

# Drying and ensiling on nutritive value of groundnut haulms

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## Key messages

- There is abundance of crop residues during the farming season but improper methods of conservation and storage often results in significant losses of feedable dry matter and nutrients (Fig. 1) resulting in feed scarcity and poor animal growth performance in the dry season.
- Ensiling groundnut haulms resulted in greater retention of nutrients than the traditional methods of drying and storage (Tables 1 and 2).

## Objective and approach

**Objective:** To train farmers on innovative techniques of ensiling crop residues and to compare the nutritional quality of the two forages.

**Approach:** Three communities consisting of ~45 farmers were each trained in the Northern, Upper East and Upper West regions of Ghana. Farmers then used the conserved forages to formulate diets (Table 2) that were fed to their sheep and goats in the dry season.

## Key results

- Through field demonstrations, farmers now appreciate the losses associated with the traditional methods of conserving crop residues by drying compared to ensiling (Fig. 1).
- The silage was well preserved and had favourable fermentation characteristics (lower pH and higher lactic acid concentration; Table 1) resulting in higher crude protein and energy in the diets (Table 2) compared to the hay.

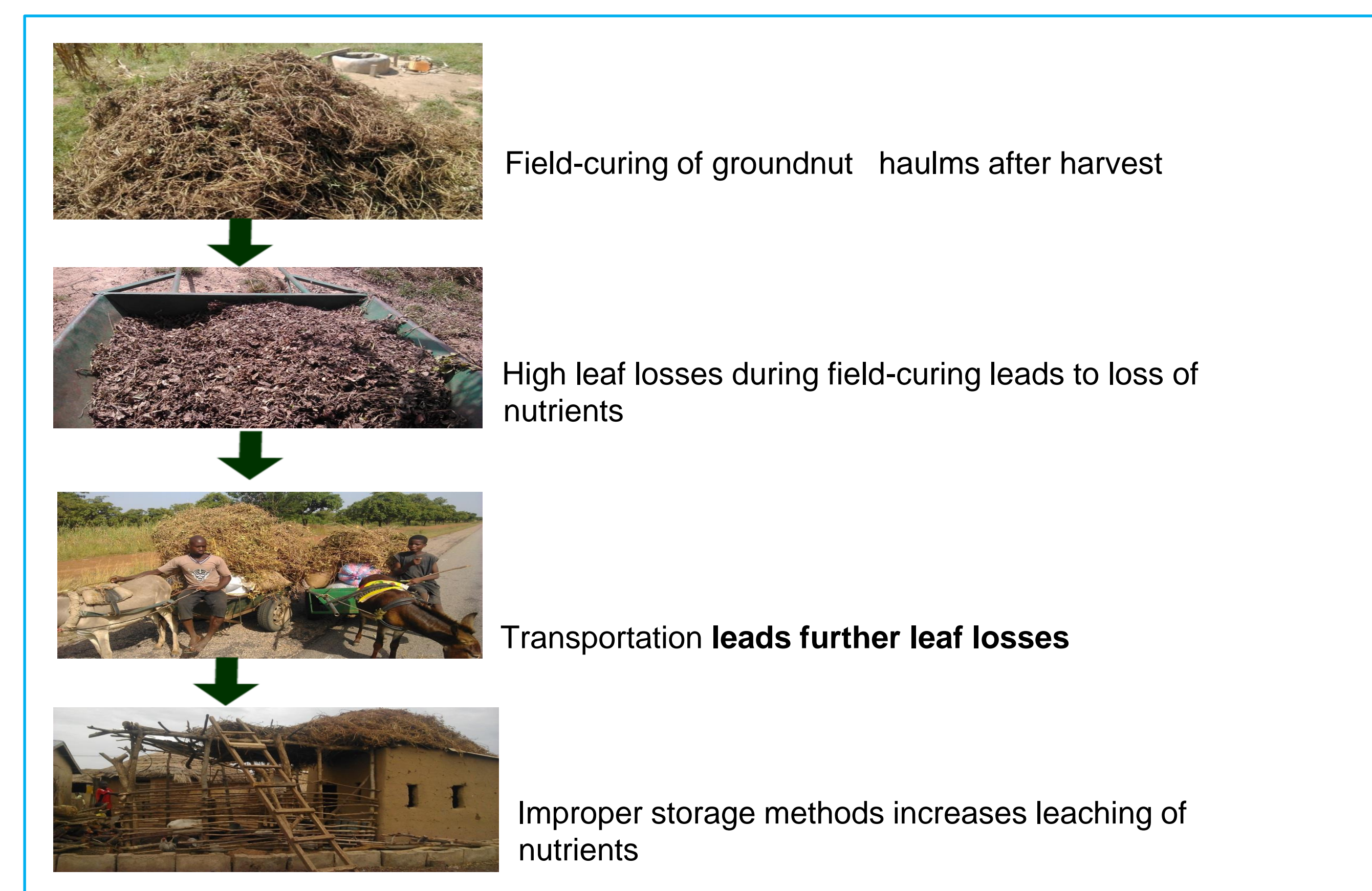
## Significance and scaling potential

- Constraints of feed availability and quality remain the greatest challenge of smallholder livestock farmers in Northern Ghana.
- Wider adoption of this innovation will be higher because it does not interfere with the traditional systems of staple food production. Up-scaling of this project will therefore increase the number of beneficiaries to about 750 compared to the current 400 farmers.
- Also feeding trials will further validate the effects of this innovation on animal growth performance.

## Reference:

Ellis, N., 1980. The nutrient composition of Sudanese animal feeds Bull 1. Northern and Central Sudan. Animal Nutrition Research Laboratory, Kuku, Khartoum North. Appendix 1, p. 19.

