KARAMOJONG SCIENTISTS:

PARTICIPATORY FIELD TRIAL OF A LOCAL DEWORMER

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ABSTRACT:
The pastoralists of the arid-semi-arid and insecure Karamoja of Northeastern Uganda rely upon their livestock for their livelihood and have developed many local techniques and medicines to insure their health. This paper shares findings of ongoing participatory field trials of *Albezia anthelmentica* as an economically viable way to deworm their livestock. Twenty local and privately owned animals were divided into control and test groups with a Karamojong traditional healer and herdsmen performing all aspects of the experiment. As compared to the negative control, *A. anthelmentica* was 76.3% efficacious at 12 days post treatment, 69.4% at 16 days and 77.2% at 19 days. The percent reduction of fecal egg counts were 76.3% at 12days, 96.3% at 16days and 80.4% at 19 days post treatment. While the trials are still ongoing, the authors are encouraged by the preliminary validation trial of *A. anthelmentica* and the Karamojong's technical abilities.

INTRODUCTION:
Karamoja is a region in the northeastern part of Uganda that is characterized as arid-semi-arid land (ASAL) with poor infrastructure including inadequate veterinary services. The area is sparsely populated and has been ravaged by famine, drought, raids and other insecurities. The transhumant Karamojong pastoralists rely heavily on their livestock for their livelihood, and primarily use their ethnoveterinary knowledge (EVK) to prevent and treat animal diseases.

Ethnoveterinary Knowledge is the indigenous veterinary knowledge or traditional techniques, practices and medicines for livestock that has been passed down verbally. Most practices are plant based and reportedly can be used on 'every livestock disease known' (quote Karamojong Emuron).

Local medicines are important for a number of reasons in Karamoja, including:

- They treat a range of various livestock diseases and other abnormalities, including some that have no ' modern' medicine treatment.
- They are cheap and available to every pastoralist (verses orthodox [modern] medicines)
- They can be used locally without much instruction (vs. orthodox medicines)
- They can easily be planted near the homestead
- They grow naturally
- They are costless
- They are safe, overdoses and toxicity's are practically unheard of.

OBJECTIVE:
To prove the effectiveness of *Albezia anthelmentica* (Ekapangiteng) in order to promote a viable alternative to expensive, rare and difficult to use orthodox medicines for the Karamojong pastoralists.

At time of presentation, anthelmintic field trials are continuing in Lolet villages near Nabilatuk of Pian County in South Karamoja while parallel trials are also ongoing in Namekwii villages near Kangole in Bokora County of Central Karamoja.

METHODS AND MATERIALS:
Twenty animals (10 calves, 5 sheep and 5 goats) were selected by 6 of the animal-owning pastoralists of Lolet village. There was no history of recent deworming. Weekly baseline values were taken for 4 weeks before administration of medicines. Baseline values included: physical exam and observation, body weight and height measurements, total protein and packed cell volume (TP/PCV) of blood samples and serial fecal egg counts. Some animals were also screened for liver fluke and lungworm infestation. Those animals that had any abnormalities were treated, not including any medicines that might alter the internal parasite levels. All of these activities were done in the bush of Karamoja and carried out by the Karamojong, except for one of the authors.

Fecal egg counts (FEC) were done with the Ovatector disposable fecal diagnostic system (BGS Medical Products Inc. Venice Florida patent #3819045) in which the supplied containers were filled with 2 gram of feces in the early morning before grazing. Shortly after collection, the internal parasite eggs were floated in Zinc Sulfate or supersaturated sucrose solution for 20 minutes and then counted with field light-microscopes near the Kraal (enclosed area where the animals are kept). There were no other changes in the typical activity of the animals throughout the field trial.

Blood samples for TP/PCV were collected from the jugular vein in capillary tubes and allowed to settle over time (without centrifuge). A refractometer was used for TP readings and a PCV chart was used for PCV readings.

The Baermann technique and local sedimentation were used for lung worm and liver fluke assessment.

Heights and weights were recorded in centimeters by the heart girth method for weight and measuring from the shoulders for height.

A rectal thermometer and stethoscope were only diagnostic tools for the physical exams.

At the time of medicine administration, the animals were evenly divided into three groups. This included two control groups (positive and negative) and one test group. Two animals were removed from the experiment because they were treated with an orthodox medicine by a District trained paravet during baseline analysis. In addition to these losses, four weeks post-treatment two animals were stolen.

The test group (2 sheep, 2 goats and 4 calves) received the local dewormer, *Albezia anthelmentica* at the recommended dose (see below). A green cloth was loosely tied around the individual animals' necks to aid in subsequent collection and observation, although fecals were only identified by a number.

