the drug in the body tissues was very low after a single intravenous administration both in buffalo calves and chicken[5,6]. Accumulation of this antibiotic in various body tissues has also been observed upon repeated administration in the case of human beings[1], guinea pig foetuses[2], sheep[3] and cows[4]. Tissue persistence of gentamicin in both buffaloes and chickens questions the use of this antibiotic in food animals vis-a-vis warrants the human consumption of the meat (beaf/chickens) of such treated animals/birds since gentamicin is known to possess a high potential for oto- or nephrotoxicity.

Thanks are due to ICAR and CSIR, New Delhi, for a fellowship to the first author. The free gift of gentamicin sulphate by Hindustan Antibiotics Ltd, Pimpri, Pune is thankfully acknowledged.

21 December 1987; Revised 14 March 1988

1. Schentag, J. J., Jusko, W. J., Vance, J. W., Cumbo, T. J., Abrutyn, E., Delattre, M. and Gerbracht, L. M., *J. Pharmacokin. Biopharm.*, 1977, **5**, 559.
2. Lelievre-Pegorier, M., Sakly, R., Meulemans, A. and Merlet-Benichou, C., *Antimicrob. Agents Chemother.*, 1985, **28**, 565.
3. Brown, S. A., Riviere, J. E., Coppoc, G. L., Hinsman, E. J., Carlton, W. W. and Steckel, R. R., *Am. J. Vet. Res.*, 1985, **46**, 69.
4. Haddad, N. S., Ravis, W. R., Pedersoli, W. M. and Carson, Jr. R. L., *Am. J. Vet. Res.*, 1987, **48**, 21.
5. Garg, S. K., Ph. D. thesis, Haryana Agricultural University, Hisar, 1987.
6. Garg, S. K. and Garg, B. D., *Br. Vet. J.*, 1987, (Communicated).

STUDIES ON THE ADRENOCORTICAL CELLS IN THE PIGEON, *COLUMBA LIVIA* DURING ITS REPRODUCTIVE CYCLE

VIDYAVATI B. MAGDUM, BHAGYASHRI A. SHNBHAG and V. B. NADKARNI
Department of Zoology, Karnatak University, Dharwad 580 003, India.

RECENT studies on seasonally breeding wild species of birds suggests a low production of corticosteroids during the sexually active phase and a relatively high production during the nestling phase[1–3]. Hence it was deemed of interest to study the structure and steroidogenic potential of the adrenal gland in the domestic pigeon, *Columba livia* during different phases of the reproductive cycle.

The reproductive cycle in the pigeon is divided into preincubation, incubation and squab feeding phases. Five pigeons of each sex from each phase of the reproductive cycle were selected from the pigeon colony maintained by the Zoology Department. The body weight of the pigeons was recorded at autopsy. They were sacrificed by decapitation and both the adrenals were dissected out and weighed to the nearest mg. One adrenal gland from each bird was fixed in Bouin's fluid and processed for routine histological studies. The other gland was used for histochemical localization of Δ^5-3β-hydroxysteroid dehydrogenase (Δ^5-3β-HSDH) and sudanophilic lipids[4,5]. The cortical cell activity was evaluated by measuring the nuclear diameter of the cortical cells and the number of cortical cells per unit area[6] in histological sections and the data were statistically analysed using Student's *t* test.

The observations on body weight, relative adrenal weight, number of cortical cells per unit area, cortical cell nuclear diameter, Δ^5-3β-HSDH activity and sudanophilic lipids in the cortical cells during different phases in both the sexes of pigeons are shown in table 1.

The gravimetric data on the adrenal glands and histometric data on the adrenocortical cells during different phases of reproduction in *C. livia* suggests that the adrenocortical cell activity is more during squab feeding and preincubation phases in both the sexes than during the incubation phase. The histological findings are supported by histochemical localization of Δ^5-3β-HSDH activity, which was maximum during squab feeding and preincubation phases with concomitant depletion of sudanophilic lipids. In white-crowned sparrow[7] and in pied flycatcher[2,3] a low cortical activity during the early phase of the reproductive cycle (sexual phase) and high cortical activity during nestling phase has been reported. The difference in our observations and those of Lorenzen and Farner[7], and Silverin[2,3] could be due to the fact that the birds in their study were caught from the wild whereas *C. livia* is a domesticated continuous breeder. The increased adrenocortical activity in *C. livia* during preincubation phase is correlated with increased sexual activity, as more corticosteroids could be needed during this phase, similar to that reported in the fowl wherein plasma corticosterone levels increase just before ovulation[8]. The functional significance of the increase in cortical cell activity during squab feeding

Table 1 *Body weight, weight of the adrenals, cortical cells/unit area, cortical cell nuclear diameter Δ^5-3β-HSDH activity and sudanophilic lipids in cortical cells in C. livia during preincubation, incubation and squab feeding phases*

	Body wt. (g) ± SE		Wt. of adrenal 100 g body wt. (mg) ± SE		Cortical cells/ unit area ± SE		Cortical cell nuclear diameter (μm) ± SE		Δ^5-3β-HSDH*		Sudanophilic lipids	
Phase	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Preincubation (5)**	299 ± 7.88	315 ± 4.76	10.01 ± 0.68	11.35 ± 0.74	30.59 ± 1.51	31.24 ± 1.30	5.28 ± 0.04	5 04 ± 0.05	++++	++++	++	++
Incubation (5)	284 ± 6.19	283 ± 6.44	8.39 ± 0.59	6.92 ± 0.86	21.68 ± 0.75	24.28 ± 0.56	4.89 ± 0.03	5.03 ± 0.05	++	++	+++	+++
Squab feeding (5)	268 ± 7.65	245 ± 4.33	13.14 ± 0.33	16.80 ± 0.79	26.50 ± 0.93	29.83 ± 0.55	5.17 ± 0.02	5.38 ± 0.04	++++	++++	++	++

** Figure in parentheses indicates the number of animals used; * Enzyme activity graded subjectively from minimum (++) to (++++). SE, Standard error.

