

## A SURVEY OF KAROO TICK PARALYSIS IN SOUTH AFRICA

A. M. SPICKETT and HELOISE HEYNE, Veterinary Research Institute, Onderstepoort 0110

### ABSTRACT

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Recent research interest in Karoo tick paralysis and its vector, *Ixodes rubicundus*, prompted this survey to determine the economic implications of this disease. The survey indicated relatively high losses caused by the condition, identified the stock involved and provided data on the incidence of paralysis and on the control methods employed. Recommendations are made to institute chemical control earlier in the season to attempt better containment of the problem.

### INTRODUCTION

Karoo tick paralysis in South Africa affects primarily sheep in the distributional area of the tick, *Ixodes rubicundus*, hence its initial citing in 1890 as ovine tick paralysis (Neitz, Boughton & Walters, 1971). It also affects goats, some antelope species and also cattle (Stampa, 1959; Neitz *et al.*, 1971).

Extensive studies have been undertaken on *I. rubicundus* in the past, mainly to establish its distribution (Theiler, 1950) and host range (Stampa, 1959). These studies have also made considerable contributions to our knowledge of this tick's biology and ecology (Stampa & Du Toit, 1958; Stampa, 1959), as well as in clarifying its laboratory life cycle (Neitz *et al.*, 1971). *I. rubicundus*, however, still remains the vector of Karoo paralysis by virtue of default, i.e., the fact that removal of all *I. rubicundus* present on an affected animal leads to its recovery (Stampa & Du Toit, 1958), plus the coincidence of the condition with the distributional area of *I. rubicundus* (Theiler, 1950).

Recent research interest in the tick and the condition led us to conduct a survey, primarily to establish the present extent of the problem, and its economic implications.

### MATERIALS AND METHODS

Survey questionnaires were drawn up comprising questions requiring direct answers, multiple choice answers and questions requiring an assessment or judgement.

Direct questions related to the farmer's name, locality and type of stock farming practised. Multiple choice questions were aimed at establishing—

- (1) the extent of the problem, both geographically and with regard to the type of stock affected;
- (2) the seriousness of the problem in terms of the stock affected; and
- (3) the type and efficacy of control methods used to combat the problem.

Estimations and/or judgements were requested to enable us to attempt determinations of—

- (1) the cost of the control methods involved;
- (2) the cost of stock losses attributed to Karoo paralysis;
- (3) topographical factors associated with the problem;
- (4) climatic factors related to the incidence of Karoo paralysis; and
- (5) the seasonal incidence of Karoo paralysis.

Initially, 200 questionnaires were dispatched to each State Veterinarian. Questionnaires returned *in toto* by State Veterinarians stating that no paralysis problems occurred in their areas were not included in the final

analysis. Questionnaires mistakenly reporting spring lamb paralysis as Karoo paralysis were easily identified by the difference in seasonal occurrence and were not included in this analysis. Requests for additional questionnaires from affected areas were granted *ad lib*. Both positive and negative returns from areas stated to experience Karoo paralysis problems were entered onto a database for later recovery and analysis.

### RESULTS AND DISCUSSION

Returns positive for Karoo paralysis from within the known distributional area of the condition accounted for 77.3 % of the total of 1 200 questionnaires returned for analysis. Current research activity on *I. rubicundus* resulted in an active interest being generated amongst farmers with more forms subsequently being requested particularly from the Fauresmith area than from the other areas. This may distort general results to some extent, although this area is well within the problem zone. Thus the percentage positive properties per area may be affected but not estimations on other parameters.

#### Distribution

The distribution of *I. rubicundus* was originally mapped by Theiler (1950) and updated by Howell, Walker & Nevill (1978) Fig. 1 the positive returns for Karoo paralysis are superimposed on this distribution. The main focus of the condition is still centred on the southern parts of the Orange Free State and in the heart of the Karoo, as reported by Stampa & Du Toit (1958). Positive records of the condition, implying the presence of the vector, were consistently received to the south-west of the previously known distributional area of *I. rubicundus*, and spreading into the Murraysburg, Aberdeen and Jansenville areas. The Cradock area, to the south of the vector's known distributional area, also reported outbreaks of Karoo tick paralysis. These were later confirmed by identification of the ticks involved as *I. rubicundus*. Positive reports of paralysis from the Sutherland, Worcester and Montagu areas indicate an eastward spread of the tick from the previous foci. Along the north-eastern boundary of the vector's distribution negative returns indicate an absence of further spread in a north-easterly direction. Previously it was suggested that the spread of typical karroid vegetation (Acocks, 1975) would be accompanied by an increase in the vector's range (Stampa & Du Toit, 1958).

