

Level of Sensitization on the Gains of Inclusion Dairy Cattle in Paddy Grazing and Formulated Feeds to End Herders-Farmers Conflict in Northern Nigeria

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Abstract

This study was borne out of the fact that rice farming and cattle rearing are predominant in the northern parts of Nigeria. But there have been increasing conflicts between farmers and herdsmen particularly in north-central. To address this problem, this study empirically looked at the nexus between sensitization on gains from paddy grazing and farming practices in rice production. Data were collected from three hundred and twenty respondents with the aid of a structured interview guide and field survey. It was found that instead of using organic manure, Urea (55%) and NPK (36.9%) fertilizers were applied on the rice farms. Most (89.4%) of the respondents were not sensitized on the benefits of paddy grazing to the dairy cattle, environment, and soil. Results of the t-test indicated that no significant difference existed in the farming practices for rice production in Niger and Benue States ($t = 8.9$). The level of sensitization on paddy grazing correlates with the farm practices of the respondents ($r = 0.69$). This study concluded that respondents did not aware that paddy grazing could lead to increased rice and milk production.

Keywords: Benefits, Herdsmen, Dairy Cattle, Problems, Rice Paddy, Nigeria.

1. Introduction

Nigeria has good vegetation that supports the production of lowland and upland rice farming. Production of rice is however dominated by smallholder farmers who use traditional methods to produce over 80% of rice (Osabuohien *et al.*, 2018). Nigeria has fertile soil that makes rice thrives in the six geo-political zones in Nigeria (Omoare, 2016). Out of 1.6 million hectares of land suitable for irrigated rice production, an estimated of 47,798ha are cultivated. Farmers cultivate three major varieties of rice Ofada, Nerica 8, and Faro 44. Rice yield is declining while farmers use different farming practices to overcome this problem. Several reports on rice production have shown an average increase of 300,000 tonnes in the 1990s to over 4 million tonnes in the year 2019 (Roy-Macauley, 2019). According to Goronyo (2019), Nigeria currently produces about 8million tonnes yearly but can produce 14 million tonnes per year if appropriate farming practices are put in place. The chunk of rice produced is from the northern part of Nigeria; it is also the region where the rearing of cattle is predominant business.

In recent times however there have been increasing conflicts between Fulani herdsmen and farmers across the country which has resulted in losses of thousands of lives and properties. For sustainable agriculture and economic development, there should be a paradigm shift from the indiscriminate open grazing of cattle on any arable farms which has been at the detriment of crop farmers to environmental-friendly grazing methods. Subjecting cattle to formulated feeds and grazing on rice forage is an alternative measure and could help to overcome these continuous killings and maiming of rural dwellers in the northern part of the country. Surplus forage could be achieved through better farming practices and as well increase the quality of rice produced. Paddy fields are very common in the north and are good sources of forage for dairy cattle. The conventional practice in the region has been burning of paddy fields after the harvest of the rice grains. Rice-straws and rice chaff can be obtained from rice farms to feed dairy cattle. These by-products are suitable for feed materials. Rice-straw can be fed to the cow without any deleterious effect on their health (Bakshi & Wadhwa, 2017). Apart from the fact that grazing cattle on rice forage would reduce farmers-herders conflicts, it has a lot of economic (high milk) and environmental benefits (recycle of animal droppings on the paddy fields for optimal plant growth). Hanson *et al.* (1998) reported that grazing on paddy improves herd health and the environment, and increases the economic rewards of Fulani agropastoralists. Tilman *et al.* (2002) state that the grazing of paddy fields conserve ecosystems and eliminate problems attached to animal confinement. This system takes advantage of the high efficiency of ruminant guts for converting low-quality forage into high-protein human foods and dairy products. The report has shown that indoor feeding systems cause stress to the dairy cattle, consequently led to a reduction in milk production and health damage (Collier *et al.*, 2006). However, there is an information gap on the benefits of paddy grazing and supplements to dairy cattle in the northern region. Since the adoption of feeding cattle on concentrates and grazing on paddy fields is dependent on the level of awareness and conviction, the sensitization of Fulani herdsmen on the benefits of forage grazing should be given the necessary attention. Sensitization led to awareness which considered the first phase in behavioural change (van Stralen *et al.*, 2010). By implication, the purpose is to promote healthy dairy cattle and

