

Full Length Research Paper

Role of poultry production in promoting peri-urban small-scale farm welfare and the gender effects of a shift from traditional extensive to intensive commercial system

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The main objective of this study was to assess the extent of gender effects on adoption of intensive commercial poultry production system by peri-urban farmers. The sample frame was divided into two strata made up of adopters and non-adopters. To select respondents, systematic sampling procedure was applied for both strata. To identify those variables that influence the gender control of poultry enterprise, a two-limit tobit model was used. The results from the two-limit tobit model identified three variables: production system, education and employment of woman as significant determinants of the degree of control by women. In conclusion, this study found that adoption of this system makes greater demands on women's unpaid labour without a matching increase in access to benefits. To improve adoption of intensive production, it is recommended that women-farmers should be involved in on-farm research activities and farmer-to-farmer should be involved in on-farm research activities and farmer-to-farmer linkages.

Key words: Commercial poultry production, two-limit tobit model, peri-urban farmers, Kenya.

INTRODUCTION

Kenya typifies the African situation, where studies have shown that with some improvements in basic husbandry, a lot of gains in production from local poultry breeds can be achieved. Despite this and the fact that almost every household has chicken, mostly under the traditional system of management, poultry production is given very little attention at peri-urban farm system. Few poultry keepers have shown any inclination to adopt commercialized intensive poultry production systems based on high performance breeds. A problem of a more serious nature is the exit from intensive poultry production system by some adopters. In some cases, farmers have adopted intensive systems of production only to abandon it later. What then ails intensive production systems that would cause farmers to abandon it? What are the problems that have constrained the development of intensive poultry the development of intensive poultry production system?

In Kericho municipality, the number of farmers involved in intensive commercial poultry production has been declining. The estimates are that there were about 986 farmers involved in commercial production in 2007 but only 620 farmers in 2009 (RoK, 2009). The municipal also has a lower adoption rate than the national average. The percentage of chicken reared under traditional extensive system is higher than the national average. Seventy-three percent of the chicken reared in Kenya are local or cross breeds under extensive or semi-intensive production system (Mbugua, 2007); the figure standards at 86% for Kericho municipality (RoK, 2009a).

Under the extensive production systems, women and children generally own the poultry and look after them (Sauer, 2001). The general understanding then is that poultry contribute to farm-family welfare generally and to the welfare of women specifically. Income generated from the enterprise under the traditional production system is largely of direct benefit to the women. This would make poultry one of the few peri-urban farm enterprises that have the greatest potential in promoting the status of women in the urban farmhousehold. More than the

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posed question 'what ails the industry?' the other question that needs asking here is 'what effect does the switch from traditional extensive to intensive production system have on the benefits previously accruing to women from the enterprise? There is very limited empirical evidence on the contribution of poultry to the small-scale peri-urban farming system. The objective of this study was to assess the role poultry production plays in promoting peri-urban small-scale farm welfare and the gender effects of a shift from traditional extensive system to intensive commercial system. It was hypothesized that women have significantly more control over the enterprise in extensive production system than in commercialized intensive production system.

MATERIALS AND METHODS

The stratified sampling technique was employed to identify poultry farmers for the study. The area was first delineated into six (06) using the local government delineation that divided Kericho Municipality into six wards, namely Kapkugerwet, Kipchichim, Motobo, Kipkoiyan, Kapchektoror, Kapsuser. In each Ward, poultry farms were identified through a snow-balling exercise. A total of four hundred and sixty two (462) poultry farms were identified in all, 33 from Kapkugerwet, 62 from Kipchichim, 55 from Motobo, 37 from Kapchektoror, 63 from Kapsuser and 50 from Kipkoiyan. Sixty five (65) percent of the identified farms in each ward were then randomly selected for the study and their resulted in three hundred (300) farms that were used for the study. Data was collected using the Questionnaire which were subjected to content validation by experts were administered to each poultry farm manager/owner on their farms. To analyse the factors that influence the degree of control by women over poultry enterprise, a 2-limit tobit model is used.

Insight into the gender aspect of poultry enterprise control can be gained by assessing for those factors that have an impact on the degree of control over the enterprise by a given gender (women in this case). The dependent variable - degree of control – has a lower limit (no control) and an upper limit (total control). A behavioural model with the dependent variable having two limits is needed. Ordered logit/probit models or two-limit tobit could be used. If the degree of control is merely ranked then an ordered logit/probit model could be used. However, if the degree of control is treated as a continuous variable truncated at both lower and upper ends then a two-limit tobit is the preferred model. A two-limit tobit was chosen over the ordered models of this study. This is because although the values that the dependent variable takes in ordered models are successive partitions of the real number line, the cut-off points between one category and other is not specified. This is implicit in the two-limit tobit since the dependent variable is treated as continuous.

