Epidemiology, surveillance and control of the principal infectious animal diseases in Africa *

N. BIZIMANA **

Summary: The author presents detailed information on traditional methods, the majority of which remain in use, for the recognition, prevention and treatment of the principal infectious diseases prevalent on the African continent. The information provided relates to the observations and practices of peoples in three main regions, namely West, East and Southern Africa. Data are presented for ten diseases of major importance, with the widest range of practices being recorded for the control of foot and mouth disease, rinderpest and anthrax.

KEYWORDS: Africa – Animal diseases – Traditional medicine – Veterinary medicine.

INTRODUCTION

Over the centuries, animal herders in Africa have learnt much about animal diseases, and a great variety of treatment has been attempted. This knowledge concerns nearly all domestic animals and has been passed on by word of mouth from generation to generation. Some of this information is available to all herders, while some remains restricted in the form of jealously-guarded family secrets.

The author presents information on observations and practices related to the principal infectious diseases prevalent on the African continent. The data are drawn from populations in three main regions – namely West, East and Southern Africa – and are arranged, somewhat arbitrarily, in accordance with the order adopted for Lists A and B of the Office International des Epizooties. Wherever possible, details are provided on the history of the disease, followed by occurrence, causes, clinical signs, diagnosis, prevention, treatment, lesions observed post-mortem, and prognosis.

Animal herders and healers always attempt to differentiate between the various diseases, principally according to symptoms. In all pastoral societies, a separate name is given to each disease, but in many cases different diseases may be thought to be the same, or a symptom common to various diseases may be taken for a disease in its own right.

Diseases are diagnosed by palpating, listening, looking and smelling; the latter is said to be especially useful in the case of trypanosomosis in camels, as the smell of the sick animals is typical of the disease. Other techniques may also be used, such as wrinkling the skin.

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Certain diseases, such as rinderpest, are known to be transmissible, and sick animals are placed in quarantine. In addition, herdsmen often flee with healthy animals to areas where the disease has not been reported. However, in the case of diseases such as anthrax, which can be transmitted from animals to humans, the danger is not always known and the disease may be spread accidentally by the consumption of contaminated meat.

In the case of particular diseases, specific material measures may be undertaken in an attempt to prevent occurrence. Ticks are removed, dew is avoided, or the animals are fed medicinal plants.

Traditional vaccinations are also important. These are performed as a protection against foot and mouth disease in various animals, against contagious bovine pleuropneumonia, rinderpest and bovine pasteurellosis in cattle, against pox and orf in sheep, and against contagious caprine pleuropneumonia in goats.

Before a vaccine is used, the virulence of the pathogenic agents may be reduced in various ways. For example, the material used for the vaccine may be allowed to age or to dry; it may be diluted with water or milk; or it may be exposed to the sun or allowed to rot. Astringent substances may also be added to the vaccine, to slow the rate of absorption.

Material forms of treatment employ natural products. African healers may use the entire body of a creature, such as a termite, or they may use only parts of its body. Other remedies may utilise various types of soil and plants. Some of this knowledge is obtained by studying the behaviour of animals. For example, plants used in the treatment of snake-bites may include some plants which snakes themselves consume after skirmishing.

In addition to these older methods, surgery (e.g. bone-setting, obstetrics and rumen trocarisation) is also known among Africans. Some special forms of surgery include scarification, blood-letting and cauterisation. The latter is used for almost every disease and is thought to heal any complaint.

Table I provides a list of the peoples mentioned below and the countries/regions which they inhabit.

**FOOT AND MOUTH DISEASE**

**Occurrence**

In the border area between Mauritania, Mali, and Senegal, foot and mouth disease (FMD) is said to occur in the seasons of *ndungu* (rainy season, from mid-July to mid-October) and *dabbunde* (cold season, from December to February), affecting cattle, small ruminants and wild animals such as warthogs (*Phacochoerus aethiopicus*). The disease also seems to be more common in rainy years (2).

Nomadic Animal Health Auxiliaries (NAHAs) in Somalia say that FMD affects sheep and goats of all ages during the wet seasons *gu* and *dayr* (4).

**Cause**

In the border area between Mauritania, Mali and Senegal, FMD is believed to be transmitted by wild animals (2).

The Tuareg in central Niger do not know the cause of the disease, but one herder mentioned poor rains as a factor (31).
TABLE I

African peoples inhabiting various countries/regions

<table>
<thead>
<tr>
<th>Name</th>
<th>Country/region</th>
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<tbody>
<tr>
<td>Baggara</td>
<td>Central African Republic</td>
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<tr>
<td>Bantu</td>
<td>Central, East and Southern Africa</td>
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<tr>
<td>Banyarwanda</td>
<td>Rwanda, Tanzania, Uganda</td>
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<tr>
<td>Dinka</td>
<td>Sudan</td>
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<tr>
<td>Fulani</td>
<td>West Africa</td>
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<tr>
<td>Fulani-Fulbe</td>
<td>Guinea</td>
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<tr>
<td>Fulani-Mbororo</td>
<td>Central African Republic</td>
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<tr>
<td>Fulani-WoDaabe</td>
<td>Niger</td>
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<tr>
<td>Iteso</td>
<td>Uganda</td>
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<tr>
<td>Kikuyu</td>
<td>Kenya</td>
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<tr>
<td>Logoli</td>
<td>Kenya</td>
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<tr>
<td>Masai</td>
<td>Kenya, Tanzania</td>
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<tr>
<td>Moor</td>
<td>Mali</td>
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<tr>
<td>Pedi</td>
<td>South Africa</td>
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<tr>
<td>Samburu</td>
<td>Kenya</td>
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<td>Swati</td>
<td>South Africa, Swaziland</td>
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<tr>
<td>Tuareg</td>
<td>Algeria, Burkina Faso, Mali, Niger</td>
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<tr>
<td>Turkana</td>
<td>Kenya</td>
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<tr>
<td>Vugusu</td>
<td>East Africa (Kenya)</td>
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<td>Xhosa</td>
<td>South Africa</td>
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<tr>
<td>Zulu</td>
<td>Southern Africa</td>
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</tbody>
</table>

The Bantu in northern Kavirondo (Kenya) say that the disease in cattle is contagious and usually occurs after an injury to the foot (29). In Turkanaland, the floor of the kraal (animal enclosure) becomes muddy from dung and surplus water in the rainy season, and this is thought to cause the disease. Contaminated standing water is thought to cause the form of FMD which the Turkana refer to as *lojaal* (see ‘Signs’ below) (22).

