Ethnoveterinary practices used by owners of working equids with dermal disorders from tropical regions of Veracruz, Mexico

Rubí Sánchez-Casanova¹, María Masri-Daba¹, Miguel Alonso-Díaz⁷*, Adriana Méndez-Bernal¹, Mariano Hernández-Gil¹,³ & José Fernando-Martinez¹,³

¹Facultad de Medicina Veterinaria y Zootecnia (FMVZ), Universidad Nacional Autónoma de México (UNAM), Ciudad Universitaria, DF., C.P. 04510 México, México; ²Centro de Enseñanza, Investigación y Extensión en Ganadería Tropical, FMVZ, Universidad Nacional Autónoma de México, Km 5.5 Carretera Federal Tlapacoyan-Martínez de la Torre, Veracruz, C.P. 93600 México, México; ³Programa Donkey Sanctuary (DS), Universidad Nacional Autónoma de México, Ciudad Universitaria, DF., C.P. 04510 México, México

E-mail: alonsodma@hotmail.com

Received 25 September 2014, revised 03 March 2015

The tropical environmental conditions of the North-central region of the state of Veracruz, Mexico, are favorable for the development of specific dermal disorders in working equids and sometimes cost and inaccessibility has led to the continuation as well as rediscovery of traditional treatment practices in developing countries. Four hundred sixty seven working equids from the North-central region of the state of Veracruz, Mexico, were treated at the Donkey Sanctuary Mobile Clinic Program-Universidad Nacional Autónoma de México. Animals with signs of cutaneous pathology underwent a physical examination. Each owner of an animal with dermal disorders was interviewed using a standardized structured and pre-tested questionnaire that included detailed questions on owner demographics and equid ownership, feeding practices, animal disease history and the ethnoveterinary practices (EVP) performed. Prevalence (P) and confidence intervals for prevalence (CIp) for husbandry and EVPs were calculated. A total of 84 owners who cared for 96 equids with dermal disorders were interviewed. Nine dermal disorders were reported by owners. The therapeutic methods used included gentian violet, hydrogen peroxide, soap, commercial parasiticides, used engine oil, dehorning paste, sulfur, creolin, and practices such as suture and firing or branding. Only the medicinal plant Aloe vera was reported as being used to treat skin wounds.

Keywords: Ethnoveterinary practices, Dermal disorder, Working equids, Skin wounds, Welfare

IPC Int. Cl.: A61D, A61K, A61B 17/322, A61Q 17/00, A61B 17/00, A45D 27/38, A45D 44/22, A01D 6/00

Ethnoveterinary medicine (EVM), the scientific term for traditional animal healthcare, encompasses the knowledge, skills, methods, practices and beliefs about animal healthcare found among members of a community. The knowledge base differs not only from region to region, but also among and within communities. Thus, EVM is less systematic, less formalized, and not universally recognized as a valid method of disease control in animals. Local practices include folk belief, the use of medicinal plants, surgical techniques and management practices to diagnose, prevent or treat a wide variety of diseases. According to the World Health Organization (WHO), at least 80% of people in developing countries depend largely on these practices for the control and treatment of various diseases that affect both animals and humans. The advent of allopathic veterinary medicine has to some extent eroded the use of ethnoveterinary methods. Nevertheless, sometimes cost and inaccessibility associated with this healthcare system has led to the continuation as well as rediscovery of traditional treatment practices in developing countries. Several reports have described the ethnoveterinary practices (EVP) used by owners of almost all species with emphasis on the use of medicinal plants.

Mexico has nearly two million equids (62% horses, 11% mules and 27% donkeys) and the vast majority is used for agricultural and rural activities. Working equids are normally used for carting goods and people, carrying packs, riding, plowing, weeding and tourism. The tropical environmental conditions of the North-central region in the state of Veracruz, Mexico (temperature ≥18 °C, high humidity) are favorable for the development of specific dermal disorders in working equids, and are linked to owner management and sheltering practices. However, no published report is available on the EVPs for a wide variety of diseases in relation to owners of working equids with dermal disorders from tropical regions of Veracruz, Mexico. Therefore, the objective of the present study was to

*Corresponding author
estimate the prevalence and gather insight into the nature of EVPs by owners of working equids in tropical regions of Veracruz, Mexico.

