Katembo et al., 2021 Journal of Animal & Plant Sciences (J.Anim.Plant Sci. ISSN 2071-7024)
Vol.48 (3): 8722-8728 https://doi.org/10.35759/JAnmPlSci.v48-3.3

Clinical trial of *Alectra sessiliflora* (VAHL.) Kunze powder in the treatment of sheep's foot rot in Lubero territory (North-Kivu/DR Congo)

Siviri. P. Katembo[1, 3*], Gloire. K. Mukatakamba[1], Valymunziya Charles[4], Arthur Ngulusansi[2]
[1] *Faculty of Medicine Veterinary, Université Catholique du Graben (UCG), DR Congo, Butembo*
[2] *Faculty of Medicine Veterinary, Université De Lubumbashi (UNLU), DR Congo, Lubumbashi*
[3]*Faculty of Medicine Veterinary, Université Pédagogique Nationale (UPN), DR Congo, Kinshasa*
[4]*Faculty of agriculture, Université Catholique du Graben (UCG), DR Congo, Butembo*
Corresponding author: Siviri P. Katembo, mail: kapapy23@gmail.com, tel: +243853566996

Key words: Clinical trial, *Alectra sessiliflora* powder, sheep, Lubero territory, Ethnomedicine

Date of Acceptance 8/04/2021, Publication date 30/06/2021, http://m.elewa.org/Journals/about-japs/

1 ABSTRACT

***Alectra sessiliflora,* a plant native to the forests and grasslands of tropical Africa is currently found in the pastures of farms in the Lubero territory as weeds. In tropical Africa, it is used to treat a wide range of diseases such as gastrointestinal infections, wounds, scabies, and oral thrush. It is also used in some regions of Central Africa as a galactogen and to speed up parturition. This plant contains bioactive para-couramic acid, 3, 4-dihydroxybenzoic acid, luteolin and other compounds including alkalis and phosphorus. The aim of this study was to test the effectiveness of *Alectra sessiliflora* powder in the clinical treatment of sheep foot rot. The broad objective of this study was to contribute to the promotion of the ethnomedicine in the fight against antibiotic resistance in the Lubero Territory. Two lots of 60 sheep each suffering from foot rot and distributed in four sites were subjected to two types of treatment. The first batch was treated with oxytetracycline spray combined with penicillin by injection route and the second batch was treated with *Alectra sessiliflora* powder for 10 days. At the end of the treatment period, the cure rates were 55.0% and 76.7% for the control treatment with oxytetracyline spray combined with penicillin by injection route and *Alectra* sessiliflora powder, respectively. This powder could replace the antibiotics commonly used in the treatment of foot rot of sheep in Lubero territory.**

2 INTRODUCTION

Infectious and parasitic diseases are one of the major challenges leading to economic losses in farms in rural areas (Black and Nunn, 2009). Such is the case of foot rot, which is the consequence of a bacterial infection of the lesion of the interdigitate part in ungulates like the sheep (Winter, 2011). The sick status of an animal vis-a-vis the foot rot lies particularly on the visualization of the interdigital lesions of this condition (Digital dermatitis, 2019). The disease appears when the podal tissues become fragile thus giving access to bacteria leading to (i) necrosis of the finger, to (ii) sepsis and even to (iii) death of the animal. An enzootic manifests itself in tropical countries with high humidity causing damage to livestock and the economy of populations (Katitch *et al.*, 1988). Antibiotic therapy *in vitro* and *in vivo* carried out by numerous researchers in the treatment of foot rot. Particularly, Sophie (2011) and Katembo (2015) have shown that microbes responsible for foot rot are relapsing to several common antibiotics due to antibiotic resistance. From these studies, seemingly the antibiotic therapy

has limitations that it would be desirable to take away using more effective alternative fighting ways against foot rot (Winter, 2011; Katembo, 2015). One of them is the use of *Alectra sessiliflora*. Several ethnobotanical studies have shown that *Alectra sessiliflora* has antimicrobial healing effects (Kasamba, 2001; Kashmir, 2014) and antifungals (Amugume *et al*., 2013). *Alectra sessiliflora* (VAHL.) Kunze (*scrophulariacea*) (Van Der Merwe, 1993) commonly used to treat scabies in Lubero territory, is widespread in agro-pastoral farms. Although this herb has multiple uses in ethnomedicine, in DR Congo, no study has been carried out to verify its therapeutic effectiveness against sheep foot rot. It is in this context that the present study takes place. The basic study was on how effective *Alectra sessiliflora* powder is in the treatment of sheep foot rot compared to the usual treatment based on antibiotics.