**Signs**

In the border area between Mauritania, Mali and Senegal, the signs of FMD are described as follows: the animal becomes feverish and tired, and retires into the shade or into water (or water shaded by trees) to avoid heat, waiting for the weather to change before going to graze. The disease may affect animals one after another in the same stock, or may spread throughout the entire region. The lesions are blisters which are easy to open and are found on the tongue, feet and udder. Healing may take up to two years, especially in the case of exungulation (2).

The Tuareg in central Niger say that the disease in cattle is generally thought to be contagious. Signs include ulcers in the mouth and between digits, which may swell and become painful. Secondary complications include decreased suckling and grazing due to a sore mouth, and less time spent foraging due to lameness. The disease is seldom fatal, but may lead to death if animals are no longer able to eat (31).
The Fulani-Mbororo in the Central African Republic mention the following signs, which are similar to those described by other Fulani (2) and the Turkana (22): eruptions in the area of the mouth and the udder, and lesions between toes leading to lameness (20).

In Sudan, the Dinka say that spots and then blisters are to be found on the tongue, lips and gums of cattle, cracks are to be found between digits, and the animals pant. Cattle seldom die from the disease (28).

The Samburu describe the disease in cattle as follows: the affected animals initially give no milk, their hair stands on end, their eyes run and their mouths drool. The mouths of affected animals may also show signs of erosion and the animals eat little. They may also limp due to erosion between the hooves (J. Politz and J. Lekeleley, unpublished findings, 1988).

The Turkana mention the following signs: animals affected by the disease become crippled, as wounds develop between the hooves. When described as lojaala, the disease is said to arise in the mouth of affected animals. The teeth begin to fall out and the animals slaver profusely (22).

Herders in Burundi say that the main signs of the disease in cattle are fever, aphthae, interdigital lesions and hypersalivation (3).

Prevention

Inhabitants of the border area between Mauritania, Mali and Senegal think that it is wise to leave any infected area (2).

Among the Turkana, herders scrape the muddy surface of the ground and remove any mud and dung from the kraal. They also alter the position of the kraal within the village, or move the village itself when the ground becomes too sloppy. The Turkana may also perform aleiyat, an operation which involves slitting part of the skin at the throat of the cattle. This is said to work by allowing some ‘evil principle’ to leave the body together with the blood (22).

Treatment

The Tuareg in central Niger say that FMD is self-limiting, but some herders pack the lesions with butter or a mixture of manure and hot water (31). The powder of the leaves of Pennisetum typhoides is applied externally by herders in the area of Dosso (24).

Fulani in the north-western province of Cameroon treat the disease in cattle using the phytoparasite of Albizzia chevallerii (C. Ndi, unpublished findings, 1990).

The Samburu treat the disease in cattle as follows: as soon as the disease appears in the herd, a member of the Ltoijo clan is called, but not a moran (warrior), and milk is taken from a cow which has borne its first calf and has healthy teats. The milk is mixed with the same amount of water (for example 0.5 l of milk with 0.5 l of water), and the mixture is called ngarer. Then a small piece of the root of Cyperus kilimandscharicus is taken and added to the liquid. (This root is carried by most Samburu in their necklaces or snuff boxes because of its pleasant smell.) Then the member of the Ltoijo clan will spray the ngarer over all cattle in the morning and in the evening for four consecutive days. During the spraying, prayers are spoken. Leaves of Acacia nilotica are soaked in warm water, which is then used for washing the erosions and wounds (J. Politz and J. Lekeleley, unpublished findings, 1988).
Among the Bantu of north Kavirondo, there is no cure or treatment for the disease, but affected cattle are made to stand in water for as long as possible. It is said that the animals recover after between three days and one week (29).

In Kenya, the Turkana treat the disease in any species of livestock by smearing butter on the affected parts and placing the legs of diseased animals near the heat of a fire. They cut open the affected parts to squeeze out the pus, smear the butter into the cut and tie the hooves together with string. For lesions in the mouth (lojaala), Cissus quadrangularis is pulverised, put into water and drenched. Another form of treatment is blood-letting. Animals are bled in the same way as when blood is let for consumption. This blood is then consumed as usual. Recovery is said to be due to the escape of evil together with the blood. The Turkana may also perform aleiyat (22).

Herders in Burundi use the following plant preparations: the crushed stems and leaves of Amaranthus graecizans are mixed with butter, and sap is extracted and given to the animals to drink, as is sap from the leaves of Aspilia ciliata, Plectranthus barbatus, Distos tropae, Entada abyssinica and Lantana trifolia (3).

Stock-owners in Tanzania wash the hooves of sick cattle or goats with hot water and then rub the hooves with cattle urine (25). In cattle and other species, the disease is also treated using the rind of the root of Dichrostachys glomerata Chiov., both internally and externally (21). The Banyarwanda rub affected parts with the crushed leaves of a plant known locally as umuravumba (18; M.M.J. Minja, personal communication, 1990). In the Arusha and Kilimanjaro regions, use is made of the leaves of Adenia gummifera (Harv.), Dodonaea viscosa (L.) Jacq. and Solanum nigrum L., together with the leaves of Indigofera arrecta and copper sulphate. The most effective medicine is said to be Adenia gummifera (19).

