

**Gnoumou, B.** 2001. Cattle and manure management strategies to increase soil fertility in Western Niger. Ph.D. Dissertation (Animal Sciences). University of Wisconsin-Madison, Madison, WI.

**Abstract:** In western Niger soil fertility depletion threatens food production. Cattle management and manure are used to maintain soil fertility. However, cattle population and insufficient feed limit the use of manure for improving soil fertility. The purpose of this research was to assess farmers' perceptions of soil fertility, particularly the role of cattle, the contribution of communal action to soil fertility improvement, and to examine the ability of phosphorus (P) supplementation to cattle to increase P levels in Djerma and Fulani farm fields.

Focus group interviews indicated that the management of communal resources affects manure availability. The monitoring of feed and water resource utilization in Katanga maintained the quality of grazing areas and attracted more herders compared to Falanga. Household interviews in the village of Katanga indicated that Fulani and Djerma farmers use similar indicators (soil color and plants species) to describe soil fertility. Manure utilization to improve soil fertility in Katanga is determined by access to manure rather than farmers' perceptions of soil fertility. Fulani specialization in livestock rearing give them access to manure while Djerma land owners rely more on fallow. Phosphorus supplementation to cattle significantly ( $P < 0.05$ ) increased the P concentration in manure. Manure application significantly increased millet yield ( $P < 0.05$ ). The yield response to the combination of fertilizer plus manure was significantly ( $P < 0.01$ ) higher compared with either fertilizer or manure alone indicating that yield potential had not been reached by either manure or fertilizers. The economic assessment indicated that combining manure and fertilizer is more profitable but social and biophysical constraints exist.

Despite the biophysical constraints that limit the use of manure, the low organic matter content of Sahelian soils implies its crucial role in improving soil fertility. To offset nutrient deficit the development of institutions is required to facilitate access to fertilizers. Although P supplementation to herd cattle may not be a feasible approach to increasing P in soil, a targeted supplementation of P to lactating cow to increase milk yield, or to small ruminant in association with high yielding cash crop are worth consideration.