## Partners



**Figure 1:** Traditional methods of conserving, storing and transporting crop residues (groundnut haulms) in Northern Ghana are associated with high nutrient losses

**Table 1:** Chemical and microbial compositions (mean  $\pm$  SD) of groundnut haulm conserved as hay or silage

Item (mean $\pm$ SD)	Fresh haulm	Method of conservation <sup>1</sup>	
		Hay	Ensiled
DM (g/kg DM)	391 $\pm$ 24.1	937 $\pm$ 33.6	301 $\pm$ 0.1
pH	6.5 $\pm$ 0.6	6.7 $\pm$ 0.1	5.2 $\pm$ 0.1
<b>Chemical composition (g/kg DM)</b>			
WSC (mg/kg) <sup>2</sup>	21 $\pm$ 3.6	19.1 $\pm$ 0.9	17.3 $\pm$ 1.1
NH <sub>3</sub> -N (g/kg of total N)	16 $\pm$ 0.2	70.6 $\pm$ 0.1	170 $\pm$ 0.2
Lactic acid	ND <sup>3</sup>	9.5 $\pm$ 1.3	17 $\pm$ 0.2
Acetic acid	2 $\pm$ 0.1	10.1 $\pm$ 1.1	28 $\pm$ 0.1
Propionic acid	ND	8.0 $\pm$ 0.1	14 $\pm$ 0.1
Butyric acid	ND	10.0 $\pm$ 0.1	21 $\pm$ 0.8
Lactic: acetic	—	0.94 $\pm$ 1.2	1.0 $\pm$ 0.3
<b>Microbial populations (Log<sub>10</sub> CFU/g DM)</b>			
Lactic acid bacteria	5 $\pm$ 0.6	6 $\pm$ 0.4	7 $\pm$ 0.2
Yeasts	5 $\pm$ 2.1	7 $\pm$ 0.8	7 $\pm$ 1.0

Groundnut haulm was ensiled for 171 d whereas hay was initial field-cured for 6 d and then stored unprotected for additional 165 d.; <sup>2</sup>WSC: water-soluble carbohydrates; <sup>3</sup>ND: Undetectable

**Table 2:** Chemical composition (mean  $\pm$  SD) of diets<sup>1</sup> containing groundnut haulm conserved as hay or silage

Item (g/kg DM)	Method of conservation	
	Hay	Silage
Dry matter	830 $\pm$ 40.4	848 $\pm$ 37.3
Crude protein	89 $\pm$ 35.4	108 $\pm$ 18.4
Nitrogen free extract	284 $\pm$ 93.2	306 $\pm$ 60.1
Ash	60 $\pm$ 5.8	53 $\pm$ 14.5
Neutral detergent fibre	445 $\pm$ 86.7	470 $\pm$ 11.7
Acid detergent fibre	352 $\pm$ 113.3	225 $\pm$ 86.6
ME (MJ/kg DM) <sup>2</sup>	9 $\pm$ 1.9	10 $\pm$ 0.04

<sup>1</sup>The diet contained (g/kg DM): corn chuff (450); rice bran (150); whole cotton seed (200); dried or ensiled groundnut haulms (200); <sup>2</sup>ME (MJ/kg DM) = 0.31crude protein + 0.12 crude fat + 0.05 crude fibre + 0.14 nitrogen free extract (Ellis, 1980).