

Perceived causes, diagnosis and treatment of babesiosis and anaplasmosis in cattle by livestock farmers in communal areas of the central Eastern Cape Province, South Africa

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ABSTRACT

Perceived causes, diagnosis and treatment of redwater (babesiosis) and gallsickness (anaplasmosis) in cattle by livestock farmers in communal areas of the central Eastern Cape Province were investigated by means of participatory methods, semi-structured interviews and a questionnaire survey. Most livestock owners relate the causes of these diseases to excessive grazing of lush green grass, which is thought to bring about an accumulation of bile in the body. The majority of livestock owners diagnose gallsickness and redwater on the basis of presenting signs and *post mortem* findings. Eighty nine percent of a total of 343 livestock owners participating in the study claimed to administer herbal remedies to treat the 2 tick-borne diseases; 75 % of these combine herbal remedies with conventional medicines and 25 % use herbal remedies only. Application of herbal remedies was reportedly aimed mainly at the removal of excess bile. However, some plant species used to prepare herbal remedies are reported to possess activities ranging from anti-inflammatory, analgesic, antimicrobial, anti-pyretic and purgative, and may be effective in the treatment of gallsickness and redwater. A lack of understanding of the causes and transmission of gallsickness and redwater, leading to ill-directed treatment, and widespread deviation from the directions of use when administering conventional medicines, were identified as problems that could be addressed by farmer training and the supply of appropriate information.

Key words: anaplasmosis, babesiosis, cattle, central Eastern Cape Province, communal areas, herbal remedies, treatment.

Masika P J, Sonandi A, Van Averebeke W **Perceived causes, diagnosis and treatment of babesiosis and anaplasmosis in cattle by livestock farmers in communal areas of the central Eastern Cape Province, South Africa.** *Journal of the South African Veterinary Association* (1997) 68(2): 40–44 (En.). Farming Systems Research and Extension Unit, ARDRI, University of Fort Hare, Private Bag X1314, Alice, 5700 South Africa.

INTRODUCTION

Extension officers serving in the rural areas of central Eastern Cape Province identify tick-borne diseases, including gallsickness (anaplasmosis), redwater (babesiosis) and heartwater (cowdriosis), as the secondmost important cause of morbidity and mortality amongst cattle in communal areas, malnutrition being the main cause. Several authors have reported that small-scale livestock farmers in the central Eastern Cape perceive redwater and gallsickness to be problem diseases in cattle^{5,20,23}. The occurrence of heartwater, although prevalent in the region, is rarely mentioned by local livestock owners. Conventional

medicines to treat gallsickness and redwater are available locally, but informal discussions with livestock owners and extension officers suggested that the use of herbal remedies was still a widespread practice in the area. Little is known about the efficacy of herbal remedies in the treatment of livestock diseases, but there is evidence that some of the plants used may be effective against various disease conditions⁹. At the end of the 19th century, Smith¹⁹ observed that local herb preparations administered to cattle developing a disease condition thought to be caused by the eating of 'bad grass', produced results far in advance of European medicines available at that time.

The objective of the current study was to assess the perceived causes, diagnosis and treatment of babesiosis and anaplasmosis in cattle by livestock farmers in the communal areas of the central Eastern Cape Province.

MATERIALS AND METHODS

The study was conducted in 7 districts in the central Eastern Cape Province, namely Victoria East, Keiskammahoek, Middledrift, Zwelitsha, Mdantsane, Peddie and Stutterheim (Fig. 1). The target group consisted of livestock owners who produce cattle on communally managed rangeland.

The investigation was conducted in 3 phases. In a preliminary investigation, the objectives of the study were addressed by means of a farmer-friendly approach to data collection. Matrix ranking, diagramming and group interviews, which form part of the rapid rural appraisal (RRA) family of techniques⁶, were used to elicit information from a total of 138 participants. The RRA sessions were conducted at Mqaba Kulile and Pewuleni (Middledrift district), and Gwaba and KwaTyutyu (Zwelitsha district). Most appraisal meetings were organised to coincide with livestock inspection or dipping days.

