Ethnoveterinary medicine against poultry diseases in African villages

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The high incidence of disease is one of the major constraints to smallholder poultry production systems in Africa. In order to control various poultry diseases, ethnoveterinary medicine is widely practised by poor village farmers. Natural products, especially those which are locally available, are generally used. The use of ethnoveterinary medicine can be considered sustainable as it is economical, culturally acceptable and ecologically sound. Although village poultry farmers claim that these practices are effective, there is an urgent need for applied research to substantiate their assertions.

Keywords: Africa; ethnoveterinary medicine; disease; plant; poultry; village

Introduction

Smallholder poultry production systems which are common in African rural areas have been previously described by various workers (Sonaiya, 1990a; Guèye and Bessei, 1996; Guèye, 1998). Birds kept under these conditions experience high mortality resulting from accidents, predation and disease. However, the high incidence of disease is one of the principal constraints to these production systems (Chabeuf, 1990; Sonaiya, 1990b; Guèye, 1997, 1998).

The generally resource-poor village poultry farmers in Africa do not have money for or access to chemical medicines or to other cost effective control measures. They rely on ancestral indigenous knowledge to control various poultry diseases (Bizimana, 1994; Guèye, 1997). In ethnoveterinary medicine (EVM) natural products, especially those of plant origin, are generally used for the treatment and/or, in some cases, the prevention of disease.

This paper reviews selected published field experiences on the use of EVM in poultry husbandry systems in Africa. Only those ethnoveterinary practices that are considered by village farmers to be common and effective have been included.

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Occurrence of poultry diseases

Infectious diseases seriously affect village poultry production in Africa and therefore constitute one of its major threats. Surveys among farmers in some regions of Africa revealed that various diseases are associated with the production of poultry (*Table 1*). Newcastle disease is the most widespread infectious disease in the continent and its symptoms are generally clearly described by village poultry keepers. Severe rearing losses resulting partly from the high incidence of diseases are experienced. For example, it has been estimated that diseases account for 56% of the annual losses suffered in Nigeria (Dafwang, 1990) and in The Gambia (Bonfoh, 1997). Other mortality causes reported were parasites (17%), cats (15%), snakes (4%), accidents (4%) and bees (4%) (Bonfoh, 1997). Diseases seriously affect growing birds because they are particularly vulnerable to infection. The mortality of indigenous fowl up to four weeks of age under traditional management systems in sub-Saharan Africa has been estimated at 53%. When indigenous guinea fowl are reared under free-range conditions in Nigeria, the mortality of keets before eight weeks of age can be as high as 60% (Nwagu and Alawa, 1995). Furthermore, the estimated mortality in ducklings up to four weeks of age averaged 64% (Otchere *et al.*, 1990). Thus, losses from disease in .African rural poultry operations amount to about 75 million chicks, guinea keets and ducklings each year (Sonaiya, 1990b) from a total rural poultry population estimated in 1990 to be about 729 million.

Importance and uses of EVM

In order to control the different poultry diseases and thereby prevent high mortality rates, ethnoveterinary practices are widely used by village farmers in Africa. EVM is the only option for most of them as there are almost no veterinarians working in African rural areas. Additionally, in the absence of severe droughts such as those that occurred in the 1970s and 1980s in Sahelian countries, plant products with recognised medicinal properties are far more accessible to villagers than drugs used by Western veterinarians. They can either be collected at no cost or are cheap to obtain (Guèye, 1997). These locally available products are very suitable for use on smallholdings by poultry farmers who can prepare the traditional remedies themselves. Thus, the use of EVM is obviously sustainable and ecologically sound.

Table 1 Incidence of disease problems as mentioned by village poultry farmers in Africa

Study area	Prevalence of disease	Source
Western Middle Belt Region, Nigeria	Newcastle disease (61%), respiratory diseases (14%), fowl pox (7%), fowl cholera (4%), other diseases (7%)	Atteh (1990)
Central River Division, The Gambia	Newcastle disease (88%), fowl pox (6%), fowl cholera (3%), coccidiosis (3%)	Bonfoh (1997)
Bilene District, Mozambique	Newcastle disease (43%), fleas (19%), diarrhoea (17%), cough (5%), fowl pox (4%), other diseases (12%)	Alders *et al.* (1997)

