

From: [Mark Yeager](#)
To: [Coffin Butte Landfill Appeals](#)
Subject: Serious Interference Adjacent Property Business Impacts
Date: Tuesday, October 7, 2025 3:42:56 PM
Attachments: [T0774_07092025_BRADLEY_McKenna.pdf](#)
[T0739_06302025_BRADLEY_Erin.pdf](#)

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Commissioners Wyse, Malone and Shepherd - I am forwarding to you letters previously submitted as part of the Planning Commission proceedings.

These letters are from adjacent properties that clearly demonstrate that the impacts of the existing landfill operation with regard to blowing trash (uncontained by all measures implemented by the operator) directly and seriously interferes with uses on adjacent property in violation of BCC 53.215(1). The proposed new landfill will move operations even closer to the subject properties, severely affecting their existing farm and business operations.

This application for a conditional use permit must be denied as the applicant has no effective means to prevent these impacts from occurring and being magnified by a closer operation.

The next two letters are from the Bradley family that operate the Bit by Bit horse therapy program and they are attached.

Mark Yeager

From: [Erin Bradley](#)
To: [Benton Public Comment](#)
Subject: Dent LU-24-027
Date: Monday, June 30, 2025 6:17:53 AM
Attachments: [Bit by Bit Bradley Packet.pdf](#)

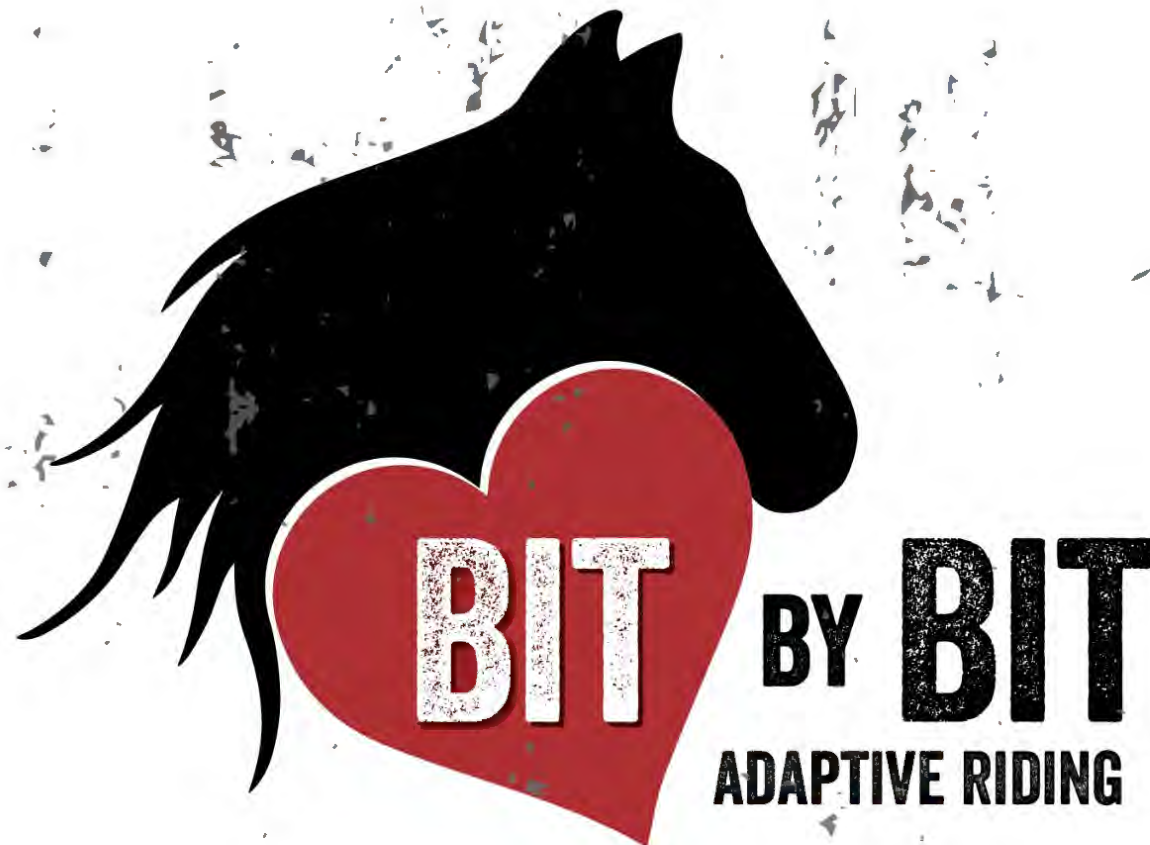
CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

To whom it may concern,

Please see attached testimony and admit it to the record.

Thank you

Erin Bradley
Bit By Bit
541-908-3293
bitbybitadaptiveriding.org



June 27, 2025
Erin and Lowell Bradley
38578 Hwy 99W
Corvallis, Oregon 97330

To: Benton County Planning Commission

RE: Opposition to LU-24-027 Land Use Application

Dear Commissioners,

We respectfully ask you to apply the plain language of the law and deny the proposed landfill expansion application LU-24-027. Our family lives on and operates a therapeutic horse farm, Bit by Bit, located just south of Coffin Butte Road on Highway 99W, east of Tampico Ridge. Our property shares two direct borders with Republic Services' forestland and lies among the closest neighbors to the proposed expansion site. Unfortunately, the applicant's submitted map inaccurately portrays this relationship, showing a 10-acre buffer where our land in fact directly borders the landfill's forest.