Materials and methods

Study design

A descriptive cross-sectional survey was carried out during April, October and November 2012 in order to calculate the prevalence of husbandry and the EVPs used by owners of working equids in Veracruz, Mexico. This study was carried out in seven municipalities located in the North-central region of the state of Veracruz, which are visited by the Donkey Sanctuary Mobile Clinic Program, from the Universidad Nacional Autónoma de México (DS-UNAM) at least twice a year. Climatological and topography data from each municipality are presented in Table 1.

Sample size determination and sampling strategy

A pilot study was performed to validate a questionnaire and the presence of dermal disorders in two municipalities (Colipa and Vega de Alatorre). Subsequently, convenience sampling was performed, where all animals taken to the mobile veterinary clinic by owners were evaluated. The criteria for selection of the municipalities were location, transportation and communication facilities.

Data collection

Examinations were undertaken outdoors with no restraint other than the headcollars or bridles that the horses wore on arrival. All equids were thoroughly examined for body lesions. Animals with signs of dermal disorders underwent a special physical examination. Each owner of an animal with dermal disorders was interviewed using a standardized structured and pretested questionnaire. This questionnaire included questions on owner demographics and ownership details, feeding practices, equid diseases and the EVPs performed.

Statistical analysis

Data were entered into a custom-built Excel data base and cross-checked to identify and rectify errors in data entry. Data were processed using Epi Info 7.0. Prevalence (P) and confidence intervals for prevalence (CIp) for husbandry and EVPs were calculated.

Results

Clinical examination

A total of 467 working equids were examined (269 horses, 170 donkeys and 28 mules) and dermal disorders were observed in 96 (61 horses, 31 donkeys and 4 mules).

Owner questionnaire

A total of 84 owners were interviewed who owned and cared for the 96 equids identified as having dermal disorders. Answers to questions regarding equid husbandry are summarized in Table 2. A total of 9 dermal disorders were cited by working equid owners (Table 3). In the humid tropics of Veracruz, Mexico, EVPs used for the treatment of dermal disorders also are provided in Table 3. The therapeutic treatments used by equid owners included natural and synthetic products as well as practices like suture or branding. Some owners used combinations of these products for the treatment of the conditions reported. In several instances, more than one product had been used for the treatment of a particular dermal disorder. There was only one medicinal plant (Aloe vera) reported that was used to treat skin wounds even though some owners did not remember the name of the plants and instead described it.

Products used for skin wounds

Equid owners can acquire gentian violet, hydrogen peroxide and soap at community drugstores or supermarkets if they are nearby and usually apply them for less than one week when a skin wound is detected. One owner of a donkey reported that gentian violet was used when his animal was injured accidentally by a rope, but the wounds did not heal with formation of a “tumor” (Exuberant Granulation Tissue, EGT). Other owners have described the topical application of fresh leaves or soap and the wound-healing effects of sabila (Aloe vera), which can also be used as an ornamental plant.

Products used for ticks, ringworm, rainscald, weals and mange

Ticks, insect bites (which cause weals) and mites (which cause mange), fungi (which cause ringworm) and bacteria (which cause rainscald) are collectively referred to as sarnilla by equid owners; causing dermatitis and itching. Products used for treat these conditions include used engine oil, creolin, sulfur and commercial parasiticides. Used engine oil (sometimes referred to as “petroleum”) is generated during the normal periodic preventative maintenance services conducted on internal combustion engines and is either collected from personal vehicles or purchased at auto repair facilities. Sulfur is used as a pesticide on crops. Creolin (a liquid cresol) is used as a disinfectant for barns and stables. Commercial parasiticides used by equid owners contain formamidines (Bovitraz®),...
organophosphates (Asuntol®, Neguvon®, Garraban®), and pyrethroids (Butox®, Garraban®, Bayticol®). They sometimes apply it according to instructions on the label, or by following veterinary advice when available. However, owners answered that they must apply the products each time disorders appear.

**Products and practices used for warts and tumors**

Besides dehorning paste and Aloe vera which are applied topically, treatment of warts (mostly sarcoids) is performed using auto-hemotherapy; referred to as cambio de sangre (that means “change of blood” in English) by equid owners. This practice consists of extracting 10 ml of blood from the equid jugular vein and then the autologous whole blood is applied via intramuscular injection. Another practice performed equally for the treatment of warts and tumors (melanoma and EGT) is ligation with a rubber band, where a small band is applied to the base of the nodule stopping the blood supply. Most equid owners interviewed that had been using these practices said that both procedures work.