Table 2 Percentage of village fowl fanners who regularly use EVM in Africa

Study area	Regular use of EVM	Source
Middle Belt Region, Nigeria	35%	Dafwang (1990)
Tabora and Morogoro Regions, Tanzania	58%	Yongolo (1996)
Central River Division, The Gambia	59%	Bonfoh (1997)
Serowe-Palapye Subdistrict, Botswana	79%	Moreki (1997)
Bilene District, Mozambique	55%	Alders et a/. (1997)

Many village poultry farmers regularly use EVM (*Table* 2). In contrast to most other African countries, traditional remedies were reported to be used by only about 1% of poultry farmers in Zimbabwe (Kelly ef *al.,* 1994) although as recently as the 1970s many plants were regarded as being of medicinal value to animals (Chavunduka, 1976). Perhaps the fact that this country has the lowest percentage of village fowl in its national flock (25–30% compared with more than 80% for Africa as a whole (Guèye, 1998)) explains the discrepancy.

Most village poultry farmers claim that ethnoveterinary practices, which consist of both preventive and curative measures, are effective. For example, in the Tabora and Morogoro regions of Tanzania about 58% of village poultry keepers claimed success by using local medicines to control fowl typhoid and pullorum disease (Yongolo, 1996). However, there are very few reports of experiments carried out under controlled conditions with the aim of validating scientifically these remedial practices. The use of 10 g *Kalanchoe crenata* leaves per litre of water (as an infusion) gave good results in preventing avian coccidiosis in domestic fowl (Agbédé ef *al.,* 1993). Tchoumboué et *al.* (1996) observed nematodicinal properties in the bark of a creeper of the *Combretum* sp. (application rate 1 g powdered bark per kg bird live weight) in village fowl naturally infested with various parasites. The efficacy of ethnoveterinary plant products against parasites has therefore been confirmed.

All this ethnoveterinary knowledge tends to be in the custody of older people, both men and women, who pass it on to the younger generations by word of mouth - still the most widespread means of communication in Africa. According to Bizimana (1994), while part of this knowledge is available to all poultry keepers, another part is a jealously guarded family secret. Given these considerations, it can be concluded that, whereas on the one hand the use of EVM is culturally acceptable, on the other hand much of this precious knowledge is in danger of being lost or suppressed. This is probably the case in Zimbabwe, although there appears to be no published estimates of the importance of EVM in the treatment of village poultry in the 1970s in this country.

Village poultry farmers tend to use the same traditional medicinal remedies for treating related disease conditions in both humans and poultry. This is not surprising as most diseases that affect poultry induce symptoms that are similar to those caused by some ailments in humans (e.g. pox, cholera), although the farmers often do not know the causes of the diseases. Additionally, there are often 'humanised' relationships between humans and poultry. This arises from the fact that, firstly, small poultry flocks are kept by village producers (Guèye, 1998) and, secondly, in many cases humans and poultry live within the same house. For example, it is not uncommon for village farmers in Senegal to name their birds after people.

Prevention of poultry diseases

Village poultry are almost never vaccinated with standard Western-type vaccines. Very occasionally they are given antibiotics originally intended for human use. Village poultry farmers in Africa tend to start dealing with disease control once the symptoms appear in their flocks. They therefore treat symptoms instead of diseases and link specific therapeutic preparations to specific disease symptoms. However, in The Gambia one preventive measure ('vaccination') traditionally used by farmers against Newcastle disease consists of blending the excreta from any wild birds with goat's milk and giving the resulting mixture to village fowl to drink (Bonfoh, 1997). A similar use of the entrails of fowl that have died of Newcastle disease has also been reported. The entrails of the fowl are soaked in goat's milk and the resulting infusion is given orally to the birds. These practices may have some protective effect but cannot be recommended because the entrails are very likely to contain the virulent Newcastle disease virus. Village fowl farmers in Botswana have reported that, before Newcastle disease attacks, they feed their fowl on green mulberry leaves to induce diarrhoea and claim that fowl that have been subject to this treatment do not contract the disease (Moreki, 1997).