Two-limit tobit model is a truncated model with lower and upper limits. Suppose the continuous version of the model is given by:

Where Y_i^* is the latent variable.

If we denote by y_i the observed dependent variable then according to Maddala (1983, 1993) is

Here L_- and L_+ are, respectively, the lower and upper limits.

In a two-limit tobit model, the dependent variable (degree of control) was treated as a continuous variable truncated at a lower end of 0 (no control) and upper limit of 100 (total control). When this approach is taken, threshold parameters between one level of control and the next are the divisions of the real line between 0 and 100. The two-limit model is more appropriate.

The estimation two-limit tobit model used was of the form;

$$Y_i^* = \beta X_i + u_i, (i = 1 \text{ to } n); \quad (3)$$

where Y_i^* is the latent variable

$$\begin{aligned} y_i &= 0 \text{ if } y_i \leq 0, \\ &= Y_i^* \text{ if } 0 < Y_i^* < 100, \\ &= 100 \text{ if } Y_i^* > 100, \end{aligned} \quad (4)$$

Here 0 and 100 are, respectively, the lower and upper limits.

The explanatory variables X_i are; X_1 = system of production: 1 if traditional extensive, 0 otherwise, X_2 = education of woman in the household as number of years of formal education, X_3 = if woman is employed: 1 if woman is employed, 0 otherwise, X_4 = employment of the man: 1 if employed, 0 otherwise, X_5 = family income, X_6 = education of man in the household as number of years of formal education. A priori all β_j were expected to be positive.

RESULTS AND DISCUSSION

Poultry contribution to farm-family welfare

Traditional extensive poultry system based on indigenous poultry breeds is still the dominant production in the municipality and contributes substantially to small-scale peri-urban family welfare. Poultry products are used to meet a diversity of family needs. Eggs and poultry are used to meet a diversity of family needs. Eggs and poultry meat is used as food for the family. Some little surplus is sold for cash. The cash income so generated is used to meet household needs such as food stuffs, clothing and farm inputs. It is also used to pay school fees, buy books and pay transport for school going children. A smaller proportion is used to meet such non-monetary social obligation as feasts, and gifts to relatives and friends. Of course, some is always kept back to be used to produce replacement stock. For the farmers who practice this system, it was found that income obtained from poultry as a percentage of farm income ranged from 0.8 to 32.2% with an average of 10.4%. This system is also still widely practiced by farmers who have adopted intensive system of production based on high performance exotic breeds. Eighty seven percent of the

Table 1. Gender participation in poultry husbandry under traditional extensive system.

Activity	Proportion of farm families in which men carried out the activity (%)	Proportion of farm families in which women carried out the activity (%)	Proportion of farm families in which hired labour carried out the activity (%)
Feeding and watering	7.7	92.3	0
Securing for the night	9.5	90.	0
Collecting eggs	5.3	94.7	0
Cleaning chicken house	6.1	93.9	0
Selling chicken	14.3	82.1	3.6
Selling eggs	4.2	95.8	0
Repairs to chicken house	60	10	30

Table 2. Gender participation in poultry husbandry under intensive production system.

Activity	Proportion of farm families carrying out the activity in egg production (%)			Proportion of farm families carrying out the activity in broiler production (%)		
	Men	Women	Hired labour	Men	Women	Hired labour
Feeding and watering	10.3	66.2	23.5	23.7	44.7	31.6
Brooding	41.1	44.6	14.3	30.6	52.8	16.7
Repairs in poultry house	75	0	25	66.7	0	33.3
Buying and transporting feed	64.1	15.4	20.5	65	20	15
Booking and transporting chicks	74.3	23	2.7	64.7	27	8.1
Collecting eggs	9.7	58.1	32.2	*	*	*
Selling culls	46.8	46.8	6.4	*	*	*
Dressing broiler	*	*	*	10	20	70
Marketing	*	*	*	46.7	33.3	20

*Not applicable.

adopters still kept the local chicken under the extensive system.