The results of the appraisal meetings provided the authors with a general idea of the main issues affecting health management in local cattle herds. During the 2nd phase of the study, information obtained in RRA meetings was expanded by conducting semi-structured interviews with 145 individual livestock-holding households at Qqumashe (Victoria East district), Durban, Feni and Fair View (Peddie Extension) (Peddie district), Upper Gxulu (Keiskammahoek district), Macibini (Zwelitsha district) and Kubusi (Stutterheim district). RRA meetings and semi-structured interviews were conducted during the period April to July 1995. The data obtained during the 1st 2 phases were used to develop a questionnaire, which was pre-tested for content validity and reliability before it was presented to 60 individual livestock-holding households at 5 sites consisting of 1 or 2 locations. The test sites were Makuzeni and Kwezana (Victoria East district), Koloni (Middledrift district), Zanyokwe and Burnshill (Keiskammahoek district),

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Received: January 1997. Accepted: May 1997.

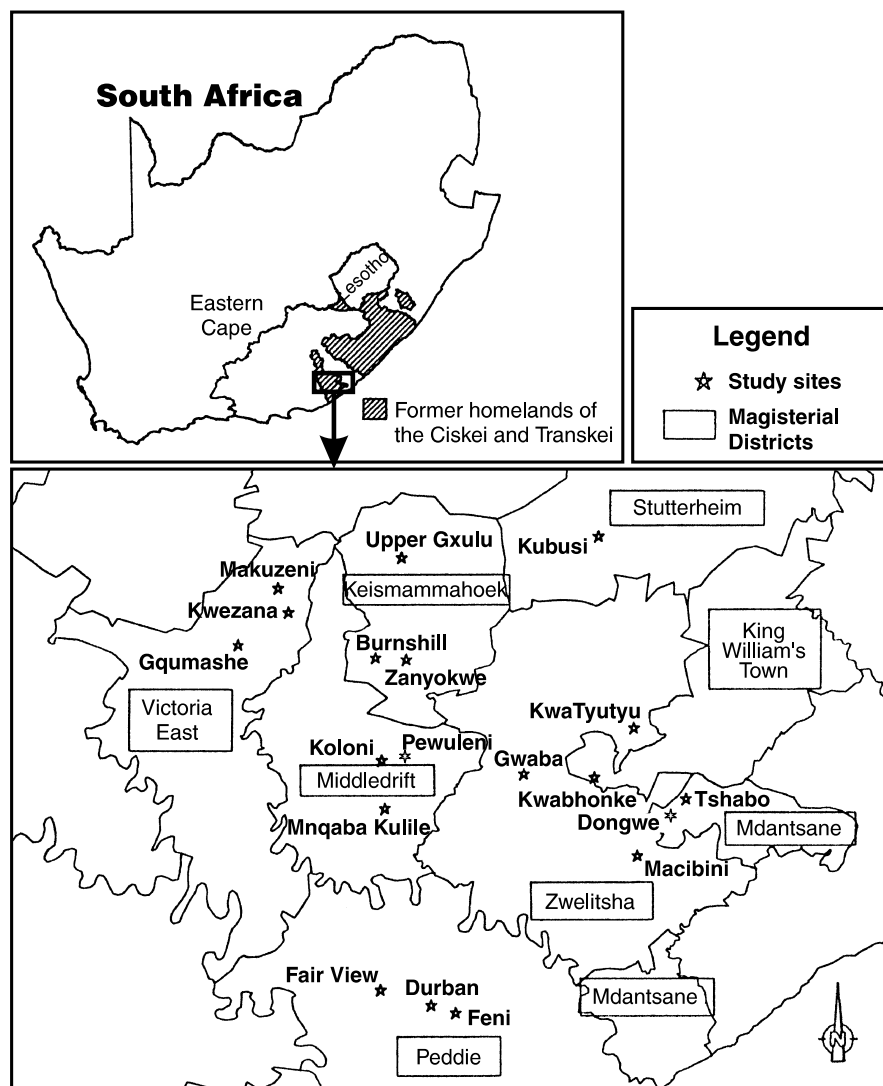


Fig. 1: Map of South Africa (top) showing the location of the Eastern Cape Province and the former homelands of Transkei and Ciskei, and the districts and locations where the study was conducted (bottom).