Snakes and hawks can also cause losses among village poultry. With a view to preventing snake bites in village fowl in Zimbabwe, *Annona senegalensis* roots are soaked in water and the fluid is sprinkled in the hen run to repel snakes (Chavunduka, 1976). In Nigeria, poultry owners grow certain plants (e.g. *Euphorbia* sp. and lemon grass) or place sliced garlic (*Allium sativum*) around hen houses to repel snakes (Ibrahim, 1996). Farmers also take care to keep the areas clear of twining vines such as *Landolphis florida* which they believe attract snakes. TO protect chicks and keets against hawk attacks, the spiny fruits of *Cucumis pustulatus* are placed in the birds' drinking water (Ibrahim and Abdu, 1996). The natural selection for aggressiveness in village poultry helps to reduce losses caused by hawks and other predators, although the limitations of this trait, particularly in young birds, can be readily appreciated.

Plant products are also used to ward off various ectoparasites such as ticks, lice, mites, fleas and small red ants that can infest village poultry. For example, in Botswana the leaves of *Thamnosma rhodesica* are reported to repel parasites when placed in the shelter (Moreki, 1997). This plant produces a strong smell.

In village duck farms in Northern Nigeria several old farmers have reported lameness ('cowboy leg'), respiratory disorders and cholera as the principal disease problems. TO protect ducks against various diseases a preparation from the fresh leaves of *Lannea acida, Momordica charantia,* the fruit of sweet pepper and *Olerefera subdarfa* ground together and dissolved in water is given to ducklings up to seven days of age (Hassan and Aliyu, 1996). Details on application rates were, however, unfortunately not reported.

Treatment of poultry diseases

Using the system adopted by Bizimana (1994) poultry diseases can be categorised according to the organs of the birds affected *(Tables* 3-6). The symptoms observed in sick birds (before death) help poultry farmers to identify the disease. This method of presentation also provides other interested persons with the relevant information about the plant products used to treat specific diseases.

TO treat various poultry diseases, including Newcastle disease affecting several organs, farmers use many plant products *(Table 3).* Except for eye diseases, the methods used mainly consist of soaking plant products (bark, leaves, stems,

Table 3 Ethnoveterinary plant products used to treat poultry diseases affecting several organs

Diseases	Plant products	Application form	Country	Source
ND[1]	Bark of *Parkia filicoidea*	Put into drinking water	*Nigeria*	Nwude and Ibrahim (1980)
	Leaves of Cassia didymobotrya or latex of *Euphorbia matabelensis*	Added to drinking water	Zimbabwe	Chavunduka (1976)
	Stern of *Euphorbia candelabrum* Kotschy *var. candelabrum* or fruit of *Capsicum annuum* together with *leaves* of *Iboza multiflora*	Used in drinking water	Tanzania	Mkangare (1989)
ND[2]	Fruits of *Lagenaria breviflora* and *Capsicum frutescens*	Put into drinking water	Nigeria	Sonaiya *et al.* (1992)
	Bark of *Khaya senegalensis* and *Capsicum* sp. extracts	Soaked in drinking water	Senegal	*Guèye* (1988a)
	Barks of *Mangifera indica*	Put into drinking water	The Gambia	Bonfoh (1997)
	Leaves of *Mucuna sp.*	Crushed leaves soaked in drinking water	Kenya	Anonymous (1996)
	Barks of *Combretum micranthum* + *Butyrospermum parkii* + *Ficus* sp.	Dried, ground and soaked in drinking water	Burkina Faso	Tamboura *et al.* (1998)
	Barks of *Lannea acida*	Soaked in drinking water	Burkina Faso	Tamboura et *al.* (1998)
ND"	Barks of *Cassia sieberiana*	Used as infusion	Mali	Nomoko (1997)
ND and other diseases[2]	Hot pepper, elephant faeces, sisal leaves and leaves from plants locally known *as 'chunga', 'hunduhundu'* and *'mwambalasimba'*		Tanzania	Mwalusanya (1998)
Cholera[1]	Fruit of *Adansonia digitata*	Broken and dipped in drinking water	Nigeria	Nwude and Ibrahim (1980)
Fever[1]	Chopped bulb of *Allium sativum* and *Capsicum annuum* (red pepper)	Added and given orally	Nigeria	Nwude and Ibrahim (1980)
	Fruit of *Cyperus articulatus*	Soakrd in drinking water	Nigeria	Nwude and Ibrahim (1980)
Eye infections'	Leaves of shrub *Pseudognaphalium luteo-album* and root powder of *Diospyros lyciodes*	Exudates used as eye drops	Botswana	Moreki (1997)
Eye trouble[2]	Leaves of *Cycnium adonense*	Decoction given to newly-hatched birds to open gummed-up eyes	Zimbabwe	Chavunduka (1976)
Sore eyes[1]	Bulb of *Adenium multiflorum*	Juice used as eye drops	Zimbabwe	Chavunduka (1976)
Poor growth, low production'	Fruit of *Cucumis pustulatus*	Mixed with bran and placed in drinking water	Nigeria	Nwude and Ibrahim (1980)
	Fruit of *Cyperus articulatus*	Soaked in drinking water	Nigeria	Nwude and Ibrahim (1980)
Coughing, diarrhoea and leg weakness[4]	*Citta* sp. (ginger) *or* pepper	Put into drinking water	Nigeria	Maigandi and Usman (1996)
All diseases[2]	Leaves of *Eucalyptus* spp.	Put into drinking water	Ethiopia	Dessie (1996)
	Hot pepper (*Capsicum frutescens*)	Soaked *in* drinking water	Ethiopia	Dessie (1996)

