

THE PREVALENCE AND GROSS PATHOLOGIC LESIONS OF OVINE AND CAPRINE PNEUMONIA CAUSED BY BACTERIAL AGENT IN ZARIA, NIGERIA

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Abstract

The bacterial agents of ovine and caprine pneumonia, and associated gross pathologic lesions were studied for period of 10 years (1985-1995). Data were collected from Veterinary Microbiology diagnostic unit. The results obtained from ovine bacterial pneumonia were *Escherichia coli* 24.7 per cent, *Pasturella multocida* 15.5 per cent, *Staphylococcus aureus* 10.4 per cent, *Corynebacterium pyogenes* 6.3 per cent and *Proteus vulgaris* 4.0 per cent. Bacterial agents of caprine pneumonia isolated were *E. coli* 26.6 per cent, *P. multocida* 13.8 per cent, *S. aureus* 16.5 per cent, *C. pyogenes* 10.1 per cent, *Streptococcus pyogenes* 8.3 per cent, *P. vulgaris* 5.5 per cent and were more prevalent 174 (61.5%) than caprine 109 (38.5%). The average monthly distribution of ovine pneumonia cases increased from 7 (4%) in August to 28 (16.1%) in November, declined to 12 (6.9%) in December and increased to 32 (18.4%) in January. Cases in caprine pneumonia increased from 6 (5.5%) in June to 15 (13.8%) in August, and declined to 4 (3.7) in March. The annual distribution of ovine pneumonia was highest in 1990 (24.7%). Caprine pneumonia, however, was highest in 1988 (22.9%). The value of this study to livestock producers is highlighted in the discussion.

Introduction

It is established that small ruminant (sheep and goats) production is essential for meeting protein requirement in the developing nations of the world, but this area of livestock production is

Résumé

RAJI, M. A., ADOGWA, A. T., NATALA, A. J. & OLADELE, S. B.: *Fréquence et lésion pathologique brute d'ovin et de pneumonie caprine causées par agent bactérien à Zaria.* Les agents bactériens d'ovin et de pneumonie caprine et les lésions pathologiques brutes étaient étudiés dans une période de dix ans (1985-1995). Des données étaient rassemblées du département diagnostique microbiologique vétérinaire. Les résultats obtenus de pneumonie bactérienne d'ovin étaient *Escherichia coli* 24.7 pour cent, *Pasturella multocida* 15.5 pour cent, *Staphylococcus aureus* 10.4 pour cent, *Corynebacterium pyogenes* 6.3 pour cent, *Proteus vulgaris* 4.0 pour cent. Les agents bactériens de pneumonie caprine isolées étaient *E. coli* 26.6 pour cent, *P. multocida* 13.8 pour cent, *S. aureus* 16.5 pour cent, *C. pyogenes* 10.1 pour cent, *Streptococcus pyogenes* 8.3 pour cent, *P. vulgaris* 5.5 pour cent. Les cas de pneumonie ovine augmentaient de 7 (4%) en août à 28 (16.1%) en novembre, déclinaient à 12 (6.9%) en décembre et augmentaient à 32 (18.4%) en janvier. Les cas de pneumonie caprine augmentaient de 6 (5.5%) en juin, à 15 (13.8%) en août et déclinaient à 3.7 pour cent en mars. La distribution annuelle de pneumonie ovine était plus élevée en 1990 (24.7%). La pneumonie caprine, toutefois, était plus élevée en 1988 (22.9%). La valeur de cette étude aux éleveurs de bétail est mise en lumière dans la discussion.

neglected (Majiyagbe & Lomode, 1997). Reared predominantly by rural farmers in the northern part of Nigeria, small ruminant is estimated to contribute about 35 per cent of the country's meat supply (ILCA, 1993). Census estimates in Nigeria

suggest that there are about 24 million goats and 8.8 million sheep, which gives a ratio of 3:1. This ratio has been attributed to the fact that goats are more resistant to infectious diseases than sheep, (Sumberg & Cassaday, 1985).

It has been suggested that the country may be losing close to 20 per cent of her ruminant population annually to infectious diseases, of which respiratory disease is of utmost importance (Dipeolu, 1996). Pneumonia is a major respiratory disease of domestic animals worldwide, especially in countries where livestock management and husbandry is yet to be developed (Smith & Jones, 1963; Osinowo & Adu, 1985). The disease incidence is usually very high in these areas, and this causes serious financial losses to the livestock industry (Isoun & Mann, 1972; Jensen, 1974).

Among the bacterial agents responsible for spe-

cific forms of pneumonia are *Pasturella multocida* and *P. hemolytica*. Infection with these organisms and others associated with the so-called bacterial pneumonia possibly occur as a complication of primary viral pneumonia (Buxton & Frazer, 1977).