**Practice used for onchocerciasis**

Onchocerciasis is referred to by equid owners as cargazón de la nuca (“neck threadworms”). Diagnosis is made through clinical examination and medical history, and for a total of 11 equids (mostly horses) marks of firing were observed. When owners detect a swelling around the head and mane, they use the same technique for marking cattle (branding): the use a red-hot knife or pass the animals to a farrier, who applies the procedure. On the questionnaire, most owners answered that this practice helped to reduce swelling.

**Discussion**

There have been few studies on the use of EVPs to treat diseases in equids, especially in horses. These works focused on EVMs and practices with particular reference to the use of plant bio-resources in equids healthcare. The present study dealt with the EVPs used by owners of working equids with dermal disorders from tropical regions of Veracruz, Mexico.
frequently used by owners for the treatment of skin wounds, maybe by extrapolating from similar treatments used on humans. Gentian violet is a triarylmethane dye used as a histological stain and in Gram’s method for classifying bacteria and has antibacterial, antifungal and antihelmintic properties, and was historically important as a topical antiseptic\textsuperscript{21}. Evidence suggests that dissipates the bacterial (and mitochondrial) membrane potential by inducing permeability followed by respiratory inhibition. This anti-mitochondrial activity might explain gentian violet’s efficacy towards both bacteria and yeast with relatively mild effects on mammalian cells\textsuperscript{17,18}. However, its safety is controversial because it is a potential carcinogen and potentially injurious to mucus membranes and open wounds\textsuperscript{17}.

Table 3—Ethnoveterinary practices and products used by owners of working equids with dermal disorders from the north-central region of the state of Veracruz, Mexico

<table>
<thead>
<tr>
<th>Common/Scientific name of DD/EVP</th>
<th>Mode of uses</th>
<th>Prevalence (%)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin wounds (including harness and saddle sores)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Gentian violet</td>
<td>Applying directly on affected site, drench</td>
<td>5.95</td>
<td>0.90-11.00</td>
</tr>
<tr>
<td>2. Peroxide (Hydrogen peroxide)</td>
<td>For saddle sores, applying with a syringe without needle into the wound</td>
<td>3.57</td>
<td>-0.39-7.53</td>
</tr>
<tr>
<td>3. Soap</td>
<td>Topically, rubbing for cleansing on affected site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Suture</td>
<td>Using a non-surgical nylon thread to close wounds</td>
<td>3.57</td>
<td>-0.39-7.53</td>
</tr>
<tr>
<td>5. Sabila (Aloe vera L.)</td>
<td>Breaking off the tip of the leaf and squeezing the gel over the wound</td>
<td>3.57</td>
<td>-0.39 - 7.53</td>
</tr>
<tr>
<td>Ticks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Used engine oil</td>
<td>Topical application as ointment</td>
<td>7.14</td>
<td>1.64-12.64</td>
</tr>
<tr>
<td>2. Commercial parasiticide</td>
<td>Spraying over the animals’ body and drench</td>
<td>5.95</td>
<td>0.90-11.00</td>
</tr>
<tr>
<td>Warts (Sarcoid)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Change of blood (Autohemotherapy)</td>
<td>Autologous whole blood intramuscular injection</td>
<td>2.38</td>
<td>-0.87-5.63</td>
</tr>
<tr>
<td>3. Dehorning paste</td>
<td>Rubbing as ointment over the warts</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>4. Sabila (Aloe vera L.)</td>
<td>Breaking off the tip of the leaf and squeezing the gel over the sarcoid</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>5. Ligation with a rubber band</td>
<td>Tying a rubber band around the sarcoid</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>Onchocerciasis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Firing or branding (cauterization)</td>
<td>Making three marks over the swelling around the head and mane with a red-hot knife</td>
<td>9.52</td>
<td>3.25-15.79</td>
</tr>
<tr>
<td>Ringworm (Dermatophytosis)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Commercial parasiticide</td>
<td>Spraying over the animals’ body and drench</td>
<td>3.57</td>
<td>-0.39-7.53</td>
</tr>
<tr>
<td>2. Used engine oil</td>
<td>Topical application as ointment</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>3. Sulfur</td>
<td>Topical application as ointment</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>4. Creolin</td>
<td>Topical application as ointment</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>Rainscald (Dermatophilosis)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Commercial parasiticide</td>
<td>Spraying over the animals’ body and drench</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>2. Used engine oil</td>
<td>Topical application as ointment</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>Weals (Insect-bite hypersensitivity)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Commercial parasiticide</td>
<td>Spraying over the animals’ body and drench</td>
<td>2.38</td>
<td>-0.87-5.63</td>
</tr>
<tr>
<td>2. Used engine oil</td>
<td>Topical application as ointment</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>Mange (Dermatitis caused by mites)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Commercial parasiticide</td>
<td>Spraying over the animals’ body and drench</td>
<td>2.38</td>
<td>-0.87-5.63</td>
</tr>
<tr>
<td>Tumors (Melanoma or Exuberant granulation tissue)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Ligation with a rubber band</td>
<td>Tying a rubber band around the tumor</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
<tr>
<td>2. Gentian violet</td>
<td>Applying directly on affected site, drench</td>
<td>1.19</td>
<td>-1.12-3.50</td>
</tr>
</tbody>
</table>

