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Ethnoveterinary medical practice for ruminants in the subhumid zone of northern Nigeria

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Abstract

Ethnoveterinary medical practice is widespread among herdsmen and village livestock producers in northern Nigeria where livestock in the country are concentrated. For most of these livestock owners, modern veterinary inputs and services are not readily available and are relatively expensive. Traditional remedies are locally available and cheaper.

Our questioning of 50 herdsmen and village livestock producers revealed that the ingredients used in these indigenous practices include plant extracts, seeds, leaves, barks of trees, tubers and roots of various plants. These are processed in various ways and administered to animals for a variety of disease conditions. More recently used ingredients include kerosene and spent engine oil. Considering the combination of ingredients used by the traditional animal-health practitioners, it is likely that additive, synergistic and nutritional effects might be involved in alleviating the problem of ill-health in animals.

Herdsmen and livestock owners readily identify signs of disease (although some common infectious diseases have several signs and may affect various parts of the animal body). Aspects of indigenous health care practices are contrasted with modern veterinary health care. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Ethnoveterinary medicine; Animal diseases; Production problems; Plant extracts

1. Introduction

Poor animal health is an important factor limiting animal productivity in most developing countries. In many of these countries, there has been a decline in funding for veterinary services and for animal-health care in general ([Centre Technique de Coopération Agricole et Rurale, 1987](#)). For these and other reasons, most of the animals kept by herdsmen and other village producers are not reached easily by veterinary personnel.

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Traditional remedies, on the other hand, are more readily available and cheaper than orthodox veterinary treatments. In these circumstances, ethnoveterinary medical health care is the only alternative to “Western” veterinary therapy.

Traditional veterinary practice is based on indigenous knowledge passed on from generation to generation. A compendium of ethnoveterinary medical practices in parts of Africa has been published ([Intermediate Technology Development Group and International Institute of Rural Reconstruction, 1996](#)). In other studies ([Nok et al., 1992, 1993; Nok and Williams, 1996](#)), the active principle as well as the mechanisms of action of some plant extracts that are used in ethnoveterinary medicine have been discussed. In some of the studies cited above, the appropriate dosages of the plant extracts required to suppress the growth of causative organisms of some diseases have been given—thus suggesting the potential of traditional drugs in primary animal-health care.

We report various traditional drugs and methods of treating some common animal health and production problems among Fulani herdsmen and village producers. Fulani’s provide 85% of the meat supply in Nigeria ([Anonymous, 1982](#)) and are spread throughout the core Northern States of Nigeria. Fulani’s have a traditional lifestyle and cattle-management system and commonly use ethnoveterinary remedies. Similarly, village livestock producers in the Northern States of Nigeria adopt fairly common management practices that use herbs and plant products for treating sick animals.

2. Materials and methods

We conducted an initial reconnaissance survey—a small-scale rural rapid-appraisal (RRA) phase—in two Local Government Areas (Sabon Gari and Giwa Local Government Districts) in Kaduna State. Kaduna State was identified earlier as one of the three most important ruminant-producing States in Nigeria (Kano and Sokoto States are the other two) ([Alawa and Lemu, 1996](#)). The reconnaissance phase of the study was intended to provide primary data on size of holdings and species of animals owned by each producer as a basis for selecting respondents for the second phase of the study. Livestock producers with <25 animals (either as sheep, goats or cattle or a species mix of these) were excluded in the second phase of the study.

Out of 80 livestock producers with >25 animals each, 50 were selected as respondents based on proximity to the Zaria urban area so that respondents were not clustered in a location and were within 5–10 km from the Zaria urban area in a peri-urban setting. All individuals who were asked to participate agreed to do so.

We subsequently designed a checklist questionnaire to obtain information on major diseases and health problems prevalent on each farm as well as health-management measures, source and preparation of traditional drugs used to treat such disease conditions. The questionnaires were backed up by personal interviews and visits during which respondents were asked for detailed description of diseases and symptoms to aid identification. Occasionally, return visits were made to clarify any ambiguous details and provide secondary data where necessary. In some cases, some of the health problems and associated symptoms were evident to the interviewer during personal visits (making painstaking descriptions by respondents unnecessary).