Post-mortem

The Samburu find very little blood in the body of cattle and the stomach empty (J. Politz and J. Lekeleley, unpublished findings, 1988).

Prognosis

According to informants from the border area between Mauritania, Mali and Senegal, animals contract the disease but it is seldom fatal (2).

The Samburu say that the prognosis is good for adult cattle, but calves from three to five months of age are liable to die, and pregnant cows are likely to abort (J. Politz and J. Lekeleley, unpublished findings, 1988).

In Somalia, the disease in sheep and goats is said to be mild, and NAHAs found no fatalities. In one village, animals were immune following recovery (4).

**RINDERPEST**

**History**

During an interview with Bá, an old Fulani from the border region between Mauritania, Mali and Senegal said that this disease is a recent phenomenon, occurring for the first time in this area 'like a wind blowing from the east' when the informant was eight years old. No cattle of any age have been known to survive after contracting the disease (2).
The Tuareg in the Sahel remember rinderpest as a lethal disease which has been stopped by modern vaccination (5).

In East Africa, the disease first raged among cattle belonging to the Vugusu in 1911 and is said to have come from the Buhayo region (29).

In Uganda, the disastrous rinderpest outbreak of 1890 is still remembered as the first real date in Iteso history (13).

Rinderpest has occurred in the past in cattle in Burundi, but only very old people can remember this occurrence (3).

Occurrence

In the border area between Mauritania, Mali and Senegal, rinderpest now affects only animals under the age of three years (2).

Cause

The warthog contracts the disease by eating cadavers and is able to transmit the disease to other animals. However, the most dangerous carriers of the disease are the *Coli ci carvalli*, small birds which perch on cattle and feed on slime from the eyes and nostrils (2).

The Tuareg in central Niger realise that the disease is contagious but are unable to pinpoint the cause. Some feel that it may be due to internal parasites and poor nutrition (31).

The Dinka believe that rinderpest is contracted from dead giraffes and buffalo (28).

Some Turkana say that flies and ox-peckers (*Buphagus africanus*) transmit the disease from wild animals, such as buffalo, eland, giraffe and rhinoceros (22).

The Iteso believe that the disease is brought from the east by *Edeke*, the spirit of calamity, and indeed the term 'edeke' is synonymous with rinderpest (13).

Signs

The Fulani in the border area between Mauritania, Mali and Senegal say that the main signs of rinderpest are fever, profuse diarrhoea, ulcers in the mouth accompanied by foaming saliva, conjunctivitis with runny eyes, and rapid weight loss (2).

The Tuareg in central Niger say that rinderpest is a severe, acute, contagious disease. The main signs are an acute onset of bloody diarrhoea, a mild cough, runny eyes and nose, and oral and periorbital ulcers. Morbidity is very high but can be limited by isolating sick animals. Estimates of mortality range from 30% to 94%. The disease often causes animals to lie down and die within two or three days (31).

The Fulani-WoDaabe say that the main sign of the disease is diarrhoea, which has given rise to the name (*sabo*, *zoga*). The disease is accompanied by swelling of the mouth, runny eyes, drooling and pustules over the entire body (11).

According to the Dinka, affected cattle suffer from severe diarrhoea and loss of appetite. Their eyes become runny, spots appear on the gums and the lower lips, and the mouth becomes red. Most of the affected animals die (28).

The Samburu say that affected cattle attract flies, their coats darken, their hair stands on end, and some suffer from diarrhoea with reddish and foul-smelling faeces. The animals eat little and seek shade under trees, and their eyes are sunken and runny (J. Politz and J. Lekeleley, unpublished findings, 1988).
The Bantu of northern Kavirondo say that affected cattle shiver, their hair stands on end, water forms under the skin, and diarrhoea develops. The animals succumb rapidly and usually die within three days (29).

The Masai call rinderpest *ol odoa*, which means gall, as they regard the sickly change of the gall-bladder as the main manifestation of the disease (17).

The Turkana describe the disease as follows: the animals have very runny eyes and nostrils. They find it hard to breathe and tend to withdraw into the shade. Sometimes the coat is shed, which is a sign that the animals will recover. The following signs are recognised for the form of the disease which the Turkana refer to as *loutokonyen*: the animals have sunken eyes, shed tears, run at the nose and have diarrhoea. They breathe rapidly and their mouths have an unpleasant odour due to oozing pus. Affected animals die abruptly. The coats of animals which have recovered become mottled, as the fur falls out in patches. In the form known locally as *loleeo*, affected animals suffer from violent diarrhoea (22).

**Prevention and treatment**

The Tuareg practise a traditional form of vaccination. Nasal discharge and a piece of lung from an animal which has died of rinderpest are wrapped in a piece of cloth and buried in the sand for one or two days. An incision is made in the ears of healthy animals and a little of the prepared mixture is introduced under the skin (5).

The Fulani-WoDaabe merely separate the sick members of the herd from the healthy animals. The calves which are affected first are isolated on a separate piece of land, where they are given something to drink. However, in most cases, the calves are further suckled by their mothers, so the disease spreads. This isolation is only effective if there is no contact with wells or pastures (11).

The Dinka are similarly helpless in the face of rinderpest. If the disease is believed to be present nearby, they simply flee, taking healthy cattle with them and leaving sick animals behind (28).

Likewise, in Itesoland, there is no recognised native cure, although the pounded and boiled roots of *Fagara chalybea* (administered internally or externally), and soup made from leopard meat, are both thought to be beneficial (13).