Kwabhonke (Zwelitsha district), and Tshabo and Dongwe (Mdantsane district). None of the respondents to the questionnaire had previously participated in the RRA meetings or semi-structured interviews. The questionnaire survey constituted the 3rd phase of the investigation. It enabled the authors to obtain quantitative data, free of bias introduced by group dynamics, which may affect similar data obtained using RRA techniques⁶. Responses to the questionnaire were analysed using the computer programme NWA Statpak, version 3.2 (North West 2 Analytical, Portland, Oregon). Potential respondents to the questionnaire were identified as being owners of high and densely-woven holding pens. Experience had shown that such holding pens were used almost exclusively for cattle. The owners of these holding pens were visited individually,

and asked if they were willing to respond to the questionnaire. In each of the 5 target areas this procedure was repeated until 12 responses had been obtained. The survey was conducted during October and November 1995. The data presented below refer to the questionnaire survey only.

RESULTS AND DISCUSSION

Main causes of cattle mortality as perceived by livestock owners

The most important causes of cattle mortality identified by farmers are shown in Fig. 2. Farmers regard diseases as the main cause of mortalities, followed by hunger, because most livestock are lost during drought periods, when food supply is limited. Farmers report diseases, especially tick-borne diseases, to have the

greatest impact during spring and summer and much less impact during autumn and winter. The converse applies for drought-related hunger, which is most prominent during the dry winter season, when availability of herbage reaches a low, often exacerbated by the practice of winter veld burning.

Most common cattle diseases as perceived by livestock owners

Livestock owners perceive tick-borne diseases in cattle to be of major importance, especially gallsickness and redwater, but not heartwater (Fig. 3). This may be due to the prevalence of the clinically inapparent form of heartwater, which is difficult to diagnose under field conditions¹, or because farmers do not know the presenting signs of this disease in cattle. It is also possible that cattle in the communal areas have well-developed immunity against heartwater, and a state of endemic stability may prevail, which would result in few clinical cases being observed.

Most farmers believe redwater and gallsickness to occur simultaneously in the same animal. Concurrent infections of anaplasmosis and babesiosis may occur¹⁷, but are not the norm.

Farmers use the term 'gallsickness' for a range of ailments associated with one or more of the following conditions: jaundice, distension of the gallbladder with bile, and lesions of the liver. At times diseases such as redwater, heartwater and mixed infections of these diseases are all referred to as 'gallsickness'¹¹. As a result incorrect diagnoses are thought to be common.

Perceived causes of gallsickness and redwater

Most farmers in the communal areas associate the occurrence of gallsickness (anaplasmosis), an arthropod-borne rickettsial disease¹⁷, and redwater (babesiosis), a tick-borne protozoan disease⁸, with a range of other causes, as shown in Fig. 4. The majority of respondents stated gallsickness to be caused by excessive consumption of lush green grass, which typically occurs a few weeks after good spring rains have fallen. Only 2 % of the respondents identified ticks as the cause of gallsickness in cattle. Relating gallsickness to eating of grass is not as far-fetched as it may at first glance appear. Many years ago a similar case occurred in England, where farmers thought that abortion in their ewe flocks was connected with the presence of carrion crows¹⁰. Farmers then perceived abortions to be caused by the birds frightening the sheep.

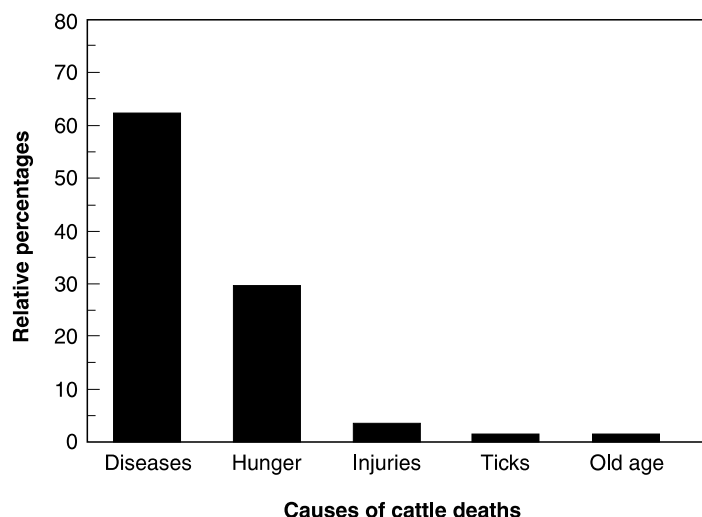


Fig. 2: Perceived causes of cattle mortality.