3. Results and discussion

3.1. Source of indigenous knowledge

Ninety-six percent of the 50 herdsmen and village livestock producers interviewed had gained their knowledge of traditional drugs from their parents and grandparents. Oral transmission is typical for ethnomedicine (Gueye, 1997). Two producers (who were village non-Fulani producers) indicated that they gained the knowledge of remedies for animal diseases from neighbours and co-producers.

3.2. Common animal diseases and production problems

Twenty-one of the most common animal diseases (excluding trauma) and other problems reported by herdsmen and village livestock producers are given in Table 1, in alphabetical order of the diseases/problems. The diseases and problems noted in Table 1 were identified on the basis of clear indications and descriptions of various signs given by the producers and herdsmen. Interestingly to us, the descriptions of signs for a specific disease were fairly common from one producer to another (facilitating easy identification).

3.3. Administration of remedies

The local remedies and drugs for the various diseases (as well as the mode of administration of these remedies) are presented in Table 1. The most commonly used sources of drugs are herbs and plant extracts, seeds, leaves and barks of certain trees, tubers and roots. Others include wood ash, kaolin and potassium, local soap and spent engine oil. Noteworthy in this regard is the use of a single remedy or plant extract in treating more than one disease—as well as combinations of various plant extracts for broad-spectrum therapy. For example, extracts or ingredients from the mahogany tree (*Khaya senegalensis* A. Juss) are used to treat anthrax, diarrhoea, dysentery, footrot, helminth infections and ringworm. Extracts from the mahogany tree are also used to improve appetite and fertility as well as to relieve animals in cases of gastric/emetic problems, poisoning and as a laxative. In a previous report, the ethnobotanical use of another variety of mahogany tree (*Khaya ivorensis* A. Juss, known locally as “*Senegal quinine*” and obtainable largely in the southern part of Nigeria) as an anthelmintic and against diarrhoea in small-ruminant-owning householders was noted (Alawa et al., 1996). A few other multi-functional and supposedly broad-spectrum plant ingredients reported by respondents to be effective for a range of disease conditions are listed in Table 2.

The methods of processing vary from grinding or soaking in water to obtain solutions that are given per os to inclusion in feedstuff fed to the animal (Table 1). In most of these cases, the principle of a carrier mechanism for the medicine to be administered is clearly implied and used. The principle of using a carrier mechanism in Western veterinary medicine (as is the case in chick vaccinations through feeds) is well recognized. In contrast, however, most cases of using a carrier in ethnoveterinary medical practice involve arbitrary quantities of the carrier which might dilute the drug or reduce its relative potency. Variability in the quantity of the carrier material in Western medicine usually is not as prominent as in ethnoveterinary medicine.

Table 1
Common ailments and production problems of animals in northern Nigeria and their local remedies

Serial number	Ailment	Plants/primary ingredients	Method of preparation/ingredients	Mode of application
1	Acetonaemia	<i>Arachis hypogea</i> Linn.	Mix crushed seed cake with millet bran and maize offal	Feed as ration once daily
2	Anthrax	Bark of <i>K. senegalensis</i> A. Juss and <i>S. incanum</i> Linn. plus fresh leaves of <i>V. amygdalina</i> Del.	Grind all ingredients and mix in water	Give orally about 35 cl of solution three times daily
3	Appetite promotion	<i>Anchomanes difformis</i> Engl.	Grind whole plant and add water	Give orally 35 cl once daily
		<i>Euphorbia hirta</i> Linn.	Grind dried whole plant shoot and mix with any type of bran	Feed as ration three times daily
		<i>Gossypium barbadens</i> Linn.	Mix crushed seed with millet or guinea corn bran	Feed as ration ad libitum
		<i>K. senegalensis</i> A. Juss	Soak ground fresh or dried bark in water or mix ground bark with any type of bran	Give orally about 10 cl or feed mixture of bark and bran as ration
4	Bloat	<i>A. hypogea</i> Linn.	Oil extract	Give orally about 10 cl daily
		<i>Mimordica balsamia</i> Linn.	Grind whole plant shoot with leaves of <i>S. hermontheca</i> Del. and leaves of corn, add water and filter	Give orally about 15 cl of filtrate daily until condition improves
		<i>Schwenkia americana</i> Linn. Wood ash	Mix with red potash in water and filter Dissolve in water	Give orally about 15 cl of filtrate daily Give orally about 20 cl daily
5	Diarrhoea and dysentery	<i>Adansonia digitata</i> Linn.	Grind dried leaves, add water and mix with any type of bran	Give suspension orally about 10 cl three times daily or give mixture of ground leaves and bran as ration ad libitum until recovery
		<i>Deterium microcarpum</i>	Mix ground fresh or dried bark with any type of bran	Add to ration and feed
		<i>Elaise guinensis</i> Jacq	Mix oil extract (palm oil) with little salt	Give orally about 85 cl three times daily