In Kikuyuland, the use of the yellow water-algae ‘*gacenga*’ has been attempted as sympathetic magic, but with no success (14). The Vugusu have no treatment, merely separating the sick and healthy cattle. The Logoli claim that they have sometimes succeeded in curing animals by administering a concoction called *olunyasi luenombe*, which is made of pounded herbs (29). The Masai have no treatment for this disease. If an epidemic occurs in the neighbourhood, they move as far away as possible; and as soon as symptoms of the disease are seen in their own stock, the Masai continue fleeing, leaving the sick animals behind, as these are bound to die (17).

The Turkana usually perform *aleiyat*. An alternative to *aleiyat* for *loutokonyen* is to make sick animals drink infusions of *Euphorbia triaculeata*, but this seems to be ineffective. For *loleeo*, one of the following is pulverised, mixed with water and given to the animal: *Euphorbia triaculeata*, leaves of *Cadaba rotundifolia* or *Aloe* sp., or the ashes of *Salvadora persica*. The leaves of *Salvadora persica* are also given as an infusion in hot water (22).

The Somali in the north of the country have developed a form of vaccination using urine, faeces and milk from cattle suffering from rinderpest. This mixture is dribbled
into the nostrils of healthy animals. Although this practice has led to numerous outbreaks of the disease, the number of cattle lost has significantly decreased (27).

**Post-mortem**

The Tuareg in central Niger find various anomalies in cattle; one herder mentioned discoloured muscles, while another observed a bluish heart and grey lungs (31).

The Dinka say that the gall-bladder is much enlarged and that the mucosae of the intestines are necrotic (28).

Similarly, the Samburu find that the gall-bladder is enlarged and that faeces in the intestines are bloody. Much gas is contained in the small intestine, the contents being yellowish and foul-smelling (J. Politz and J. Lekeleley, unpublished findings, 1988).

In the form of the disease known as *loutokonyen*, the Turkana say that parts of the lung are swollen. These parts are cut out and thrown away, while the rest is considered fit for consumption (22).

**Prognosis**

In the border area between Mauritania, Mali and Senegal, animals are said to have more resistance to the disease outside the rainy season. Small ruminants are said to be less severely affected (2).

In Burundi, old herders remember that the disease is usually fatal. In some cases, 50% of the local herds died (3).

**CONTAGIOUS BOVINE PLEUROPNEUMONIA**

**Occurrence**

According to Tuareg herders in central Niger, contagious bovine pleuropneumonia (CBPP) usually affects cattle between the ages of one and four years (31).

The Turkana believe the disease to be prevalent in hilly areas (22).

**Cause**

The Fulani in the border area between Mauritania, Mali and Senegal are aware that the agent is to be found in the lungs of affected animals (2).

**Signs**

The Fulani in the border area between Mauritania, Mali and Senegal know that the disease is infectious and therefore have the following maxims: ‘*Yeelo hoto njeeddu*’ (‘avoid letting sick herds rest with healthy ones’) and ‘*jofe hoto njofdu*’ (‘avoid having sick and healthy animals dwell together’). They also say that the disease is indicated by fever, and dry and painful coughing which becomes stronger at night and in the morning. The animal stretches its neck, holding the head high; the nose is slightly runny, and the animal pants and is weary. The affected animal ceases grazing, and remains standing or lying in the shade. Recovery is rare but is followed by total immunity (2).

Tuareg herders in central Niger indicate that the disease is contagious, and that animals develop a severe and slowly progressive cough. They say that if the cough is
mild, the animal may recover; but affected animals usually live for up to a year following the onset of discernible symptoms and then die (31).

According to the Dinka, affected animals stand apart from the rest of the herd, seek shade, and face the wind with their heads lowered. They have a strong thirst, a tendency to emit a grunting sound and the brief, dry cough which is typical of the disease (awuok) and is unlike the other type of cough (roi) (28).

The Turkana say that affected animals withdraw into the shade. Furthermore, the animals foam at the mouth and their fur bristles up (22).

**CBPP** is well recognised by Somali cattle owners in the part of the country formerly under British control, and also by those Somali living in Ogaden (Ethiopia), to the south (15).

**Prevention**

In common with many other ethnic groups, the Fulani in the border area between Mauritania, Mali and Senegal practise a form of vaccination against CBPP. Affected lungs are removed and allowed to ferment for one or two nights in a mixture of bran or finely ground millet soaked in water, fresh milk and tanning extract from *Acacia nilotica*. On the day of vaccination, the operator cuts the lungs into small pieces which he places under a cut (two cuts are more effective) made in the skin at the front of the head. A violent inflammatory reaction usually results. On the third day, the foreign body is removed, the wound is washed and the surrounding area is cauterised (2).

This type of vaccination (called *loonal*) is more effective if performed during the season of *ceeDu* (warm, dry season, from March to May). A single vaccination lasts a lifetime. Some animals respond to the vaccine with a violent inflammatory reaction leading to the formation of a horn-like projection. The first Europeans in Senegal saw a number of such animals and believed them to be a new species with three horns (*Bos triceros senegalensis*) (Fig. 1). However, as with the other types of vaccination described, this technique may induce the disease. If this occurs, inflammation may affect the whole head. This happens especially in the cold and wet season and is invariably fatal (2).

Some groups of Moors in Mali immunise healthy animals by dipping a knife into the lung of an animal which has died of pleuropneumonia, and then making one or more cuts with this knife in the forehead of the healthy animal (23).

