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# The Maasai ethnodiagnostic skill of livestock diseases: a lead to traditional bioprospecting

**J. O. Ole-Miaron**

Abstract
A survey study was conducted on the ethnoveterinary knowledge of the *Ilkisonko* Maasai of Kenya. The data on the ethnodiagnostic skills of livestock diseases was gathered using a well-structured questionnaire. The result show that the *Maasai* rely not only on symptoms of diseases but also on vectors of disease, season effects and species affected by a particular malady. The *Ilkisonko* Maasai use 18 medicinal plant species to combat the diseases positively diagnosed. It is concluded that, the Maasai ethnodiagnostic skill is the bases of their traditional bioprosecting techniques.
**Author Keywords:** Maasai; Diagnostic skills; Livestock diseases; Bioprospecting

## 1. Introduction

The Maasai who depend solely on livestock for subsistence have developed impressive traditional procedures to select genetically sound livestock that survive in their harsh environment. In addition, they have a well-established ethnoveterinary practice to cure and control livestock diseases. This practice is based on a deep indigenous knowledge of their environment (Ole-Miaron, 1997). This knowledge acquired through observation, palpation and auscultation of sick livestock evolved into an ethnodiagnosis procedure, which could be a major contributor to the Maasai traditional bioprospecting skills.

Prior to the discovery of organic chemistry in the 19th century, 80% of all medicines were obtained from plant materials. In Africa, herbal medicine is particularly popular and is estimated that 80% of the population resort to traditional medicine to treat human and livestock diseases. The African tradition lacks written records and one may wonder as to how traditional healers acquire knowledge of plants with medicinal value. Ethnobotanical studies reveal that the indigenous knowledge of a community is a key player in the identification of medicinal plants and such plants have been often tested by generations of indigenous people (Cox; Tabrah; Makhubu and Ole). This indigenous knowledge is passed on orally from one generation to the next and occasionally within a family constitute the basis for traditional bioprospecting. Traditional bioprospecting form the foundation for ethnomedicine ( Sindiga et al., 1993) and ethnoveterinary practice ( Ole-Miaron, 1997). Traditional bioprospecting is often the lead to new herbal product development. For a very long time modern bioprospecting, which depends on scientific analysis has preyed upon traditional bioprospecting to benefit the pharmaceutical industry.

In the Maasai inhabited regions of Kenya, ethnoveterinary bioprospecting field surveys has been conducted (Ole-Miaron, 1997). These activities are focused on the discovering of new anthelmintics of plant origin to combat anthelmintic resistance in livestock ( Waller, 1997). There is a very high probability of discovering new medicines from these bioprospecting activities because, the Maasai ethnoveterinary practice is well developed and compares favorably with modern veterinary practice ( Ole-Miaron, 1997). The Maasai ethnoveterinary medicine depends on an elaborate indigenous knowledge of disease diagnostic procedure and medicinal plants. This paper discusses the ethnodiagnostic skills of the Maasai and medicinal plants used in the treatment of common livestock diseases.

## 2. Data acquisition

A well-structured questionnaire (open-ended interviews and guided dialogue technique) was used to interview 274 Maasai. In addition, the direct observation approach as described by Etkins (1993) was used. The criteria for the choice of the participants and the study area were described previously ( Ole-Miaron, 1997). The survey team was made of a veterinarian who doubled as the translator, a laboratory technologist, trained field assistants recruited from the local Maasai community and a community leader. The interviews were conducted in the Maasai language. The respondents were interviewed in the local '*Manyattas*' (homesteads). Briefly, they were asked about their livestock disease diagnostic procedures and treatment. Medicinal plant specimens were collected, pressed and transported to the University of Nairobi Herbarium for identification.

