

Efficient feed utilization through improved feed troughs for small ruminants in northern Ghana

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Through action research and development partnerships, Africa RISING is creating opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three regional projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads the program's monitoring, evaluation and impact assessment.




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Introduction

Seasonal feed scarcity, particularly in the dry season, is the norm in the Sudano-Sahelian zone of West Africa. The ad-hoc manner of feeding from the available feed resources by the smallholder farmers is characterized by waste as animals eat part, and trample and urinate on the rest. Given the feed shortage particularly in the dry season, efficient utilization of the available feed resources is essential to minimize waste to feed more animals. Under the Africa RISING project in Ethiopia, improved feed troughs have been designed, tested, and evaluated for feeding ruminants (cattle, sheep, and goats) by ILRI. Results from monitoring of the use of the improved feed troughs in four sites in Ethiopia showed that it saved 27% of the cereal and legume residues offered to the animals compared to the traditional feed troughs. Besides, the improved feed troughs led to a significant increase in the amount of manure collected according to feedback from the participating farmers in the Africa RISING project sites in Ethiopia. The success stories in Ethiopia around this simple technology have led to an enquiry about the feasibility of testing the same technology in West Africa. This study therefore aimed at testing, validating, and demonstrating the effect of improved feed troughs on feed utilization by both cattle and small ruminants in the two regions (Northern and Upper East) in northern Ghana. The objectives of this study were: (i) To test, validate, and demonstrate the effect of improved feed troughs on feed utilization by both cattle and small ruminants in the Northern and Upper East regions; and (ii) To build the capacity of smallholder livestock keepers in improved feeding systems to reduce waste and improve animal productivity.

Methodology

Ten farmers were selected randomly from each intervention community (Duko and Tibali in Northern region; Gia in Upper East region) out of which three were women who were trained in the use of improved feed troughs for cattle and small ruminants. Each farmer was provided with one improved feed trough, which was then compared with the traditional feeding practice. The design of the improved feed troughs was carried out by a local artisan based on the specifications provided by ILRI Ethiopia. The specification of the prototype was presented to a local artisan in northern Ghana who constructed a miniature model. The model and pictures of the improved feed trough were presented to the participating farmers in the selected communities for their views on the design. Most of the farmers favored construction of the troughs for their small ruminants as many of them don't own cattle. Each improved feed trough for sheep and goats was constructed at a cost of about Ghc1,149 (USD 194). The cost could go down considerably with the inclusion of local building materials such as trees and thatch for roofing instead of corrugated iron sheets. Thirty improved feed troughs have been built for farmers in Tibali and Duko in the Northern Region, and Gia in the Upper East Region. The improved feed troughs constructed are two sided and can be used by up to 12 sheep and goats. The quantity of feed offered (both in the morning and afternoon) and that was wasted during the feeding process were measured for six consecutive days, both for the traditional feed troughs (for example, spreading a portion of the feed on the ground, using bowls, wooden troughs etc.) in Tibali and Duko in Northern Region, and in Gia in Upper East Region. The amount of time spent in looking after the animals while feeding (bringing back dispersed feed, keeping animals to feed comfortably) was recorded for both practices. Most of the feedstuffs offered were crop residues such as groundnut haulms and pigeon pea residues. The data collection was conducted in March and April 2019. A survey questionnaire was also administered to all participating farmers to document their opinions about the contribution of the technology to efficient feeding systems.

Training of farmers in efficient feed utilization using improved feed troughs

Following the construction of the improved feed troughs, training was conducted for the beneficiaries in Tibali and Duko on the 17 January 2019 and 2 and 3 January 2019, respectively, while the training of farmers in Gia took place in March 2019. The farmers were trained to mount the trough at a suitable location on dry ground with sufficient shade. The farmers, on their own accord, provided fencing around the structure to keep out stray animals during feeding. Twenty-nine youth from Youth Empowerment for Life (YEfL) NGO, Tamale also participated in the training in Tibali. The involvement of the youth group in the training is to explore the employment opportunity that the construction of improved feed troughs for farmers in villages outside the Africa RISING project. For the local artisan engaged in the construction of the improved troughs, it is an income generating activity for him as interested farmers are directed to him. The breakdown of those trained is presented in Table 1.

Table 1: Breakdown of those trained in design and use of improved feed troughs.

Category	Male	Female	Total
Duko (beneficiary farmers)	5	5	10
Duko (other farmers)	10	0	10
Tibali (beneficiary farmers)	7	3	10
Youth Empowerment for life (Tibali)	19	10	29
Gia (beneficiary farmers)	5	5	10
Total	46	23	69



Picture 1: Members of Youth Empowerment for Life (YEfL) and farmers observing construction of feed trough in Tibali. Photo credit: Sadat Salifu/CSIR-ARI.



Picture 2: A newly constructed improved feed trough in Tibali. Photo credit: Sadat Salifu/CSIR-ARI.