In Nigeria (7), and among the Fulani-WoDaabe in Niger (11) the same vaccination procedure is used. A small piece of diseased lung tissue taken from a dead cow is soaked in milk for two or three days. This is then implanted deep into a cut in the nose of a healthy cow. Later, the surrounding nasal tissue is cauterised to limit the spread of the disease. Occasionally, this vaccination results in death or severe deformation of the face of the animal. However, cattle which survive are said to be well protected.

The Baggara in the Central African Republic make an incision in the ear of healthy cattle and onto this they dribble lymph from the lung of a sick animal (27).

In Dinkaland, owners of cattle with an *awuok* cough are ostracised and forced to flee from the cattle camp, to ensure that the breath of their animals does not transmit the disease to other cattle (28).

The Somali in the part of the country formerly under British control use the following vaccination procedure: when an animal dies from the disease, a solid piece of affected lung is removed and buried, or is kept in a cool, shaded place for one or two days (the
Fig. 1

Post-vaccinal exostosis: a horny protrusion observed on the nasal bone of a zebu vaccinated with virulent pleuropneumonic lung tissue, according to the traditional procedure used in Mauritania

This skull corresponds to the falsely classified *Bos triceros* species


Length of time is variable, depending on the ideas of the individual and the journey time. In some cases, mainly in Ogaden (Ethiopia), the lung is used fresh. The chosen piece of lung is minced into pieces the size of maize grains and washed in approximately 1 pint (0.57 l) of water, to which is added 1/4 oz. (7.08 g) of salt. If water and salt are scarce, as is often the case, this washing is omitted. All the animals in the herd, except those with pneumonic symptoms, are cut on the face halfway between the eyes and the nostrils. The 1/2 inch (1 cm) cut is made down to the bone, and a piece of the minced lung is inserted. There is usually some local reaction, which takes three to five days to abate. From the fifth to the seventh day, the reaction proper is expected. When this occurs, the reaction tissue is excised radically, exposing the frontal bones over an area of 6 x 4 inches (15 x 10 cm). The boundary of the tissue to be removed is first demarcated by a line made with a hot iron. After the swelling (which constitutes the reaction) has been cut out in this manner, the periosteum on the exposed frontals is carefully and painfully scraped off. An iron at dull red heat is then passed over the wound, flush to the bone, and the edges of the skin are seared with care. Healing is naturally prolonged and Mares (15) has seen bare frontals one year after vaccination. When healing is complete, a small horny excrescence is left in the centre on the face; the presence of this enhances the value of an animal in good condition. If the wound becomes septic, major facial swelling occurs. This is treated by ‘line firing’ (15).

The method is unquestionably effective and the stock-owner will pay the vaccinator for performing the job. All the manipulations are performed in the cast position, even the initial skin incision. A rope is passed round horns and chest in half hitches and is
then taken to the hind fetlocks, which are tied together before pulling the animal over. Sometimes, the hind fetlocks are tied and the animal is cast by pulling only at this point and having a strong man at the head (15).

The Masai make several incisions into the underskin on the bridge of the nose of healthy cattle. This wound is then rubbed with a piece of lung, about the size of a fist, taken from a sick animal. This method was used on a large scale for the first time in 1890 (27).

**Treatment**

*Acacia nilotica* is used to treat CBPP in Dosso (Niger) (24).

Turkana herders press heated stones on the chest of affected animals. However, this measure is said not to be very effective (22).

**Post-mortem**

The Fulani in the border area between Mauritania, Mali and Senegal find exudation in the pleural cavity of cattle which have died from CBPP. They say that the affected lungs bear stains varying in colour from dark red to pale yellow, and are stuck to the chest wall by a whitish spongy mass of tissue. The meat is consumed without danger (2).

The Tuareg in central Niger find lesions similar to those found by the Dinka and the Fulani, also believing that the meat is safe to eat if the diseased organs are removed. The Tuareg also think that drinking the milk from a sick cow cannot cause disease in humans (31).

The Dinka find that the lungs are inflamed and discoloured, that they stick to the ribs, and that the pleural cavity has a highly unpleasant odour (28).

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**LUMPY SKIN DISEASE**

**Signs**

According to the Samburu, the hair of affected cattle stands on end, the mouth drools, and after three to four days many lumps appear on the skin (J. Politz and J. Lekeleley, unpublished findings, 1988).

**Post-mortem**

The Samburu say that lumps also appear in the flesh (J. Politz and J. Lekeleley, unpublished findings, 1988).

**Prognosis**

The Samburu consider the disease to be lethal (J. Politz and J. Lekeleley, unpublished findings, 1988).

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**AFRICAN HORSE SICKNESS**

**Treatment**

In Nigeria, African horse sickness accompanied by nasal catarrh is treated with a dry powder made from the fruit of *Solanum incanum*, which is blown through a tube into the nose (9, 21).
The Zulu and the Swati believe that if diseased horses are given a cold infusion of the rhizome of *Kaempferia* nr. *Kaempferia ethelae* Wood, this will provide some relief. However, this treatment is not regarded as either a cure or a preventive. Overdosage is said to stupefy the animal and to cause a deterioration in the condition (30).

**NEWCASTLE DISEASE**

**Treatment**

In Nigeria, Newcastle disease is treated by dipping *Lagenaria vulgaris* in drinking water, and allowing the entire flock to drink this. Another method is to use the bark of *Parkia filicoidea* in the same way (21).

In the regions of Arusha and Kilimanjaro (Tanzania), the stem of *Euphorbia candelabrum* Kotschy var. *candelabrum* is used, or the fruit of *Capsicum annuum* together with the leaves of *Iboza multiflora* (19).

In Zimbabwe, the leaves of *Cassia didymobotrya* or the latex of *Euphorbia matabelensis* are added to drinking water (6).

**ANTHRAX**

**Occurrence**

According to the Tuareg in the Sahel, anthrax in camels first occurs during the rainy season and the following season (5).