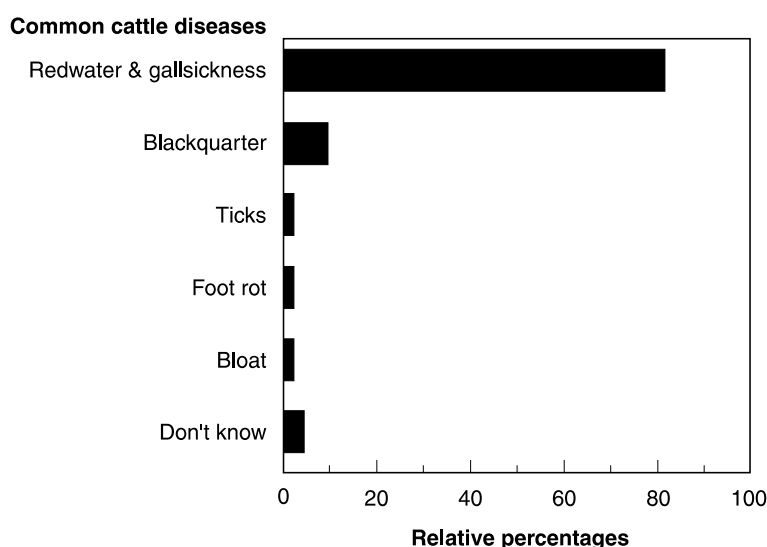


Fig. 3: Most common diseases of cattle as perceived by farmers.

It is now known that sheep may abort because of infection with the bacterium *Vibrio fetus*, and that this organism is often found in the intestines of crows. As a result, these birds may be the source of infection in isolated flocks of sheep¹⁰, and thus indirectly involved in causing abortion. A similar indirect relationship exists between lush growth of grass and the occurrence of anaplasmosis. In central Eastern Cape Province, most active growth of grass occurs during the period October to March, when the availability of soil water reaches a maximum¹³, and temperatures are sufficiently high to permit rapid leaf and stem elongation⁷. The period of active growth of grass coincides with the period during which tick numbers reach a maximum, causing cattle to be exposed to a high

tick challenge. Grass provides a suitable microhabitat for ticks to survive and multiply¹⁸. Low winter temperatures result in synchronisation of egg development and hatching, and warming of the weather during spring results in the presence of high numbers of larvae on the pastures¹⁶. As a result, the exposure of cattle to a high tick challenge and active growth of grass occur more or less simultaneously. This has led to the perception amongst farmers that eating of lush green grass by cattle results in anaplasmosis. Some of the other perceived causes of gallsickness and redwater are animals eating insects and spiders attached to the grass, especially early in the morning. This is one of the reasons why many livestock farmers do not let their stock out to graze before 9:00–10:00, although fear of

predators such as jackals is another reason why animals are released late in the morning.

In the case of redwater, a larger number of farmers (12 %) identified ticks to be associated with the disease than was the case for gallsickness (2 %). The perception of lush green grass consumption as the cause of disease was not as strong for redwater, with only 8 % of respondents associating it with the occurrence of the disease. Failure to vaccinate animals with herbs is thought by 2 % of the respondents to lead to the disease. A large number of farmers (42 %) claim not to know its cause.

Symptoms and diagnosis used by farmers

The majority of livestock owners diagnosed gallsickness and redwater on the basis of presenting signs and on *post mortem* findings. As has been shown elsewhere in Africa, the knowledge of ethno-veterinarians closely parallels conventional veterinary approaches with respect to the diagnosis of livestock diseases using clinical symptoms and *post mortem* signs²¹.