DD = Dermal disorder; EVP = Ethnoveterinary product/practice
Hydrogen peroxide, soap and Aloe vera were reported as the second most frequently used products. Hydrogen peroxide has been described as an effective sporocide, but with a narrow antimicrobial spectrum and a toxicity to fibroblasts which exceeds its antibacterial potency, yet at low concentrations it can stimulate keratinocyte re-epithelialization. It has a limited usefulness for skin disease, although it is used for cleaning minor skin wounds and as a chemical debridement, despite its pigmented effects. However, previous studies mentioned the use of hydrogen peroxide to lavege saddle sores and abscesses after drainage and recommend that if hydrogen peroxide is used, it should be employed only once at the time of the initial lavage of heavily contaminated wounds for its foaming action to help physically remove debris. Therefore, attention must be paid to dosage and mode of use recommendations by equid owners considering that the use of this product is a common EVP for the treatment of skin wounds. In some cases, contaminated wounds with lower bacterial concentrations may become infected when foreign bodies like sutures are present. For this reason, it is necessary to explain to owners about when and how to suture and when it is not appropriate.

Aloe vera L., a species native to the Arabian Peninsula, is used with other species of Aloe in Mexican folk medicine and many medical and cosmetic purposes in several other countries. The fresh leaves are used to obtain a mucilaginous gel from the parenchymatous tissue, which has been used for topical treatment of skin burns and wounds. Aloe vera treatment has a beneficial influence on the various phases of wound healing such as fibroplasia, collagen synthesis and contraction resulting in more rapid healing. Several studies suggest that Aloe vera sterols might have an anti-inflammatory effect due to their structural similarity with anti-inflammatory steroids. Acemannan, a β-(1,4)-linked polydispersed, highly acetylated mannan which is obtained from the inner leaf has been shown to positively impact wound healing.

A variety of methods for the treatment of “sarnilla” were documented in this study, similar to those reported in other studies. Used engine oil was the most common product reported to treat dermal disorders. Use of this product is said to be effective in controlling cattle ticks because the oil likely acts as a physical acaricide, clogging the spiracles and causing the ticks to suffocate. Direct contact between used engine oil and the tick is necessary for effective results and owners need to apply the oil specifically when and where they observe large numbers of ticks. As with other disorders treated similarly, equid owners usually apply the engine oil when they observe dermatitis or hair loss. Some owners reported that applications of used engine oil were more effective than conventional methods. Nevertheless, there is need for safety assessment because this product is a highly complex mixture, containing compounds distilled from petroleum (e.g. aliphatic, aromatic and polycyclic aromatic hydrocarbons), as well as metals such as aluminum, chromium, lead and manganese, which are toxic. Also is mentioned that continuous contact with used engine oil has caused skin cancer in laboratory animals and swallowing may cause stomach cramps and diarrhea. Therefore, used engine oil should not be promoted. Sulfur and creolin are also used for the treatment of “sarnilla”. In several studies, sulfur has been used for management of dermal disorders, mainly for the treatment of mange and ringworm, sometimes mixed with some plants. Sulfur has been used as a fungicide for plants to prevent spores from germinating, and it can be purchased as a dust, wettable powder, or liquid. It also is a degreasing agent. At low concentrations it is keratoplastic, whereas higher concentrations are keratolytic. It has antifungal and antibacterial properties, presumably by conversion to pentathionic acid and H₂S (accomplished by cutaneous bacteria and keratinocytes). Creolin, a petroleum product, effects act by denaturing microbial proteins, it is also antipruritic and antifungal. There are few studies showing that treatment with creolin results in control of parasites, and it currently has few legitimate uses on skin. The use of sulfur, as with creolin and commercial parasiticides, must be with medical supervision.