3 MATERIELS AND METHODS

3.1 Studied Sites: The experiment was conducted in the cool highlands of Lubero territory in North Kivu province and more precisely in 4 sites namely Masoya, Lubero, Kirima and Musienene. These sites are characterized by a climate that would be typical equatorial if it were not contrasted by the mountains. The temperature is moderate (17 to 18 °C) and quasi- isothermal with rainfall episodes spread over the whole year (*Afi*, according to the classification of Vladimir Köppen).

Figure 1: Specimen of *Alectra sessiliflora*

3.2 Materials: The biological material consisted of plant material and animal material. The plant material consisted was *Alectra sessiliflora* (Figure 1). It is from this plant that the samples intended to produce the powder used for foot rot treatment were extracted. These were collected in the mountains of Mughola (2030 m asl), region located west of Butembo town in Lubero territory, Baswagha chiefdom, Ngulo Group, in the DRC, in January 2018, in the full bloom of flower buds' period.

3.3 *Alectra sessififlora* powder manufacturing and trial conduction: The procedure for manufacturing *Alectra sessiliflora* powder consisted of (i) harvesting the plant in full bloom, cut at the level of its basal part, of (ii) drying in the shade for ten days, of (iii) grinding in a porcelain mortar to obtain a fine powder and of (iv) storing the powder in sterile vials. The animal material consisted of sheep confined to the four experimental sites above- mentioned. In each of the sites, thirty sheep suffering from foot rot split in two batches, one subjected to treatment based on antibiotics commonly used in the area and the other to the treatment based on *Alectra sessiliflora* powder. Selection criteria of

experimental farms were the presence of cases of typical foot rot and the observance of a two-week period without antibiotic treatment. The criteria for choosing animals to be part of the experimental sample were the score of the lesion that was to be between 3 and 4 (figure 2).

Figure 2: lesion score 3 (on the left) and 4 (on the right) of foot rot in sheep

The dose of *A. sessiliflora* powder was 5 grams administered externally on the lesion of the animal, the one of the antibiotics in topical use (oxytetracycline in spray on lesion associated with penicillin by injection route); for oxytetracycline one second spray on the lesion after rinsing with salt water and trimming, and for penicillin 1 ml per 20 Kg by injection route.

3.4 Data collection and analysis: During the experiment, two parameters were evaluated, namely the evolution of symptoms over time (lame state of the animal, degree of swelling of the feet, evolution of the lesion) and the rate of healing. The evaluation was carried out during a 10-day period, on the fifth day of treatment and on the tenth day of treatment i.e., after every 5 days. Descriptive analysis was used to assess the healing rate of sheep foot rot for both, antibiotic and *Alectra sessiliflora* powder. Collected data were also subjected to contingency test using GENESTAT software 15th edition at 5% significant level.

4 RESULTS

During the conduct of the trials, the evaluation of the treatment with *Alectra sessiliflora* was effective. A total of 120 sheep were surveyed. For the four sites chosen, 30 sheep made the object of investigation. In addition, for each of the sites 15 sheep were treated with *Alectra sessiliflora* powder and 15 others with the usual treatment with antibiotics (oxytetracycline spray combined with penicillin). Tables 1 to 4 illustrate the results endorsing this study.

Table 1: Comparative daily evaluation of the two treatments for foot rot at Kirima

Treatment	***Alectra sessiliflora***		**ATB**	
Healing	+	-	+	-
Day 1	0	0	0	0
Day 5	6	9	2	13
Day 10	12	3	9	6

P-value > 0.231

Table 2: Comparative daily evaluation of the two treatments for foot rot at Musienene

Treatment	*Alectra sessiliflora*		ATB	
Healing	+	-	+	-
Day 1	0	0	0	0
Day 5	7	8	5	10
Day 10	11	4	8	7

P-value > 0.255

Table 3: Comparative daily evaluation of the two treatments for foot rot at Lubero

Treatment	*Alectra sessiliflora*		ATB	
Healing	+	-	+	-
Day 1	0	0	0	0
Day 5	8	7	5	10
Day 10	11	4	7	8

P-value > 0.136.

Table 4: Comparative daily evaluation of two treatments for foot rot at Masoyi

Treatment	*Alectra sessiliflora*		ATB	
Healing	+	-	+	-
Day 1	0	0	0	0
Day 5	6	9	2	13
Day 10	12	3	9	6

P-value > 0.231

The P-value was greater than the observed Khi2 in all the studied sites (Tables 1, 2, 3 and 4) indicated that the use of antibiotics to treat sheep foot rot could be replaced by *Alectra sessiliflora* powder. Table 5 summarizes the healing after treatment in the different Sites.

