

Assessment of Poisonous Plants to Livestock In and Around Nekemte Area, East Wollega Zone of Oromia Regional State, Western Ethiopia

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Abstract: The study was conducted from November 2014 to May 2015 in and around Nekemte town, East Wollega Zone of Oromia regional state, Western Ethiopia with the objective of assessment and identification of the potential toxic plants to livestock. Two types of structured questionnaires were developed and 140 individuals (121 livestock owners (farmers and traditional healers) and 19 animal health practitioners) were interviewed on Voluntary basis from Guto Gida and Wayu Tuka districts. The result of this assessment indicated that 120 respondents were complained the presence of plant poisoning to livestock in the study area. From total interviewee, 88.4% of the people were from Wayu Tuka and 83.09% of people were from Guto Gida. In this study 34 toxic plant species were identified and documented during the study period. These plants were common in both districts of the study area. The major problems that expose the livestock to the toxic plants as complained by study participants were predisposing factors like shortage of feed, water shortage, nutritional deficiency and others factors like sudden graze. The animals were usually poisoned at the start and end of rainy season and during the dry season. The most common plant parts that cause toxicosis to the livestock were whole and leaf. Among the toxic plants *Sorgum vulgariae*, *Medicago burweed*, *snowdenia polystachia*, grass species, *Brakenfren (Pteridium aquilinum)* and *Amaranthus* species were the most frequently complained toxic plants in the study areas. The majority of the toxic plants that cause toxicosis to the livestock were by ingestion with single exposure and bovine species were found to be susceptible poisoned animals. The present assessment study indicates the existence of high toxic plants in the area that needs interventions to reduce livestock exposure and further research to determine the toxicogenic ingredients of the plants.

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1. Introduction

Plants comprise the third largest category of poisons known around the world. They form a major part of livestock feed, thus toxicities in animals consuming these plants can be expected. It is also known that poisonous plants constitute a major cause of economic loss in livestock industry since the days of early settlement (Clarke and Clarke, 1977). Toxic plants affecting both large and small animals are a major concern for the practicing veterinarian and livestock producer in every country (Bernal *et al.*, 2006).

A variety of poisonous plants has caused extensive losses to the livestock industry in many parts of the world mainly east Africa including Ethiopia since the days of early settlement. They are still significant problems in numerous areas. Even though plants have vital nutritious and providing the normal atmospheric oxygen, it will cause life threatening if it is toxic (Bah, 2013). Poisonous plants produce their toxic effects after being ingested and/or absorbed by animals, which include physical upset, loss of productivity and death (Mekonnen, 1994).

The possibility for toxic plants to end up in hay and forage represents a serious risk to livestock and other animals. There are several factors which contribute to an animal poisoning. Foremost, there is the requirement that a sensitive species of animal ingest or otherwise be exposed to a toxic plant at an appropriate time. It is also more likely to occur in animals which have been moved from one part of the country to another. While there are many indications for plant poisonings, the most obvious cases involve sudden onset of disease in a group of animals (Cheeke, 1998).

Numerous factors influence the action of poisonous substances, which include: route of absorption, the dose, the physical and chemical nature of the poison, whether exposure to poison is single or repeated, the species, body size, sex, and general health state of animal, and chemical factors such as: particle size, solubility, toxicity, absorption and excretion rate, affinity for body tissues or fluids, interaction with other drugs, and lacking development of metabolic pathway. Liver or kidney insufficiency may enhance toxicity due to poor metabolism or slow excretion of toxicants. Alteration in gastrointestinal

pH can change the ionization of drug or chemicals and influence their absorption; presence or absence of food in the stomach affects the toxicity of certain compounds (Dixit, 2007).