## 3. Results and discussion

### 3.1. Maasai diagnostic skills

Symptoms of disease, knowledge of known vectors of livestock diseases, season effects of disease outbreak and species affected by specific diseases are important tools of the Maasai traditional disease diagnostic procedures. Individuals who are constantly in contact with the animals are the first to detect the initial symptoms of disease. Forty seven percent of the respondents (livestock owners) of the people interviewed confirmed that they detect the first symptoms of illness in their herds. An equal number agreed that herds-boy detects the first symptoms, but only 6% agreed that women could detect disease symptoms. Table 1 shows the symptoms the Maasai associate with livestock disease. The prevalent diseases in the study area have been discussed previously (Ole-Miaron, 1997).

Table 1. The symptoms the Maasai associate with livestock diseases as a percentage of respondents (*N*=274)

| | ECF | Anthrax | Trypano-somosis | FMD | MCF | Helmithiasis |
|---|---|---|---|---|---|---|
| Fever | 2 | 6 | *NR* | *NR* | *NR* | *NR* |
| Coughing | 6 | 8 | 15 | *NR* | 14 | *NR* |
| Piloerection | 54 | 44 | 54 | *NR* | 58 | 33 |
| Loss of appetite | 6 | 9 | 4 | 50 | 7 | *NR* |
| Swollen glands | 29 | *NR* | *NR* | *NR* | 21 | *NR* |
| Diarrhea | 4 | 13 | *NR* | *NR* | *NR* | 21 |
| Lameness | *NR* | *NR* | *NR* | 100 | *NR* | *NR* |

NR, none reported; ECF, east coast fever; FMD, foot and mouth disease; MCF, malignant catarrhal fever.

The obvious lack of agreement between the Maasai disease diagnosis and modern veterinary medicine in some cases such as lack of fever in East Coast fever (ECF) and anthrax is probably due to lack of traditional instruments to quantify raise in body temperature of animals. ECF is an acute disease of cattle characterized by high fever, swelling of the lymph nodes, emaciation, and high mortality rate caused by *Theileria parva*. The disease is a very serious problem in East and Central Africa. From Table 1, it appears that for the Maasai, piloerection is an important indicator of the health status of livestock. In some cases such as Foot and Mouth Disease (FMD) the diagnosis based on lameness agrees favorably with the modern veterinary medicine. FMD is an acute, highly contagious, viral disease of the cloven-hoofed domestic and wild animals. It is characterized by vesicular lesions and subsequently by erosion of the epithelium of the mouth, nares, muzzle, feet, teats, udder and rumen pillars. Morbidity and mortality are highest in the young. There is no known cure but vaccination is applied as a control measure. The Maasai do not base their disease diagnosis on the symptoms alone but also on known vectors of disease, season of disease outbreak and the livestock species affected by the diseases ( Table 2). For centuries, the Maasai were convinced that the wildebeest is a silent carrier of the Malignant Catarrhal Fever (MCF) causative agent. They have no known traditional cure for MCF, but they keep their cattle strictly away from the wildebeest during their calving season. This precautionary measure is based on the deep indigenous knowledge of the course and the vectors of MCF. MCF is an acute, generalized infectious disease of cattle, buffalo, deer and antelope characterized by low morbidity and extremely high mortality. Clinical signs include high fever, cataarhal, mucupurulent inflammation of the upper respiratory system and meningoencephalitis. The disease has no known cure. The Maasai associate ticks (*ilmasher*) with ECF, dust (*Enterit*) with anthrax, tse tse fly (*olkimpai*) with trypanosomiasis. Liverflukes (*Osingiri*), MCF and FMD are considered to be waterborne diseases (Table 2). The Maasai differential diagnosis of hemoparasitic infections is rather poor, Cowdriasis and anaplasmosis are lumped together with ECF. This is an acceptable limitation arising from the fact that the Maasai rely heavily on clinical manifestation of diseases to make a diagnosis. The seasonal outbreak of diseases is an important diagnostic tool for the Maasai. They associate anthrax with the dry season (62 vs. 38%). FMD and MCF are associated with the wet season ( Table 2). Incidences of these disease conditions are known to increase during the wet season. Helminthosis occur throughout the year.