Table 5: Summary table of healing after treatment in the different sites

Zones	Sites	Treatment			
		Alectra		Antibiotics	
		+	-	+	-
North zone	Kirima	12 (80.0)	3 (20.0)	9 (60.0)	6 (40.0)
	Masoya	12 (80.0)	3 (20.0)	9 (60.0)	6 (40.0)
South zone	Lubero	11 (73.3)	4 (26.6)	7 (46.7)	8 (52.3)
	Musienene	11 (73.3)	4 (26.7)	8 (52.3)	7 (46.7)
	Total	46 (76.7)	14 (23.3)	33 (55.0)	27 (45.5)

Note: The numbers in parentheses represent the percent of healing (+) or non-healing (-).

Results in Table 5 indicate that 76.7% of sheep treat with Alectra sessiliflora healed against 55.0% treat with the antibiotic 10-day ego after treatment.

5 DISCUSSION

The results obtained show that out of a total of 120 sheep selected, 79 responded positively to treatment of foot rot, of which 46 or 76.7% were treated using *Alectra sessiliflora* extract and 33 or 55.0% with the usual treatment consisting of antibiotics (topical use of oxytetracycline). Through the research carried out during this study, the impact of the treatment of foot rot

with *Alectra sessiliflora* is positive. Analysis of the data reveals that treatment with *Alectra sessiliflora* is more effective than the antibiotic therapy, which confirms the hypothesis of present research. Two phenomena can explain this healing gap. Firstly, it is a heavy abuse of antibiotics leading to antibiotic resistance. Numerous researchers agree that overuse of antibiotics leads to weak response during treatments. For Fortane (2016) the bacteria have triumphed over antibiotics and this because of overuse and uncontrolled use. Andremont and Comillot (2007) assert that poor management of the prevention of infections and the use of non-specific and inappropriate antibiotics at the wrong time may cause resistance. Manske *et al* (2002) asserted that following two treatments with oxytetracycline with 5 days interval under dressing on 23 cows, a demonstration of cure rate with oxytetracycline of 87% (20/23) significantly higher compared to treatment with glutaraldehyde. Treatment with *Alectra sessiliflora* powder showed a marked regression of symptoms 36 hours after the first application. In sheep treated with *Alectra sessiliflora*, on the tenth day a significant decrease in symptoms was noted. Therefore, in the South zone between 1380 and 1900 m asl, including the two sites Musienene and Lubero , there was a regression of symptoms until reaching an average of 73.3% cure with *Alectra sessiliflora* powder against 46.7% at Lubero and 53.3% in Musienene. In the North zone between 1100 and 1871 m altitude including Kirima and Masoyi as site, treatment with *Alectra sessiliflora* showed an 80% cure in both sites with the use of the extract of *Alectra sessiliflora* against 20% with antibiotic therapy. Several studies have shown that there are limits in the use of topical treatments. In this study compared two topical treatments including oxytetracycline spray combined with penicillin and *A. sessiliflora* powder. The first limit is the fact that after a month of treatment the disease becomes recurrent after application of topical treatments, up to 32% when clinically the lesions were considered cured (Higginson *et al*., 2013). In addition, Holzhauer *et al*. (2008) has shown that despite topical treatment, 43% of level 4 lesions remained unchanged after a week. Nishikawa and Taguchi (2008) concluded that a local application of drug does not inactivate the pathogens because the concentration of these antibiotics is insufficient, and this may lead to the persistence of these agents and antibiotic resistance. This leads to the reappearance of new infections. This study is the first study to evaluate the effectiveness of *A. sessiliflora* powder in the treatment of foot rot with comparison of antibiotic treatment (topical oxytetracycline). This for 10 days of treatment. Very few researchers have studied the use of *Alectra sessiliflora* preparations. Holzhauer *et al*. (2012) have shown that this plant is used in the clinical treatment of tuberculosis (Sharif-Rad *et al*., 2017) and this by infusion of the leaves. This treatment had displayed a positive result in patients. Kusamba, (2001), Tshikalanga *et al* (2016) have shown that *Alectra sessiliflora* is used in the treatment of kidney problems in many countries in Central Africa. In Kenya, a study conducted by Amugune (2013) had proven its antimicrobial and antifungal activity in numerous germs cultivated in laboratory, such as *E. coli*. Other authors like Amugune (2013) and Van Der Merwe (1993), asserted that flavonoids and alkalis enhance the medicinal effect of the plant. From these results, it was noticed that A*lectra sessiliflora* had a cure rate higher than the ATB treatment. The differences between the two treatments would be because in the farms investigated there is an abusive use of antibiotics and lack of realization of antibiograms to determine which antibiotics to use, which leads to resistance germs.

