RESEARCH ARTICLE

IMPACT OF TRAINING ON RURAL CHICKEN PRODUCTION REARED BY WOMEN IN ISLAMABAD/ RAWALPINDI, PAKISTAN

ABIDA PARVEEN, SOHAIL HASSAN KHAN*, ABDUL RASHID, MIAN AURANGZEB

Poultry Research Institute, Murree Road, Shamsabad, Rawalpindi, Pakistan

*Corresponding Author: sohailhassan64@gmail.com

Authors’ contributions
This work was carried out in collaboration between all authors. Author AP conducted the study, performed the statistical analysis. Author SHK designed the study and wrote the first draft of the manuscript. Authors AR and MA managed field tours and collected some research material. All authors read and approved the final manuscript.

ABSTRACT

Aim: To study the impact of training given to female farmers under the poultry extension women worker on the status of rural chicken production in Islamabad/Rawalpindi area.

Study Design: The data were analyzed using General Linear Model procedures. The statistical model was constructed to ascertain the effect of egg production, egg storage in different seasons, vaccination practice, egg selection criteria for hatchability and training received by female farmers on mortality in chicks.

Place and Duration of Study: Poultry Research Institute, Murree Road, Shamsabad, Rawalpindi, Pakistan, between July 2011 and June 2012

Methodology: The study contained data collection (prior to and after getting training in rural chicken production over a one year period) from 100 female farmers who were willing to join female farmers groups and get training from extension workers. These one hundred female farmers were primarily selected from 150 farmers at random, keeping in view their zeal for joining female farmer groups. The training included skill development, production, and breeding of highly productive stock, care of the newly hatched chicks, housing, feeding, disease prevention, and hygienic measures, control of external and internal parasites, egg selection and
storage, hatchability of eggs, and its requirements, selection and culling of birds, vaccination schedule.

**Results:** Significantly lower flock size was maintained by female farmers before getting training (12.4 numbers) than after training (23.44 numbers). Egg production, per bird, was significantly lower prior to training (37.7 eggs) than after training (75.2 eggs). A significantly higher number of eggs per capita per year were available for farmers after training (140 eggs) than before training (87 eggs). However, per capita egg consumption was not improved by training. Mean overall mortality per flock were significantly higher before training (45.5%) than after training (13.5%). Eggs were stored for a longer duration in summer (6.80) and winter (15 days) for hatching prior to training than after training (4.09 and 7.75 days, respectively). A significantly higher number of eggs (18.0 eggs) were set under a broody hen before training than after training (12.6 eggs). Hatchability per number of eggs set was significantly lower before training (59.0%) than after training (75.5%). Ninety percent female farmers were adopted vaccination practice, whereas, 21.0 percent female farmers were already vaccinating their birds prior to training.

**Conclusion:** Training significantly improved rural chicken production by female farmers. Overall training improved the poultry production practices through better adaptation of new techniques by female farmers. Most of female farmers adopted vaccination schedule after training.

Key words: Rural chicken; training; women; egg production

1. **INTRODUCTION**

Gender equity has gained currency worldwide especially, in the agricultural sector in developing countries where women comprise half or more of the workforce. The rural literacy rate in Pakistan is only 41.6% [1]. It is interesting to note that the female literacy rate of 26.6% is far below the men’s (56.3%) in rural areas. Livestock production generally and chickens in particular play fundamental socio-economic roles in developing countries [2]. Poultry has become a good alternate of beef and mutton. Its significance can be judged from the fact that according to Livestock Wing of Ministry of Food, Agriculture and Livestock almost every family in rural areas and every fifth family in urban areas is connected with poultry production activities in one way or the other [3].
Backyard chickens are primarily kept for egg and meat production on a survival basis in rural areas of Pakistan. The term “backyard” chicken was employed to describe rural birds which were reared on a survival basis, on a small scale by a household [4]. In this type of poultry rearing, usually a few birds (10-12 birds) are kept primarily for family use [5]. The surplus birds and eggs are sold in the village or nearby market and the earned money are utilized for fulfilling other requirements of the household. This is a common practice in the rural area of Pakistan. Keeping in view the very low cost of producing rural poultry, the net return from rural poultry could be several times more than that of birds produced on commercial scale. Contribution of rural poultry to household economy could be further enhanced through genetic improvement of the rural birds, in addition to their feeding, management and health status.