For nearly two decades, our family has built Bit by Bit into a unique and vital community service. Our therapeutic riding program provides individually tailored equine sessions to children and adults with a range of diagnoses, including Down syndrome, cerebral palsy, traumatic brain injury, autism, ADHD, hearing impairments, and depression. Our horses also support bereavement clients and youth in foster care.

We are proud to be a place of healing and growth for clients referred by the Benton County School District, Linn Benton Early Intervention, and Benton County Developmental Disabilities. Clients from across Benton and Linn Counties come to our farm to form bonds with our animals and gain physical, emotional, and mental benefits through therapeutic riding. For some, these are the only safe outdoor physical activities they can access.

Our herd includes empathetic and experienced therapy horses—such as Gem, a golden palomino skilled in comforting the bereaved, and Journey, a calm American Quarter Horse gelding used for search-and-rescue work. These animals are more than livestock—they are therapy partners and lifelines for dozens of vulnerable people in our region.

But our work—and their wellbeing—has already been severely compromised by the existing landfill operations. In the past five years, we've endured a steep increase in

off-hours industrial noise, overwhelming odors, airborne pollution, and fire hazards. On July 24, 2024, trash literally rained down on us in the afternoon. That same evening, a fire erupted beside the burn-off stack and propane tanks behind Republic's building. Emergency response was delayed due to a locked gate. Had the flames spread into the unmaintained forest that borders our property, our family, and animals would have been in grave danger.

With 17 head of livestock and clients who cannot evacuate quickly, we live with constant anxiety. Plastic and debris frequently blow into our pastures—posing fatal risks to our animals and forcing us to patrol fields daily. Noise pollution from the landfill's machinery—pounding, horns, and backup beepers—disrupts therapy sessions and has triggered anxiety responses in some of our most vulnerable riders. Trees that once buffered sound and debris are no longer adequate. The notion that the ridge offers protection is not supported by our lived experience.

Expanding the landfill would bring these dangers even closer, with far less buffering than now exists. It would place so much stress on our animals, riders and other clients that it would result in potential dangers and diminish our ability to remain in operation. It would almost certainly compromise our water source, placing our farm's well—and the animals and clients who depend on it—at risk. This would violate County Code 53.215(1), seriously interfering with the use of our property as adjacent landowners. If the expansion is approved, we may lose our ability to operate entirely. The land would become uninhabitable for our programs, our animals, and our family—and due to lost property value, we could not afford to relocate.

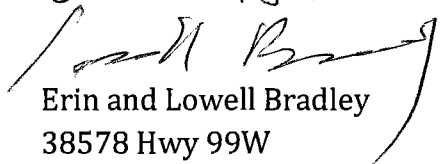
Beyond our farm, our family is also known for service in the community. During recent wildfire emergencies, we spent four days transporting horses, cattle, and other animals to safety. We are active in youth and disability programs, regulars at events like the Polar Plunge for Special Olympics Oregon, and proud sponsors of Every Child Linn Benton's DHS treatment room. We are doing our part to strengthen Benton County. Please don't let this expansion make it impossible for us to continue.

We are not asking for special treatment or sympathy, only that you apply the clear words of the Benton County Development Code. The simple truth of the matter is that the proposed use *will* seriously interfere with uses on our adjacent property (which happen to serve the public good), as well as with the character of the area. As to the latter, the fact that the quiet rural character of our area suffers some adverse impacts already cannot serve as a license to make things exponentially worse. No matter the efforts to explain it away, the proposed use will violate Section 53.215(1) of the Development Code. Some of you may nonetheless be inclined to weigh the

public "benefit" of an expanded or longer-lived dump against the effects on our much smaller business. However, the Code does not allow for such a balancing test. It says what it says, in plain English.

We ask you, on behalf of our family and the dozens of community members we serve each week—many of whom have no voice in this process—to reject LU-24-027. Help us preserve not just our land, but the health, dignity, and inclusion that Bit by Bit brings to so many.

Sincerely,

Erin and Lowell Bradley
38578 Hwy 99W
Corvallis, Oregon 97330

Proposed New Landfill



6/8/2025, 3:20:15 PM

Taxlots

Sectionlines

Override 1

SEC-LINE

TWP-LINE

Roads

Structure_AddressCorvallis



Cities and Places



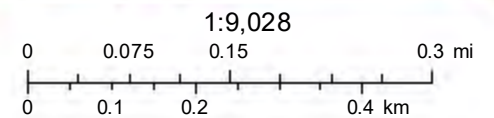
County Boundary



County Parks



Buildings



Benton County, Oregon
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user

Benton County, Oregon

This product is for informational purposes
and may not have been prepared for,
or be suitable for legal, engineering, or surveying purposes.