6 CONCLUSION

After the clinical trials carried out in the interdigital spaces of sheep, *Alectra sessiliflora* is effective in the treatment of foot rot in sheep. The results showed a disappearance of the symptoms until an 80% healing on the tenth day of treatment. From these results, *Alectra*

sessiliflora could be used to replace the use of antibiotics in the treatment of foot rot in sheep. ATBs (injectable and topical oxytetracycline) being so expensive and creating antibiotic resistance in public health. Pharmacological studies should be envisaged for the valuation of the plant, the extraction and the demonstration of the antimicrobial active principles against the germs responsible for foot rot. A unique treatment does not ensure the elimination of all pathogens. In addition, antibiotics or *Alectra sessiliflora* powder can only be administered to sick animals at the stage 2. Such treatment should come after sanitation of the herd through regular passage in footbath that contains zinc sulphate (2, 5 kg/10 litres of water) and trimming the hooves. For the same reason, other treatments intended for isolated animals, such as, formalin sprays, antibiotic grease applications are not enough to eradicate foot rot. Only by including the whole herd in a treatment that we can fight effectively and durably against this disease. However, our research only focused on one region, which is the Lubero territory. It would be relevant to extend this study to the national level.

7 REFERENCES

Amugune B.K., Mwangi, J., Omosa L.K. & Kibwage I. Antimicrobial Activity and Bioactive Constituents of *Alectra sessiliflora* (VAHL) Kuntze Methanol Extract. (2013).

Amugune, B.K., Mwangi, J.W., Thoithi, G.N. & Kibwage, I.O. In Vitro Screening of Ten Selected Traditionally Used Medicinal Plants in Vihiga County, Kenya for Antibacterial and Antifungal Activity. International Journal of Medicinal Plants and Natural Products 3, 37–44 (2017). http://dx.doi.org/10.20431/2454-7999.0302005

Andremont, A. & Comillot, T. the triumph of bacteria, the end of antibiotics. *Milo* (2007).

Black, P. & Nunn, M. Consequences of climate change and environmental change on emerging or re-emerging animal diseases and on the animal production. *Conf. OIE* 2601, 1–13 (2009).

Digital dermatitis: contribution to the control by treatment with an anti-topical infectious. (2019).

Fortané, N. The public problem of antimicrobial resistance in animal farming: trials and characterization. *INRA Prod. Anim.* (2016).

Higginson Cutler, Janet, Cramer, Gerard, Walter, JJ, Millman, Suzanne and Kelton, D. Randomized clinical trial of tetracycline hydrochloride bandage and paste treatments for resolution of lesions and pain associated with digital dermatitis in dairy cattle. *J. Dairy Sci.* (2013).

Holzhauer, Menno, Bartels, Chris J., Bergsten, Christer, Van Riet, Miriam Mj, Frankena, Klaas and Lam, T. The effect of an acidified, ionized copper sulphate solution on digital dermatitis in dairy cows. *Vet. J.* 139, (2012).

Kashmir, A. Ethno-botanical inventory and medicinal uses of some important woody plant Asian Pacific Journal of Tropical Biomedicine. (2014). http://dx.doi.org/10.12980 / APJTB.4.201414B381

Katembo, S. Epidemiological profile and antibiogram of the causal pathogens of foot rot in Lubero territory. Memory. Université Catholique du Graben (2015).

Katitch, R.V, Katrinka, M. & Jovanovitch, M. On the etiologic and prophylaxis of sheep foot rot. 119–124 (1988).

Kusamba C.U. Contribution to the inventory of medicinal plants from the Bushi area, South Kivu Province, Democratic Republic of Congo. 351–368 (2001)

Nishikawa, A and Taguchi, K. Healing of digital dermatitis after a single treatment with topical oxytetracycline in 89 dairy cows. *Vet. Rec.* 168, (2008).

Sharifi-Rad, J. *and al.* Medicinal plants used in the treatment of tuberculosis - Ethnobotanical and ethnopharmacological approaches. *Biotechnol. Adv.* (2017). doi: 10.1016 / j. biotechadv.2017.07.001

Sophie, R. Epidemic-Clinical Study, Paul-Sabatier, Toulouse, (2014).

Tshikalange TE, Mophuting BC, Mahore J, Winterboer S, Lall N (2016). An ethnobotanical study of medicinal plants used in villages. Department of Plant and Soil Sciences, University of Pretoria, Pretoria

Van Der Merwe C.A. Seed germination requirements of *Alectra sessiliflora*. *South African J. Bot.* 59, 459–460 (1993). http://dx.doi.org/10.1016/S0254-6299(16)30724-9

Winter, A. Treatment and control of hood disorders in sheep and goats. The veterinary clinics of North America. *Food Anim. Pract.* 27, 187–193 (2011).