milk production through grazing of the cattle on quality rice forage and formulated feeds; and to foster peaceful co-existence of Fulani herders and farmers in the northern region and nation at large. It is given because of this background that this study looked at sensitization on the benefits of paddy grazing in the rice paddy in northern Nigeria. The study hypothesized that there is no significant difference in farm practices of Fulani agro-pastoralists in Niger and Benue States; and that there is no significant correlation between the level of sensitization on paddy grazing and farming practices in the sampled states.

1.1 Theoretical Concept

1.1.1 Diffusion of Innovations Theory

Rogers (2003) defined diffusion as the process by which an innovation is disseminated through certain channels over time among the members of a social system. The diffusion of innovation theory could, therefore, be used to explain the relationship between sensitization, improved farming practices, and paddy grazing. Theory on innovation diffusion emphasizes how new concepts, notions, ideas or practices can circulate within a community, or society. Though, the concept of forage grazing is not a new thing since evidence suggests its practices in advanced countries from time immemorial, the pattern at which it is been practiced have however changed considerably. Thus, it can be regarded as an innovation in Nigeria. The theory posits that diffusion of innovation is a gradual process involving key participants whose adoption tendency is hierarchical. The innovation-decision process has five steps which are knowledge, persuasion, decision, implementation, and confirmation. Based on time, the innovativeness of individuals varies and specifically, the theory identifies and defines five (5) subgroups of individuals in the adoption continuum (Rogers, 2003). The order of innovativeness is innovators, early adopters, early majority, late majority and laggards. Diffusion of innovation theory in relation to dairy production is that Fulani agro-pastoralists are most likely to adopt paddy grazing for higher productivity if they are enlightened of the benefits therein.

2. Research Methodology

2.1 Sampling Technique

This study used multistage sampling procedures to select three hundred and twenty Fulani agro-pastoralists for this study. Two Local Government Areas (LGAs) were purposively selected in Benue and Niger States based on the *a priori* information that they are rice producing communities, and this gave rise to four Local Government Areas. Secondly, two rice farming villages were purposively selected from each of the four selected rice-producing LGAs in the two States and this gave rise to eight communities. In the third stage, a simple random sampling technique was used to select forty Fulani agro-pastoralists from each of these eight villages. This gave rise to a total of three hundred and twenty Fulani agro-pastoralists selected.

2.2 Data Collection Method

Data for this study were collected through the use of a well-structured interview guide in addition to Focus Group Discussions (FGD) with Fulani agro-pastoralists in the study areas. The exercise was carried out with the assistance of the State Agricultural Development Programme field officers and also the Seriki Fulani, who helped to locate agro-pastoralists in their various settlements (*Gaas*). The instrument used for the data collection was subjected to face and content validity involving experts in Agricultural Extension and Rural Development, their criticisms and suggestions were positively utilized for a more valid instrument. Content validity was carried out to ensure that the instrument covers all the objectives highlighted in this study. Also, the reliability test for the instrument was conducted using the test re-test method. Administration of the instrument was done for 40 Fulani agro-pastoralists who were not included in the actual study sample at two weeks interval. Data from the selected respondents were collated. Total scores for each period were computed and Pearson Product Moment Correlation (PPMC) was used to determine the relationship coefficient between the two sets of scores. The instrument was considered reliable with a reliability coefficient of 0.75.

2.3 Measurement of variables and method of data analysis

Sensitization was conceptualized as Well informed (3), Partially informed (2), and Not informed (1). Weed and birds control was measured at the nominal level as Used (1), Not Used (0). Data obtained were analyzed with t-test and PPMC.

The formula for the t-test:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

\bar{X} = Mean of the first set of values

\bar{X} = Mean of the second set of values

s_1 = standard deviation of the first set of values

s_2 = standard deviation of the second set of values

n_1 = total number of values in the first set

n_2 = Total number of values in the second set.