About Us



Based in Corvallis, Oregon, Bit by Bit is a non-profit, 501c(3) therapeutic equestrian program serving disabled children and adults in Benton and Linn Counties through custom-tailored riding sessions. We provide care through private equine-assisted therapy sessions to children and adults with a range of needs, including bereavement clients, children in the foster care system, and patients with emotional and physical disabilities including Down Syndrome, Prader Willi syndrome, cerebral palsy, Muscular Dystrophy, traumatic brain injury with paralysis, autism, hearing impairment, attention deficit hyperactivity disorder, general anxiety disorder, and depression.

Contact Us



Phone

541-908-3293

Website

www.bitbybitadaptiveriding.org

Email

bitbybithorsetherapy@yahoo.com

Address

38578 Hwy 99W, Corvallis OR

BIT BY BIT

EQUINE HORSE
THERAPY

CORVALLIS,
OREGON





WHY CHOOSE US

Bit by Bit founder, Erin Bradley, was a horse-crazy girl for as long as she can remember. Growing up in Fair Oaks, California, outside of Sacramento, Erin babysat and cleaned stalls to pay for her own horses. She showed Arabians and later owned several off-track Thoroughbreds. Winchester, one of the Bit by Bit therapy horses, has been part of her family since 1999. Erin was inspired to start Bit by Bit by her uncle, who was paralyzed in an automobile accident, but who continued to lead an energetic and active life, despite his inability to walk. She also found her calling through conversations with a friend about the lack of activities for her young daughter who had Down Syndrome. As she found out more about equine therapy she saw a need, not only for her friend's daughter, but for many others in her community, that she could help meet.



CLIENT TEST MONIALS

"With horse therapy our son is developing several skills like: muscle strength, balance, coordination, reduced anxiety, social-emotional, connection, affection, motivation, self confidence, language and communication skills. These horses are being such a wonderful blessing for our son to improve his quality of life. We have no enough words to thank this place."

"(Client) has benefitted greatly from his time at Bit by Bit. His anxiety has decreased exponentially, especially so over the past 6 months as he has bonded with the horses. He has learned from Erin about their body language... He can now recognize when they feel safe and when they are seeking affection. He doesn't have to be anyone but himself and they accept him as is. His relationship with the horses has also shown him the value of his strengths - he has always been very sensitive and gentle, and cautious about personal space. The horses pick up on this and that positive feedback has encouraged him to value these "soft skills".

"Bit by Bit has been a wonderful experience for our son who has a history of PTSD. He had phobia of all kinds of animals, especially dogs and with horse therapy he was able to overcome that phobia. Now he has his own dog who is very attached to him."



OUR SERVICES

Equine-Assited Therapy

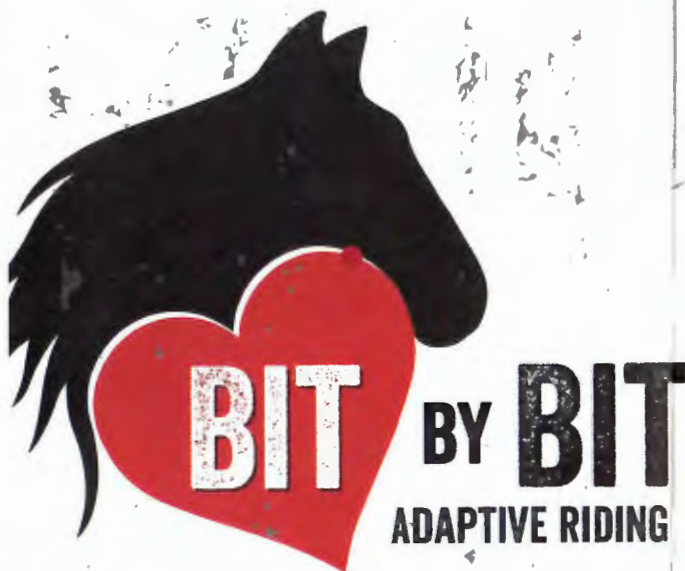
Also known as hippotherapy, this service has been newly added to our program. Our physical therapist Mindy leads 30 minutes of therapy off the horse, and 30 minutes on.

Therapeutic Riding

Erin, or director, provides unique, personalized sessions for each client that are designed to respond to individual client needs and help them gain balance, mobility, strength, and confidence as they work through their specific challenges.



Offering Hippotherapy in 2023!



CONTACT US



EMAIL

bitbybithorsetherapy@yahoo.com



WEBSITE

bitbybitadaptiveriding.org



ADDRESS

38578 Hwy 99W Corvallis OR 97330



PHONE

541-908-3293

What We Do

Our programs assist clients with a range of diagnoses including Down Syndrome, Prader Willi syndrome, cerebral palsy, traumatic brain injury with paralysis, autism, hearing impairment, ADHD, general anxiety disorder and depression. We also serve several bereavement clients.



**We proudly partner
with**



Youth Volunteer Corps
Every Child Linn Benton
CEI
Cornerstones and Associates
Benco
Special Olympics

Meet our hippotherapist

Mindi Romer, MPT is a native Oregonian who has a passion for providing her patients with the tools they need to recover and help themselves. She originally received her degree in athletic training and continued to complete her physical therapy degree. She specializes in John Barnes Myofascial Release and Myofascial Decompression which are hands on treatments to work with the body and create a healing environment.

