



ABSTRACT

Poultry manure is being produced voluminously with the growing poultry industry in Nepal. Use of poultry manure in agriculture could be an appropriate waste management tactic; and this could solve the fertilizer deficit situation existing in Nepal for many years. This paper explores the potentiality of poultry manure to use as fertilizer in agriculture. A total of 120 respondents of Chitwan, Nepal were randomly interviewed during 2013 to determine farmer's perceptions of using poultry manure. In addition, relevant publications were reviewed. Descriptive statistics, probit econometric regression model and indexing were used to analyze data, and identify determinants of poultry manure use in agricultural production. Poultry manure was found to be more economical than chemical fertilizer for agricultural production in Nepal. For the same amount of NPK availability (3.6 kg), the amount to be paid in using chemical fertilizer (Rs. 327) was found to be comparatively higher than in using poultry manure (Rs. 275). Probit econometric model revealed that age (P=0.010), annual household income (P=0.001), agriculture as major occupation (P=0.003), access to credit (P=0.050) and membership in an organization (P=0.071) positively determined the use of poultry manure in agriculture. More significantly, the probability of using poultry-manure was found to be increased by 48% and 28% respectively, for the farmers whose major occupation is agriculture and have access to credit. Interviews revealed that improvements in soil fertility followed by affordable price and availability assurance were the major reasons of using poultry manure in agriculture. However, volatilization, leaching, improper decomposition and storage loss were identified as the major problems associated with its use.

Key words: Poultry manure, Agriculture, Probit regression, Indexing, Fertilizer

1 INTRODUCTION

Fertilizer plays a very important role to increase yield of agriculture crops. Though the fertilizer deficit situation is existing in Nepal, it is not feasible to establish inorganic fertilizer factory in the country. Lack of raw materials such as naphtha, petroleum, coal, natural gas and phosphates in Nepal, being the first reason followed by inadequate electric power, as second reason respectively (Thapa, 2006). Continuous use of chemical fertilizer does not replenish the soil nutrients regularly, instead it exhausts the soil fertility and decreases the nutrient availability to the crop. Poultry manure is an important nutrient source to increase the yield of the crop. The commercial poultry population reached 85.5 million including broilers and layers across the nation in 2011; they produce millions of tons of manure (Bhattarai, 2012 a). An effective management of poultry waste is lacking at the present scenario; waste management is seen as a major problem. The unprocessed application of poultry manure is common in crop fields of Nepal where nutrient loss is a major problem. Economic recycling of the poultry manure could reduce the adverse environmental impacts and promote sustainable agricultural practices in Nepal. It is difficult to find research studies which explore the scope of poultry manure as a substitute for chemical fertilizers.

2 OBJECTIVES

- ❖ Comparative assessment on economics of using poultry manure and chemical fertilizer for agricultural production.
- ❖ Determination of factors affecting the use of poultry manure in agriculture.
- ❖ Explore the perception of farmers towards use of poultry manure in agriculture.

3 METHODOLOGY

3.1 Study area, sample size and data collection technique

Chitwan district, Mangalpur and Fulbari VDCs were purposively selected because of the well-established poultry industry. A total of 120 households were selected using a simple random sampling technique. Primary data were collected through a pre-tested interview schedule, focus group discussions and key informant interviews. In addition, relevant publications were reviewed.

3.2 Comparative assessment of economics of using poultry manure and chemical fertilizer in agricultural production

A comparative assessment on nutrient availability and cost incurred in using poultry manure and chemical fertilizer was documented. Simply the unitary method of calculation was used. The data on nutrient content of poultry manure and chemical fertilizers was obtained through the review of relevant publications.

3.3 Determination of factors affecting the use of poultry manure for agricultural production

The probit model specified in this study to analyze factors affecting farmers' decisions towards use of poultry manure for agricultural production is:

$$Pr(\text{using poultry manure}=1) = f(b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + b_{10} X_{10})$$

where,

Pr = Probability score of using poultry manure

X₁= Family type (dummy), X₂= Number of schooling years (years)

X₃= Farm size (kattha), X₄= Livestock holding (Livestock Standard Unit)

X₅= Gender of household head (Dummy), X₆= Age of HH head (yrs)

X₇= Availability of credit (Dummy), X₈= Major occupation (Dummy)

X₉= Annual household income (NRs), X₁₀= Ethnicity (Dummy)

b₁, b₂,... b₁₀ = Probit coefficient, b₀ = Regression coefficient

Software package STATA (Version 12) was used for statistical analysis.