The positive control group (one sheep, one goat and 3 calves) received the most common bottled liquid dewormer in Karamoja, Wormicid ® (Mebendazole manufactured by Cosmos Limited, Nairobi, Kenya) at label dose. This dewormer is typically under-dosed by the Karamojong pastoralists as they underestimate the weight. A red cloth was placed around their neck,

The negative control group (one sheep, two goats and three calves) received water in the same quality and quantity as the test group. A blue cloth was placed around their neck

The local dewormer was collected, prepared and administered by a Karamojong traditional healer, Damac Felix. He had collected the bark of a particular *Albezia anthelmentica,* known as 'aroo ekapangiteng' that grows in the dark soils and is stronger that the common *A. anthelmentica.* Damac then dried and ground the bark into powder form. He added 2 spoons of ground *A. anthelmentica* into 1 mug of borehole water, stirred gently for a few minutes and gave the supernatant to the test animal. Sheep and goats (shoats) received a soda bottle (300ml) orally and calves received 1 mug (½ liter). Other shepherds assisted in handling the animals.

Starting on the day of administration, early morning observation daily FEC were performed. This continued for four days and then once to twice weekly thereafter. Heights and weights were measured weekly.

Efforts were made not to change any of the routine surroundings of the livestock during the study. All of the animals in the study were allowed to freely mix with those of the manyatta at all times. No changes were made in feeding, watering or housing.

RESULTS:

Percent reduction in FEC

The percentage reduction in fecal helminthes egg output following medicine administration was calculated for the test group and both control groups. Formula and results follow.

$$\% \text{ Reduction} = \frac{(\text{mean FEC day 0} - \text{mean FEC day X})}{\text{Mean FEC day 0}} \times 100$$

Where day 0 = before administrating medicines
day X = the days post medicine administration

Medicine administered	Percent reduction in FEC			
	12 days post treatment	16 days post treatment	19 days post treatment	27 days post treatment
Ekapangiteng	76.3%	96.3%	80.4%	24.9%
Mebendazole	99.3%	99.6%	81.6%	86%
Negative control (water)	55.8%	74.2%	20.3%	46%

Percent efficacy
The efficacy or the percentage of de-parasitism was extrapolated according to the method used by Carvier (1973). Formula and results follow.

$$\% \text{ efficacy} = \frac{N-n}{N} \times 100$$

Where N= average FEC in negative control animals
n= average FEC in treated animal

Medicine administered	Percent efficacy as compared to negative control		
	Day 12	Day 16	Day19
Ekapangiteng	59.7%	69.4%	77.2%
Mebendazole	98.8%	99.5%	93.6%

We also charted the average FEC for each group and calculate trendlines. Visually, it is obvious that the trendlines (log of the average FEC) on positive control and test group go in the negative direction, whereas the trendline on FEC of the negative control continues to increase. See attached charts at appendix.

There were no appreciable height or weight changes at time of publication

CONCLUSIONS:
We realize the limitations of Karamoja as a prime research arena due to its erratic insecurity. The ethnoveterinary team had hoped to have more frequent serial egg counts (at least twice weekly before and after drug administration), but many times our fieldwork was interrupted due to insecurity. However, we feel through our continued interactions and sharing with the pastoralists of Karamoja it can help to promote respect and peace in and around the district of Karamoja. However, the initial results are promising. The log trendlines concur that the *A. anthelmentica* is indeed efficacious, although not as well as the mebendazole. Also worth noting is the general increase in both positive control and test group at three weeks after dosing, this fits well with the life cycle of helminthes and the ongoing field trial in Bokora has been redesigned to re-dose the local medicine at 3 weeks post initial dose. We realize further validation studies need to be done and this protocol needs to be improved, including utilizing McMasters slides for standardized comparative studies. After validation trials, we plan to do quantitative and qualitative trails to assist the Karamojong in best dosing and frequency information. Truly, for a 'scientific test' to be undertaken, some may suggest that the animals need to be isolated and off pasture. However, our focus is to make the research applicable to Karamoja in order to assist the people of Karamoja. Efforts were made not to change any of the routine surroundings of the livestock during the study. CVM/WC continues to be impressed by the veterinary wisdom of the Karamojong and of their competence as field scientists and utilizing the years of 'field trails' of their ancestors. The Karamojong are the some of the best field diagnosticians that the authors have met, at times surpassing even those whom have been trained at the University level. We continue to encourage the livestock community by facilitating the sharing of knowledge and the techno-blending of knowledge, both old and new, local and exotic, traditional and orthodox in order to have healthier animals and people and ultimately to build up respect and peace in Karamoja.