Diagnosis of plant poisoning of livestock depends on the history, clinical syndrome observed, post-mortem lesions, evidence that plants have been grazed, and remains of toxic plants in the gastro intestinal tract. Where the toxic principle is known, confirmatory laboratory tests may be possible (Botha and Penrith, 2008). Good pasture management is one of the most important steps in preventing animal suffering or loss from toxic plants. Keeping the desirable forage species productive throughout the grazing season reduces the possibility of animals grazing on poisonous plants. Most poisonous weeds and cultivated plants can be controlled. It may be practical to simply fence off infested areas so that animals do not have access to particularly hazardous weeds. An alternative method of controlling poisonous weeds is to spray them with approved herbicides. Another alternative is to physically or mechanically remove the toxic plants (Robert and Donna, 1986).

There is scarcity of information on toxic plants to livestock in Ethiopia. Further, it is not customary among veterinarians to write case reports, thus most of the plant poisonings that occur in the country are not documented in the literature. Hence, it is imperative to bring to the attention of all professionals to the effects of poisonous plants on animal health and productivity (Kaufmann, 1986). Most of the livestock in the area are kept under semi-intensive or extensive systems of management making them susceptible to poisoning by toxic plants. With increasing human activities such as construction, farming, deforestation and other forms of environmental degradation, which affects the fauna and the flora, it becomes very important to assess common poisonous plants found in the area.

Therefore, the objective of this study was planned to assess and identify the potential toxic plants to livestock in selected districts of East Wollega Zone, Western Ethiopia.

2. Materials and Methods

2.1. Study Area: The study was conducted from November 2014 to May 2015 in and around Nekemte town, East Wollega Zone of Oromia regional state, Western Ethiopia. Nekemte is far from Addis Ababa around 331km. The average temperature in the area is 21°C. The area receives the minimum annual rainfall of approximately 1450mm and the maximum annual rainfall of 21500mm with the average rain fall of 1800mm. Altitude ranges from 1300-3140m above sea level and the district has various topographic features. In terms of livestock population of cattle in head 85,584 sheep 14,702 goat 11,861, equine 98,674,

chicken 94,276, Xerophylic plants dominate the vegetation of the area. Mixed crop and livestock farming system is the mode of agriculture in the districts in which cattle and sheep kept as the major livestock, which are highly important for the livelihood of the local population (NDAO, 2013).

2.2. Study Population: The target populations for this study were livestock owners (farmers and traditional healers) and animal health practitioners.

2.3. Study design and sampling methods: Questionnaire survey was carried out on the selected individuals by interviewing voluntary animal owners, traditional animal healers and animal health practitioners. Among 17 districts of east wollega zone, two districts (Guto Gida and Wayu Tuka) were purposefully selected by considering the proximity to the center, and also availability of the issue of plant and availability of traditional animal healers. All volunteer traditional healers selected based on recommendation from elders of the study area.

2.4. Study Methodology: The survey was conducted through questioner surveys designed for farmer particularly knowledgeable elders, traditional animal healers, veterinarians and other related professionals. A total of 140 individuals were interviewed from the two districts. The structured questionnaire was used to collect information related to toxic plants to livestock and its associated risk factors. The plants were collected from surrounding forests and other site of the study areas with the people who knows the local name of the plants. To identify the scientific names of the complained and collected poisonous plants the National Herbarium of Biology Department of Natural Science Faculty, Wollega University was consulted.

2.5. Data analysis and management: The information that was gathered through questionnaire survey on suspected toxic plants to livestock was coded and entered to Microsoft Excel 2007 spread sheet. Before the analysis of the coded data it was filtered. SPSS version 20 was used for the analysis. Descriptive statistics was also used to calculate the frequency of the respondents.

3. Results

In the present study 140 individuals (121 livestock owners and 19 animal health practitioners) were interviewed using structured questionnaires. The result of this assessment indicated that 121 of livestock owners (65 from Guto Gida and 56 people from Wayu Tuka) and 19 of animal health practitioners (6 animal health practitioners from Guto Gida and 13 animal health practitioners from Wayu Tuka) were interviewed. From total interviewee, 88.4% of the people from Wayu Tuka and 83.09% of people from Guto Gida complained presence of plant poisoning on livestock in the study area (Table 1).