The Tuareg in central Niger say that the disease is fatal and contagious in sheep and goats, affecting weak and malnourished animals (31).

The Turkana claim that only camels are affected (22). However, the Kikuyu say that anthrax occasionally affects sheep and cattle, but never goats (14).

**Cause**

The Fulani in the border area between Mauritania, Mali and Senegal believe that the disease is caused by contaminated pastures (2).

The Tuareg in central Niger blame contaminated wells for the disease in sheep and goats (31), while the Tuareg in the Sahel think that these animals contract anthrax by lying on humid sand or eating large quantities of the fruit of *Acacia flava* or *Acacia arabica* (5).

Cattle anthrax is believed by the Dinka to be contracted from dead antelope and buffalo (28).

The Samburu believe that cattle contract the disease from the ground. Indeed, the disease is called *nokulupo*, which means 'coming from the ground'. They say that elephants and rhinoceros roll on the ground and rub against trees after contracting the disease. Cattle are then affected if they graze in these places (J. Politz and J. Lekeleley, unpublished findings, 1988). In Kikuyuland, it is traditionally known that the disease can be transmitted to humans through the consumption of the meat of animals which have died from anthrax (14).
In Somalia, old houses and thorn enclosures in good grazing areas are often known to harbour anthrax and are given the special name of *degel fadi*, which means literally ‘that which dwells in the dung’ (16).

Pastures infested with anthrax are known by herdsmen in Rwanda to cause the disease (1).

According to Merker (17), the disease which the Masai call *em buajangat* is lung anthrax and is caused by breathing in dust contaminated with anthrax spores.

**Signs**

The Fulani in the border area between Mauritania, Mali and Senegal describe the disease as follows: after one day of grazing, several cattle exhibit signs of colic. The animals become dejected, and bloating develops, with pain in the projection of the spleen on palpation. Diarrhoea may follow. Some animals develop a strong inflammatory reaction at the front of the shoulder. Death is usually rapid, but spontaneous remissions have occurred. The ailment is not contagious (2).

In the region of Fouta Djallon (Guinea), the Fulani-Fulbe describe the disease as follows: a dry mouth, a lack of urine, droppings and saliva, and difficulties in breathing as if the animal were suffocating. Black blood appears at the opening of the anus and the belly swells. Death occurs within one or two days, and the meat darkens rapidly. If the sick animal is bitten on the head by a tsetse fly, it becomes mad and bellows until death occurs (26).

The Tuareg in central Niger note the following signs in sheep and goats: trembling, coldness, weakness, and lack of appetite and thirst. After three days, the animals become emaciated, and death occurs within five days. One herder in the region lost 100 sheep through the disease in two months (31).

The Tuareg in the Sahel say that the main sign of anthrax in camels is swelling of the shoulder (5).

For the Dinka, the first signs are a swollen throat, muzzle and face, and bleeding from the nose and the anus. Death occurs suddenly (28).

The Samburu can diagnose the disease only after a post-mortem examination (J. Politz and J. Lekeleley, unpublished findings, 1988).

The Turkana say that, in affected camels, the front of the body from the chest to the belly (*atorob*) swells, as if full of water (22). They describe the disease in other species as follows: sores similar to burns erupt all over the body, and the animals die suddenly, bleeding from the nose, mouth, ears and anus. The blood of such animals is said to scar human skin on contact, and also to transmit the disease (22). In the form of the disease known as *lolewa*, animals die suddenly, suffering from violent diarrhoea. Another form typified by bloody diarrhoea is called *lookot*. However, according to Ohta (22), this disease may also be pasteurellosis.

**Diagnosis**

According to Curasson (8), camel breeders in various countries used to confuse anthrax, blackleg and pasteurellosis. The Algerians seem to perceive a difference between pasteurellosis and blackleg in camels, calling blackleg ‘*outsis*’ and
pasteurellosis ‘el guedda’ (8). According to Ohta (22), the disease in camels described by the Turkana may also be trypanosomosis.

**Prevention**

The Fulani in the border area between Mauritania, Mali and Senegal identify and avoid contaminated pastures, mostly in the mountain areas (2).

In the region of Fouta Djallon (Guinea), the Fulani-Fulbe believe that the disease kills animals because they have too little salt, so they administer salt as a preventive. Sea salt is used in preference to mineral salt, as only the former is considered able to act on the sense of taste, and to fatten and fortify the animals. The salt is mixed with soft loam taken from a nest of fully active termites, and diluted in water containing various powders made from medicinal barks and leaves. The resulting drink is given to bulls, calves, sheep and goats. Another preventive is to burn tarred linen and make healthy animals breathe the smoke (26).

In Samburuland, the carcasses of diseased cattle and the surrounding area are burned, and the camps or *manyattas* are abandoned. Subsequently, the area will remain uninhabited for several years. All neighbouring *manyattas* are also moved far away. The disease is reported to the authorities, and the elders are called to inspect the carcasses (J. Politz and J. Lekeleley, unpublished findings, 1988).

A traditional form of vaccination is practised against anthrax in Tanzania. Meat from sick animals (preferably from the part of the body most affected) is boiled for a day, then the boiled fluid is injected into the neck muscles (25). The ash from burnt *Acacia nubica* is also used as a preventive (25).

In the Transkei (South Africa), *Gasteria nitida* Haw. var. *grandipunctata* Salm-Dyck is a Bantu ‘anthrax plant’, which is eaten with anthrax-infected meat as a protection against infection. *Fagara capensis* Thunb. is used widely among Africans in South Africa to ‘disinfect’ anthrax-infected meat, either by boiling the leaves together with the meat or by drinking a leaf infusion after eating the roasted meat. The Xhosa use *Solanum nigrum* L. or *Withania somnifera* Dun. for disinfection (30). The Pedi use *Withania somnífera* Dun. to treat the meat of an animal which has died naturally or due to disease, including anthrax (30).