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Mr. Longok Anthony (co-author and student at Arapai Agricultural College
Mr. Damac Felix Traditional Veterinary Assistant (TVA) of CVM/WC
Mr. Loduk Joachim Ethnoveterinary Technician (EVT) of CVM/WC
Mrs. Josephine Amodoi Ethnoveterinary Technician (EVT) of CVM/WC
Mr. Egwang James Project Assistant (PA) of CVM/WC

Owners of field trial animals: Loduk Joachim, Musale, Emunongole, Lotuliade, Teke Ekodakol and Lokiru

Shepherds assisting in field trials: Tukie Apalochim, Achia Nangolok, Dengel Apalokiro, Ayopo Lomyangsiling, Lochoro Apalokamuriai, Aduk Elelia and Bulon Apalochom

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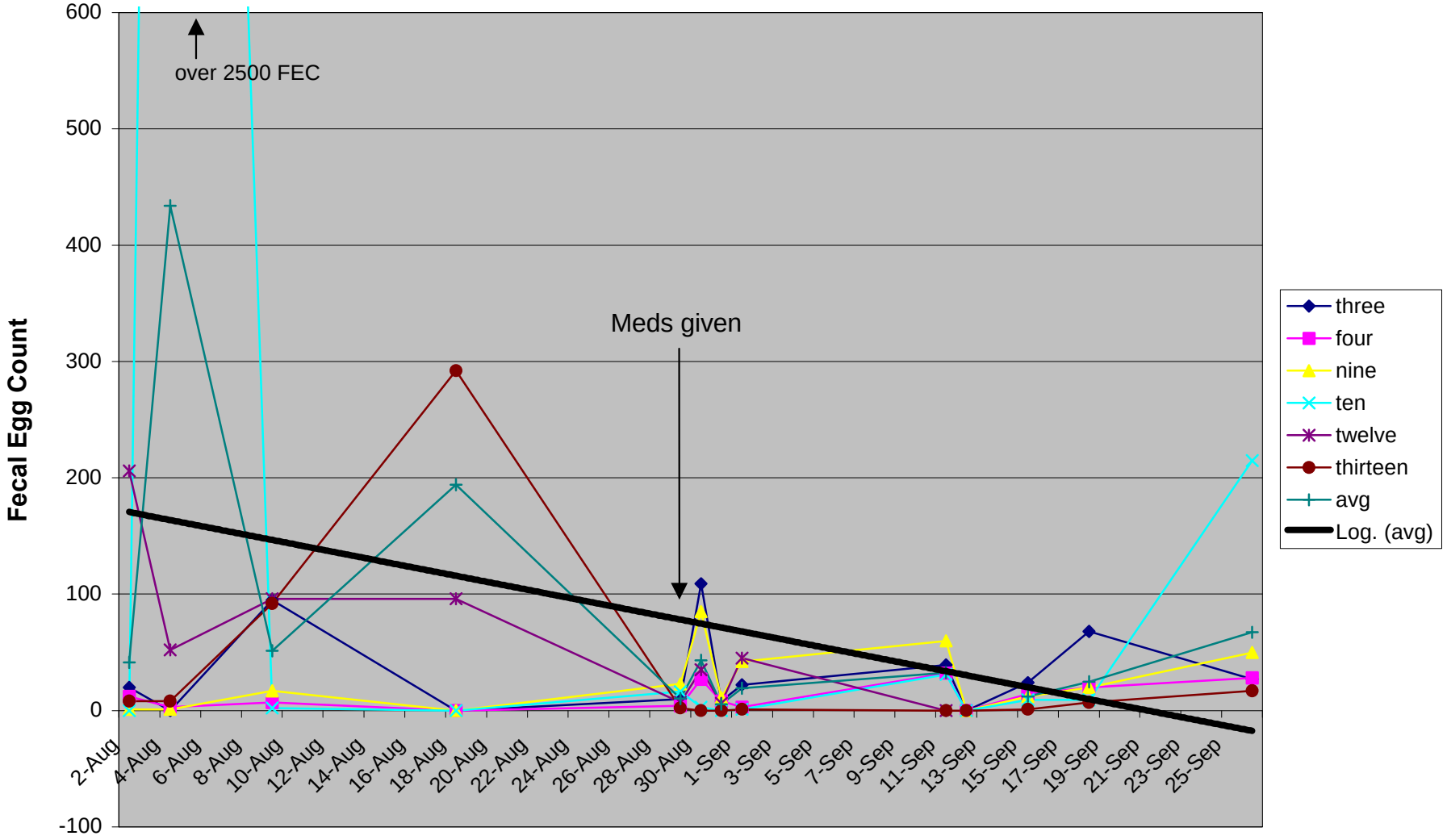
Test group


Fecal Egg Count
600
500
400
300
200
100
0
-100
over 2500 FEC
Meds given
2-Aug
4-Aug
6-Aug
8-Aug
10-Aug
12-Aug
14-Aug
16-Aug
18-Aug
20-Aug
22-Aug
24-Aug
26-Aug
28-Aug
30-Aug
1-Sep
3-Sep
5-Sep
7-Sep
9-Sep
11-Sep
13-Sep
15-Sep
17-Sep
19-Sep
21-Sep
23-Sep
25-Sep
three
four
nine
ten
twelve
thirteen
avg
Log. (avg)