Results and discussion

Comparison of the traditional and improved feed troughs

The results of the six days' monitoring of the use of the traditional and improved feed troughs (Table 2) showed that the improved feed troughs reduced feed waste significantly in all the three communities (Duko and Tibali in Northern Region, and Gia in Upper East region). The quantity of feed wasted was significantly higher with the use of traditional feed troughs than with the use of the improved feed troughs. The feedstuffs offered by the farmers were mainly groundnut haulms and pigeon pea residues. The results confirm that the traditional feeding systems are characterized by a lot of feed waste, which if reduced will enhance efficient feeding of the animals. The percentage of waste in feeding crop residues using the traditional feed troughs was about 36% in Duko, 26% in Tibali, and 36% Gia compared to less than 1% with the improved feed troughs, which implies about 35%, 25%, and 36% feed saved in Duko, Tibali and Gia, respectively. The farmers confirmed this main advantage of the improved feed troughs that it led to drastic reduction in feed waste. The results also showed that farmers spent less time in feeding the animals with the improved feed troughs as they did not have to spend time to gather dispersed feedstuffs as with the use of the traditional feed troughs. The time spent in feeding the animals was almost halved with the improved feed troughs (Table 2).

The results further showed that male adults were largely responsible for feeding the animals in the three study communities (Fig. 1). However, the boys were also involved in feeding the animals in Duko and Gia while female adults were involved in Tibali and Gia. There was no report of the involvement of girls in feeding the animals with either the traditional or improved feed troughs in all the communities.

The main challenge with the improved feed troughs is the cost of construction, which was about Ghc1,149 (USD 194) for the small ruminants. This cost can be reduced considerably with the use of local materials from the community such as trees and cereal straw or grass as thatch for the roof instead of corrugated iron sheets. Obviously, the improved feed troughs will be more beneficial for households with more animals, for example up to 10 sheep and goats.

Table 2: Comparison of the use of the traditional and improved feed troughs for small ruminants in Duko and Tibali, Northern region, and in Gia, Upper East Region, Ghana.

Variable	Traditional feed trough (mean ± se)	Improved feed trough (mean ± se)
Duko		
Time spent feeding the animals (minute/day)	22.42 ± 1.77 ^a	13.00 ± 1.23 ^b
Number of animal	3.90 ± 0.16 ^a	4.10 ± 0.14 ^a
Quantity of feed offered (g/day)	2175.00 ± 86.67 ^a	2213.00 ± 70.57 ^a
Quantity wasted (g/day)	767.00 ± 46.30 ^a	10.45 ± 2.04 ^b
% of feed wasted	36.33 ± 1.84 ^a	0.47 ± 0.09 ^b
Tibali		
Time spent feeding the animals (minute/day)	14.00 ± 0.83 ^a	6.83 ± 0.41 ^b
Number of animals	3.90 ± 0.15 ^a	4.32 ± 0.13 ^a

Quantity of feed offered (g/day)	2340.00 ± 88.72 ^a	2532 ± 76.85 ^a
Quantity wasted (g/day)	625.78 ± 49.17 ^a	10.63 ± 2.24 ^b
% of feed wasted	25.77 ± 1.67 ^a	0.41 ± 0.09 ^b
Gia		
Time spent feeding the animals (minute/day)	11.78 ± 1.06 ^a	5.60 ± 0.72 ^b
Number of animals	4.99 ± 0.21 ^a	5.10 ± 0.24 ^a
Quantity of feed offered (g/day)	1497.50 ± 58.40 ^a	1530.00 ± 24.22 ^a
Quantity wasted (g/day)	323.50 ± 33.12 ^a	4.83 ± 0.78 ^b
% of feed wasted	36.32 ± 1.87 ^a	0.22 ± 0.08 ^b