The southern and south-westerly spread of the condition in the Eastern Cape districts and its westerly incidence in the Western Cape districts could be due to veld degradation caused by factors such as drought combined with over-grazing.

#### Relative importance

Stampa (1959) mentioned a loss of 10 000 sheep from 3 areas in the Karoo during 1951. Survey estimates of stock losses from 1983-1987 (Table 1), indicate that the condition is of relatively high economic importance.

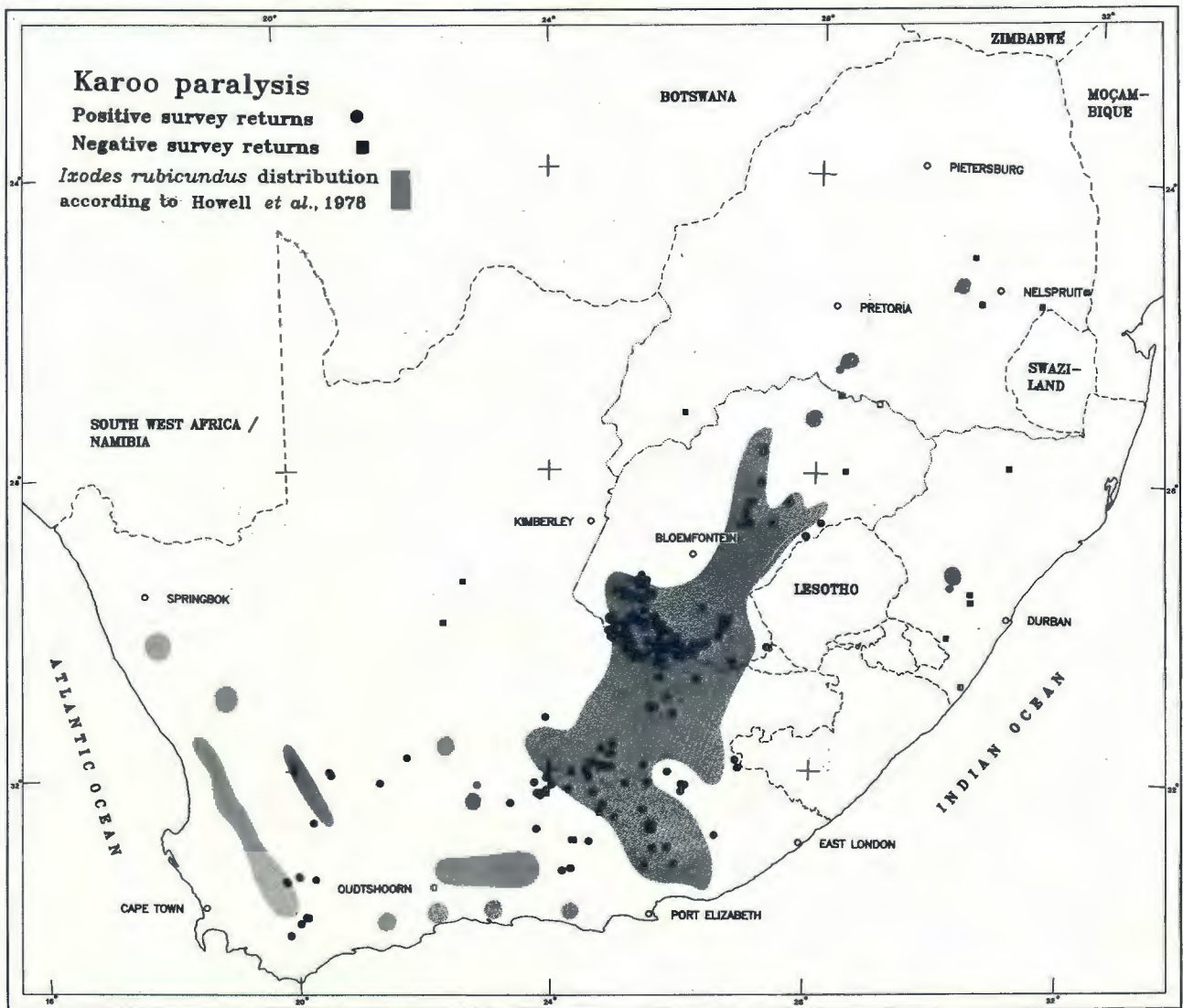


FIG. 1 Distribution of *I. rubicundus* (Howell, Walker & Nevill, 1978) and Karoo paralysis associated with the tick