Table 2. Maasai knowledge of known vectors of livestock diseases, seasonal effects and species affected as a percentages of the respondents (*N*=274)

# VETERINARY_MASSAI

NR, none reported; ECF, East Coast fever; FMD, foot and mouth disease; MCF, malignant catarrhal fever.

The Maasai knowledge on the species affected by a particular disease condition does not greatly deviate from the published information in veterinary books (Table 2). The Maasai ethnoveterinary practice is deeply rooted in their livestock disease diagnostic skills which, forms the basis for the treatment of animal diseases. The indigenous knowledge on diseases is orally passed on from one generation to the next and especially from the elders to the young. Currently the fast disappearing *ilterito* age-set (octogenarian) are the most experienced custodians of this knowledge. Globally, traditional knowledge on medicinal plants is fading away due to the loose of the octogenarians who die with their knowledge of medicinal plants unrecorded (Cox, 2000). Traditional healers rely on visual, audio and tactile senses to establish a diagnosis and on rare occasions post-mortem examination is employed to confirm cause of death of an animal. Despite a rather poor knowledge on differential diagnosis, the Maasai ability to diagnose livestock diseases accurately compares favorably with that of a modern veterinarian ( Ole-Miaron, 1997). From this study, it is evident that the Maasai utilize various techniques/informations for disease diagnostic purposes. The Maasai lack the conventional knowledge equivalent to classify disease causative agent into viruses, bacteria and fungi. Worm infestation is usually confirmed visually. This limitation did not stop them from developing relatively effective herbal remedies to cure livestock diseases.

3.2. Herbal therapy

The Maasai possess the necessary indigenous knowledge on herbal therapy used to treat both human and animal maladies. Due to the deep environmental knowledge of their ecosystem, the Maasai are self-made ethnobotanists who can name virtually every plant found on their land (Ole Lengisugi et al., 1996). The ethnodiagnostic skills allowed the Maasai to couple livestock diseases to herbal remedies leading to the development of a reliable traditional bioprospecting system. Traditional bioprospecting which requires no scientific analysis but the indigenous knowledge of a community is often a lead to new herbal preparation development by local communities ( Makhubu, 1998). The *Ilkisonko* Maasai identified 18 key plants used in the treatment of the prevalent diseases found in the study area (Table 3). The Maasai utilize the roots, bark, wood and leaves of the plants in Table 3 to prepare herbal medicines used in the treatment of livestock diseases. The common method of extracting medicine is through soaking or boiling. Apparently the active ingredients of most of these herbal plants though not identified are thermostable.