Reported in [1]all poultry species, [2]fowl, [3]guinea fowl and "turkeys.
ND, Newcastle disease; –, not reported.

Table 4 Ethnoveterinary plant products used to treat poultry diseases affecting the digestive system and related organs

Diseases	Plant products	Application form	Country	Source
Diarrhoea[1]	Young leaves of *Boswellia dalzelii*	Added to drinking water	Nigeria	Nwude and Ibrahim (1980)
	Bark of *Sclerocarya birrea*	Used as decoction	Niger	Puffet (1985)
	Juice of *Aloe veroe*	Given orally	Somalia	Lul (1990)
	Roots of *Cassia abreviata* and *Senna italica*	Ground into powder and added to drinking water	Botswana	Moreki (1997)
	Leaves of pawpaw (*Carica papaya*)	Used as infusion	Cameroon	Agbédé *et al.* (1995)
Diarrhoea[2]	Chopped-up leaves of *Pergularia extensa*	Used as feed	West Africa	Dalziel (1937)
Diarrhoea[3]	*Peltophorum ferrugineum*, the broken pepper or the bark of *Adansonia digitata*	Used as infusion	Togo	Lobi (1984)
Diarrhoea and fowl pox[3]	Herbs and chili pepper	–	Uganda	Okot (1990)
Enteritis and indigestion[1]	Leaves of *Aloe saponaria Haw.*	Cold infusion	Southern Africa	Watt and Breyer-Brandwijk (1962)
Bloody and watery diarrhoea[1]	Bulb of *Adenium multiflorum*	Soaked in water and birds drenched after 12 hours	Zimbabwe	Chavunduka (1976)
	Latex of *Aloe chabaudii* or *Euphorbia matabelensis*	Added to drinking water	Zimbabwe	Chavunduka (1976)
Blood in the excreta[1]	Bark of *Cussonia arborea*	Soaked in water and sick birds drenched with fluid	Zimbabwe	Chavunduka (1976)
Coccidiosis[1]	Fruit of *Lagenaria vulgaris*	Dipped in drinking water	Nigeria	Nwude and Ibrahim (1980)
Black head disease	Fruit of *Solanum incanum*	Broken and dipped in drinking water	Nigeria	Nwude and Ibrahim (1980)
Various endoparasites[3]	*Capsicum* sp. extracts and leaves or barks of *Azadirachta indica A. Juss.*	Added to drinking water	Senegal	Guèye (1997)
Worms[1]	Fruit of *Solanum nodiflorum*	Soaked in drinking water	Nigeria	Nwude and Ibrahim (1980)

Reported in [1]all poultry species, [2]turkeys and [3]fowl.
–, not reported.