		<i>Guiera senegalensis</i> Lam	Grind dried bark with roots and bark of <i>Parkia biglobosa</i> , <i>Magnifera indica</i> and <i>V. doniana</i> Linn. and mix in water	Give orally about 10 cl of solution daily
		Kaoline (solid mineral) ^a	Dissolve in water	Give orally about 85 cl three times daily
		<i>K. senegalensis</i> A. Juss	Grind fresh or dried bark and suspend alone or with potassium in drinking water	Give orally about 85 cl three times daily
		<i>M. balsamia</i> Linn.	Mix ground fresh or dried bark with lime juice	Give orally 20 cl twice daily
		<i>Piliostigma thonningii</i> Schum	Mix ground fresh or dried bark with any type of bran	Feed as ration
		Potassium ^a	Dissolve in water	Give orally 20 cl solution once daily
		<i>S. bicolor</i> Linn. Moench	Husk	Feed husk as roughage ad libitum
		<i>Terminalia macroptera</i> Guill and Perr	Crush apical meristem and mix with ground <i>Adansonia digitata</i> Linn. and leave in water	Give orally about 25 cl of solution daily
6	Footrot	<i>Acacia nilotica</i> Del.	Grind dried bark	Wash affected area with warm solution two to three times daily
		<i>Butyrospermum parkii</i> (Kotschy)	Oil extract	Wash affected area and rub on two to three times daily
		Cow butter	Oil	Wash affected area and rub on two to three times daily
		<i>E. guinensis</i> Jacq	Oil extract (palm oil)	Wash affected area and rub on two to three times daily
		Kerosine		Rub on affected part
		<i>K. senegalensis</i> A. Juss	Boil fresh bark with red potash in water	Wash affected area with warm solution two to three times daily
		<i>Nicotiana tobaccum</i> Linn.		Apply powder on affected area one to two times daily
		Wood ash	Ash powder	Apply on affected part two times daily
7	Gastric/emetic problems	<i>K. senegalensis</i> A. Juss	Grind fresh or dry bark and mix with any type of bran	Feed as ration
		<i>M. balsamia</i> Linn.	Soak fresh or dried bark with squashed <i>V. doniana</i> leaves Linn. in water	Give 20 cl of solution two to three times daily
		Potassium ^a		Give as lick
		<i>S. incanum</i> Linn.	Grind fruit and add water	Give orally about 10 cl two to three times daily

Table 1 (Continued)

Serial number	Ailment	Plants/primary ingredients	Method of preparation/ingredients	Mode of application
8	Helminth infections	<i>Anogeissus leicarpa</i> D.C. Guill and Perr <i>Ficus sycomorus</i> Linn.	Mix ground bark with ground bark of <i>K. senegalensis</i> A. Juss and add water Soak fresh bark in water	Give orally about 10 cl of solution two to three times daily Give orally 10 cl of solution three times daily
		<i>K. senegalensis</i> A. Juss	Boil mixture of ground bark and potash in water and allow to cool or mix ground bark with any type of bran	Give orally about 10 cl two to three times daily or feed mixture of ground bark and bran as ration
		<i>S. bicolor</i> Linn. Moench	Mix the seed, husk and bran	Feed ad libitum
9	Infertility	<i>G. senegalensis</i> Lam	Grind dry bark and add water	Give orally about 20 cl one to two times daily
		<i>G. senegalensis</i> Linn.	Squash apical part including buds and leaves and add water	Give orally 15 cl one to two times daily
		<i>K. senegalensis</i> A. Juss	Soak ground bark in water	Give orally 10 cl of solution once daily
		<i>M. balsamia</i> Linn.	Squash fresh leaves and soak in water	Give orally about 10 cl of solution one to two times daily
		Potassium ^a		Give as lick
10	Kid navel diseases/ protection	<i>Striga hermontheica</i> Del. Benth	Squash fresh whole aerial of plant and soak in water	Give orally about 10 cl of solution two to three times daily
		<i>Tamarindus indica</i> Linn.	Squash whole aerial part of plant and soak in water	Give orally 15 cl of solution two to three times daily
		<i>B. parkii</i> Kotschy	Oil extract	Apply as ointment on kid navel once daily
11	Mastitis	Cow butter	Oil	Apply as ointment on kid navel once daily
		<i>E. guinensis</i> Jacq	Oil extract (palm oil)	Apply as ointment on kid navel once daily
11	Mastitis	<i>B. parkii</i> Kotschy	Oil extract (shea butter oil)	Apply externally on udder
		Potassium ^a		Give us lick
		<i>S. americana</i> Linn.	Soak leaves and bark in water	Give orally about 10 cl of solution two times daily