Table 3. Medicinal plants used in ethnoveterinary medicine in the study area

# VETERINARY_MASSAI_2

3.3. Description of some medicinal plants

**3.3.1. *Clausena anisata* (Willd) Benth**
A shrub 1–2 m high. It is found along the banks of rivers. The leaves are crushed and fed to livestock suffering from endoparasite infestation.
**3.3.2. *Cissus quadrangularis* L**
A 1 m high plant found along river banks. The plant sap (latex) has oxytocin-like activity so when placed in the vagina the 'milk let down' reflex is initiated. The roots are also boiled and given to cattle suffering from East Coast fever.
**3.3.3. *Kigelia africana* (Lam) Benth**
A tall tree, the bark and fruits are boiled and extract used as remedy for gastroenteritis in calves.
**3.3.4. *Solanum hastifolium* Dunal**
A shrub 1 m high, found in dry lands. Is a rare plant. The roots are boiled and the extract is administered per os as a remedy for anthrax and black quarter it is used particularly against the latter.
**3.3.5. *Kedrostis foetidissima* Jacq**
Is a leguminous plant, found around the fence of Maasai *manyatta*s, is a rare plant. Have a very unpleasant smell but cattle feed on it ravenously. The leaves are crushed and fed to cattle suffering from pasture bloat and frothy bloat. The active ingredient is probably an antifoaming agent.
**3.3.6. *Iboza multiflora* (Benth) E.A. Bruce**
Is a tree (3 m high). Found in high altitude areas. It may be used for fencing. The roots are boiled and the extract fed to cattle showing signs of East Coast fever. It is usually fed to calves following cauterization.
**3.3.7. *Aloe* spp**
The leaves are boiled and the extract used to treat various disease conditions including East Coast fever.
**3.3.8. *Croton megalopcarpus* Hutch**
The bark of the plant is boiled and the resultant extract is given to livestock suffering from East Coast fever or Anthrax.
**3.3.9. *Olivia volkensi* L**
Is shrub 1–2 m high. It is used as a stimulant. The respondents also use this plant if no other remedy for East Coast fever is available. It is used as a diuretic.
**3.3.10. *Salvadora persica* L**
The root is boiled and the resultant fluid is given to cattle with Anthrax. It is also a very strong emetic used to induce vomiting.
**3.3.11. *Albizzia anthelmintica* Brongn**
The root of the plant is boiled and the resultant extract is used as an anthelminthic. It is a tall tree.
**3.3.12. *Tamarindus indica* L**
The bark of the plant is boiled and the resultant extract used as a laxative for calves.
**3.3.13. *Plectranthus barbatus* Andr**
A shrub found in high altitude areas. The leaves are crushed and soaked in water and given to livestock suffering from East Coast fever

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|---|---|---|---|---|
| 3230 | Clausena anisata (Willd.) Hook. f. ex Benth. | Rutaceae | | Vb(068), the leaves are crushed and fed to livestock suffering from endoparasite infestation. |
| 03160 | Cissus quadrangularis L. | Vitaceae | | Vb(002), the plant sap (latex) has oxytocin-like activity so when placed in the vagina the 'milk let down' reflex is initiated. - - - Vb(035), the roots are also boiled and given to cattle suffering from East Coast fever. |
| 07690 | Kigelia africana (Lam.) Benth. | Bignoniaceae | | V(006) + V(104), the bark and fruits are boiled and extract used as remedy for gastroenteritis in calves |
| 11645 | *Solanum hastifolium* Dunal | Solanaceae | Nouveau | Vb(013), Vb(041), It is a rare plant. The roots are boiled and the extract is administered per os as a remedy for anthrax and particularly against black quarter |
| 12220 | *Tamarindus indica L.* | Caesalpiniaceae | | Vb(006) , the bark of the plant is boiled and the resultant extract used as a laxative for calves |
| 10160 | *Plectranthus barbatus Andrews* | Lamiaceae | | Vb(035), the leaves are crushed and soaked in water and given to livestock suffering from East Coast fever |
| 00760 | *Albizia anthelmintica Brongn.* | Mimosaceae | | Vb(068), the root of the plant is boiled and the resultant extract is used as an anthelminthic |
| 11100 | *Salvadora persica L.* | Salvadoraceae | | Vb(013), the root is boiled and the resultant fluid is given to cattle with anthrax. - - - Vb(055) It is also a very strong emetic used to induce vomiting. |
| 09238 | *Olivia volkensi* L | ? | Nouveau | Vb(091), it is used as a stimulant. - - - Vb(035), Vb(007) the respondents also use this plant if no other remedy for East Coast fever is available. It is used as a diuretic |
| 04190 | *Croton megalocarpus Hutch.* | Euphorbiaceae | | Vb(035), Vb(041), the bark of the plant is boiled and the resultant extract is given to livestock suffering from East Coast fever or Anthrax. |
| 00990 | *Aloe sp.* | Aloaceae | | Vb(000), Vb(035), the leaves are boiled and the extract used to treat various disease conditions including East Coast fever. . |
| 07638 | *Kedrostis foetidissima* Jacq | Cucurbitaceae | Nouveau | Vb(050), It is a rare plant. Have a very unpleasant smell but cattle feed on it ravenously. The leaves are crushed and fed to cattle suffering from pasture bloat and frothy bloat. The active ingredient is probably an antifoaming agent. |