Generally, symptoms used by farmers to diagnose redwater are constipation, red urine and loss of appetite. Staggering, moving in circles and head-shaking are taken to be signs of gallsickness. These symptoms form part of a range of signs, namely anaemia, icterus, emaciation and nervous signs for gallsickness, and anorexia, depression, anaemia, icterus and dark urine for redwater, by which the respective infections can be identified^{2,12}. In addition to using visual signs, farmers rely on *post mortem* findings to confirm their diagnosis of redwater and gallsickness. A *post mortem* examination is not performed for the sake of making a diagnosis, but forms part of dressing the carcass for consumption. *Post mortem* changes that the farmers associate with redwater are an enlarged gall bladder, bloody urine, yellowish tinge of the carcass and a yellowish and soft liver. In the case of gallsickness, an enlarged gall bladder and yellowish intestines are reported. These *post mortem* findings are not pathognomonic for gallsickness, but they agree with some of those reported by several authors^{2,12,17}. The yellowish tinge of the carcass, which is due to icterus, leads farmers to conclude that excessive bile in the animal's body is the pathogenesis of these diseases.

Despite farmers using red urine to diagnose redwater infection, red urine may be absent in some redwater infections¹¹. Nervous signs, for example

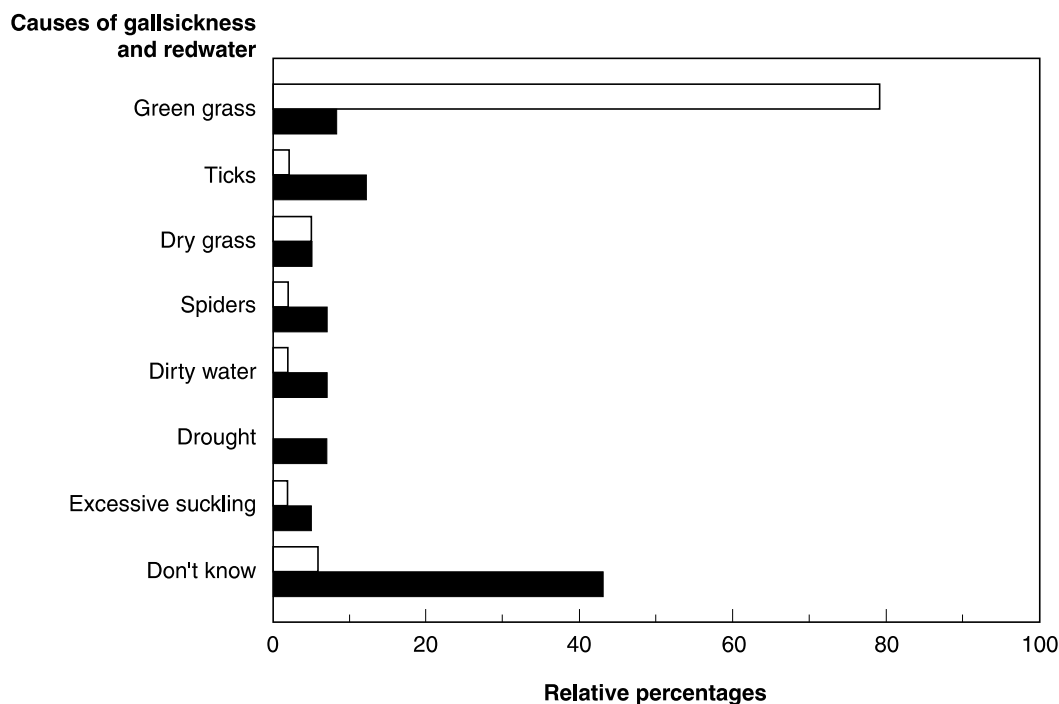


Fig. 4: Perceived causes of gallsickness (θ) and redwater (v).

hyperexcitability, are used by farmers to diagnose gallsickness, as also reported by Blood *et al.*², but redwater patients and patients with acute heartwater also exhibit nervous signs¹². There is a high probability that such animals suffer from mixed infection, since outbreaks of gallsickness and redwater may occur concurrently¹⁷. Confirmation of a diagnosis is possible only when clinical signs and *post mortem* findings are complemented by examination of blood smears and by serological and transmission tests².

Treatment

The majority of respondents (89 %) make use of herbal remedies to treat redwater and gallsickness (60 % of all respondents use a combination of herbal and conventional remedies and 29 % rely on herbal remedies only). Six percent of respondents apply conventional remedies only and 3 % claim never to have treated their cattle for these diseases. A small proportion (2 %) of respondents do not know how to treat these diseases.

