

Conference Paper

Analysis of the Implementation of Ettawa Crossbred Goat Manure Treatment in the District Kulonprogo Yogyakarta, Indonesia

Tri Anggraeni Kusumastuti, Rini Widiati, Sudi Nurtini,
Suci Paramitasari Syahlani, and Mujtahidah Anggriani Ummul Muzayyanah

Faculty of Animal Science, Universitas Gadjah Mada, Jl Fauna No 3 Bulaksumur Yogyakarta, 55281, Indonesia

Abstract

Livestock manure is a potential for soil fertility and increases the income of farmers. This research is to identify characteristic farmers and utilization of manure and the factors that influence the choice of farmers in carrying out manure treatment. The research was conducted in Kulon Progo Regency as a production center Ettawa Crossbred goats and taken one location the Village Ngargosari Samigaluh District of implementing mixed farming crops and livestock. The numbers of the sample were 65 respondents. The survey method was used to collect data using questionnaires to respondents. The data were analyzed quantitatively using Binomial Logistic Regression models. The results showed that the views of characteristic respondent had productive age (48.75 yr), have similar primary school education (51.00 %), business experience (22.63 yr) and dominance in the on-farm jobs (80.00 %). Average livestock ownership as much as 4.88 goats or 0:55UT. Utilization of manure for plants was 89.00 % and the remaining 11.00 % for fertilizer plants and sold. A total of 70.80 % of farmers did not do a manure treatment through fermentation. The independent variable number of livestock is the most influential factor positive and significance of the choice of farmers in implementing waste treatment ($P < 0.05$), the age of farmers positive and significant ($P < 0.1$), and the number of family members negative and significant ($P < 0.1$). This is due in goat raising is still dominated household. The implication of this research is the need for socialization understanding of the importance of manure treatment to improve the intangible benefits at the household of farmers.

Keywords: Fermentation, Intangible benefit, Ettawa crossbred, Income, Manure treatment

Corresponding Author:
Tri Anggraeni Kusumastuti
triaksp@yahoo.co.id

Received: 10 November 2018
Accepted: 6 January 2019
Published: 10 March 2019

Publishing services provided by
Knowledge E

© Tri Anggraeni Kusumastuti et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the UASC Life Sciences 2016 Conference Committee.

1. Introduction

Goat is considered an attractive business for small-scale farming in developing countries and less-favored areas due to their well-adapted to the grazing on poor marginal lands [1]. Small ruminants like sheep and goats are important for a larger part of the Indonesian rural population. The major breeds of goats found in Indonesia are the Kacang and

OPEN ACCESS

Ettawah goats. The concentration areas for raising Ettawa Crossbred goats are upland regions, such as Kulon Progo and Sleman Yogyakarta. Besides producing animal products, they also provide manure to maintain soil fertility [2]. Livestock manure is an important resource for food and feeds production because it supplies measure nutrients such as nitrogen (N), phosphorus (P), and potassium (K) [3]. Ruminant manure is a valuable resource as a soil fertilizer, providing both macro, and micronutrients required for the plant growth, and is a low cost alternative to mineral fertilizer [4]. Farmers use sheep and goat manure as fertilizer for their fruit trees and paddy fields [5]. Ettawa goat manure and urine have a good potential for rice farming [6]. Adult goats in Turi Sleman Regency produced 1 kg manure per day [7]. In Indonesia, the goats on small farms are generally kept in wooden housing with slatted flooring and raised above the ground, so goat manure can be collected [8].

2. Material and Method

The location selected in Kulonprogo district which is a center for the breeding production of Ettawa crossbred goats in Yogyakarta. Collecting data census farmers comes from 65 respondents in the hamlet Tegalsari, Village Ngargosari, Samigaluh, and Kulonprogo. Descriptive analysis was used to explain the characteristics of the respondents and obtained from the tabulation of questionnaires.

Binomial Logistic regression (logit) was in use to seek the determinant factors that influences to the choice of farmers ready implemented waste treatment or not. The logit model is a function of cumulative probability logistic, which is formulated as follows:

$$P_i = E(Y = 1/X_i) = 1/1 + e^{-(\alpha + \beta X_i)}. \quad (1)$$

For ease of exposition, it can be written as

$$P_i = 1/1 + e^{-z_i}, \quad (2)$$

where $Z_i = \alpha + \beta X_i$

Equation (2) was the cumulative logistic distribution function. In that equation, Z_i ranges from $-\infty$ to $+\infty$, P_i ranges between 0 and 1 and that P_i is non linearity related to Z_i (in X_i and the β 's).

If P_i is probability of a farmer ready to implementation waste treatment, then $(1-P_i)$ is the probability of waste treatment not ready to implementation where,

$$1 - P_i = 1/1 + e^{z_i}. \quad (3)$$

Therefore, it can be written as:

$$P_i / (1 - P_i) = 1 + e^{z_i} / 1 + e^{-z_i} = e^{z_i} \tag{4}$$

Further $P_i / (1 - P_i)$ is the Odds Ratio or the ratio of the probability that a farmer will ready to implementation waste treatment.