Livestock development and its associated constraints have been fairly documented elsewhere in Nigeria (Isoun & Mann, 1972; Durojiaye *et al.*, 1983; Obi, 1997), but not in northern Nigeria. Farmers in these areas had benefited immensely from such research findings, the kind of which seem scarce in northern Nigeria. A knowledge of the aetiological agents of bacterial pneumonia is necessary for both the prevention and management of diseases outbreaks with a view to improving ruminant population which in turn increases the supply of animal protein to the growing populace.

TABLE I
Bacterial agents of ovine and caprine pneumonia in Zaria from 1986-1995

<i>Bacterial agents</i>	<i>Ovine number</i>	<i>Percentage</i>	<i>Caprine number</i>	<i>Percentage</i>	<i>Total number of caprine and ovine pneumonia</i>
<i>E. coli</i>	43	24.7	29	25.4	25.4
<i>P. multocida</i>	27	15.5	15	14.8	14.8
<i>S. aureus</i>	18	10.4	18	12.5	12.5
<i>S. pyogenes</i>	11	6.3	9	7.0	7.0
<i>P. aeruginosa</i>	3	1.7	2	1.8	1.8
<i>K. pneumoniae</i>	4	2.3	1	1.6	1.6
<i>C. pyogenes</i>	26	14.9	11	12.5	12.5
<i>N. catarrhalis</i>	10	5.7	3	4.2	4.2
<i>P. vulgaris</i>	7	4.0	6	4.7	4.7
<i>Bacillus spp.</i>	5	2.9	3	4.6	4.6
<i>Moraxella spp.</i>	6	3.5	6	2.8	2.8
<i>Micrococcus spp.</i>	4	2.3	1	4.2	4.2
<i>Acinetobacter spp.</i>	5	2.9	2	1.6	1.6
<i>Haemophilus spp.</i>	1	0.6	0	0.3	0.3
Total	174	100	109	100	100

TABLE 2

Monthly distribution of bacterial pneumonia of ovine and caprine pneumonia in Zaria from 1986-1995

<i>Bacterial agents</i>	<i>Ovine number</i>	<i>Percentage</i>	<i>Caprine number</i>	<i>Percentage</i>	<i>Total number of caprine and ovine pneumonia</i>
January	32	18.4	25	22.9	20.0
February	18	10.3	8	7.3	9.20
March	10	5.7	4	3.7	5.0
April	17	9.8	13	11.8	11.0
May	14	8.0	6	5.5	7.0
June	5	2.9	6	5.5	3.9
July	3	1.8	9	8.3	4.2
August	7	4.0	15	13.8	7.8
September	10	5.8	9	8.3	6.7
October	18	10.3	0	0	6.2
November	28	16.1	9	8.3	13.0
December	12	6.9	5	4.6	6.0
Total	174	100	109	100	100

TABLE 3

Annual distribution of bacterial pneumonia of ovine and caprine pneumonia in Zaria from 1986-1995

<i>Years</i>	<i>Ovine number</i>	<i>Percentage</i>	<i>Caprine number</i>	<i>Percentage</i>	<i>Total percent of ovine and caprine pneumonia</i>
1986	12	6.9	6	5.5	6.4
1987	38	21.8	17	15.6	19.4
1988	28	16.1	25	22.9	18.7
1989	25	14.4	6	5.5	11
1990	43	24.7	23	21.2	23
1991	8	4.6	15	13.8	8.13
1992	5	2.9	7	6.4	5.24
1993	8	4.6	8	7.3	5.65
1994	2	1.1	2	1.8	1.41
1995	5	2.9	0	0	1.77
Total	174	100	109	100	100

Experimental

Data were collected from the record books of the Faculty of Veterinary Medicine, Ahamdu Bello

University, Zaria from 1986 to 1995. Zaria, in Northern Nigeria, is located in the Guinea savanna zone, where the rainy season is from May to October,

peaking in August. The dry season is from November to April. Information in this paper is based on reported cases of pneumonia in sheep and goats in the Department of Veterinary Pathology and Microbiology, Ahamdu Bello University, Zaria. The animals from which data were obtained were brought in by livestock owners from various parts of the country. They were examined for any gross

(1.8%), *Corynebacterium pyogenes* 37 (12.5%), and *Neisseria catarrhalis* 13 (4.7%).