TABLE 1 Estimations of stock losses caused by Karoo paralysis

| Year | Stock lost to paralysis |        |
|------|-------------------------|--------|
|      | Sheep*                  | Total  |
| 1983 | 25 123                  | 27 730 |
| 1984 | 23 840                  | 26 314 |
| 1985 | 22 904                  | 25 281 |
| 1986 | 32 823                  | 36 229 |

\* Calculated as 90,6 % of the total

Fig. 2 displays the relative effect of Karoo paralysis on the major economic stock units of this farming area. Although sheep (90,6 %) form the major component, the high prices of Angora goats and mohair cause concern about the losses experienced. Discussions with producers also indicate that increased management effort has undoubtedly contributed to keeping these losses at a low level.

In this area cattle were sometimes regarded as being of secondary economic importance (2,8 % losses) and sometimes tertiary importance (4,8 % losses). Game forms a tertiary natural resource, with 9 % losses estimated in this category. Game losses cited were mostly those of blesbok (*Damaliscus albifrons*) and springbok (*Antidorcas marsupialis*) with one doubtful mention of ostrich. The effect on game is generally not regarded as

being economically important but it causes concern in the maintenance of the tick population.

Despite considerable losses, stock farmers ranked the paralysis tick as only the 3rd most important problem in their area, after pulpy kidney and internal parasites (Fig. 3). This suggests inefficient use of the available

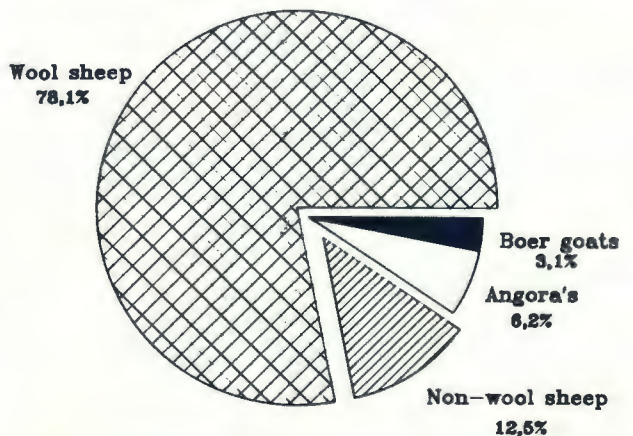


FIG. 2 Relative effect of Karoo paralysis on the major economic stock units

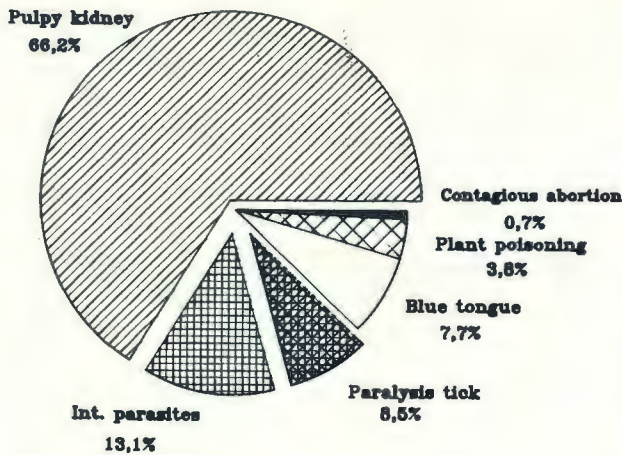


FIG. 3 Importance of Karoo paralysis relative to other problems experienced in the affected area

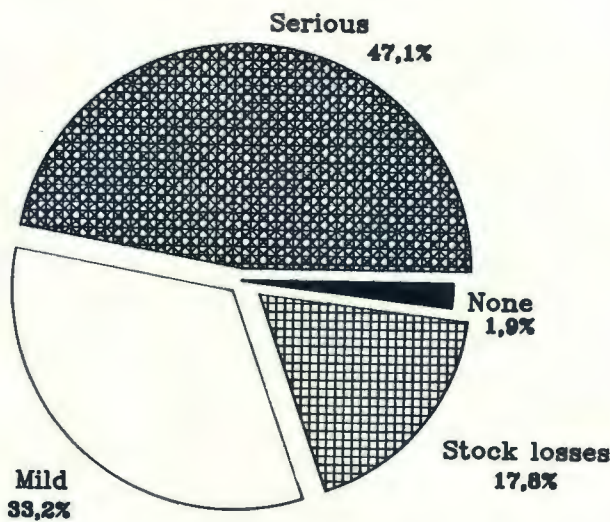


FIG. 4 Degree of importance attached to Karoo paralysis by farmers in the affected area