Islamabad is located at 33.43° North and 73.04° East at the northern edge of the Pothohar Plateau and at the foot of the Margalla Hills in Islamabad Capital Territory. Its elevation is 540 meters [6]. The modern capital and the ancient Gakhar city of Rawalpindi stand side by side and are commonly referred to as the Twin Cities [7]. The population of rural chicken in Islamabad and Rawalpindi is about 0.98 and 4.2 million, respectively [8]. Majority of the inhabitants are landless. For these landless/poor people livestock in general and poultry in particular is the important source of earning. Rural chickens are reared in traditional free range scavenging or backyard system. These rural birds are flourishing on leftover human foods, kitchen wastes, broken rice or paddy, insects or worms and do not benefit from compound feeds or defined housing. The indigenous chicken, evolved through thousands of years of natural selection, are well adapted to the local climatic conditions, feed and management stresses, with better resistance to diseases. This farming system, characterized by low input and low out production system, provides food security, protein nutrition and
women empowerment to the rural families besides elevating poverty in developing countries [9].

Regardless of their important role in egg and meat production, little attention has been paid to rural chickens. Kelly and coworkers [10] reported 25% mortality in rural household chickens kept in Chitungwiza, an urban center in Zimbabwe. Shakir and coworkers [11] found a lower mortality rate (13.5±15%) than that reported in above mentioned study. The probable reasons for lower production, poor management, and health coverage and severe losses could be poor know-how and lack of health and extension services to the farmers. The rearing of rural chicken by rural women is usually considered low input and low output production system [9]. However, rearing of local chicken with improved management, proper vaccination and disease control and selection of good ones has yielded good results in areas of Madhya Pradesh and Kashmir, India [12, 13]. Similarly in South Africa [14], Bangladesh [15] or China [16], rural chicken production has been potentiated by improved management and health care.

Recognizing the need to increase rural household chicken production as a way of alleviating poverty, a team of female poultry extension workers was formed and equipped with skills in various disciplines of poultry production activities to help the poor and subsistence female farmers. The aim was to enable the farmers to increase their household income through increased poultry productivity. As a follow-up to the activities and regular visits paid by the workers, it was decided there was a need to quantify the benefits being obtained by rural women in rural chicken production. For this purpose a study was planned to appraise the impact of training given to female farmers on rural chicken production in Islamabad/Rawalpindi division.
2. RESEARCH METHODOLOGY

2.1. Selection of Female Farmers

Among one hundred and fifty female farmers from 15 villages (08 villages of Rawalpindi and 07 villages of Islamabad) were selected at random, a further selection was made of 100 farmers who were ready to establish female farmer groups and had eager to receive training. At each village level, one farmer group was established and allotted to female poultry extension workers.

2.2. Training to Female Farmers

Training included poultry skill development concerning rural chicken production, breeding of highly productive stock, care of the newly hatched chicks, housing, feeding, disease prevention, hygienic measures, control of external and internal parasites, egg selection and storage, hatchability of eggs, selection and culling of birds, provision of vaccines and essential medicines and development of linkages with the agencies and Livestock and Dairy Development Department of the Government of Punjab. The female poultry extension workers were trained to work for vertical expansion of the rural poultry farming taking account of the limited resources of the farmers. Thus, there was not a significant increase in operational cost. No extra inputs were provided in terms of birds. However, the farmers were already rearing mixed flocks of Rhode Island Red (RIR), Fayoumi and indigenous chicken. The rural chicken was mainly reared for hatching of eggs as they have got tremendous understanding for their broodiness and hatching of eggs. The study period was July, 2011 to June, 2012.
2.3. Recording

Prior to giving training to the farmers, information was collected on the family, flock size, type of birds rearing, egg production and consumption, mortality, prices of egg and chick, egg storage duration, number and frequency of eggs set hatchability performance. After one year period of activities, training and regular follow-up visits the aforesaid information regarding household chicken production was again recorded.