Contribution from extensive poultry production system to farm income is inversely related to the farm income. This is indicated by a negative sample coefficient of correlation (-0.497) between farm income and the percent contribution of poultry enterprise. The relationship exhibits a distinct curvilinear form which when transformed to a log-linear fit gave a higher coefficient of correlation of -0.633. The implication therefore is that the poultry enterprise gains more significant as farm income decreases. The resource poorer section of the peri-urban farmers tends to rely on poultry more.

Gender participation in poultry enterprise

Women dominate traditional extensive production system. In this system, women are responsible for the husbandry. Women were found to dominate in six out of seven activities, while the men dominated in only one activity (Table 1). Women also were the dominant gender in charge of the enterprise. They decide on the use of poultry products, receive the cash income if sold and

decide on the use of such cash income (Table 3). However, the whole family benefited since they ended up using the cash income to meet family expenses. Under intensive commercial system, women stilled dominated in on-farm husbandry activities such as feeding, egg collection and brooding day-old-chicks as in the extensive system, while the men dominated in off-farm activities such as the purchase and transportation of feeds and chicks (Table 2). Since intensive system husbandry is more demanding, the demand on the women's unpaid labour to perform these tasks is higher than in extensive system. Use of hired labour in this system is also more pronounced compared to traditional extensive system. Hired labour is the dominant source of labour in dressing broiler. Hired labour also contributes substantially in feeding (31.6%) and repairs to poultry house (33.3%). However, the degree of control of women over the poultry enterprise, in terms of decision making on the use of poultry products and the receipt and use of cash income if sold, under intensive system was found to be markedly lower than in the extensive system. In a scale of one to three (one representing a low degree of control, two a medium degree and three a high degree of control), it was found that in 65% of the sampled farm families

Table 3. Extent of control by women over poultry enterprise.

	Low degree of control (%)	Medium degree of control (%)	High degree of control (%)
Adopters	25.93	33.33	40.74
Non adopters	6.35	28.57	65.08

Table 4. Adoption status/degree of control contingency table.

Degree of control	Adopter	Non adopter	Total
1	25.93 (16.14)	6.35 (16.14)	32.28
2	33.33 (30.95)	28.57 (30.95)	61.90
3	40.74 (52.91)	65.08 (52.91)	105.82
Total	100	100	200

Figures in parenthesis, () represent expected values.

Table 5. Summary statistics of variables included in two-limit tobit model.

Variable	Mean	Std. dev.	Minimum	Maximum
System of production	0.53	0.50	0	1
Formal education (woman) in years	7.53	5.18	0	21
Employment (woman)	0.18	0.39	0	1
Employment (man)	0.33	0.47	0	1
Family income	144 610	113 980	6 000	487 000
Formal education of man in years	9.62	3.98	0	20

practicing extensive system of production, women had a high degree of control (level 3) over the poultry enterprise. Under intensive system the corresponding figure was 41% (Table 4).

To test independence between degree of control and adoption status, a chi-square test was carried out with H_0 : Degree of control is independent of adoption status. The calculated χ^2 was found to be 17.84 and significant at the 1% level. The $\chi^2_{(3)} = 7.38$. The implication therefore is that the degree of control exercised by women over the poultry enterprise is dependent on the system of production. Intensive production system is a high input system. It requires more labour and capital input than the extensive system and makes greater demands on women's unpaid labour. Women like in extensive system dominate husbandry activities like feeding, brooding and egg collection. Adoption of intensive system undermines women's position including that of men. Although it does not reduce the demand on women's labour, it significantly reduces their control over the enterprise. Similar results were obtained from the two-tobit model.

Two-limit tobit model results

To identify those variables that influence the gender control of poultry enterprise a two-limit tobit model was used. The dependent variable (degree of control by women of the poultry enterprise) was treated as a continuous

variable that is truncated at a lower bound of zero and an upper bound of hundred. Zero implies no control and hundred implies total control. The statistics of variables included in the two-limit tobit model was summarized in Table 5. The results of the two-limit tobit model are given in Table 6.

Of the six variables included in the model, three of them that is production system, education and women-employment proved significant determinants of the degree of control of poultry enterprise by women. The system of production was found to be most significant variable at the 1% level in explaining the degree of control. Traditional system of production promotes control by women of the poultry enterprise in conformity with the maintained hypothesis. A shift from traditional system to intensive commercial system therefore negatively affects the access and control by women over the enterprise's output. The tobit results indicate that women have more control over the enterprise in extensive production system. The hypothesis is therefore accepted.