**Interested in
Volunteering?**

Do you have one or more hours
a week to give?
We need your help!

DATE RECEIVED:	7/19/2025
FROM:	Mckenna Bradley
PHONE OR EMAIL:	

My name is Mckenna Bradley and I live at 38578 Hwy 99w Corvallis 97330 and I oppose the land use application Lu-24-026

My home is south of Coffin Butte Road and it shares two borders with the proposed expansion.

I am 17 years old and a senior at Crescent Valley High School, I am also entering my freshman year at LBCC to complete college credits during high school.

I'm also highly involved in 4-H and am in 3 different 4-H clubs as well as the president of two of those clubs for the second year in a row. I also host 2 practice pre-fairs for my club at my house.

I competitively show high dollar show cattle at the state and Regional level. I have a cow Potato that has won multiple Supreme Championships when she was a heifer. Her calf Paisley that I bred and raised is now 11 months old and beginning her jackpot career. On top of all that I breed and show Nigerian Dwarf goats and show and care for my horses.

I want to share with you my lived experience of living by the landfill for 17 years of my life, and present you with bags of trash collected from our property. This trash doesn't belong to us but it still ends up scattered along my fields! This trash belongs to Republic landfill. This trash has been gathered after falling down from the sky, onto my property or flying into my pastures from Republic trucks. On the back is labeled contents and what the items can do to my livestock. Our land is currently polluted every single day the landfill is open. It's not just the trucks polluting, it's also trash blowing over the trees onto our property.

From years of this trash accumulating it's now imbedded below the grass and a hazard when the roots are pulled up by my grazing livestock. No matter how hard I try I just can't get rid of it. For years I have walked my pastures picking up these pieces, but they never stop coming...

Did you know it doesn't take a whole plastic bag to kill a horse, cow or goat? Did you know plastic can affect the reproduction of livestock and their fertility rates? If not then I will provide three different studies that are peer reviewed. I wanted to provide these studies because studies without peer review are often false information.

My cattle have been purchased all by myself from profits earned by my hard work of raising and selling my livestock. The feed and medical bills are paid for by myself. I put in over 3,000 hours into raising my livestock each year let that sink in.

I can't use my pastures anymore to put my livestock out to roam right now because I can't risk my animals dying. Because of this I have to hand-walk cattle daily instead of letting them roam happily outside. This also increases the cost of my hay bill and has my fields having to be manually cut which increases fire risks in the summer.

Another reason I can't put out my livestock is if I lose my livestock or they remain un-bred due to fertility problems caused by this affects my funds set away for college.

I plan to join the LBCC nationally ranked livestock judging team next year after I graduate high school. I also plan to go onto a 4 year university and get my degree and ultimately receive my masters and PHD in Animal nutrition. If I miss one piece of the debris similar to what is in those bags I may lose an animal. This would be a big loss for my schooling fund and a loss of a friend.

The cattle have also been stressed With the current blasting

All and all the Lu-24-027 land use application needs to be denied entirely not just on conditions. Not just for the future safety of my animals but for the next generation of kids that will inherit this land near the landfill from their families just like myself.

Review

Impact of Microplastics and Nanoplastics on Livestock Health: An Emerging Risk for Reproductive Efficiency

Susy Urli ¹, Francesca Corte Pause ¹, Martina Crociati ^{2,3,*}, Anja Baufeld ⁴, Maurizio Monaci ^{2,3} and Giuseppe Stradaoli ^{1,*}

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check for updates

Citation: Urli, S.; Corte Pause, F.; Crociati, M.; Baufeld, A.; Monaci, M.; Stradaoli, G. Impact of Microplastics and Nanoplastics on Livestock Health: An Emerging Risk for Reproductive Efficiency. *Animals* **2023**, *13*, 1132. <https://doi.org/10.3390/ani13071132>

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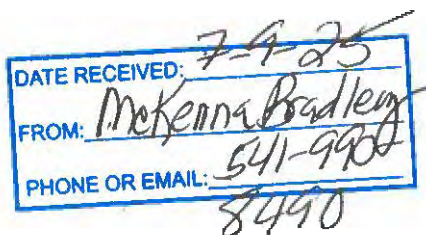
Simple Summary: Due to its multiple properties, such as stability, hardness and economic prices, the application of plastics has gradually increased, becoming essential in every industry. Since 1950, the worldwide plastic distribution has progressively created a serious pollution issue caused by difficulties in proper recycling, which has led to the presence of plastic fragments, called microplastics and nanoplastics (MPs/NPs), in the environment. The majority of the research has focused on the aquatic pollution, while studies regarding soil contamination are still poor, with the necessity to better understand how MPs/NPs can enter the food chain and reach humans passing through both crops and animals. Therefore, there is a need for evaluation, and the present work will provide an overview of the sources and distribution of MPs/NPs in farms; different mammalian exposure (digestion, inhalation and dermal contact) and associated risks and health problems caused by these fragments. In particular, this review aims to provide information on the effects, mainly from additives (such as Bisphenol A-BPA), on livestock reproduction and fertility.