The formula for the PPMC:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

n = number of pair of scores

$\sum x$ = Sum of x scores

$\sum y$ = Sum of y scores

$\sum xy$ = Summation of the x and y product

3. Results and Discussion

3.1 Farm Practices in the paddy rice by the Fulani agro-pastoralists in Benue and Niger States

Results presented in Table 1 showed that 58.4% of the respondents used hand weeding for weed control but 90.9% used herbicides on their rice farms. Since the introduction of herbicides about two decades rural farmers have adopted the use of agro-chemicals for weed control. The herbicides are made available by input suppliers and agro-dealers at affordable prices and it is convenient and effective when it compares to the use of hired labour for weed control. Meanwhile, 65.6% of respondents in Benue State used hand weeding while 51.3% did hand weeding in Niger State. Moreover, 93.1% and 85% of respondents applied insecticides in Benue State and Niger State respectively. The use of insecticides by the respondents is attributed to the high population of insects in Nigeria.

Also, 52.5% applied Urea fertilizer to rice farms in Benue State while 85.6% applied Urea in Niger State. Also, 60.6% and 89.4% used NPK in Benue State and Niger State respectively. Fertilizer application was high for both Urea (69.1%) and NPK (75%) in the two states. But, Niger State has a relative high fertilization application compared to Benue State. The fact is that soil fertility of the two states varies and as such this determines the quantity of fertilizer applied on the rice farms. For instance, the soil in northern Nigeria is loose compared to the loamy soil in the southern part of the country. Use of trap for birds and rodents control is not popular in Benue (38.7%) and Niger (27.5%) States but 98.7% and 85% used nets for bird control in Benue State and Niger State respectively. Overall, 91.9% used net while 33.1% used to trap birds in the two sampled states. In Benue and Niger States, most (89.7%) of the respondents used drill irrigation while 18.8% used watering-can. Niger State had a higher proportion (97.5%) of respondents that used drill irrigation compared to 81.9% in Benue State. The use of watery-can was very lower in Niger State (14.4%) than Benue State (23.1%). It can be said that the drill irrigation system is predominant practice for rice farming in the two states.

Table 1. Farm Practices in Paddy by Fulani Agro-pastoralists

Farm Practices in Paddy	Benue (%)	Niger (%)	Total (%)
Weed and Diseases Control			
Hand weeding	65.6	51.3	58.4
Use of herbicides	94.4	87.5	90.9
Use of insecticides	93.1	85.0	89.1
Use of Fertilizer (kg/ha)			
Urea	52.5	85.6	69.1
NPK	60.6	89.4	75.0
Birds and rodents control			
Use of trap	38.7	27.5	33.1
Nets	98.7	85.0	91.9
Irrigation system			
Drill	81.9	97.5	89.7
Watery-can	23.1	14.4	18.8

Source: Field Survey, 2019. *multiple responses recorded

3.2 Sensitization on the benefits of forage grazing to dairy cattle and paddy fields

Results in Table 2 showed that most (89.4%) of the respondents were not informed that forage grazing reduces trekking of the dairy cattle for long-distance which often resulted to the stress of the animals and herders; 90.6% were not informed that rice forage is available as free feed materials for the dairy cattle, and 91.9% were not informed that forage grazing will put an end to Fulani Herdsmen clashes with arable crop farmers. Also, 74.1% and 77.8% were not informed that it reduces the use of chemical fertilizers on the paddy farms and nitrogen leaching from the paddy fields during the raining season respectively. In a similar vein, more than seventy percent (85.9%) indicated that they were not informed that forage grazing is a sustainable method of producing high quality-protein for the dairy cattle with minimal environmental impacts; 88.1% not informed that it facilitates nutrient cycling between paddy fields and dairy cattle; 91.3% not informed that it promotes organic rice production; and 79.4% not informed that it reduces the cost of tillage for the Fulani agro-pastoralists. The implication of these findings is that majority of the respondents did not aware or know that there are benefits on forage grazing in the paddy fields, and this calls for sensitization in the study areas.