An employed woman being an income earner for the family would be expected to have more access and control over the family's resources. An employed male head of household on the other hand, given he has other sources of income, would be expected to be more disposed to let the woman run the poultry enterprise. The two explanatory factors, 'employment of woman of the household' and 'employment of man of the household', however, were both found to affect negatively the level of

Table 6. Estimated result of the two-limit tobit model.

Independent variable	Coefficient	Std. error	t-ratio	Prob. t ≥ X
System of production	58.056	12.93	4.489***	0.00001
Formal education (woman) in years	6.0847	2.400	2.536**	0.011222
Employment (woman)	-44.160	18.38	-2.402**	0.01629
Employment (man)	-21.409	18.89	-1.134	0.25698
Family income	0.12246E-03	0.8149E-4	1.503	0.13291
Formal education of (man) in years	1.6801	2.267	0.741	0.45871

***Significance at 1% level, **Significance at 5% level.

control by the woman. Employment of woman was found to be significant at 5% level. The sign on this variable is unexpected. But it could be that a male head of household would be reluctant to let the woman have control over a farm enterprise if she already had another source of income. Employment of man negatively affects the control by woman and therefore consolidated the man's control. This variable however was not significant at 10% level.

A higher family income is expected to promote control of the enterprise by the woman. A male head of household with other sources of income would be more willing to let woman have access and control over the poultry enterprise. This hypothesis is confirmed by the results. However, although positively affecting the degree of control, family income was not found to be significant at 10% level.

Education of both the woman and man of the household is expected to promote control by woman over the enterprise. An educated woman would be more enlightened, enterprising and able to exert more influence over the family resource. An educated male head of household would be expected to have access to a source of income of her own. For both variables (education of man and education of woman) the results obtained support these hypotheses. The coefficients to these variables carry the expected signs. However, 'education of man' variable proved not to be significant at the 10% level, while 'education of woman' variable was significant at 5% level.

CONCLUSION

Poultry farming contribute significantly to peri-urban family welfare. The contribution to farm income from extensive to farm income from extensive poultry production system ranged from about 1 to 32%. A negative correlation between farm income and percent contribution however shows a higher reliance on traditional extensive poultry production by the resource poorer section of the poultry keepers' community. Women were found to dominate in husbandry activities under extensive system. The notable exception is repairs to poultry houses, which was found to be predominately male activity. Under

intensive system, women were still dominant in on-farm activities such as feeding, egg collection and brooding day-old-chicks. Men dominate off-farm activities like purchasing and transportation of feed and day-old-chicks.

Although women dominate husbandry activities in both extensive and intensive systems, it was found that adoption of intensive system weakened women's position including that of the men. Intensive system is a high input system. It requires more labour and capital relative to extensive system. The system makes greater demands on women's unpaid labour, since women dominate in such activities as feeding, brooding and egg collection as in extensive system. They however have a lesser degree of control over the output of the enterprise in intensive system than in extensive system. This is indicated by the chi-test of independence and the two-limit tobit model. Chi-test shows that the degree of control exercised by women over the enterprise is dependent on the system.

The two-limit tobit model identified three variables as significant determinants of the degree of control of the poultry enterprise by women. Women therefore do have less control over the benefits derived from poultry production in intensive system, yet there is indication that they put in more in terms of labour.

In some instance, resource imbalance in favour of men was identified. Women were found to have a lower access to off-farm income and poultry management training. They also had a lower access to off-farm income and poultry management training. They also had a lower mean education level. However access to poultry market was found to be equitable. Although an imbalance in resource access in favour of men was identified, women did not feel specially constrained than men. This could be because the men were found to always participate in the decision to start the intensive system of production in families with a male head of household. Cost and husbandry requirement would therefore not become a gender specific aspect.

RECOMMENDATIONS

To enable women to retain their dominant role in poultry production, besides basic education for women,

Women-farmers should be involved in on-farm research activities and farmer-to-farmer should be involved in on-farm research activities and farmer-to-farmer linkages. Farm visits and tours should involve women farmers. On-farm research linkages on poultry could be used as a tool to target women poultry farmers and women groups. It has been found that women participate more actively when on their own rather than in mixed groups (Chinyemba, 1997). Research into ways of improving the productivity of the local breeds or crossbred chicken that can endure the range conditions would be more accessible to women farmers and the resource poor small-scale peri-urban farmers generally.

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