Improvement of Manure Quality and Crop Yields by Cattle Supplementation

Maimouna Cissé
Senegalese Institute of Agricultural Research, Senegal

M. Diaye
Senegalese Institute of Agricultural Research, Senegal

C. M. Dione
Senegalese Institute of Agricultural Research, Senegal

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Improvement of manure quality and crop yields by cattle supplementation

Cissé M . , N Diaye M . , N Dione C M .
* *Senegalese Institute of Agricultural Research (ISRA) , LNERV PoBox 2057 . E-mail : maimouna .cisse6@ gmail .com*

Key words : mineral supplementation , manure , crop yield

Introduction Animal and crop productivity are limited by mineral deficiencies in the Sahel (Cissé et al . , 1996) where millet (Pennisetum glaucum) and groundnut (Arachis hypogaea) are two major food and cash crops . Livestock are is also soil fertilizing agents by nutrient recycling from excretions (Hiernaux and Rivera , 1996) . A trial was conducted to assess the effects of application of the manure from cattle supplemented with rock phosphate and/or nitrogen on crop growth and yield in a pearl millet-groundnut rotational system .

Material and methods The study was conducted in the dry season from February to June on 60 pasture-grazing cattle alloted in a control (Group 1) and three supplemented groups . Cattle received 75 g/animal/d of Thiès rock phosphate in 30 L of water in Group 2 , 500 g of 4% urea-treated millet stover and 1 kg of peanut cake and 800 g of millet bran/animal/d in Group 3 , and combined diet offered inGroups 2 and 3 treatments for Group 4 . Cattle body condition was monthly scored (Cissé et al . , 2003) and manure produced during the night daily recorded , collected and sundried . The experiment on farm was a millet (var . souna 3)-groundnut (var . Fleur 11) rotational cropping system with 5 treatments : control (no manure) , manure from unsupplemented animals (Group 1) , and manure from cattle of Groups 2 , 3 and 4 , respectively . During the rainy season , manure was applied at 4 t/ha to the millet crop . Groundnut was planted the following year without renewing manure application . Parameters of plant growth and yield were measured at 24 , 52 days and at harvest .

Results and discussion The experiment showed important change in body condition score (BCS) according to the supplement given to cattle . Controls lost ($P<0.05$) 0.9 point in BCS (3.6 *vs* 2.7) , while cattle supplemented with rock phosphate mixed in water maintained their BCS at 3.5 points . Animals from Groups 3 and 4 groups gained ($P<0.01$) 0.7 (2.8 *vs* 3.5) and 0.9 point (3.1 *vs* 4) of BCS , respectively ; this being in part due to the high energy content of their diet . After 28 days of growth and at harvest , millet and groundnut plant population was not significantly influenced by manure application . At 52 days , manured plants were slightly taller than the controls . Enriching manure resulted in a positive response in number of leaves and groundnut plant height (Table 1) . Millet grain yield increased from 24 to 68% , depending to the diet offered to animals . The control without manure provided the lowest yield and the highest production was obtained with additional supply of P and N by manure . However , compared to the production of plots manured by control animals , the gain in millet grain yield due to manure enriched in P and N (i .e . , 264 kg/ha) was higher than the sum of the gains due to supplementation either in P (73 kg/ha) or in N only (92 kg/ha) . The residual effect of manure on groundnut yield represented 11 to 25% over yield from the unmanured plots . This trial assessed several advantageous of supplementation . However , a better response on crop yields could be expected with the confining of animals in fields , due to an increase in nutrients cycling (Powell et al . , 1994) both from fecal and urinary excretions .

Table 1 *Effect of manure on number of leaves/plant 52 days after planting*[1] *, plant height and grain yield .*

Treatment	Direct effect on millet		Residual effect on groundnut			
	Grain yield , kg/ha	% increase	Number of leaves[1]	Plant height , cm	Grain yield , kg / ha	% increase
Control	599c	-	51.93a	19.09a	683b	-
Manure of 1rst group	744b	24	51.80a	20.79c	742ab	9
Manure of the 2nd group	817b	36	52.56a	20.16b	756ab	11
Manure of the 3rd group	836b	39	57.55b	20.27b	842ab	23
Manure of the 4th group	1008a	68	58.75b	21.24d	857a	25

Means followed by different letters in the same column are different at $P<0.05$.

References

Cissé , M . , Guérin , H . , Prince , E . , (1996) . Les carences minérales existent au Sénégal . Comment corriger ce déficit nutritionnel en élevage ? *Etudes et documents , ISRA (d .)* , Vol .7 , no . 1 , 33 p .

Cissé , M . , Korréa , A . , Ly , I . , Richard , D . , (2003) . Change in body condition of zebu cattle under different level of feeding . Relationship with body lipids and energy . J . Anim . *Feed Sci* . 12 , 485-495 .

Hiernaux , P . , Fernandez-Rivera , S . , (1996) . Grazing effects of goat-sheep mixes on the vegetation structure and productivity of old fallows in the Sahel . In : West , N .E . (ed .) . Rangelands in a sustainable biosphere . Proc . Fifth Int . Rang . Congress , Vol . 2 , Denver , CO : Soc . *Rang . Manage* . , 230-231 .