Table 1: summary of respondents for poisonous plants to livestock in the study area

Group of interviewed	Number of interviewed	Number of respondents			
		Guto Gida		Wayu Tuka	
		Interviewed	Respondents	Interviewed	Respondents
Livestock owners	121	65	53(81.54%)	56	48(85.71%)
Animal Health practitioners	19	6	6(100%)	13	13(100%)
Total	140	71	59(83.09%)	69	61(88.41%)

A total of 34 plants were complained having poisonous effect on livestock by livestock owners and animal health practitioners. Among these plants, *Sorghum bicolor*, *Medicago burweed*, *Snowdenia polystachia*, *Grass* species, *Brackenfern (Pteridium aquilinum)* and *Amaranthus* species were the most frequently complained toxic plants. This study also showed that gastrointestinal upsets: salivation, bloating, inappetance and weakness are among the

frequently manifested signs by poisoned livestock. Bovine species is the most frequently poisoned livestock followed by ovine and caprine whereas equine and poultry were animals that least poisoned by those complained plants and single exposure was the most complained by interviewee. This survey also revealed that the toxic parts of suspected poisonous plants are leaf, seed and fruit, whole part, other parts and root respectively (Table 2).

Table 2: Summary of complained poisonous plants with their local and scientific names, toxic parts, manifested signs and affected species with types of exposure.

AfaanOromo/Amharic	Scientific Name	Botanic frequency	Toxicosis	Species affected	Toxic Parts	Exposure
Hasangira	<i>Datura stramonium</i>	2	Depression, Erection of Hair, Bloating	Bovine	Seed and fruit	Single
Rafu	<i>Amaranthus</i> sp.	3	Bloating , Anorexia and lesion on mouth	Bovine, Caprine and Ovine.	Leaf	Single
Muujjaa	<i>Snowdina, Polystarchia</i>	12	Bloating ,diarrhea	Bovine , Caprine	All parts	Single
Darbattee	<i>Xanthium spinosum</i>	1	Rest lessness, death	Equine	Other parts	Single
Baala diimtuu	<i>Euphorbia</i> sp.	1	Skin burn, blindness	Caprine, Bovine, Equine and Ovine	Other parts	Single
Laaftoo	<i>Acacia absynica</i>	2	Bloating	Bovine, Caprine	Leaf	Single
Sidisa	<i>Medicago burweed (Eng)</i>	19	Bloating and Colic	Bovine, Ovine	All part	Single
Bishingaa	<i>Sorghum bicolor</i>	26	Bloating, dyspnea, frequent urination	Bovine , Caprine	Leaf	Single
Akayi simbiraa	<i>Lantana camara</i>	2	Photosensitization	Bovine	All parts	Single
Jirbii	<i>Glossypium</i> sp.	2	Nausea, vomition, diarrhea	Bovine, Equine, Poultry	Seed and fruit	Single
Baala waraantee	<i>Curly Dock</i>	1	Restlessness,	Caprine	Other part	Repeat
Haraca	<i>Grass species</i>	1	Dyspnea, sudden death	Bovine, Ovine, Equine	Leaf	Single
Qobboo	<i>Castor bean (Ricinus cumunus)</i>	2	diarrhea,abdominal pain, sweating, collapse, convulsions, death.	Bovine, Equine and Caprine.	Seed and fruit	Single
Sesbaniyaa	<i>Glottidium vasicaria</i>	1	gastroenteritis, bloody diarrhea, shock, and death	Caprine, poultry	Seed and fruit	Single
Burii	<i>Grass species</i>	12	Hematurea ,inappetance	Bovine ,Equine	All parts	Single
Tirimmi	<i>Brackenfern (Pteridium aquilinum)</i>	10	Bloody Urine,nervous sign	Bovine, Equine	Leaf	Repeat
Jajjaba	<i>Hyparrhenia rufa</i>	2	Sub mandibular edema, Weight Loss	Bovine	Leaf	Single

Table 2: Summary of complained poisonous plants with their local and scientific names, toxic parts, manifested signs and affected species with types of exposure (continued ...)