Table 2 shows the monthly distribution of bacteria pneumonia cases in Zaria. The ovine pneumonia cases increased from 7 (4.0%) in August to 28 (16.1%) in November, declined in December with 12 (6.9%) cases and increased to 32 (18.4%) in January. In caprine the increase was from 6

TABLE 4
Gross pathologic lesions associated with bacterial pneumonia of ovine and caprine in Zaria

Pathologic lesions	Ovine number	Percentage	Caprine number	Percentage	Total percentage of ovine and caprine pneumonia
Congested lungs	58	33.0	27	25.0	30.0
Consolidated lungs	46	27.0	25	23.0	25.0
Hepaticized lungs	35	20.0	22	20.0	20.0
Frothy exudative/lungs	23	13.0	19	17.0	15.0
Emphysematous lungs	12	7.0	16	15.0	10.0
Total	174	100	109	100	100

pathologic lesions in the lungs. Lung samples were sent for bacterial isolation in the Microbiology Diagnostic Laboratory. In all, data were obtained from 283 pathologic lungs samples from caprine and ovine species. For bacterial isolation, blood, Mack conkey and nutrient agar plates (Oxoid) were used. The plates were incubated aerobically at 37 °C for 24 h. Routine biochemical tests were also performed to characterize the bacterial isolates as described by Cottral (1965) and Cowan & Steel (1974).

Results

A total of 174 (61.5%) of pneumonia cases occurred in sheep out of 283 cases of small ruminant pneumonia in Zaria. Caprine cases recorded were 109 (38.5%). Table 1 shows the bacterial agent of ovine and caprine pneumonia in Zaria. The major bacterial agents for sheep and goats were *Escherichia coli* 72 (25.4%), *P. multocida* 42 (14.8%), *Staphylococcus aureus* 36 (12.5%), *Streptococcus pyogenes* 20 (7.0%), *Pseudomonas aeruginosa* 5 (1.8%), *Klebsiella pneumoniae* 5

(5.5%) cases in June to 15 (13.8%) in August, and declined in March with 4 (3.7%) cases. Table 3 shows the annual distribution of pneumonia cases in Zaria. The ovine pneumonia was high in 1987 and 1990 with 25 (22.9%) and 23 (21.1%) cases, respectively.

Table 4 shows the gross pathologic lesion associated with ovine and caprine pneumonia in Zaria. Congestion of the lungs was the most pathologic lesions observed. Fifty eight (33.0%) cases were found in sheep and 27 (25.0%) in goats. Other pathological lesions observed in this study were consolidated lungs, 48 (27%) and 25 (23%) cases in sheep and goats, respectively. The frothy exudation/edematous lungs were lowest in the goats as compared to sheep.

Discussion

The commonest bacterial agents isolated of ovine and caprine pneumonia in the present study were *E. coli*, *P. multocida*, *S. aureus*, *S. pyogenes*, and *C. pyogenes*. They were the same as observed by Abubakar *et al.* (1981) and Adekeye (1984). The isolation of more *E. coli*, *S. aureus*, *C. pyogenes* and *P. multocida* associated with caprine and

ovine pneumonia seems to confirm the suggestion of the greater involvement of these organisms as the causative agents (Belshner, 1976; Blood & Radiostic, 1989).

It was formerly thought that these organisms might live outside the animal body, however, it is now believed that their habitat could also be the upper respiratory tract and they invade the lungs and the blood stream when the body's defensive mechanisms have broken down. Whether a virus plays any part in the susceptibility to bacterial infection is still a matter of discussion (Durojaiye *et al.*, 1983).

Ojo (1971) found that the incidence of pneumonia was highest in small ruminants during the rainy season in the southern part of the country. The findings were contrary to this study. The highest incidence of pneumonia was recorded in January, which is the peak of the harmattan season in Zaria. It is suggested that during dry season, the dusty, dry harmattan wind increases irritation of the respiratory tract, preparing the ground for microbial infection. The condition may be aggravated by stress due to lack of feed or inadequate feed. Slight incidence of pneumonia recorded at the beginning of the rains (April to May) in Zaria (Table 2), may be due to chilling, and the resultant rapid fall in temperature predisposes the respiratory tract to infection (Al-Tarazi & Daghall, 1997). The fact that total pneumonia cases in both sheep and goats were highest in January in this study suggests that small ruminants raised within the same locality may be equally susceptible to harsh, cold dusty, and dry harmattan which is severe in this month (Blood & Henderson, 1983; Belshner, 1976). The results confirm findings by Ojo (1971) and Marsh (1965) that rainstorms, heavy rainfall and dry harmattan are important stress factors in the pathogenesis of pneumonia of sheep and goats in the United States of America.

The gross pathologic lesions observed were very similar in the goats and sheep except that emphysematous lungs were more in goats (15%) than the sheep (12%). The role of different bacteria agents in pneumonia cases and their associated pathological lesions were very similar in sheep

and goats. However, management factors may be important in ovine and caprine pneumonia in Zaria. Further detail investigation is needed in this area.

It should be noted that bacterial pneumonia may not only cause some losses in sheep and goats in Zaria alone but probably throughout the world, looking at the pathologic lesions associated with these agents. The losses can be greatly reduced if the disease is noticed early and appropriate treatment is instituted. Routine deworming during the rainy season and good husbandry practices should be encouraged.

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