One owner reported the elimination of sarcoids on a donkey by directly applying dehorning paste. This product typically contains two caustic substances: calcium hydroxide and sodium hydroxide. When applied to the horn bud, the paste causes a chemical burn that destroys horn-producing cells. Tissue damage continues to increase as long as the active chemicals are in contact with the tissue. There are some products that have been enthusiastically, and mostly anecdotally, promoted for the treatment of sarcoids. These mixtures are caustic, escharotic,
and are believed to act by altering tumor antigenicity, resulting in death of neoplastic cells while leaving surrounding healthy tissue intact. Nevertheless, most are unsuitable for sarcoid-contaminated wounds because of their non-discriminatory and caustic necrotizing nature. It is likely that dehorning paste acts on sarcoids similarly, even though the use of caustic agents is not recommended because they induce necrosis, stimulate chronic inflammation, decrease contraction, damage new epithelial borders and inhibit healing by promoting proliferation of granulation tissue. Auto-hemotherapy, the repeated intramuscular, intravenous, or oral applications of autologous whole blood, is claimed to have therapeutic value in allergic diseases, circulatory disorders, viral diseases, and cancer through the action of circulating growth factors and antibodies, even though there is little evidence from rigorous clinical trials to suggest that they are effective. Owners of equids that used this EVP said that sarcoids disappeared after applications during 3-5 months. There are few studies about the use of autologous whole blood intramuscular injections and there are no scientific reports on the use of this technique for the treatment of equid sarcoids. The results could be occasional and anecdotal successes in very small numbers of equids because sarcoids tend to show spontaneous regression. Ligation of the sarcoids and tumors with rubber bands, sutures or tail hair, tying them around the base terminates the blood supply, causing the lesion to dry up and drop off. The technique is most applicable on conveniently-sized and situated nodular lesions and on some small pedunculated fibroblastic lesions. The repeated use of tail hairs is neither sensible nor helpful. Although some cases can be managed using this method, the lack of progressive tightening of the hair-ligature makes it unlikely that all of the cells will be destroyed. There is a very high rate of recurrence with this method, needing veterinary advice.

Firing, branding or cauterization (destruction of tissue by heat), often frowned upon by conventional veterinary surgeons for its apparent cruelty and futility, has been reported as a popular EVP worldwide for the treatment of several conditions including sprains or bruises, abscesses, nervous disorders, coughing, liver flukes, udder problems, uncoordinated movements, loosening of teeth and inability to feed properly. There are no studies about its use for the treatment of onchocerciasis. This EVP kills microfilariae with heat, but has been reported that massive destruction of microfilariae may exacerbate the cutaneous inflammation for the first 3-4 days of therapy. Using a red hot iron to mark animal skin could be used to stop a hemorrhage or dehorn young animals, but it is not recommended for the treatment of helmintic diseases due to its useless and stressful.

Conclusion
This study provides insight into the EVPs used by owners of working equids with dermal disorders from Veracruz, Mexico. The work of charities such as the DS-UNAM that provide veterinary care for donkeys, horses and mules in this region would benefit by embracing the holistic and sustainable views in EVMs, taking into account the fact that owners have their own considerations and cultural/social beliefs. Not all EVPs provide effective or ideal solutions to animal health problems, but allopathic veterinary medicine would benefit from including holistic and sustainable views in EVPs. Further research on the EVPs used by owners of working equids is needed for disease treatment, as well as an inventory of natural ingredients or plants they use in order to document and validate treatment effectiveness.

Acknowledgment
Authors would like to thank all the equids owners that allowed their animals to be examined and gave their time willingly to share their knowledge. R Sánchez gratefully acknowledges the scholarship from CONACYT Mexico to pursue her graduate studies.

Manufacturers’ details
1 Microsoft Corporation, Redmond, Washington, USA.
2 Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA.
3 Bayer Planta Santa Clara, Ecatepec de Morelos, Estado de México, México.
4 Lapisa, La Piedad, Guanajuato, México.
5 MSD Animal Health, Santa Clara Coatitla, Ecatepec de Morelos, Estado de México, México.

References
3 Kumar S & Tripathi H, Ethnoveterinary practices and socio-cultural values associated with animal husbandry in rural Sunderbans, West Bengal, Indian J Tradit Knowle, 8 (2009) 201-205.


8 Ortiz E, Características edafológicas, fisiográficas, climáticas e hidrográficas de México, (Instituto Nacional de Estadística y Geografía, INEGI, Mexico), 2008, 14-21.