AfaanOromo/Amharic	Scientific Name	Botanic frequency	Toxicosis	Species affected	Toxic Parts	Exposure
Qullubbii waraabessaa	<i>Allium cepa</i>	1	Diarrhea, Inappetance	Caprine, Equine Bovine	Root	Single
Boqolloowaraabessaa	<i>Arisaema ennaephyllum</i>	1	breathing problems, trembling, coma, depression, death	Bovine, Eaprine	Seed and fruit	Repeat
Garbuu	<i>Hordium vulgare</i>	2	irritation, abscesses	Bovine, Equine Ovine, Caprine	Seed and fruit	Single
Saphaaphuu bishaanii	<i>Alge species</i>	1	Diarrhea	Bovine	All parts	Repeat
Cadaa	NA	2	Skin burn, pain sensation	All species	Other part	Single
Hincinnii	<i>Hibiscus ludwigii</i>	1	Bloating	Caprine, Ovine	Leaf	Repeat
Qorxobi	<i>Plantago lanceolata</i>	1	Bloating	Bovine, Caprine, Ovine	Leaf	Repeat
Qaaca	<i>Agave lecheguilla</i>	1	Pain sensation and depression	All animals	Other part	Single
Hiddii gurraacha	<i>Solanum-incanum</i>	1	diarrhea, loss of appetite, depression,	Ovine Caprine, Bovine	Seed and fruit	Repeat
Doobbii	<i>Giradinia bullosa</i>	1	Restless ness, irritation	All animals	All part	Single
Walaalchis	<i>Alophylus apsinicus</i>	1	Ataxia, death	All animals	Leaf	Single
Buna saree	<i>Pokeweed</i>	1	Burning, salivation, severe stomach irritation, bloody diarrhea.	Caprine, Ovine	Seed and fruit	Single
Hoomii	<i>Prunus Africana</i>	1	Bloating, salivation, Colic	Caprine, Bovine	Leaf	Repeat
Ashoo	<i>Opuntia microdasy</i>	1	skin discomfort, itching and a burning sensation	Bovine, Caprine, Cvine and Equine	Other parts	Repeat
Alfalfa	<i>Medicago sativa</i>	1	Bloating	Bovine, Caprine	Leaf	Single
Gurgubbee	Stinging Nettle	2	Skin burn	All animals	All parts	Repeat
Shumbura qamalee	<i>Crotalaria incana</i>	1	depression, have a rapid pulse and diarrhea	All animals	Seed and fruit	Single

Key: NA - not identified Eng - English

The study also indicated that food shortage is the primary predisposing factor followed by nutritional deficiency and water shortage (Table 3).

Table 3: Priority ranking of factors that predispose livestock to plant poisoning based on interviews results.

Factors	Frequency	Percentage (%)	Rank
Food shortage	71	59.167	1
Other factors	44	36.67	2
Nutritional deficiency	5	4.17	3
Total	120	100	

4. Discussion

The results of the present study showed that phytopoisoning causes health problem in livestock with huge economic loss as the information from the respondents like that of in elsewhere. For instance Plant poisonings of livestock are responsible for considerable economic losses in southern Africa (Kellerman *et al.*, 1996). From the present total interviewee, 88.4% of the people from Wayu Tuka and 83.09% of people from Guto Gida complained presence of plant poisoning to livestock in the study area. As the study indicated that, majority of the poisonous plants which were found in the study area were similar, this might be due to the similarity of the climate of the two districts but, with little variation of people perception on the toxic plants in their area.