12	To improve milk yield	<i>Anchomanea difformis</i> Engl.	Grind whole plant and add water	Give orally 35 cl once daily
		<i>A. hypogea</i> Linn. cake	Crush and mix with bran	Feed ad libitum
		<i>E. hirta</i> Linn.	Grind dried whole plant and mix with any type of bran	Feed as ration three times daily
		<i>F. sycomorus</i> Linn.	Mix ground bark with any type of bran	Feed as ration
		<i>G. barbadens</i> Linn.	Mix seed cake (cotton seed cake) with millet or guinea corn bran	Feed as ration ad libitum
		Potassium ^a	Mix with millet bran or cotton seed cake	Feed ad libitum
		<i>S. americana</i> Linn.	Mix ground leaves with local potassium and magnesium salts	Rub externally on udder
13	Mineral deficiencies	<i>Euphorbia aegyptica</i> Boiss	Soak bark in water	Give orally about 10 cl of solution once daily
		*Sylvite KCl ^b		Give as lick
14	Poisoning	<i>A. hypogea</i> Linn.	Oil extract (groundnut oil)	Give orally about 10 cl two times daily
		<i>E. guinensis</i> Jacq	Oil extract (palm oil)	Give orally about 10 cl two times daily.
		<i>K. senegalensis</i> A. Juss	Soak ground bark in water	Give about 10 cl of solution one to two times daily
		Milk	Liquid milk	Give orally about 10 cl two times daily
		<i>Nelsonia canescens</i>	Soak in leaves for about 2 days	Give about 10 cl of solution orally two times daily and rub solution on animal's belly
		<i>S. hermontheca</i> Del. Benth	Soak ground fresh or dry whole aerial part of plant in water	Give about 10 cl of solution two times daily
15	Pneumonia and other respiratory diseases	<i>F. sycomorus</i> Linn.	Soak fresh bark in water	Give orally 10 cl of solution three times daily
		Potassium ^a		Give as lick two to three times daily
		<i>S. hermontheca</i> Del. Benth	Mix ground leaves and bark with potassium powder in water	Give orally 20 cl one to two times daily
16	Retained placenta	<i>Balanites aegyptica</i> Del.	Soak fresh leaves in water with leaves of <i>T. indica</i> for about one day	Give orally about 15 cl of solution or give fresh leaves to animal to eat
		<i>Ficus thonningii</i> Blume	Fresh leaves	Give fresh leaves to animal to eat
		<i>Hibiscus sabdariffa</i> Linn.	Apical part of plant	Feed to animal
		<i>S. bicolor</i> Linn. Moench	Apical part of plant	Feed to animal
		Wood ash	Ash powder	Rub ash powder around vagina to induce placenta expulsion

Table 1 (Continued)

Serial number	Ailment	Plants/primary ingredients	Method of preparation/ingredients	Mode of application
17	Ringworm	<i>A. hypogea</i> Linn. cake	Burn cake to ashes	Rub the ash on affected skin
		<i>Butyospermum parkii</i> Kotsky Cow butter oil <i>F. thonningii</i> Blume <i>Khaya senegalensis</i> A. Juss	Oil extract (shea butter oil) Oil Latex extract Mix ground dry bark with any tpe of bran or with ground <i>S. incanum</i> Linn. and palm oil	Rub externally as ointment once daily Rub externally as ointment once daily Rub on affected skin once daily Rub mixture on affected part of body once daily
18	Sprain	Local soap		Wash animal with local soap once daily
		Spent engine oil		Rub on skin as ointment
		<i>B. parkii</i> Kotschy	Oil	Massage affected area and apply as ointment one to two times daily
19	Swollen joint or feet	Cow butter oil	Oil	Massage affected area and apply as ointment one to two times daily
		<i>E. guinensis</i> Jacq	Oil (palm oil)	Massage affected area and apply as ointment one to two times daily
20	Ticks and fleas	<i>B. parkii</i> Kotschy oil	Oil	Rub oil on swelling one to two times daily
		<i>Colocasia esculentum</i> L. Schott Var. <i>Lawsonia inermis</i> Linn.	Mix pounded leaves with any type of bran Crush leaves into paste	Feed mixture as ration Rub on swelling once daily
20	Ticks and fleas	<i>A. sativum</i> Linn.	Burn in housing	Smoke from burnt plant allowed to circulate in housing for some time
		Kerosine		Rub externally on all parts of animal's body once daily
		<i>N. tobaccum</i> Linn.	Mix powder with <i>B. parkii</i> oil	Rub externally on all parts of animal's body once daily