Table 5 Ethnoveterinary plant products used to treat poultry diseases affecting the respiratory, locomotor and nervous systems

Diseases	Plant products	Application form	Country	Source
Coughs, colds and pneumonia'	Tuber of *Colocasia esculenta*	A whole tuber (about 0.5 kg) washed and ground in a mortar, 2 litres water added and the mixture sieved. Three drops are given once in the nostrils of each fowl	Kenya	Anonymous (1996)
'Cough"	Fruits of pepper (*Pipper guineense*)		Cameroon	Agbédé *et al.* (1995)
Various respiratory infections'	Fruits of *Capsicum annum* and *Capsicum frutescens*	Pulverized and small amount of a mixture of the fruits + a little salt put into the drinking water	Zimbabwe	Chavunduka (1976)
	Latex of *Euphorbia matabelensis* or leaves of *Nicotiana tabacum*	Added to drinking water	Zimbabwe	Chavunduka (1976)
Influenza'	Watery extracts of *Nicotiana glauca*	–	Southern and East Africa	Watt and Breyer-Brandwijk **(1962)**
Lameness of ducks	**Leaves** of *Momordica balsamina*	Pulverized and mixed with food	Nigeria	Nwude and Ibrahim (1980)
	Fruits of *Lagenaria breviflora*	Legs are held in a bowl of water containing sliced fruits (several times a day)	Nigeria	Sonaiya *et al.* (1992)
Locomotion trouble'	Leaves of *Borreria uerticillata*	Used as infusion	Togo	Lobi (1984)
Various nervous symptoms[2]	Grains of Zea *mays*	Roasted and given hot	Zimbabwe	Chavunduka (1976)

Reported in 'fowl, [2]all poultry species and [3]chick embryos.
–, not reported.

Table 6 **Ethnoveterinary plant products used to treat poultry diseases affecting the skin and the feathers**

Diseases	Plant products	Application form	Country	Source
Fowl pox'	Leaves of *Aloe excelsa*	Soaked in drinking water	Zimbabwe	Chavunduka (1976)
	Oil of *Elaeis guineensis*	Paint affected birds	Togo	Aklobessi (1990)
	Oil of *Elaeis guineensis*	Smear scabs	Ghana	Williams (1990)
Fowl pox[2]	Roots of *Microglossa pyriflora* with *Agave sisalana* leaves and *Aloe* sp. leaves	Two parts *Microglossa pyriflora* roots mixed with 1 part *Agave sisalana* leaves and 1 part *Aloe* sp. leaves boiled in water for 30–45 minutes and given as drinking water to infected fowl	Kenya	Anonymous (1996)
	Bulbs of *Allium sativum*	Chopped or ground bulbs (2) are mixed in 4 litres water and used as bird wash once daily until free of lice	Kenya	Anonymous (1996)
Various ectoparasites'	Roots of *Derris elliptica*	Infested birds and their houses drenched with the mixture (453.6 g powdered roots + 113.4 g soap + 4.4 l water)	West Africa	Matzigkeit (1993)
	Latex solution of *Aloe chabaudii*	Affected birds dipped in a diluted solution	Zimbabwe	Chavunduka (1976)
	Roots of *Annona stenophylla*	Soaked in drinking water	Zimbabwe	Chavunduka (1976)
	Oil of *Butyrospermum parkii*	External use	Togo	Lobi (1984)
	Oil of *Elaeis guineensis*	Paint affected birds with mixture (oil + a little salt)	Benin	Assan (1990)
	Butter of *Butyrospermum parkii*	Mix with same volume of liquid potash and paint affected birds	Burkina Faso	Tamboura *et al.* (1998)
Various ectoparasites[2]	Wood ash	External use	Ethiopia	Dessie (1996)

Reported in [1]all poultry species and [2]fowl.

fruits, bulbs or latex) in the drinking water and depriving the birds of access to any other water. According to Nomoko (1997), one potential side effect from the use of large doses of the infusion of the barks of *Cassia sieberiana* (Table 3) is intoxication leading to the death of treated guinea fowl. The high tannin present in the bark is the most likely cause of the intoxication.

Diseases can affect the digestive system and related organs of poultry. In general, different kinds of diarrhoea are symptoms of diseases facing village farmers (Table 4). In most cases ethnoveterinary plant products are added to the drinking water and given to the affected birds.

Plant products used to treat poultry diseases affecting the respiratory, locomotor and nervous systems are listed in Table 5. There are various forms of application. Not all Muscovy ducks affected by leg paralysis reported to be a major problem in South Western Nigeria and treated using traditional remedies fully recover (Sonaiya et *al., 1992).*

Fowl pox and various ectoparasites affect the skin and feathers of poultry. To control these ailments traditional remedies are used (*Table* 6). In fowl pox infection, farmers in Ghana attribute scabs that appear at the corners of the mandibles of growers or on the combs of adult poultry to chicks picking up pawpaw seeds (Williams, 1990). The scabs resemble pawpaw seeds and this may offer a simple explanation for the ascribed relationship. According to Williams (1990) the scabs disappear for a while after the treatment described in *Table* 6. External application tends to be practised against ectoparasites. Farmers in Togo indicated that the plant oil used in *Table* 6 obstructs the respiratory system of ectoparasites (Lobi, 1984).