3.4 Perception of farmer towards use of poultry manure

Indexing was done to rank the reasons and constraints of using poultry manure in agriculture. A scaling technique, which provides the direction and extremity attitude of the respondent towards any proposition (Miah, 1993) was used to construct the index. The intensity of the reasons was ranked using the scale values 1, 1-1/n, 1-2/n, 1-3/n and so on where n = number of categories in the ranking.

The formula used to determine the index for intensity of reasons or problems is,

$$I_{\text{reasons or problems}} = \sum S_i f_i / N$$

where,

I_{reasons or problems} = index value for intensity of reasons or problems

∑ = summation

S_i = scale value at ith intensity

f_i = frequency of the ith intensity

N = total no. of the respondents = ∑ f_i

and, I_{reasons or problems} = index, 0 < I < 1

Scaling/indexing was done using the software package, Microsoft Excel.

4 RESULTS AND DISCUSSION

4.1 Comparative assessment of economics of using poultry manure and chemical fertilizer in agricultural production

Nitrogen, phosphorus and potassium concentration in poultry manure was found to be 1.6%, 0.8% and 1.2% respectively; in addition, organic matter content close to 48% (Joshi, 2013).

Price of poultry manure per 100 kg = NPR. 275 (Field survey, 2013)

This means with NPR. 275, 1.6 kg nitrogen, 0.8 kg phosphorus, 1.2 kg of potash and 48 kg of organic matter can be obtained in using poultry manure for agricultural production; total NPK availability being 3.6 kg.

The imported price of urea, DAP and MOP that the Nepalese government paid, was reported to be NPR. 41, NPR. 56 and NPR.42 respectively (AICL, 2013).

In respect of nutrient content and price, to get 3.6 kg of NPK from these chemical fertilizer, it costs (Rs. 146 + Rs. 97+ Rs. 84) i.e. NPR. 327. This is comparatively higher than in using poultry manure.

4.2 Factors affecting the decision to use poultry-manure in agriculture

Probit regression analysis showed that five variables were statistically significant for the decision to use poultry manure in agriculture (Ag.). They were; age, annual household income (AHI), access to credit, membership of organization/co-operatives and major occupation (Maj. occp.) (Table 1).

Table 1. Factors affecting the adoption of poultry manure use for agricultural production

Variables	Coefficient	P> z	dy/dx ^b
Age (years)	.0526***	0.010	.0210
AHI (rupees)	.00001***	0.001	0.000004
Credit access(Yes=1)	.747**	0.050	.288
Membership	.610*	0.071	.239
Maj. occp. (Ag.=1)	1.333***	0.003	.480
Constant	-6.260	0.000	-

*** Significant at 1%; ** Significant at 5% ; * Significant at 10% level

^b Marginal change in probability evaluated at the sample means

No. of observations(N)=120, LR chi² (11) =73.19*** (Prob> chi² = 0.0000)

Pseudo R²=0.4400, Goodness of fit test= Pearson chi² (108) = 93.02 .Prob> chi² = 0.8473 Source: Field survey, 2013

4.3 Reasons for using poultry manure in agriculture

Farmers ranked improvement in soil fertility (I= 0.90) followed by affordable price (I= 0.67) and availability assurance (I= 0.65) as first, second and third reasons respectively for using poultry manure in agriculture.

4.4 Problems/Constraints of using poultry manure in agriculture

Volatilization (I= 0.95) was ranked as the major problem followed by leaching (I= 0.65), when questioned about the nutrient losses from poultry manure. The perception of farmers is in the line of the findings of Wolf *et al.* (1988), who stated that the much nutrient is lost from poultry manure by volatilization. No proper decomposition (0.53) and storage loss (0.38) were reported to be third and fourth reasons respectively.

5 CONCLUSIONS

Use of poultry manure in agriculture was found to be more economical than in using chemical fertilizer. Farmer's group should be formed in the VDC; this facilitates the membership to every farmer and will internalize the innovation-adoption process. Promotion of agriculture occupation and access to credit could motivate farmers for using poultry manure in agriculture; thus, government should prioritize these issues. Improvement in soil fertility followed by affordable price and availability assurance with growing poultry industry were found to be the major reasons of using poultry manure in agriculture. However, volatilization followed by leaching, improper decomposition and storage loss were identified as the major problems associated with the use of raw poultry manure in agriculture. Addressing these problems, there is a good scope for use of poultry-manure fertilizer as an alternative to chemical fertilizer for agricultural production in Nepal.

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