Abstract: Pollution due to microplastics and nanoplastics is one of the major environmental issues of the last decade and represents a growing threat to human and animal health. In aquatic species, there is a large amount of information regarding the perturbation of marine organisms; instead, there are only a few studies focusing on the pathophysiological consequences of an acute and chronic exposure to micro- and nanoplastics in mammalian systems, especially on the reproductive system. There are several studies that have described the damage caused by plastic particles, including oxidative stress, apoptosis, inflammatory response, dysregulation of the endocrine system and accumulation in various organs. In addition to this, microplastics have recently been found to influence the evolution of microbial communities and increase the gene exchange, including antibiotic and metal resistance genes. Special attention must be paid to farm animals, because they produce food such as milk, eggs and meat, with the consequent risk of biological amplification along the food chain. The results of several studies indicate that there is an accumulation of microplastics and nanoplastics in human and animal tissues, with several negative effects, but all the effects in the body have not been ascertained, especially considering the long-term consequences. This review provides an overview of the possible adverse effects of the exposure of livestock to micro- and nanoplastics and assesses the potential risks for the disruption of reproductive physiological functions.

Keywords: microplastics; nanoplastics; reproductive system; health; bovine; cow; cattle; BPA, granulosa cells; steroid hormone



ELSEVIER



Small Ruminant Research 30 (1998) 77–83

Small Ruminant
Research

Pathology of the rumen in goats caused by plastic foreign bodies with reference to its prevalence in Jordan

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Accepted 27 December 1997

Abstract

The lesions in rumens of goats with soft foreign bodies (SFB), namely plastics, and its prevalence in Jordan are investigated. In cases where hard masses of plastics were seen, congestion, erosions, focally denuded areas and focal thickening of nodular- and proliferative-type were seen in the mucosal wall of the rumen. Shortening and stunting of the papillae with irregular distribution, and in some cases thinning of the walls were also observed. Histopathologic examination revealed the presence of rumenitis and prolonged rete pegs with a papillary or frond-like downward growths. This hyperplastic growth also took the shape of numerous epithelial islands of variable thickness, approaching the muscularis mucosae. These revealed differentiated stratified squamous epithelium with intercellular bridges, keratin formation and with several mitotic figures as seen under a high-power field (40×). In cases where floating plastic was found, the changes were less prominent. These findings suggest that plastics play an important role in the pathogenesis of rumenitis and ruminal hyperplasia. This could be the consequence of partial degradation and/or chronic irritation of plastics. Out of 347 rumens examined in the summer of 1996, 39 (11%); 10/136 (7%) rumens at Ajloun and 29/311 (7%) at Irbid slaughterhouses contained plastics. Out of the 888 goats brought to the Veterinary Health Centre (VHC) from January 1993 to September 1997 for treatment of different conditions, 32 (3.6%) had plastic impaction and were treated by rumenotomy of which 32/722 (4.5%) were older than one year. Out of 28 goats brought dead to VHC for routine necropsy examinations, three goats had plastic impaction. No significant differences were found in the prevalence of plastic among Shami, local and mixed-breed goats. These results suggest that subclinical cases exceed clinical ones. The prevalence, although when compared with our previous results in sheep, is low, yet it is still considered quite high and public awareness and anti-littering laws and a clean-up of the environment would substantially reduce this problem in Jordan. © 1998 Elsevier Science B.V. All rights reserved.

Keywords: Goats; Plastics; Rumen; Hyperplasia; Prevalence

*Corresponding author. Tel.: 0096222295111 Ext. 2037; fax: 00 962 2 295123.

RESEARCH ARTICLE

PLASTIC BAGS - THREAT TO ENVIRONMENT AND CATTLE HEALTH: A RETROSPECTIVE STUDY FROM GONDAR CITY OF ETHIOPIA

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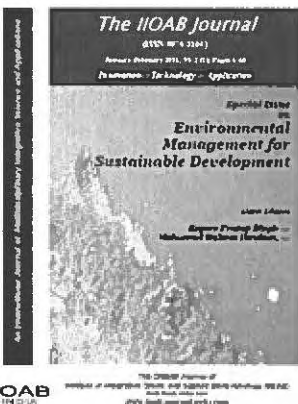
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Received on: 15th-Sept-2010; Revised on: 03rd-Nov-2010; Accepted on: 12th-Nov-2010; Published on: 5th-Jan- 2011