2.4. Statistical Analysis

The data were analyzed using General Linear Model procedures. The following statistical model was constructed to ascertain the effect of breeds, season, health coverage program and training received by female farmers on egg production and mortality in chicks:

$$Y_{ijklmn} = \mu + A_i + B_j + C_k + D_l + E_{ijklmn}$$

Where,

- $Y_{ijklmn}$ = $n^{th}$ observation on egg production by $i^{th}$ type of chicken during $j^{th}$ season under $k^{th}$ health coverage programme by farmers receiving $l^{th}$ training.
- $\mu$ = Population constant common to all observations.
- $A_i$ = the effect of $i^{th}$ type of chicken; $i = Desi$, RIR and Fayumi.
- $B_j$ = the effect of $j^{th}$ season; $j = summer$, winter and moderate
- $C_k$ = the effect of $k^{th}$ health coverage programme: $k = vaccination$, no vaccination.
- $D_l$ = the effect of $l^{th}$ training; $l = training given$, no training.
E_{ijklmn} = the residual term associated with each Y_{ijklmn} assumed to be normally, independently and identically distributed with mean zero and variance 1.

A similar model was used for flock size, egg consumption and percent mortality.

For ascertain hatchability under field conditions before and after training the following statistical model was constructed:

Y_{ijklmn} = \mu + A_j + B_j + C_k + D_l + E_m + F_{ijklmn}

Y_{ijklmn} = n^{th} observation on hatchability by i^{th} egg storage period with j^{th} No. of eggs set per incubation during k^{th} season under l^{th} health coverage programme by farmers receiving m^{th} training.

\mu = Population constant common to all observations.

A_i = the effect of i^{th} egg storage period; i = 1, 2, 3, 4...15 days.

B_j = the effect of j^{th} number of eggs set per incubation; j = 12 eggs, 15 eggs, 18 eggs

C_k = the effect of k^{th} season; k = summer, winter and moderate

D_l = the effect of l^{th} health coverage programme: k = vaccination, no vaccination.

E_m = the effect of m^{th} training; l = training given, no training.

F_{ijklmn} = the residual term associated with each Y_{ijklmn} assumed to be normally, independently and identically distributed with mean zero and variance 1.
Egg selection criteria were excluded from the aforementioned model for mortality in adult birds. When differences between before and after training were significant, means were separated using Duncan’s multiple range tests at the 0.05 level of significance [17]. The analyses were conducted using SPSS 15.0 software [18].

3. RESULTS AND DISCUSSION

Impact of training on flock size, types of birds rearing, egg production, per capita egg availability, per capita egg consumption and mortality is given in Table 1. A higher \( P<0.05 \) flock size (23.44/household) was maintained by rural women after training than before training (12.4/household). This is in agreement with other studies in developing countries which have reported a flock size between 12 to 24 per household, with chicks comprising the major proportion and a mating ratio ranging between 1:2.3 to 1:6.4 [19, 20, 21].

The flock size maintained by the trained female farmers in this project was higher than that (10-12) reported by Qureshi [22], (23.1) by Shakir and coworkers [11] and (15-19) by Olwande and coworkers [23] but lower than that (30.83) reported by Farooq and coworkers [4]. This could be explained by fluctuation in flock size due to seasons and time and also by the fact that some farmers were practicing semi-confined and confined systems of production which always have high carrying capacity than extensive system. The increase in flock size per household by about 11 chickens after training in the current project could be attributed to improved practices learned by the women poultry keepers and increased knowledge of the importance of rural chicken in survival income generation.