**Treatment**

In Dosso (Niger), a decoction of the roots of *Eragrostis tremula*, or the leaves and bark of *Momordica balsamina*, is used to treat anthrax in ruminants (24).

To treat the disease in camels, the Tuareg in the Sahel mix a red clay called *tamasgeyt* with sheep milk, and pour the solution into the nostrils of the sick animal. The foam of sheep milk is also spread onto the swollen areas in affected camels (5). Treatment in sheep and goats involves blood-letting scarification at the tip of tail, the nose and the ears (5).

The Turkana press heated branding irons onto the swollen area of affected camels, and feed one of the following materials to the animal: boiled goat meat which is roasted first without skinning; pulverised *Euphorbia triaculeata* mixed with water; or a soup made with boiled, uncleansed donkey intestines. This disease is said not to be very serious, killing few camels. Camels affected by anthrax in the dry season are said to recover after suffering diarrhoea caused by fresh grass eaten at the beginning of the rainy season (22).

Another treatment used by the Turkana in several species is to sprinkle the dried and powdered leaves of *Acacia tortilis* over sores on the skin. However, this is said only to
cure the sores and not to be effective against the disease itself, as most of the animals die despite treatment. Another of the putative cures used by the Turkana is to slit the throat of the animal, releasing with the blood the evil spirit which causes the disease. No treatment is known for the form of the disease known as *lolewa* (22).

In Somalia, charms are used in an attempt to treat the disease, along with cauterisation of the swollen glands (16).

In Rwanda, the pounded leaves of *Colocasia* sp. and viper carcasses are used in fumigation of cattle (1).

In parts of East Africa, an infusion of the leaves of *Croton pseudopulchellus* is given to sick cattle (12, 25). A decoction of the roots of *Solanum mauense* is given to sick humans and animals (12).

The Masai give sick cattle an infusion of *ol gitelegi* mixed with a little milk (17).

*Blepharis integrifolia* is used to treat various species in Southern and East Africa (30; M.M.J. Minja, unpublished findings, 1990).

The following plants or preparations are used for the treatment of anthrax in various species in Tanzania: *Embelia* sp.; a decoction of the root of *Cadaba farinosa* Forsk. is administered orally, together with fresh blood or honey to make this more palatable; a cold infusion of the leaf of *Faurea arborea* Engl. is used for what is thought to be pulmonary anthrax; a decoction of the roots of *Solanum mauense* is used to treat humans and animals; pounded parts of *Erythrina abyssinica* are used to provide a vapour in treating *yamo*, a general term for diseases such as anthrax; and the fresh juice of the leaves of *Withania somnifera* Dun. is applied to the anthrax pustules (25).

South Africans treat cattle using a decoction of the leaf of *Clutia heterophylla* Willd. with *Aloe* sp. and *Ptaeroxylon obliquum* (30).

**Post-mortem**

The Fulani in the border area between Mauritania, Mali and Senegal find that the hypertrophied spleen of affected cattle is full of blood, like an engorged tick. If the disease has lasted for quite a long time, the spleen is almost entirely composed of blood, and this is totally released after the incision of the capsule. The gall-bladder is hypertrophied and distended, and the intestines are dark green (2).

The Tuareg in central Niger find that the blood of affected sheep and goats is very dark, and the meat is bright red with an unpleasant taste (31).

The Dinka note a very enlarged spleen in cattle, which has a black appearance if cut. Subcutaneous haemorrhages occur throughout the body, and dark, clotted blood is found in most organs (28). Anthrax is thought not to be a danger to humans, so the carcass is dissected, cooked and eaten, as are the carcasses of nearly all cattle (28).

According to the Samburu, affected cattle show the following signs: watery and bloody discharge from the anus and the nose; the liver and blood are black; the kidneys are full of blood which does not clot; if the spleen is removed and buried 10 cm deep in the ground, the organ soon swells and raises the covering soil (J. Politz and J. Lekeleley, unpublished findings, 1988).

According to the Turkana, blood clots are found under the skin and in the heart and stomach of affected animals after death. The liver and kidneys are hypertrophied. In the case of *lookot*, blood clots are found under the hide, in the flesh and in the intestines (22).
Prognosis

The Somali know that this disease is usually fatal, so they kill for food any camel showing severe symptoms. In spite of this dangerous habit, the incidence of anthrax in humans and animals is not high (16).

RABIES

Occurrence

Herders in the border area between Mauritania, Mali and Senegal say that rabies is a severe disease in dogs, and is the most dangerous zoonosis. The rural population take this disease particularly seriously, as it threatens their own lives and that of their animals. Rabies outbreaks occur while female dogs are in heat, generally during the seasons of ceettel (the gap between the end of the grazing period and the beginning of the rainy season, from June to mid-July) and dabbunde (cold season, from December to February). All male dogs in the region chase after the females and fight over them (2).

Signs

Herders in the border area between Mauritania, Mali and Senegal suspect any odd behaviour of dogs at this period, even if signs typical of rabies are absent. Typical signs are exhaustion with much weight loss, fury, increased salivation, and flight from or biting of other animals and human beings. Victims of bites begin to behave in the same way and die (2).

Prevention

These herders kill all dogs in the area and any domestic animals which have been bitten by them or show the same symptoms (2).

BRUCELLOSIS

Signs

The main signs of brucellosis described by the Fulani-Mbororo in the Central African Republic are swelling of the joints (hygromas) and abortion (20).

Treatment

Dombeya goetzenii is used as a treatment for brucellosis in Rwanda (10).