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ABSTRACT

A retrospective study was conducted in Gondar city of Ethiopia for six years (2004/05 to 2009/10) to observe the impact of plastic bags usage on environment and cattle health. Paper packaging is vanishing slowly in the city and limited to small shops only. Open dumping of plastic bags containing wastes is observed commonly near road side, open plots, river side, in drains and public places however, it is prohibited under Ethiopian law. Winds carry bags to distant areas sometimes found entangled on the trees and shrubs create nuisance. During rainy season, the blockage of drains and overflowing of water was observed in some areas of the city. During study period, out of 711 rumenotomies done, in 111 (15.61%) and 600 (84.39%) animals, emergency rumenotomy and elective rumenotomy was performed, respectively. The quantity of the foreign bodies (FB's) collected from the rumen was ranging from 0.75 to 2.0 kg in 28 animals (3.94%); 2.0 to 5.0 kg in 116 animals (16.32%); 5.0 to 9.0 kg in 217 animals (30.52%) and above 9.0 kg in 350 animals (49.23%). Due to absence of plastic recycling unit in the Gondar city or in nearby areas, there is no practice of collecting and selling these products to junk dealers. Use of reusable bags made of cloths, jute and other natural fibers must be encouraged. In order to save the life of animals, residents should not pack and throw the food items in plastic bags. The cattle owners may be advised not to allow their cattle to freely wander in streets especially in the cities. They should see that the grazing lands are not polluted with the polythene and other wastes. Awareness may be created on careless disposal of plastic bags and as well as the periodical cleaning of these wastes in the grazing area.



Keywords: plastic bags; cattle health; environmental effects; rumenotomy; reuse; Gondar

[1] INTRODUCTION

Every year trillions of polythene bags are used in the World. They persist on this earth to haunt us and our generations for centuries. Polythene chokes the drains and the water bodies, pollutes the land and poisons us slowly but surely. Even mowed grass cannot escape the polythene menace [1]. Polythene has been recovered from the rumen of countless cattle and is a major threat to animals also. Polythene pollution is an epidemic now.

Polythene is indestructible. One particle of polythene is further made of many particles. If we continue to use polythene, the earth would become polluted on an alarming rate [2].

The word plastic has its origin from the Greek word "plastikos", which means 'able to be molded into different shapes' [3]. They are made up of long chain polymeric molecules [4] and basic materials used for their manufacturing is extracted from oil, coal and natural gas [5]. Plastic or polythene bags commonly known as festal in Amharic language are in common use as shopping

bags for packaging food, and other items in Gondar city as well as other parts of Ethiopia. In addition to polythene bags, plastics are used in bottling of mineral water, cold drinks and liquid soap, which become part of waste after use. Majority of the residents collect their household wastes in plastic sacks and place them roadside on every Friday until it is carried away by private waste collectors in the city. Their better physical and chemical properties of being strong, light in weight, resistance to water and most water-borne microorganisms make them preferable choice over paper and reusable cloth and jute bags. Plastic consumption is growing at a rate of approximately 5% annually, and the global production reaching about 150 million tons per year [6].

After their entry to environment, plastics resist biodegradation and pollute for decades and centuries [7], and pose risk to human health and environment [8]. They are resistant to moisture, travel long distances because of their light weight, block drains during rains, and may also trap birds. Plastics cause "visible pollution" as they contribute to large volume of total municipal solid wastes and are major threat to air [9], oceans [10], soil [11], livestock [12,13], wildlife [14] and marine life [15]. Approximately, 95% of urban stray cattle in India are suffering from various ailments due to hazardous materials, mostly plastic bags inside their abdomen [13]. These plastics reduce the rain water percolation, affecting the ground water recharge and level. Soil fertility and seed germination is also affected when these plastic bags become part of manure and reaches agricultural fields. Presently there is no recycling unit of plastic bags in Gondar city so most of these plastics become part of municipal waste. As per literature survey limited work is done on this aspect in Ethiopia [16], so this study was designed to assess the impacts of plastic usage on environment and cattle health and to put forward some alternatives about plastic bags usage. The data obtained would be a baseline for the further research.

[II] MATERIALS AND METHODS

2.1. Study area

Gondar city, the capital of North Gondar zone in Amhara regional state, is located 750km North-west of capital city of Addis Ababa [Figure-1]. It is situated between 12°36'N and 33°28'E at an altitude of about 2300 m above mean sea level with an average temperature of 20°C and an average annual rainfall of 1800 mm. Being a highland area, the city is spread on different mountains, slopes and in valleys and has three small rivers, many streams and a lake. The city with a population of 186,077 [17], has 21 kebeles (wards), one hospital, three health stations, two health centers, one university, three veterinary clinics, four colleges, six secondary schools, one preparatory school (Senior Secondary School), one technical and vocational school, 27 primary schools, 13 kindergartens and an airport. The city has historical importance of being the capital of Ethiopia from 1635 to 1855 G.C. and has many medieval castles and churches.

2.2. Methodology

The retrospective study period was six years (2004/05 to 2009/10) and the data was collected by:

1. Personal observation.

2. Case study analysis i.e. by observation of cases registered under three veterinary clinics.
3. Key informant interview i.e. by conducting interviews of animal health assistants working in veterinary health service and private veterinary practitioners of Gondar city.
4. Transect walk observation.