The type of breed rearing represented Desi (36.15%), RIR (33.80%) and Fayoumi (30.05%) chickens before and 28.78%, 40.55% and 16.7% chickens, respectively, after the training was
recorded. Data indicated that Fayoumi and RIR (golden) have been taking their place besides the Desi hens due to their adaptability and acceptability in the climatic conditions of country.

Training had a positive effect on egg production. Egg production per bird was higher after (75.2%) than before (37.7%) training. The higher egg production could be recognized to better care and management of the birds and rearing of more productive strains like Fayoumi and Rhode Island Red (RIR) which are compatible to backyard production under subtropical conditions when compared with local Desi chicken [24]. The egg production reported in the current study from the rural chicken was simulating the production potentials reported in the native chicken of South Africa [25] or Chitral, Pakistan [5]. Season is also an important factor affecting the physiological function of layer chicken, though the effect on egg production rate depends on age of laying hens. In the present study, farmers gained more egg production in summer season than winter that indicated day length as a factor affecting on rural poultry egg production (these are qualitative observations, not measured). The effect is more evident at old age when birds are exposed to a cold climate. When temperature falls below the thermo neutral zone of below 12.8°C egg production becomes unprofitable difference [26].

Eggs were mostly used for food, hatching and as a source of income. Backyard chicken eggs are supposed to be tastier and this might be why they are mostly used for food and their high demand. The current results indicated that smaller number of per capita eggs consumed (23.5 and 25.5 before and after training, respectively) than per capita available eggs (87 and 140 eggs) obtained by a household from backyard chicken in selected area. Similar findings were obtained by Shakir and coworkers [11] and Javed and coworkers [27], who reported a higher number of eggs, obtained and consumed less in number on an annual basis in Chitral and Peshawar; The present study showed that training had no clear effect on egg consumption
patterns of rural households. It may be due to the fact that people prefer to sell the surplus eggs obtained after the training. The results are in line with previous study [4] which found that no significant effect of training on egg consumed by rural households.

The current study indicated that training reduced mortality in chickens. Higher mortality was observed in RIR (16.50%) than Fayoumi (10.76%) and non-descript indigenous Desi chicken (6.78%; data not presented).

The lower mortality in Fayoumi and non-descript indigenous Desi chicken could be attributed to better adaptability of these chickens to the local environment. Literature showed [11,4] that mortality of approximately 14% and 23.4% reduced in backyard chicken at Chitral and Peshawar, respectively after training to rural women which is lower than the values (32%) recorded in the present study. This could probably be due to proper hygienic measures, improved care of the flock and successful vaccination and health coverage programs adapted by the female farmers after receiving training in backyard chicken production. So such intervention through improved management practices has been found not only to increase productivity of indigenous chicken but also reduces mortality [27].

Impact of training on egg storage period, egg set for incubation, frequency of egg setting for hatching, hatchability and vaccination is given in Table 2. Eggs for hatching were stored longer in summer (6.80 days) and in winter (15.00 days) by rural women prior to training than after training (4.09 and 7.75 days, respectively). This could be recognized to better knowledge of the female farmers about the importance of egg storage in incubation and hatching. Fewer eggs were set under a broody hen in Islamabad/Rawalpindi areas after (12.6) than before (18.0) training. The results recommended a skillful approach of the female farmers towards hatching of eggs in backyard poultry production. Frequency of egg setting for hatching is improved (3.40/year) after training than before training (2.50/year). The lower hatchability of eggs of
backyard chicken before the women were trained could be due to the prolonged storage period, setting too high a number of eggs under a broody hen and poor criteria for selection of hatching eggs.

In all the households, hatching was naturally done with hens brooding and raising their own chicks. Hatchability was significantly higher after the women received training (75.5%) than before training (59.0%). Similar findings were reported in previous study [28] for Fayoumi breed. This concurs with the implication of previous study [29] that reducing the storage period leads to better hatchability. They suggested that the eggs should not be stored for more than four days. Season is the most critical factor for incubation and the seasonal temperature could influence on both quantity and quality of hatch. Species of birds differ in their temperature requirements for incubation [30]. In current study, winter season showed maximum hatchability (65.43%) then followed by summer (49.70%) and monsoon or rainy (44.45%) seasons. Similar results were observed in another study [31], in which the hatchability of chicken eggs was higher in spring (78.0%) than in summer (46.5%). Hatchability of fertile eggs may also be influenced by several other factors such as care of hatching eggs, age of broody birds, quality of eggs and nutrition [32].