Phases compared	Body wt.		Adrenal wt.		Cortical cells/unit area		Nuclear diameter	
	♂	♀	♂	♀	♂	♀	♂	♀
Preincubation vs Incubation	NS	$P<0.01$	NS	$P<0.01$	$P<0.001$	$P<0$ 001	$P<0.05$	NS
Incubation vs Sq. feeding	$P<0.05$	$P<0.001$	$P<0.01$	$P<0.001$	$P<0$ 01	$P<0.001$	$P<0.001$	$P<0.001$
Sq. feeding vs Preincubation	NS	$P<0.001$	$P<0.01$	$P<0.001$	$P<0.05$	NS	$P<0.05$	$P<0.001$

P, Values calculated by Student's t test among different phase of reproduction and judged significant if $P<0.05$; NS, nonsignificant.

phase in *C. livia* could be an adaptation to the increased need to utilize the body's own reserves in bringing up the nestlings/squabs (in this case, in the production of crop milk also) as suggested by Silverin[2] and this view is further supported by a significant reduction in the body weight of the parent pigeons during this phase.

20 February 1988; Revised 25 March 1988

1. Peczely, P., *Gen. Comp. Endocrinol.*, 1976, **30**, 1.
2. Silverin, B., *Gen. Comp. Endocrinol.*, 1979, **38**, 162.
3. Silverin, B., *Gen. Comp. Endocrinol.*, 1986, **64**, 67.
4. Baillie, A. H., Ferguson, M. M. and Hart D. Mck, In: *Developments in steroid histochemistry*, Academic Press, New York, 1966.
5. Pearse, A. G. E., In: *Histochemistry, theoretical and applied*, 3rd edn, Vol. 1, Churchill Livingstone Ltd., London, 1968.
6. Chester Jones, I., In: *The adrenal cortex*, Cambridge University Press, Cambridge, 1957.
7. Lorenzen, L. C. and Farner, G. M. A., *Gen. Comp. Endocrinol.*, 1964, **4**, 252.
8. Bouing, G. and Vander, G. M. A., *Gen. Comp. Endocrinol.*, 1981, **44**, 382.

OSMOTIC FRAGILITY OF SHEEP ERYTHROCYTES IN *DICTYOCAULUS FILARIA* INFECTION

T. K. BHAT and R. L. SHARMA
Regional Research Centre, Indian Veterinary Research Institute, Srinagar 190 005, India.

DICTYOCAULUS FILARIA infection in sheep is associated with certain blood dyscrasias such as anaemia[1-3] and prolonged whole blood clotting time[4]. The effect of this infection on the resistance of circulating erythrocytes of sheep to osmotic lysis is not known. The present study was undertaken to investigate the effect of this parasite on the osmotic fragility of sheep erythrocytes for 71 weeks under controlled laboratory conditions.

Twenty seven male lambs of Nali breed, aged 6–10 weeks, were randomly distributed into four groups of eleven (infected), five (vaccinated), four (challenge-control) and seven (clean-control). The infected group of animals received each 2000 infective larvae of *D. filaria* on day zero of the experiment, whereas the vaccinated group lambs were each given 1,000 and 2,000 gamma radiation attenuated larvae on days zero and thirty respectively and 4,000 normal infective larvae on day 45. The challenge-control group received 4,000 normal infective larvae on day 45 of the experiment. Osmotic fragility of erythrocytes was determined by subjecting them to a hypotonic shock in buffered saline and was studied till week 71 post-infection (PI).

There was a positive correlation between decreased resistance of erythrocyte to osmotic lysis and the progress of the disease throughout the study period. In infected and challenge-control group of lambs, erythrocytic fragility increased from 3rd week PI and remained at significantly elevated level (0.80% ± 0.03 initiation; 0.65% ± 0.04 completion) from eighth week onwards ($P < 0.001$ initiation; $P < 0.01$ completion). The vaccinated animals did not show any significant increase in the osmotic fragility of their erythrocytes and behaved like clean control animals (0.68% ± 0.02 initiation; 0.50% ± 0.02 completion). During the chronic phase of infection, aptly described as immune-carrier phase, (11 weeks of PI onwards), although the erythrocytic fragility had a tendency to decrease (0.72% ± 0.02 initiation; 0.53% ± 0.03 completion) yet did not return to normal till the end of the experiment. The differences were statistically significant ($P < 0.05$ initiation; $P < 0.025$ completion). This is the first report on increased osmotic fragility of sheep erythrocytes in helminth infection of domesticated animals.

Osmotic fragility of erythrocytes has been shown to vary with their geometrical configuration, membrane defects, decreased membrane cholesterol content, direct action of circulating complement and antibodies on their membrane and decreased erythrocyte acetylcholinesterase activity[5]. Although the osmotic resistance of erythrocytes is known to decrease in certain diseases[6,7] and toxic conditions[8], much remains to be investigated about changes occurring in parasitic disease. The precise reasons for the progressive increase in erythrocyte fragility in the sheep infected with *D. filaria* are not known. Investigations in this direction are currently in progress.

24 February 1988; Revised 19 April 1988

1. Udall, D. H., *The practice of veterinary medicine*, 6th edn, Oxford and IBH Publishing Co.,