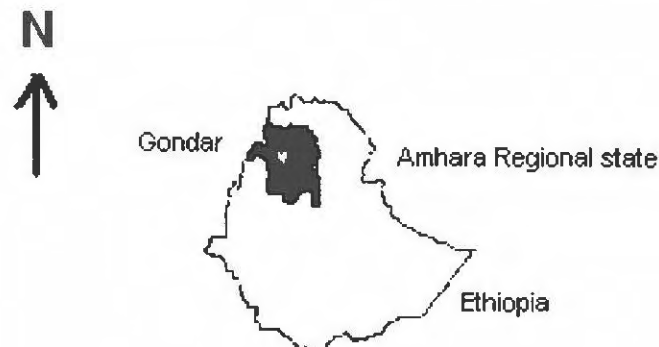


Fig. 1. Map of the study area

[III] RESULTS AND DISCUSSION

3.1. Increasing trend of plastic bags use

During the study period, authors observed an increasing trend of using plastic bags among Gondar city residents. A developing trend of "use and throw-away" towards these polythene bags is the main cause of the problem. During 2004-2008, shopkeepers sell these bags and provide the bags to those customers purchasing more items. The trend changed slowly and up to 2009, these plastic bags were given free of charge to shoppers. In some years residents of the city will be accustomed to plastic bags use that they find it difficult to change their habits. Paper packaging is vanishing slowly in the city and limited to small shops only. Locally made bags from big empty plastic sacks are in use on Saturday market day in the city but they are also losing their charm in the race of modernization. These plastic bags do not contribute much in terms of volume and weight to municipal solid waste (MSW), but the main problem is the disposal of these bags after use. Presence of used bags causes aesthetic disturbance of the city's hilly landscape.

3.2. Current practices of plastic bags use and their environmental impacts

Open dumping of residential wastes including plastic is observed commonly in almost all wards of the city. Dumping is commonly observed near road side, open plots, river side, in drains and public places however, it is prohibited under Ethiopian law [18]. Residents used commonly plastic sacks and polythene bags for storing their wastes, which ultimately become part of MSW. From the temporary and final waste disposal sites, the stray and other domestic animals like cattle and donkeys engulf these

plastic bags containing food materials inside. Sometimes the street boys were also found to sort large size and good quality bags for their use. Winds carry away these bags to distant areas which were sometimes found entangled on the trees and shrubs and creates nuisance. During rainy season, the blockage of drains and overflowing of water was also observed in some areas of the city. Sometimes residents pack and throw the food items in the plastic bags. The stray and other animals were unable to open these bags and were found to consume whole plastic bags. In due course of time, the amount of plastic bags got accumulated in the stomach of these animals and create health problem for these animals. Intentional open burning of waste along with plastic bags is also a commonly observed practice in the city leading to problem of local air pollution with harmful gases.

As per the section 8 of Ethiopian Government Proclamation, passed in February 2007, any unlabeled plastic bag will be treated as unlawful and also bans the manufacture and import of plastic bags less than 0.03 mm in thickness [18]. Authors observed different colors of unlabelled plastic bags available and provided commonly in Gondar city, which are against the government law and need to be controlled.

3.3. Effects on cattle health

The plastic bags along with other foreign bodies in cattle affect the health and cause economic loss to the owner. The cattle have three non-glandular fore-stomach compartments - the rumen, reticulum and omasum. These are the sites for fermentative digestion. The fourth glandular compartment, the abomasum is the "true stomach" which is responsible for the next phase of enzymatic digestion. The indiscriminate eating habits and mineral deficiency make them susceptible to inadvertent ingestion of foreign materials [19, 20]. The various pathological conditions that are encountered due to ingestion of plastic and polythene materials in animals are indigestion, impaction, tympany, polybezoars, and immunosuppression [13]. The most common symptoms observed in the affected animal were bloat and were exhibited by the abnormal bulging of the paralumbar fossa on the left side of the abdominal wall. The other clinical symptoms were depression, complete or partial anorexia followed by loss of weight, ruminal impaction, reduction of milk yield, and suspended rumination. Milk and weight reduction in the affected animals was variable according to the stage of bloat. However accurate data in this regard was not maintained properly by the respective clinics. Acute bloat causes more pressure over the diaphragm and ribs which limits the respiratory movements, leading to hypoventilation and decreased venous return to the heart [19]. Lack of emergency and timely treatment of acute bloat may lead to cattle mortality. When the conservative line of treatment fails to correct these ailments of rumen, the only alternative is rumenotomy, which is surgically opening the rumen for treating its various ailments and to remove a variety of foreign bodies. A total of 711 rumenotomies were

performed in the Gondar city area during the study period [Table-1].

The hloat or tympanites may occur in different forms like acute, chronic recurrent, simple or frothy bloat. Out of the 711 rumenotomies done, in 111 (15.61%) and 600 (84.39%) animals, emergency rumenotomy and elective rumenotomy were performed, respectively. The ruminal tympany occurs during obstruction due to foreign bodies occluding the passage of eructing gases [26]. Farmers who could not arrange timely treatment used to lose their animals. The acute bloat was due to the complete obstruction of the rumino-reticular orifice and the ingesta could not be moved to the next compartment and the stasis resulted in accumulation of the fermented gas in the rumen.

In the cases of recurrent bloat the distension of the rumen reduced subsequent to conservative line of treatment. In these cases the obstructing foreign bodies were shifted to other parts of rumen resulting in temporary relief of bloat which recurred after few days. Ruminal impaction is due to the obstruction caused to the movement of the ingesta to the next compartment and it was noticed in 148 (20.83%) animals. It has been observed that cows with polythene materials in their stomach suffer from immunosuppression that leads to increased sensitivity to various infections [13].