CONTAGIOUS CAPRINE PLEUROPNEUMONIA

Occurrence

The Fulani in the border area between Mauritania, Mali and Senegal say that contagious caprine pleuropneumonia (CCPP) occurs in all seasons. The disease also affects sheep, but principally occurs in goats and is highly contagious in the latter species (2).

The Kikuyu describe CCPP as a fatal disease affecting the lungs of sheep and goats, which is able to destroy entire flocks unless appropriate precautions are taken (14). The Turkana say that the disease occurs mainly on hilly land (22).
The NAHAs in Somalia say that CCPP occurs mainly in the extremely dry seasons. Scarcity of forage forces herders to move their flocks into neighbouring areas. This means that far more animals than usual are kept together, and infections are more easily transmitted. NAHAs have observed the disease principally in animals over two years of age and seldom in animals less than one year old (4).

**Signs**

The Fulani describe CCPP as follows: the disease begins with a worsening of the general state of health, and the hair stands on end. The animals drool, their noses run with yellowish-green mucus, and they cough. Signs persist for nearly forty days without any marked loss of appetite or thirst. Some cases are noted with bloating and aphonia. The affected animals die when the purulent nasal discharge becomes abundant (2).

The Samburu note pneumonia with a cough in goats (J. Politz and J. Lekeleley, unpublished findings, 1988). The Turkana say that affected animals tend to withdraw into the shade, their mouths foam and their fur stands on end (22).

**Prevention**

A traditional form of vaccination is known among the Kikuyu: an animal which is already affected and is dying of the disease is slaughtered, and the affected lungs are excised. A cut is then made on the nose of every animal in the flock, and the skin is turned back to allow a small piece of lung to be inserted under the skin and make contact with the blood. On the third day, the wound is opened. the scrap of lung is removed, and the wound is bathed with hot water and allowed to heal. It is believed that animals thus treated do not contract the disease, or at least not fatally (14).

The NAHAs in Somalia say that the disease control and preventive measures favoured by herdsmen consist in separating the sick animals from the healthy by having them graze at separate places far apart. Owners of healthy flocks try to avoid areas which are thought to harbour the disease. A traditional form of vaccination is also reported, similar to that which is used in East and West Africa to prevent CBPP. Briefly, tissue containing CCPP lung lesions is rubbed or inserted into cuts made between the eyes and nostrils of healthy goats. The traditional vaccination procedure is thought by stock-owners in these areas to be an effective means of prevention, but some scientists ascribe the acquired immunity to natural recovery (4).

**Treatment**

The Fulani in the border area between Mauritania, Mali and Senegal combine the methods used to treat hurko (pasteurellosis?), sometimes with good results (2). Hurko is a disease described in small ruminants in this region. The Fulani treat the nasal form by injecting brine into the nose, and this is said to cure the disease. To treat the pulmonary form of hurko, the healer shuts the mouth and one nostril of the animal, and blows into the other nostril, striking the rib-cage, mainly on the affected side. The coryza and the content of the bronchi are subsequently excreted. If the treatment is performed sufficiently early, mucus or a bloody mucopus emerges and healing ensues. The healer also cauterises the animal, making one or two symmetrical vertical lines which join in the area of the withers. Despite these treatments, the disease may recur in future cold seasons (2).

The Samburu slaughter affected animals if they consider that there is no chance of recovery (J. Politz and J. Lekeleley, unpublished findings, 1988). In Kikuyuland, one herder mentioned the following treatment: a potion is made by boiling njahi beans for a long time, and the water used in boiling is given to the sick animal to drink (14). The
Turkana press heated stones on the chests of affected animals. However, this measure is said not to be very effective (22).

The traditional method of treatment for CCPP in Somalia is the faith-healing practice of Koran reading (4).

**Post-mortem**

The main post-mortem finding of the Fulani in the border area between Mauritania, Mali and Senegal is that the lungs 'stick to the ribcage like cheese': intercrossing whitish vessels containing water extend from the ribcage, forming a tree-like structure in each affected and enlarged lung (2).

The Turkana find the hypertrophied lungs to be stuck to the ribs and find clots of blood around the heart and lungs (22).

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**ÉPIDÉMIOLOGIE, SURVEILLANCE ET PROPHYLAXIE DES PRINCIPALES MALADIES ANIMALES INFECTIEUSES EN AFRIQUE.** - N. Bizimana.

**Résumé:** L'auteur décrit de façon détaillée les méthodes traditionnelles, dont la plupart sont encore utilisées, pour le diagnostic, la prévention et le traitement des principales maladies infectieuses en Afrique. Les observations et pratiques qu'il rapporte, sont celles de peuples appartenant à trois grandes régions d'Afrique : occidentale, orientale et australe. L'auteur fournit des données sur dix maladies très répandues, en rapportant notamment les pratiques utilisées pour lutter contre la fièvre aphteuse, la peste bovine et la fièvre charbonneuse.


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**EPIDEIMIOLOGÍA, VIGILANCIA Y CONTROL DE LAS PRINCIPALES ENFERMEDADES ANIMALES INFECCIOSAS EN ÁFRICA.** - N. Bizimana.

**Resumen:** El autor describe detalladamente los métodos tradicionales que casi todos aún se usan en África para el diagnóstico, prevención y tratamiento de las principales enfermedades infecciosas. La información que ofrece se refiere a las
prácticas y a los conocimientos empíricos de los pueblos de África occidental, oriental y austral. Los datos atañen a diez enfermedades mayores; las prácticas que más ampliamente se conocen son aquellas que son utilizadas para el control de la fiebre aftosa, la peste bovina y el caruneco bacteridiano.

PALABRAS CLAVE: África – Enfermedades infecciosas – Medicina tradicional – Medicina veterinaria.

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