Table 2. Sensitization on the benefits of forage grazing to dairy cattle and paddy fields

Sensitization on forage grazing	Well informed (%)	Partially informed (%)	Not informed (%)
It reduces trekking of the dairy cattle for long-distance which often resulted in stress of the animals and herders	4.7	5.9	89.4
Rice forage is available as free feed materials for the dairy cattle	3.7	5.6	90.6
It will put an end to Fulani Herdsmen clashes with arable crop farmers	3.1	5.0	91.9
It reduces the use of chemical fertilizers on the paddy farms	6.2	19.7	74.1
It reduces nitrogen leaching from the paddy fields during raining season	4.1	18.1	77.8
It is a sustainable method of producing high quality- protein for the dairy cattle with minimal environmental impacts	2.8	11.3	85.9
It facilitates nutrient cycling between paddy fields and dairy cattle	3.1	8.8	88.1
It promotes organic farming (organic rice production)	3.7	5.0	91.3
For the Fulani agro-pastoralists, it reduces the cost of tillage	6.6	14.1	79.4

Source: Field Survey, 2019.

3.3 Hypotheses testing

Results of the t-test in Table 3 showed that there was no significant difference in the farm practices of Fulani agro-pastoralists in Niger and Benue States ($t = 8.9$, $p = 0.14$). It implies that farm practices in Niger and Benue States are similar. This could be connected to the fact that traditional methods of farming are still prevailing in rice production in the rural areas of Nigeria.

Table 3. t-test result of significant difference between farming practices in Niger and Benue States

Farming Practices	Sample size	Mean	Std. Dev.	Std. Mean Error	Mean diff.	t	p-value	Decision
Benue State	160	0.64	0.20	0.20	0.33	8.9	0.14	NS
Niger State	160	0.31	0.01	0.00				

Source: Field Survey, 2019. NS - Not Significant

3.4 Correlation between Sensitization on Paddy Grazing and Farming Practices

Results of correlation in Table 4 showed that a significant relationship existed between sensitization on paddy grazing and farming practices ($r = 0.69$) across the sampled states. This sign is an indication that the farming practices of the respondents are influenced by the level of sensitization on paddy grazing. It implies that the more the Fulani agro-pastoralists are aware of the advantages of paddy grazing the more they adopt better farming practices.

Table 4. Correlation between Sensitization on Paddy Grazing and Farming Practices

Variables	r	p-value	Decision
Farming Practices	0.69	0.03	Significant

Source: Field Survey, 2019.

4. Conclusion

Based on the findings of this study, it was found that sensitization on the benefits of paddy grazing was at a very low ebb. Respondents did not aware that paddy grazing could facilitate the rapid growth of the dairy cattle and led to increasing milk production; and it could checkmate incessant conflicts between Fulani Herdsmen and arable crop farmers. Farming practices of respondents in the sampled states were similar. The prevailing traditional farming practices are products of poor sensitization.

5. Recommendations

The study recommends that:

- Fulani agro-pastoralists should be encouraged to intensify on rice farming rather than grazing their animals on other peoples' farms;
- Feeding dairy cattle on formulated feeds and hygienic practices should be continuously disseminated to the Fulani agro-pastoralists and ensured compliance;
- putting Fulani herdsmen in a bigger cluster would help them to pull their resources together and grow rice on large scale and make forage available for the dairy cattle all the year-round;
- agricultural extension services should expedite action by creating awareness and organizing training for the Fulani herdsmen on the benefits of paddy grazing, this will encourage them to cultivate large hectares of rice and adopt best farming practices;
- instead of the use of inorganic fertilizers, the respondents should be made to know that cow dung is good manure to replenish the soil nutrient and prevent leaching of Nitrogen;
- Government, International Donors and Non-Governmental Organizations should support Fulani herdsmen by providing basic rural facilities (water supply, good roads, and electricity) and agro-inputs that can support both rice production and cattle rearing in the study areas.

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