Only 21% of women farmers amongst those selected were vaccinating their birds against diseases (particularly, Newcastle Disease Vaccine) before receiving training whereas 90% were found to vaccinate their birds after training. In another study [4], 25% of women were vaccinating their birds before training at the same time as 100% were found to vaccinate their birds after training. Higher flock size has also been reported for flock owners vaccinating their flocks [11, 33] than in non- vaccinated flocks. The higher number of chicken in flocks vaccinated against ND + Fowl-Pox could probably be due to better immunity development of the chicken ensuring survivability of more chickens.
4. CONCLUSIONS

The results showed that training significantly improved rural chicken production by female farmers. Overall training improved the poultry production practices through better adaptation of new techniques by female farmers. Most of female farmers adopted vaccination schedule after training. The authors suggested that a mass training program for all the female farmers should be launched to increase backyard/rural chicken productivity thereby increasing household income. Regular vaccination, increases in flock size, replacement of poor producers by more productive birds well suited to scavenging conditions, minimal storage period of eggs intended for hatching and selection of quality eggs should be practiced for obtaining better results.

COMPETING INTERESTS

Authors have declared that no competing interests exist.
Table 1. Impact of training on flock size, type of birds rearing, egg production & consumption and mortality at Islamabad/Rawalpindi area (Mean values ±SE)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Before Training</th>
<th>After Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flock Size</td>
<td>12.4±1.32 b</td>
<td>23.44±1.55 a</td>
</tr>
<tr>
<td>Type of birds rearing (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Desi (Non-descript)</td>
<td>36.15±3.00</td>
<td>28.78±2.01</td>
</tr>
<tr>
<td>b) Rhode Island Red</td>
<td>33.80±3.09</td>
<td>40.55±3.67</td>
</tr>
<tr>
<td>c) Fayoumi</td>
<td>30.05±2.80</td>
<td>30.67±2.88</td>
</tr>
<tr>
<td>Eggs produced per bird (No./bird)</td>
<td>37.7±3.09 a</td>
<td>75.20±6.00 a</td>
</tr>
<tr>
<td>Per capita available eggs</td>
<td>87±1.00 b</td>
<td>140±7.88 a</td>
</tr>
<tr>
<td>Per capita egg consumption</td>
<td>23.5±1.00</td>
<td>25.50±1.85</td>
</tr>
<tr>
<td>Overall mortality in a flock (%)</td>
<td>45.5±1.65 a</td>
<td>13.50±1.00 b</td>
</tr>
</tbody>
</table>

Means with a different letters in rows are significantly different (P<0.05)
Table 2. Comparison of egg storage duration, egg setting, hatching performance and vaccination of backyard chicken produced by a rural household before and after getting training at Islamabad/Rawalpindi area

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Before Training</th>
<th>After Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg storage during summer (days)</td>
<td>6.80±0.43&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.09±0.17&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Egg storage during winter (days)</td>
<td>15.00±0.63&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.75±0.26&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Eggs set per incubation</td>
<td>18.00±0.39&lt;sup&gt;a&lt;/sup&gt;</td>
<td>12.60±0.11&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Frequency of egg setting for hatching per year</td>
<td>2.50±0.23&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.40±1.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hatchability per number of eggs set under a hen (%)</td>
<td>59.0±5.51&lt;sup&gt;b&lt;/sup&gt;</td>
<td>75.50±6.80&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Vaccinating chicken (%)</td>
<td>21&lt;sup&gt;b&lt;/sup&gt;</td>
<td>90&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a,b</sup>Means with a different letters in rows are significantly different (P<0.05)
REFERENCES


