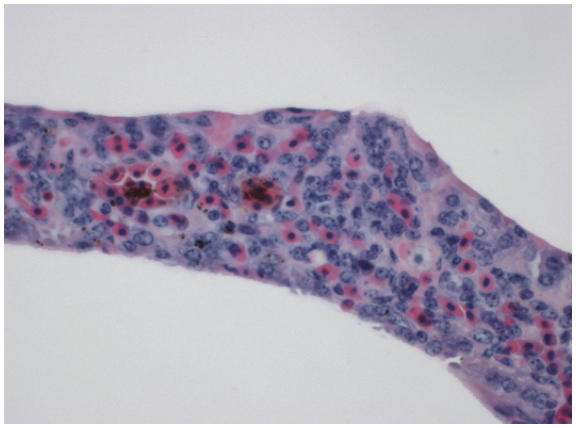

Figure 2. Higher magnification of lung of an H&E-stained lung from a squab with respiratory signs.

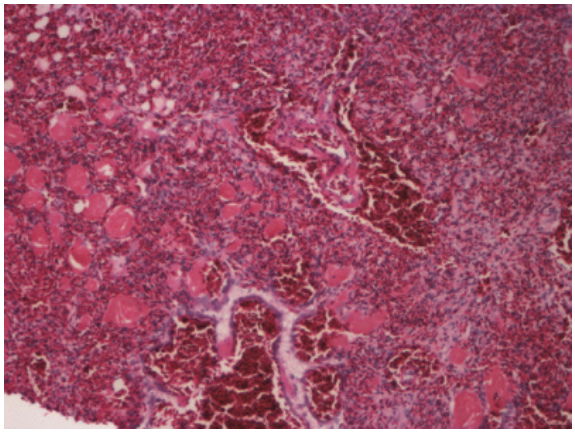

Figure 3. Low magnification of an H&E-stained lung from an adult breeding pigeon with respiratory signs.

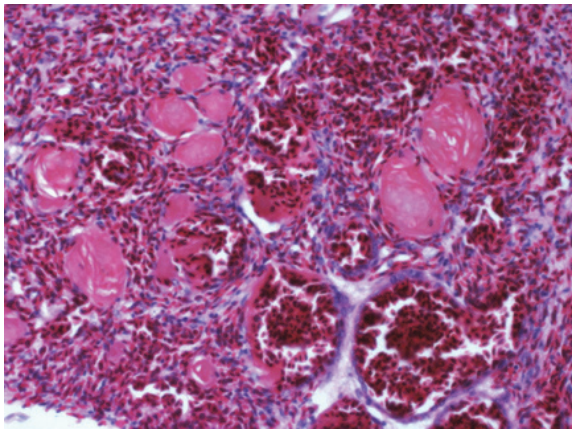

Figure 4. Higher magnification of lung of an H&E-stained lung from an adult breeding pigeon with respiratory signs.

lung were also found. Lesions in the adult birds included severe acute diffuse pulmonary oedema and the presence of dense eosinophilic fibrinous material within the air capillaries, atria, and tertiary bronchi (Figures 3 and 4). This material was multifocal to locally extensive. It stained positive for fibrin.

AVIARY VISIT

A farm visit was undertaken to assess farm management and determine possible causes for the mortalities. The farm contained two animal housing facilities, one housing breeding birds and the other (about 500 metres away), replacement stock. The same food and water was provided for all birds, but mortality was not seen in replacement birds. Breeding birds were held in pairs in long rows of wire batteries that were 4 cages deep and overall the hygiene was good. The building was well ventilated. There was no evidence of feral birds in the building and an aggressive rodent control program was underway and appeared to be successful. Replacement birds were housed in a semi-open building. Breeding birds were provided with a square piece of carpet padding (felt) that was

used as the nest. The padding was soaked in a potassium permanganate solution and dried before being provided for each pair. This had been common practice in the aviary for several years. Nest felts were changed after each breeding cycle. Three weeks prior to the onset of mortality in the adult hens, a batch of nest felts had been soaked in formaldehyde before being provided to the birds. After extensive questioning, it was determined that a new role of carpet padding had been purchased just prior to the onset of the mortality event (four months earlier).

INTERPRETATION OF THE FINDINGS, MANAGEMENT CHANGES, AND OUTCOMES

The lung lesions in the squabs and adults were most consistent with a toxic insult to the lung either as the result of an absorbed or inhaled toxin. The severity of the lung disease explained the signs exhibited by the birds prior to death and the marked polychromasia. The bacterial infections found in some squabs were considered to be an incidental or secondary problem.

The necropsy findings, coupled with the history of the acquisition of new carpet padding that was being used for nest pads, indicated that the pads might be the source of the toxicity. This assessment was further supported by the fact that the only difference between the management of the replacement birds and the breeding birds was cage confinement and exposure to the nest pads.

Instructions were given to the owners to replace all nest felts with straw as the nesting material until safe felts could be obtained. This process took three weeks, but mortality of adult birds began to decline almost immediately and chick survivability improved to 50%. Because deaths of chicks continued at an unacceptable rate, it was hypothesized that toxins might be persisting on the feathers of the adults and the owners were instructed bathe the birds with fresh water. Following the onset of this practice mortality declined further to rates similar to those seen prior to the onset of the problem.

DISCUSSION

Carpet underlays are known to contain a range of chemicals that are associated with their manufacture and installation. Some of the chemicals detected in carpet underlays include acetone, benzene, 12-propylbenzene, caprolactam, diethylene glycol, formaldehyde, hexane, benzene, styrene, toluene, diisocyanate, 4-phenylcyclohexene (4-PC), xylene, styrene and butadiene. One or more of these chemicals have been associated with a number of medical conditions, including irritation of mucous membranes, in experimental animals and people exposed to them (Johansson et al., 2008; Katsoyiannis et al., 2008; Trudel et al., 2008).

It is highly likely that the carpet was the source of the lung disease seen in the squabs and adult hens in this study. The chicks were affected because they were in direct contact with the carpet and the hens were more heavily impacted because they incubate the eggs and chicks for 16 hours a day while the male birds only incubate for eight hours. Which chemical or chemicals caused the disease in these birds in unknown. Also, it is possible that treatment with potassium permanganate may have resulted in an interaction with the chemicals in the felts, making them more toxic. The adult hen mortality began three months after the chick mortality began. This corresponded with a one-time treatment of some of the nest felts with formaldehyde. Whether the formaldehyde treatment was associated with the adult mortality or was coincidental also remains unknown.

The primary reason for presenting this report is that the lesions seen in the chicks and adults were

new to the senior author (Phalen). Much money and effort was spent identifying a cause for the deaths in these birds. In the future, pathologists who see similar lesions can immediately consider a toxin as the source. In discussions with other avian veterinarians working with commercial pigeon breeders, this problem appears to be occurring in the United States, Europe, and Australia. It has been postulated that it is associated with carpet matting that is made from recycled material.

REFERENCES

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