Table: 1. Details of rumenotomies performed in the Gondar city during 2004-2010

Sl. No.	Place of surgery	Number of cattle operated
1.	Gondar university veterinary clinic	85
2.	Gondar woreda veterinary clinic	99
3.	Animal health assistants (private practice)	502
4.	Private veterinary clinic, Gondar	25
Total		711

Table: 2. The details of quantity of the foreign bodies (FB's) collected during rumenotomy

Sl. No	Quantities of FB's recovered (Kg)	No of animals	%
1.	0.75 - 2.0	28	3.94
2.	2.0 - 5.0	116	16.31
3.	5.0 - 9.0	217	30.52
4.	> 9.0	350	49.23
Total		711	100

The foreign bodies recovered by transruminal exploration during rumenotomy are broadly classified into penetrating (nails, wires) and non-penetrating foreign bodies (polythene bags, plastic materials, rubber articles, leather pieces, and cloths) as found in the cattle [Figure- 2 and - 3]. Other workers in different part of World encountered metallic objects [21], cloths [22] and

polythene bags [23] in the gastrointestinal tract of ruminants, causing ruminal obstruction and occlusion. The foreign bodies were mostly dark black in color and their shapes modified into ball-like and other shapes and their texture was also altered to be tougher than original. The above changes in foreign bodies were



Fig: 2. Large quantity of foreign bodies recovered after rumenotomy.



Fig: 3. Varieties of foreign bodies removed from a cow

due to churning action by the contraction of the rumen and reticulum and also by the action of the micro flora population inside. These large tight balls inside the rumen cause impaction. In some animals the churned up masses get fused together and make it difficult to remove through the rumenotomy opening and have to be cut into pieces and removed. The quantity of the foreign bodies collected from the rumen were ranging from 0.75

to 2.0 kg in 28 animals (3.94%); 2.0 to 5.0 kg in 116 animals (16.31%); 5.0 to 9.0 kg in 217 animals (30.52%) and > 9.0 kg in 350 animals (49.23%) [Table-2]. The items rarely recovered were a small boy's trouser, belt and screw driver. In some unusual cases about 70% of the rumen was impacted with the foreign bodies. On exploratory rumenotomy twenty-two hair balls were recovered from the rumen and reticulum of a goat [24]. In an unusual case of rumenotomy in a cow revealed a large empty cement bag with its part embedded in the reticulo-omasal orifice obstructing the ingesta [25].

In all the cases the animals showed symptoms of pain exhibited by depression, arched back and grunting. Apart from this there was sudden drop in milk yield and 75% reduction was noticed incurring a heavy economic loss to the farmer. Losses or costs of several kinds occur like losses by death and by culling of bloat prone animals, losses of production from animals which suffer from bloat and survive, losses due to the disruption of normal farm work and management programs, losses due to the use of less productive but safer pastures, and the cost of preventive measures and treatment. Not measurable in monetary terms is the mental and physical strain on the farmer and his family when an outbreak occurs. Other costs those of research and extension services must be added [27].

3.4. Reuse and recycling

It's very difficult to impose complete ban on plastic bags use and plastic packing until there is fully equitable alternative available. The four R's as feasible options for achieving reduced material use and waste generation are Reduction, Reuse, Recycling and Recovery. Presently only reduce and reuse option are feasible in Gondar. As there are no recycling units for plastics in the Gondar city or in nearby areas, there is no practice of collecting and selling these products to junk dealers. However, the residents were found to reuse good quality of big size plastic bags. The reuse of these bags was observed among small shopkeepers and rural people, who sell vegetable in Saturday market. The residents had a good practice of reusing mineral water and cold drinks plastic bottles for pouring milk, oil, and "tella", a local beverage therefore contributing in reducing the amount of waste. In our previous study, the respondents were agreed to participate in segregating and storing the wastes provided there is some recycling unit which can buy their segregated wastes [28].

3.5. Options

Reusable bags made of cloths, jute and other natural fibers are durable, having long life span, biodegradable and above all environment friendly. Further reusable bags are washable, easy to carry and handle, will not break under the weight of heavy shopping items, reduce use of plastic bags, and do not pose a threat to environment and wildlife. Such types of bags are already in use in Addis Ababa, the capital city of Ethiopia and also seen occasionally in Gondar. Even plastic bags can be reused again and again so that threat to environment and life can be reduced. If possible we can refuse unnecessary packing of

purchased item in plastics. In order to save the life of cattle, residents should not pack and throw the food items in plastic bags. The cattle owners may be advised not to allow their cattle to freely wander in streets especially in the cities. They should see that the grazing lands are not polluted with the polythene and other wastes. Awareness may be created on careless disposal of plastic bags and as well as the periodical cleaning of these wastes in the grazing area. Creating awareness among city residents regarding indiscriminate use and disposal of plastic bags will be a good option to overcome the problem in future. The non-governmental organization named "SOS Addis Tefetron Bemalimat Bikletin Masweged Mahiber" in Addis Ababa is engaged in generating awareness among Addis Ababa residents [29]; however such types of activities are needed in other parts of Ethiopia.

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