Many respondents consider it dangerous to administer both herbal remedies and conventional remedies at the same time, and recommend administering herbal remedies after the conventional remedies. At KwaTyutyu and Koloni, respondents reported cases of deaths that they attributed to simultaneous application of herbal and conventional remedies.

The majority of respondents (60 %)

believe that the pathogenesis of redwater and especially gallsickness is due to the accumulation of bile in the body. This perception concurs with the observations by Bryant⁴ and Ngubane¹⁴ that perception of the aetiology of many human ailments also determines treatment, and that most common ailments are believed to be caused by an excess of bile, which needs to be removed. As in humans, the treatment given to animals perceived to be suffering from gallsickness and redwater is aimed at removing excess bile from the animal's body and relieving fever and pain (Holani, Stutterheim, pers. comm., 1995^a).

An enlarged gall bladder and icterus support the belief that bile accumulates in the bodies of animals suffering from these diseases.

The plants most often used to treat redwater and gallsickness vary in their recorded effects. These range from purgative in the case of *Teucrium capense*, *Kedrostis africana*, *Hypoxis* spp.²² and *Eucomis undulata*³, analgesic in the case of *Heteromorpha trifoliata* (T G Fourie, Noristan, pers. comm., 1995), to antimicrobial e.g. *Plectranthus* spp. (T G Fourie, Noristan, pers. comm., 1995). *Salix capense* is recorded to possess anti-pyretic activity²². Some of the plant combinations used by farmers appear to be carefully selected.

^aHolani from Kubusi, Stutterheim, is one of the herbalists that participated in the study.

For example, the use of a combination of *Salix* spp. and *Hypoxis* spp. possibly assists in reducing the animal's high body temperature, caused by fever, which is symptomatic of both diseases^{8,17}, and in correcting the gastrointestinal disturbances, such as ruminal stasis and constipation, which are typical symptoms of gallsickness¹⁷. A combination of *H.trifoliata*, which possesses both anti-inflammatory and analgesic activity (T G Fourie, Noristan, pers. comm., 1995), and *Cussonia spicata*, which possesses anti-inflammatory activity (T G Fourie, Noristan, pers. comm., 1995), may both relieve pain and stress in the animal. Despite these plants having different activities that could benefit the animals symptomatically, their efficacy against the causative organisms of redwater and gallsickness has not been proven. Several of the plants possessing antimicrobial activity, for example *Melia azedarach*, *Olea* spp., *Tulbaghia alliacea*²² and *Plectranthus* spp. (T G Fourie, Noristan, pers. comm., 1995) may be effective remedies in the treatment of these tick-borne diseases.

CONCLUSION

Tick-borne diseases, especially redwater and gallsickness, are present in the study area, and are considered by local farmers to be the main infectious causes of cattle mortalities. Although heartwater, another tick-borne disease, is said to be prevalent in the area, farmers consider it less impor-

tant, especially in cattle. Redwater and gallsickness are perceived to be caused by eating of green grass, especially at the beginning of the rainy season in spring, but very few farmers associate ticks with the 2 diseases. A lack of understanding of the causes and transmission of gallsickness and redwater, leading to ill-directed treatment and widespread deviation from the directions of use when administering conventional medicines, are problems that could be addressed by farmer training and supplying appropriate information.

The majority of farmers use herbal remedies to treat their cattle, most often in combination with conventional drugs. Some of the plants used in the preparation of herbal remedies are known to produce certain beneficial effects, and the combination of plants used in the remedies indicates that farmers possess intimate knowledge of the activities of plants. It follows that verification of the effectiveness of the different herbal remedies used by farmers to treat gallsickness and redwater may yield useful results. Little has been published on the efficacy of ethno-veterinary remedies and practices. There is a need for further analysis in order to identify, select and test practices that may be suitable for development as effective remedies.

Training of farmers and ensuring the availability of appropriate information enabling farmers to obtain good understanding of the causes and treatment of diseases prevalent in their areas, is an important task that could be undertaken by governmental extension services and other agents active in communal areas.

This in turn will enable farmers to realise better economic returns from their livestock enterprises.

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