In the form the natural log of the Odds Ratio, namely

$$\ln \frac{P_i}{1 - P_i} = Z_i = \alpha + \beta X_i \tag{5}$$

$e = 2.71828$

In the form equation was:

$$\ln \frac{P_i}{1 - P_i} = \alpha + \beta_1 X_1 + \beta_2 X_2 + D_1 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \tag{6}$$

$$P_i = \frac{1}{1 + e^{-(\alpha + \beta_1 X_1 + \beta_2 X_2 + D_1 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5)}} \tag{7}$$

where

P = choice farmers to implementation waste treatment

α = intercept

$\beta_1 \dots \beta_5$ = regression coefficient

X_1 = age (year)

X_2 = formal education (score)

D_1 = dummy of non formal education

1 = trainee

0 = not trainee

X_3 = experience (year)

X_4 = member of household (person)

X_5 = goat ownership (goat)

μ = stochastic disturbance term

Because the model was nonlinear, so that the model was tested using Maximum Likelihood Estimation (MLE) test. It means to get the value of Likelihood Ratio Index (LRI) which should be equal to R-squared in OLS regression, Likelihood Ratio (LR) test which should be equal to F-test in OLS regression, and Wald test which should be equal to t-test in OLS regression [9, 10].

3. Results and Discussion

Based on the research results, judging from the characteristic of respondents including productive farmers age (48.75 yr) and business experience has been effort hereditary (22.63 yr). The mean level of similar elementary school education (51.00 %) in particular is relating to the low implementation of waste treatment technologies (11.27 %). The average family size was 3.63 ± 1.50 of people. Farmers involved their family members in participating in managing the farm business [11].

TABLE 1: Characteristics of respondents.

Component	value
Age (year)	48.75 ± 10.15
Business experience (year)	22.63 ± 14.43
Formal education (%)	
No School	2
Elementary School	51
Junior High Schools	18
High Schools	26
Colleges	3
Family members (person)	3.63 ± 1.50
The main job (%)	
government employees	3
private	6
farm workers	11
farmers	80
Non formal education (%)	
Feed technology	50
Recording goat	66.68
Waste treatment	29.2

TABLE 2: Ettawa crossbred goat ownership on farmers.

Type of goat	goat	Animal Unit	Selling price (IDR per goat)
Male goat	1.42	0.94	2 527 500
Parent doe	2.03	0.91	1 519 230
Breastfeeding doe	1.70	0.97	-
Doe	1.70	0.98	-
Young	1.42	0.69	1 920 000
Kids male	1.66	0.77	1 770 000
Kids female	1.79	0.89	1 416 155
Total	4.88	0.55	

Table 2 shows the average ownership of 4.88 goats per farmers or 0.55 AU per farmers. The highest of parent doe showed heterogeneity livestock awake. While waiting for a good price for selling, farmers have the opportunity to obtain additional products such as kids and manure. Kids with 3 mo to 4 mo is ready for sale IDR 1 770 000 per goat for males and females IDR 1 416 155 per goat. Utilization of manure for plants was 89.00 % and the remaining 11 % for fertilizer plants and sold. In Kulonprogoro potential crops being developed are plantation crop cloves (*Syzygium aromaticum* (L.) Merrill & Perry), coffee (*Coffea* L.), tea (*Camellia sinensis* (L.) Kuntze), and coconut (*Cocos nucifera* L.). A total of 70.80 % of farmers did not do a manure treatment through fermentation. This concurs with the statement that farmers knowledge on handling and processing of goat manure is still lacking [12]. Farmers do not calculate the intangible benefits of goat manure to provide added value to the family income. In Turi Sleman Regency 10.20 % of farmers had been processing the manure and selling the compost [12]. In this area, the utilization of goat manure is mainly to support fruit production, especially for *Salak Pondoh* [*Salacca zalacca* (Gaertn.) Voss cultivar Pondoh] because these fruits are the main agriculture products which require goat manure as the fertilizer.

TABLE 3: Binary Logistic Regression for the factors that affect the choice of farmers in implementing waste treatment.

Independent variable	Coefficient	Std. Error	z-Statistic	Prob.	Odds Ratio
Constanta	-5.078	2.417	-2.1001	0.035	160.4523
Age (X1)	0.07	0.039	1.777*	0.075	1.071436
Formal education (X2)	0.025	0.349	0.072	0.942	1.025315
Non formal education (X3)	1.119	0.756	1.481	0.139	3.061789
Experience (X4)	-0.003	0.027	-0.984	0.325	1.027368
Number of family (X5)	-0.448	0.259	-1.730*	0.084	1.565178
Goat ownership (X6)	0.457	0.179	2.541**	0.011	1.579328
McFadden R-squared	0.16992				
LR statistic	13.34666				
Note: *** = level significantly 0.01 ($P < 0.01$)					
** = level significantly 0.05 ($P < 0.05$)					
* = level significantly 0.1 ($P < 0.1$)					

The results of the binary logistic regression model analysis showed that goat ownership had a significant positive effect ($P < 0.05$) to the choice of farmers in implementing waste treatment. The value of the Odds Ratio showed probability goat ownership increased by 1.5778 times higher than in those who did not implement waste treatment. Similarly, a number of family and age significantly ($P < 0.10$).