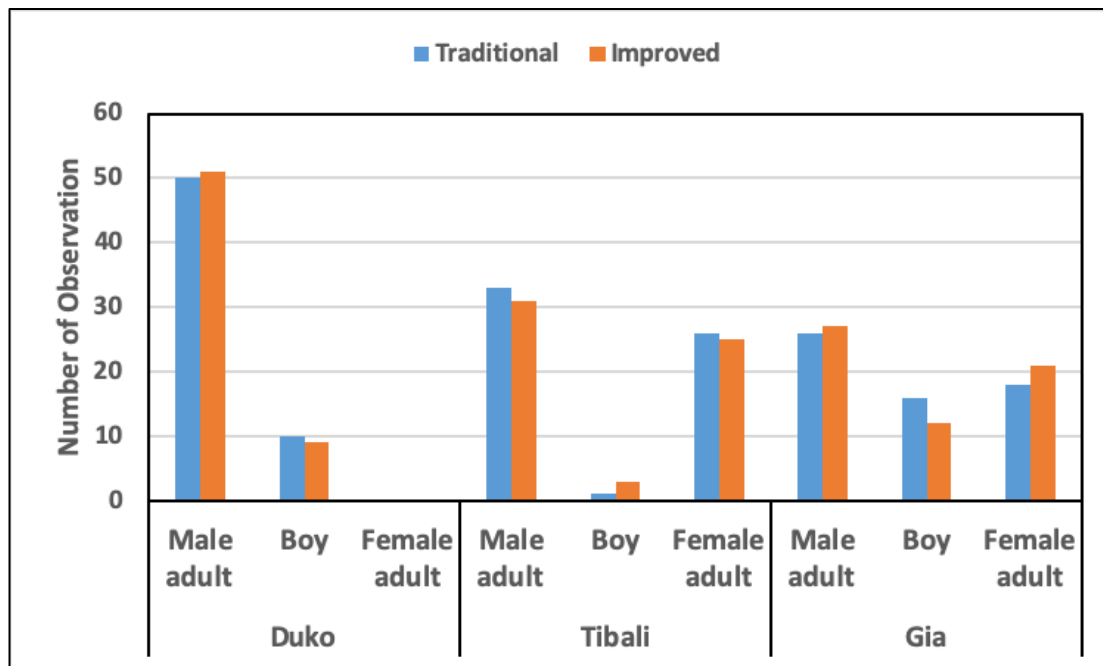


Figure 1: Feeding of the animals using traditional and improved feed troughs by different gender groups in the intervention communities.

Perceived benefits of the improved feed troughs

After the 6 days monitoring of the use of the traditional and improved feed troughs, the farmers were asked to respond to a series of statements on the perceived benefits of the improved feed troughs. The statements are presented in Table 3. The response could be: Completely disagree, disagree, neither disagree or agree, agree or completely agree. Generally, the farmers strongly agreed that there is less feed waste with the improved feed trough and that it reduces feed contamination. They also strongly agreed that the improved feed trough is comfortable for the animals to eat from and that the benefit outweighs the cost in the long run. Nearly all the participating farmers agreed that they would invest in constructing the improved feed trough in the near future. They also strongly agreed that the animals tend to eat more with the improved troughs as a result of less feed waste. They disagreed strongly that the improved feed trough is only beneficial for households with high flock size and that it is difficult for women to use.

These responses by the participating farmers confirm the benefits of the improved feed troughs and the general enthusiasm in using it. Farmers who were not involved in piloting

the technology have approached the project team to make request for the improved trough. Consequently, some of them were included in the training on the design and use of the improved feed troughs in Duko.

Table 3: Response to the perceived benefit of the improved feed troughs compared to the traditional feed troughs (1 = Completely disagree; 2 = Disagree; 3 = Neither disagree or agree; 4 = Agree; 5 = Completely agree)

	Statement	Duko (Mode)	Tibali (Mode)	Gia (Mode)
1.	There is less feed waste with the improved feed trough compared to the traditional practice	5	5	5
2.	The improved feed trough reduces feed contamination with sand, feces, urine etc.	5	5	5
3.	The improved feed trough is comfortable for the animal to eat from	5	5	5
4.	The benefit of the improved feed trough outweighs the cost	5	5	5
5.	I will invest in constructing improved feed trough for my animals	4	4	4
6.	The animals eat more with the improved feed trough	5	5	5
7.	The improved feed trough increases time spent on feeding the animals	2	1	1
8.	The improved feed trough is only beneficial to those who have many animals	1	1	1
9.	The improved feed trough is difficult for women to use	1	1	1
10.	The improved feed trough will last much longer than the traditional feed trough	5	5	5

Conclusions

The main conclusions from the demonstration of the use of the improved feed troughs in Duko and Tibali, Northern region, and in Gia, Upper East Region are:

- The improved feed troughs reduced waste significantly in all the study communities (Duko, Tibali, and Gia). The percentage of waste in feeding crop residues using the traditional feed troughs was about 36% in Duko, 26% in Tibali, and 36% Gia, compared to less than 1% with the improved feed troughs, which implies about 35%, 25% and 36% feed saved in Duko, Tibali and Gia, respectively.
- Farmers spent less time in feeding the animals with the improved feed troughs. The time spent in feeding the animals was almost halved with the improved feed troughs.
- The participating farmers confirm the benefits of the improved feed troughs and the general enthusiasm in using it. Farmers who were not involved in piloting the technology have approached the project team to make request for the improved troughs.
- The construction of the improved troughs can be an income generating activity for the youth as demonstrated by the enthusiasm of members of Youth Empowerment for Life who participated in the training on the design and use of the improved feed troughs.
- The main challenge with the improved feed troughs is the cost of construction, which was about Ghc1,149 (USD 194) for the small ruminants, which can be reduced considerably with the use of local materials from the community such as trees and cereal straw or grass as thatch for the roof.