Plant products involved in the treatment of diseases corne from various botanical families (*Tables* 3-6) such as Mimosaceae (*Parkia* sp.), Caesalpiniaceae (*Cassia* sp.), Euphorbiaceae (*Euphorbia* sp.), Araceae (*Colocasia* sp.), Solanaceae (*Capsicum* sp., *Solanum* sp. and *Nicotiana* sp.), Cucurbitaceae (*Lagenaria* sp., *Cucumis* sp. and *Momordica* sp.), Ebeneceae (*Diospyros* sp.), Meliaceae (*Khaya* sp. and *Azadirachta* sp.), Anacardiaceae (*Mangifera* sp., *Sclerocarya* sp. and *Lamnea* sp.), Composeae (*Microglossa* sp.), Agavaceae (*Agave* sp.), Bombacaceae (*Adansonia* sp.), Liliaceae (*Allium* sp. and *Aloe* sp.), Cyperaceae (*Cyperus* sp.), Apocynaceae (*Adenium* sp. and *Pergularia* sp.), Caricaceae (*Carica* sp.), Araliaceae (*Cussonia* sp.), Crassulaceae (*Kalanchoe* sp.), Rubiaceae (*Borreria* sp.), Gramineae (*Zea* sp.), Cycadaceae (*Elaeis* sp.), Annonaceae (*Annona* sp.), Sapotaceae (*Butyrospermum* sp.), Moraceae (*Ficus* sp.), Combretaceae (*Combretum* sp.) and Fabaceae (*Derris* sp.). This non-exhaustive list demonstrates that a great many plants need to be protected and/or conserved to enable village (and also peri-urban) poultry keepers to continue to make good use of their products. The concerns of poultry specialists are therefore linked to the concerns of those seeking to preserve and protect plant biodiversity. There is a clear need for the establishment of multidisciplinary teams whose membership should include those with specialist knowledge of farming practices as well as botany, pharmacy, veterinary science and plant conservation.

Prospects for the use of EVM for the control of poultry diseases

This paper demonstrates that throughout the African continent there are many medicinal plants that are, or might be, suitable for the treatment of poultry diseases, although there is generally a dearth of information on application rates. However, some plants regarded by village farmers as being of medicinal value to

poultry are in danger of extinction, especially in arid zones. It is therefore important that these plants be clearly identified and listed with a view to ensuring their conservation for research and possible wider use in the future.

Ethnoveterinary knowledge is gradually being lost. Thus, field observations on the current use of EVM should be more broadly published in order to help meet poultry healthcare needs among the village farming community.

EVM using plant products is reported to be effective. However, little research has been undertaken on the efficacy of these traditional remedies under controlled conditions. There is therefore an urgent need for further research in this field to establish which of the wide variety of products used in EVM are most effective and the circumstances under which they may be best used. Comparisons should be made to determine when modern veterinary medicine offers better alternatives. Scientific validation of EVM is necessary both to justify and assist in its increased application. There will then be much greater recognition of the importance of EVM by scientists, veterinarians, pharmacists and other professionals concerned with poultry health. The potential for enhancing our knowledge of disease control for the benefit of the sales of poultry products throughout the world should not be overlooked.

It is suggested that future investigations and the reporting of field experiences should, whenever possible, include the following: the disease conditions (e.g. Newcastle disease, cholera, coccidiosis, fowl pox); the poultry species (e.g. domestic fowl, turkeys, guinea fowl, ducks, pigeons); the plant species and the product (e.g. bark, leaves, roots, stems, fruits, bulbs, juice, latex); other products associated with main used plant products (e.g. salt, soap, other plant products); form (e.g. decoction, infusion, pulverisation); method of application (e.g. drinking water, feed); application rate (e.g. for a plant product to be administered through the drinking water: g (sun)-dried powdered plant product per litre of water per kg of bird live weight and how often); and an assessment of the effectiveness of the treatment.

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