^a Local potassium and kaolin: Potassium salt and kaolin are unrefined types obtained by excavation of areas around river banks and streams during the dry season.

^b Sylvite KCl: Locally made white potassium salt lick consisting of a mixture of potassium and industrial salt.

Table 2
Plant ingredients used to relieve a variety of animal diseases/conditions in northern Nigeria

Serial number	Plant/primary ingredients	Animal diseases/conditions
1	<i>K. senegalensis</i> (bark)	Anthrax, appetite promotion, diarrhoea, footrot, gastric/emetic problems, helminthosis, infertility, poisoning, ringworm
2	<i>B. parkii</i> (oil extract)	Footrot, mastitis, kid navel diseases, ringworm, sprain, swollen joint, ticks and fleas
3	<i>E. guinensis</i> (oil extract)	Diarrhoea, footrot, kid navel diseases, poisoning, sprain
4	<i>M. balsamia</i> (leaves and plant shoot)	Bloat, diarrhoea, gastric/emetic problems, infertility
5	Cow butter (oil)	Footrot, kid navel diseases, ringworm, sprain
6	<i>F. sycomorus</i> (bark)	Helminthosis, low milk yield, pneumonia, respiratory diseases
7	Local potassium	Diarrhoea, gastric/emetic problems, infertility, low milk yield
8	<i>S. hermontheca</i> (leaves, plant shoot and bark)	Infertility, poisoning, pneumonia, respiratory diseases
9	Wood ash	Appetite promotion, footrot, retained placenta
10	<i>S. americana</i> (leaves and bark)	Bloat, mastitis, low milk yield
11	<i>A. hypogea</i> (cake)	Acetonaemia, low milk yield, ringworm
12	<i>S. bicolor</i> (husk, bran and seed)	Diarrhoea, helminthosis, retained placenta
13	<i>G. senegalensis</i> (bark and roots)	Diarrhoea, infertility
14	<i>E. hirta</i> (leaves and plant shoot)	Appetite promotion, low milk yield
15	<i>A. difformis</i> (whole plant)	Appetite promotion, low milk yield
16	<i>G. barbadiens</i> (seeds)	Appetite promotion, low milk yield
17	<i>A. hypogea</i> (oil extract)	Poisoning bloat
18	Kerosine	Footrot, ticks and fleas

The use of wood ash, kaolin and potassium (noted in Table 1), which have no known medicinal value might have caused some perceived improvement in performance through their effects on feed efficiency (because they are given as a lick).

3.4. Duration of drug administration

In ethnoveterinary practice, the duration for which treatment for a particular disease is applied is highly variable and depends largely on the herdsmen or village producers. The clinical improvement of affected animals usually is considered the end of that disease condition by some producers. There is, therefore, the possibility that causative organisms for a specific disease might not be completely eliminated at the end of the duration of treatment. This contrasts with (fully compliant) Western veterinary medical practice where treatment might continue well after the signs of a disease are gone. Furthermore, ethnoveterinary medical practice might create resistant organisms considering the duration for which drugs are administered—but we have not come across trials designed to establish or counter this observation.