4. Conclusion

Based on the results of research on the benefits of understanding farmers goat manure is still lacking. The implication of this research is the need for socialization understanding of the importance of manure treatment to improve the intangible benefits at the household of farmers. Farmers groups should be facilitated to cooperate with the Department of Agriculture or Animal Husbandry, education institutions, and corporate Research and Development of Agriculture. Forms of cooperation include education about processing technology goat manure into compost and liquid fertilizer, livestock procurement assistance, and marketing of fertilizers.

References

- [1] Pirisi A, Lauret A, Dubeuf JP. Basic and incentive payments for goat and sheep milk in relation to quality. *Small Ruminant Research* 2007;68(1–2):167–178 <https://www.sciencedirect.com/science/article/pii/S0921448806002501>
- [2] Sodiq A, Tawfik ES. The Role and breeds, management systems, productivity and development strategies of goats in indonesia: A review. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* 2003;104 (1):71–89 <https://www.jarts.info/index.php/jarts/article/view/19>
- [3] Mishima S, Leon A, Eguchi S, Shirato Y. Livestock waste, potential manure production and its use in Japan in 1980 and 2010. *Compost Science and Utilization* 2017; 25(1):43–52. <https://www.tandfonline.com/doi/abs/10.1080/1065657X.2017.1362674?needAccess=true#hL93d3cudGFuZGZvbmxpbmUuY29tL2RvaS9wZGYvMTAuMTA4MCM8xMDY1NjU3WC4yMDEzQ/bmVIZEFjY2Vzcz10cnVlQEBAMA==>
- [4] Nasiru A, Ismail N, Ibrahim MHI. Vermicomposting: Tool for sustainable ruminant manure management. *Hindawi Publishing Corporation Journal of Waste Management* 2013; pp.1–7. <https://www.hindawi.com/journals/jwm/2013/732759/>
- [5] Budisatria IGS, Udo, H.M.J., Eilers, C.H.A.M., van der Zijpp, A.J. Dynamics of small ruminant production: a case study of Central Java. Indonesia. *Outlook on Agriculture* 2007;3(2):145–152 https://www.researchgate.net/publication/40104796_Dynamics_of_small_ruminant_production_A_case_study_of_Central_Java_Ind
- [6] Ferichani M, The Potential of ettawa goat manure and urine management to support the productive and sustainable farming. *Journal of Crop and Weed* 2013;9(2):76–80 <http://www.cropandweed.com/vol9issue2/pdf2005/13.pdf>

- [7] Suranindyah Y, Widi TSM, Sumadi, Tarmawati NH, Dwisepta U. Production Performance of Etawah Cross Bred Goats In Turi – Sleman. Yogyakarta. Paper presented in: 2009 The 1st International Seminar on Animal Industry. November 23–23, 2009. Bogor, Indonesia. p: 314–318 <https://isai.ipb.ac.id/file/113/download?token=gy1p8SSz>
- [8] Orskov ER, Kustantinah A. Dairy goat milk and composition in so-called developing countries. Proceeding The 2nd Asian-Austrlasian Dairy Goat Conference. April 25–27, 2014. Bogor, Indonesia. p.37–38 https://www.researchgate.net/profile/Ghulam_Rafique2/publication/303840498_Pathological_Studies_of_Caseous_Lymphadenitis_in_Small_Ruminants_Muhammad_Younus1-Ghulam_Mustafa_2_Muti_Ur_Rehman2_Aftab_Anjum_3_Muhammad_Raza_Hameed1_Iahtasham-Khan1/links/575797a308ae5c6549042b5d/Pathological-Studies-of-Caseous-Lymphadenitis-in-Small-Ruminants-Muhammad-Younus1-Ghulam-Mustafa-2-Muti-Ur-Rehman2-Aftab-Anjum-3-Muhammad-Raza-Hameed1-Iahtasham-Khan1.pdf
- [9] Gujarati DN, Porter DC Basic econometrics. Fourth Edition. McGraw-Hill Printed, Singapore; 2003. p. 595–614. <https://isbnsearch.o,rg/isbn/9780073375779>
- [10] Mittelhammer,R.C, G.C.Judge, and D.J. Miller. Econometric foundations. First Published. Cambridge University Press; 2000. p.571–572. <https://www.barnesandnoble.com/.../econometric-foundations...mittelhammer/110095>
- [11] Guntoro B, Rakhman AN, Suranindyah YY. innovation adoption of dairy goat farmers in Yogyakarta. International Journal of Environmental & Agriculture Research 2016;2(2):98–109 <http://www.ijoeear.com/Paper-February-2016/IJOEAR-JAN-2016-33.pdf>
- [12] Indarwati R, Herawati, Endang A. strategic planning to develop good dairy farming practices in smallholder dairy farms in Batu city, East Java. Jurnal Pembangunan dan Alam Lestari [Indonesian Journal of Environment and Sustainable Development] 2015; 6(2):163–170 <http://jpal.ub.ac.id/index.php/jpal/article/view/202>