The study also showed that the situation was aggravated by prevailing feed shortage, nutritional deficiency, and other factors like sudden graze with non toxic plants. Feed shortage can force animals to browse perennial shrubs and bushes while most of these perennial plants have been known to contain toxic secondary metabolites. The result is in the agreement of with the findings of (Ebbo *et al.*, 2003) and (Onyeyili *et al.*, 1996) in the Sokoto state, Nigeria.

In the present study area, 34 plants having toxic effect to livestock were identified. *Sorghum bicolor*, *Medicago burweed*, *Snowdenia polystachia*, *Grass* species, *Brackenfern* (*Pteridium aquilinum*) and *Amaranthus* species were the most frequently complained plants. According to the research findings of (Dereje *et al.*, 2014) around Adama area : *Rhizophoraceae*, *Medicago polymorpha*, *Sorghum bicolor*, *Parthenium hysterophorus* and *Trifolium burchellianum* were the most frequently complained toxic plants. The differences might be due to various plants growing in different areas that have different edaphic and climatic factors. These factors also contribute to the chemical compositions of plants which account for existence of different toxic plants in different geographical areas.

However, some of the plants recorded in this study were reported to have similar effect on livestock in other places. For instance *Ricinus communis* has been known to cause poisoning of cattle in Columbia (Aslani *et al.*, 2007). *Medicago sativa* was also reported to have caused poisoning of livestock in many countries. These plants have already been confirmed to contain nitrate in their tissues (Munro,

2009). Similarly, the importance of *Medicago burweed*, *Snowdenia polystarchia*, and *Sorghum bicolor* as causes of livestock poisoning have been published (Aslani *et al.*, 2007). In the same way, *Lantana camara* causes similar effect in Columbia (Ghisalberti, 2000), also in Swaziland (Ogwang, 1997). *Bracken fern* is also widely distributed in many parts of the world. In Ethiopia, its existence and importance as a cause of enzootic hematuria has been previously shown in different regions (Radostittis *et al.*, 2007) and it has also been reported South Africa (Smith 1997).

The present study result also shown that toxic plants are causing significant animal health problems in and around Nekemte town. However the status of the individual plants in this regard was not ascertained. The most common part of the plants that causes poisoning when consumed by livestock varies according to farmers' perspective. But, there was a general agreement that poisoning occur mainly when leaves, seed and fruit and whole parts are eaten. Similarly, it was agreed with the research finding reported around Adama (Dereje *et al.*, 2014).

Generally plant toxicities complained during the study were classified into two. These are acute toxicosis and chronic toxicosis. Aute toxicity occurs while animals eat large amount of the plant with in short time in some plants but in others, it occurs by eating of small amount of the plants. and chronic toxicity occurs when animal eat small amount of the plant for a long time which was also reported in South Africa (Botha, 2003).

5. Conclusion and Recommendations

The results of the present study show that plant toxicities are among important causes of health problems in and around Nekemte. *Sorghum bicolor*, *Medicago burweed*, *Snowdenia polystachia*, *Grass* species, *Brackenfern* (*Pteridium aquilinum*) and *Amaranthus* species were the most commonly incriminated toxic plants. Similarly, Shortage of feed, nutritional deficiency, drinking water, and other factors are among the predisposing factors to toxicosis in the area. The majority of the toxic plants that cause toxicosis to the livestock were by ingestion with single exposure and bovine species were found to be susceptible poisoned animals.

Based on the present finding, the following recommendations are forwarded:

➤ Awareness creation should be given to livestock owners on the impact of toxic plants to their livestock

➤ Good range management should be practiced to combat the danger of plant poisoning to the animals

➤ Government and non-governmental organizations should focus on pasture and water development in order to minimize the risk of poisonings

➤ Detailed investigation should be performed to know the epidemiology of the poisons plants to livestock

➤ pasture land experimental studies should be carried out to substantiate the empirical knowledge of plant poisonings

➤ Further research should be conducted to investigate the toxic principles in these plants and their toxic effects in laboratory and domestic animals so as to help reduce losses that could result from their poisoning to livestock.

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