3.5. Chemotherapeutic and pharmacological evidence of ethnomedicines

The antibacterial activities of some plant extracts have been documented. For instance, a 100 ml extract obtained from 1.17 g of *Vernonia amygdalina* leaves pounded and soaked in

water significantly reduced worm burden (*Bonustumum*, *Dicrocoelium* and *Fasciola* spp.) in calves (Alawa et al., 2000). The result was comparable to that obtained from an orthodox anthelmintic drug which was not disclosed (probably because the report was preliminary and the study was still on-going). The anthelmintic properties of *V. amygdalina* and *Anona senegalensis* also have been demonstrated in cattle (Chiezey et al., 2000) and in chickens (Ibrahim et al., 1984; Jagun et al., 1998; Abdu and Faga, 2000). In the report of Abdu and Faga (2000), the anthelmintic activity of *K. senegalensis* (Table 1) was indicated.

Casia alata has bactericidal and fungicidal activity due to its methanolic extracts (hydroxyanthraquinone, glycoside, chrysophanic acid, kampferin and samoxides A and B) (Makinde, 2000). In other studies (Atawodi et al., 2000), coccidiosis and worm infestation in poultry were controlled with extracts from various plants that included *K. senegalensis*, *Solanum nodiflorum*, *Bozwellia dalzieli*, *Mimordia balsamia*, *Vitex doniana*, *Striga* spp., *Butyrospermum paradoxum* (most of which are also listed in Table 1).

Abdu et al. (2000) also reported the use of *Solanum incanum* fruits to treat coccidiosis in poultry and of *M. Balsamia* to treat fowlpox and *Capsicum frutescens*, to treat Newcastle disease.

Respondents also indicated the use of *K. senegalensis* against ectoparasites and skin infection. Makinde (2000) explained the efficacy of *K. senegalensis* against dermatophilosis in terms of the effect of calicedrine (the active principle in Lamstreptocide A obtained from *K. senegalensis* seed oil), which inhibits the growth of *Dermatophilus congolensis*.

Lamstreptocide is effective against mange in rabbits (Makinde, 2000). The above author also indicated that *K. senegalensis* contains 12.88% palmitic acid; 67.91% oleic acid; 9.88% linoleic acid and 9.33% stearic acid all of which (as fatty acids) inhibit bacterial and fungal growth. This may explain the efficacy of *K. senegalensis* against diarrhoea, footrot and gastric problems (Table 1) most of which are caused by bacterial infections.

In addition to the effectiveness of *A. senegalensis* against worms mentioned earlier, the extract from this plant is also antitrypanosomal (Freiburghaus et al., 1996). Asuzu and Chineme (1990), Asuzu and Anaga (1991) and Nok et al. (1993) reported on the trypanocidal properties of leaf and bark extracts from *Morinda lucida*, *Histonina boonei* and *Azadiracta indica*, respectively.

In determining the mechanism of action of *Allium sativum* against ectoparasites, Nok and Williams (1996) demonstrated that the extract obtained from *A. sativum* (which matched the standard diallyldisulphide, DAD) completely eliminated trypanosomes in mice following administration of 120 mg/kg live weight by 4 days post-treatment. DAD has a lipid-regulatory effect and the extract from *A. sativum* is thought to have caused cell death in trypanosomes through causing an early arrest in the synthesis of membrane lipids (Nok and Williams, 1996).

In other ethnoveterinary medical practices with surgical implications, wounds, joint conditions and swellings are treated by applying a red-hot iron (in the belief that as the burnt skin heals, the ailment is healed along with it) (Abdu, 2000).

Although our results suggest ethnomedicine as a readily available alternative to modern veterinary inputs and services, there is a lack of information on the efficiency and mode of action of many traditional drugs. Standard drugs are often more effective and convenient to use than traditional remedies. Furthermore, traditional drugs have not been extensively tested for their effects on organ integrity. There is also the need to determine the active

ingredients and their amounts in the plant. Such information is important in dosages. Biochemical studies also would reveal any poisons (such as alkaloids and cardiac glycosides) which may exist in the plants.

4. Conclusion

For a list of 21 ailments of ruminants that we prepared, 50 livestock-owing respondents typically could provide multiple ethnoveterinary treatments. We caution that some of these have not yet been studied to identify active compounds or standardized dosages. However, some ethnomedicines do have supporting evidence for their reported uses.