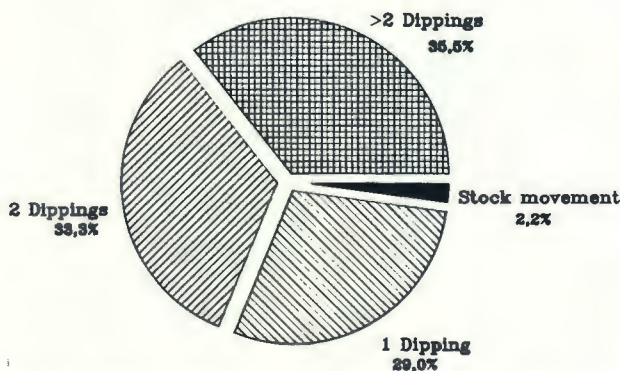


FIG. 5 Frequency of control measures practised against Karoo paralysis

pulpy kidney vaccine. Although tick paralysis was ranked only 3rd in disease importance 47,1 % of the returns suggested the problem as serious: 17,8 % of farmers still suffered losses and only 1,9 % did not regard Karoo paralysis as a problem at all (Fig. 4).

The high regard for the condition as serious probably reflects the increasing management input necessary to contain the problem.

### Control

All producers who gave a positive return for Karoo tick paralysis practise some form of control. The control measures practised are almost all chemical (97,8 %), commencing mostly in March (60 %) but differing in the number of applications during the tick season (Fig. 5). It is interesting that on only 4,1 % of the returns, all from farmers who dipped more than twice, was it stated that these measures were ineffective in controlling the condition.

On the other hand, 100 % stated that losses would have been extremely high if no control measures had been used. This apparent satisfaction with existing control measures, which is in contrast with perceived losses, might indicate acceptance on the part of the producers of the sacrifice of animals to a condition that has prevailed in the area for almost a century.

The small percentage of farmers who did not use chemical control (2,2 %) (Fig. 5) made use of stock movement to avoid infested camps during the tick season.

Estimates of the cost of control measures employed gave a mean of R604,48 per property per season or R0,47 per small stock unit per season.

### Incidence

Producers stated that paralysis occurs from February until as late as October with most cases experienced during March (61,2 %). This agrees closely with Stampa (1959), who showed that females were active from February to October with peak numbers during May. The tendency is for most producers to start dipping in March, to coincide with the onset of paralysis. We suggest, though, that female tick numbers must start to increase on animals in early February, well before the onset of paralysis.

It is therefore recommended that producers should commence chemical control early in February, with a 2nd application towards the end of this month, in order to prevent the build up of peak female numbers later. This would possibly minimize the occurrence of paralysis. It would also contribute to population control of the tick by negating ovipositing females early in the season, thus preventing a proportion of the larval hatch and ultimately reducing the number of available adults during the next season. Problems encountered when animals are treated in winter might also be relieved to some extent.

The extremely close interaction between the tick and its environment (Stampa & Du Toit, 1958; Stampa, 1959) was confirmed by the fact that the vast majority of survey returns associated paralysis with specific environmental (93 %) and climatic (77,4 %) conditions. Environmental conditions listed included specific vegetational types, i.e. *Rhus erosa* and *Danthonia disticha* veld (64,2 %), and veld left ungrazed for 3-4 months (50 %). Only a small percentage (3,6 %) associated the tick with dolerite ridges and the southern slopes of ridges.

Climatic factors associated with the incidence of paralysis incidence also confirmed the findings by Stampa (1959), i.e. sudden cold in the form of frost and snow (72 %) as well as heightened humidity caused by rain (52 %). A previously unassociated factor given in survey returns has the occurrence of warmer weather during winter (16 %). This may, however, be a perception rather than a direct observation, some producers linking the incidence to the relatively warmer weather following a cold period that occurred a few days before the onset of paralysis.

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