References

- Abdu, P.A., 2000. A survey of ethnoveterinary practice of Agropastoralists in Nigeria. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Abdu, P.A., Faga, J.N., 2000. The efficacy of some Nigerian plants on helminths found in local chickens. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Abdu, P.A., Ibrahim, M.A., Ibrahim, H., George, B.D.J., Saidu, S.N.A., 2000. Ethnoveterinary knowledge and practices on the health and disease of indigenous poultry in Hausaland. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Alawa, J.P., Lemu, N.S.A., 1996. Studies on small ruminant production systems in Zaria urban area: population demography, management systems and husbandry techniques. *Nig. J. Agric. Ext.* 9 (1–2), 58–69.
- Alawa, J.P., Lemu, N.S.A., Sackey, A.K., Alawa, C.B.I., 1996. Studies of small ruminant production systems in Zaria urban area, Kaduna State: observations on aspects of health management of small ruminants. *Nig. J. Agric. Ext.* 9 (1), 1–10.
- Alawa, C.B.I., Gefu, J.O., Chiezey, N.P., Abdu, P.A., Magaji, S.O., Eduvie, L.O., Adeyinka, I.A., 2000. Screening of *Vernonia amygdalina* for anthelmintic properties. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Anonymous, 1982. Beef production in Nigeria. In: Proceedings of the National Conference on Beef Production in Nigeria, July 27–30, 1982, pp. 2–5.
- Asuzu, I.U., Anaga, A.O., 1991. Pharmacological screening of the aqueous extract of *Histonia boonei* bark. *Fitoterapia* 1xii (5) LXIII, 411–417.
- Asuzu, I.U., Chineme, C.N., 1990. Effects of *Morinda lucida* leaf extract on *Trypanosoma brucei* infection in mice. *J. Ethnophar* 30, 307–313.
- Atawodi, S.E., Usman, M., Bulus, S.T., Atawodi, J.C., Wakawa, L., Ameh, D.A., 2000. Herbal treatment of some protozoal and parasitic diseases of poultry in the middle belt of Nigeria. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Centre Technique de Cooperation Agricole et Rurale (CTA), 1987. Primary animal health care in Africa. In: Synopsis of the Seminar held at Blantyre, Malawi, September 25–28, 1985.
- Chiezey, N.P., Jagun, A.G., Abdu, P., Alawa, C.B.I., Magaji, S.O., Gefu, J.O., Eduvie, L.O., 2000. Screening of medicinal plants for antibacterial agents in Nigeria. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Freiburghaus, F., Brun, R., Kaminsky, R., Nkunya, M.H.H., 1996. Evaluation of African plants for in vitro antitrypanosomal activity. *Trop. Med. Int. Health* 1 (6), A29–30.
- Gueye, E.H.F., 1997. Diseases in village chickens: control through ethnoveterinary medicine. *ILEIA Newslett. Low Ext. Input Sustain. Agric.* 13 (2), 20–21.
- Ibrahim, M.A., Nwude, N., Aliu, Y.O., Ogunsusu, R.A., 1984. Screening West African plants for anthelmintic activity. *ILCA Bull.* 17, 19–22.

- Intermediate Technology Development Group and International Institute of Rural Reconstruction (ITDG and IIRR), 1996. *Ethnoveterinary Medicine in Kenya. A Field Manual of Traditional Health Care Practices*. Nairobi, Kenya.
- Jagun, A.G., Abdu, P.A., Chiezey, N.P., Magaji, S.O., Alawa, C.B.I., Mohammed, A.K., 1998. Evaluation of Nigerian herbal plants for anthelmintic activities. Technical Progress Report. IDRC, Canada, submitted for publication.
- Makinde, A.A., 2000. Ethnoveterinary medicine research and development: the vom experience. In: Paper Presented at the International Workshop on Ethnoveterinary Practices, August 14–18, 2000. Arewa House, Kaduna, Nigeria.
- Nok, A.J., Williams, S., 1996. *Allium sativum*—induced death of African Trypanosomes. *Parasit Res.* 82, 634–637.
- Nok, A.J., Esievo, K.A.N., Armrose, A., Isaac, A.I., Emmanuel, G.C., James, K.A., 1992. Trypanocidal activity of an organotin compound (tri-*n*-butyltin oxide) toward *Trypanosoma brucei*. *J. Clin. Biochem. Nutr.* 13, 81–85.
- Nok, A.J., Esievo, K.A.N., Longdet, L., Arowosafe, S., Onyenekwe, P.C., Gimba, C.E., Kagbu, J.A., 1993. Trypanocidal potentials of *Azadirachta indica*: in vivo activity of leaf extract against *Trypanosoma brucei*. *J. Clin. Biochem. Nutr.* 15, 113–118.