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Challenges and Prospects of Village-Based Exotic Chicken Development Strategy in Amhara Regional State, Northwest Ethiopia

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Challenges and Prospects of Village-Based Exotic Chicken Development Strategy in Amhara Regional State, Northwest Ethiopia

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Abstract - A study was performed from September 2009 to August 2011 to identify the major challenges and prospects of village-based exotic chicken production in Amahara Regional State. In this study ,village chickens were found raised mainly for income generation (76.0%) and home consumption (14.5%).The exotic chickens in this study were kept in scavenging type (61.5%) feeding with seasonal supplementation of grain .Among the maim problems related to poultry feed preparation are less availability of feed ingredients (48%) both in quality and quantity. It was found that individuals engaged in chicken rearing activities had higher preference for LOH (27%) than RIR (22.0%) breeds. But RIR breeds (52.5%) were more adapted the existing environmental conditions than LOH breeds. About 81.5% of respondents were found able to construct separate chicken houses and 94% of the respondents have incriminated disease as the most important constraint for chicken production. The overall mortality rate of distributed exotic chickens in the three agro-climatic zones of Amahara regional State was 45.00%. The mortality rate of LOH breed of chicken (29.34%) was found higher than that of RIR (*16.18%*). There was also statically significant difference ($p<0.05$) in mortality rates between the two breeds of chicken. The present study indicated that the exotic chickens distributed in mid-altitude areas were with low mortality rates than high and low-altitude areas. Therefore, the bureau should fill the gaps with respect of inputs like identifying areas where exotic chickens adapt more, extension services and health and feeding packages for better implementation of the strategy.

Keywords : lohmann white/Rohde island red/exotic chicken breeds / mortality rates.

I. Introduction

Among the different food sources, poultry products contribute significantly to the Ethiopia's food demand. With the increasing population of the country, there is an increasing demand for the supply of food. Under the prevailing management situations, it may be difficult to fulfill these demands in short time. Therefore, intensification and upgrading of the potential of birds will be inevitable to provide surplus products. In line with this aim different chicken breeds have been introduced into this country (Alemu, 1995; Ashenafi, 2000; Tadelle and Ogle, 2001).

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Accordingly, the Bureau of the Amhara Regional State of Agriculture and Rural Development (BoARD) schemed poultry development strategy starting from 2003. The main purpose of the strategy was to enable farmers to generate income through rearing day-old chickens of two exotic breeds, Rhode Isle land Red (RIR) and Lohmann white breeds (LOH) which are hatched and distributed from poultry multiplication centers located at Andassa and Kombolcha. For this purpose 16 districts in 5 zone of the region were selected to be included in this new strategy. These districts were selected based on their market accessibility for poultry and poultry products. Farmers in different village and livestock experts at district level were trained on poultry development packages. The training included on methods of producing hay-box brooders technology, formulate ration from locally available feed resources, prevention of Newcastle disease vaccine and on general biosecurity measures for prevention of poultry diseases. At the end of training, every farmer in this program was given 50 ,100 and 500 day-old chickens of either the two breeds and/or both breeds with formulated ration enough for 2 months and disease prevention packages. During the periods of 2003 to 2011 over 500,000 day-old chickens were distributed to 6,000 farmers in the region. This study tries to identify the major challenges and prospects of exotic chicken distributed across three agro-climatic zones of the region

II. Materials and Methods

a) Study area

The study was conducted in sixteen districts of Amhara regional state which were included in poultry development strategy through distribution of exotic day-old chicks .the districts were located in three agro-climatic zones based on altitude ranges. The low altitude agro-climatic zones were found in altitude ranges from 1500-2000 masl. Similarly, the mid-altitude and high altitude districts were in the ranges of 2000-2500 masl and above 2500masl respectively. In all study agro-climatic zones, the rainy season lasts from june to august and the dry season from December to march. Similarly, months from April to May were classified as before rainy season and months from September to December as after rainy seasons.

Figure 1 : Map of Agro-climatic zones in poultry production strategy.

(Source: CSA, 2010).

b) Study design

Both cross-sectional and longitudinal studies were employed in the three agro-climatic zones of Amahara regional state where the poultry development strategy was launched.

c) Questionnaire survey

Questionnaire survey was conducted on different aspects of the exotic chicken production systems and its constraints. Information as to the constraints of chicken production were collected through predesigned questionnaire from farmers involved in the poultry development strategy. Emphases were given on causes of mortality, associated risk factors and in respective agro-climatic zones.

d) Longitudinal/cohort study

Starting from day one, the birds were closely observed, maintained for one year (September 2009 to August 2010 and individual farmers' day-old chicks were recorded by enumerators and animal health experts. All those birds died were recorded and examined following the standard procedures for identifying the cause of mortality. Based on their age, the birds were conventionally grouped as 0- 2 weeks, 2 weeks to 2 months and above 2 months of age groups.

e) Data analysis

Descriptive statistics was utilized to summarize data on constraints chicken production, and mortality. Chi-square test statistics was employed to see if there is any significant difference in constraints of poultry production among different groups. Tests were considered significant at $p \leq 0.05$.

III. Result and Discussion

a) Socioeconomic status of farmers

This survey indicated that village-based exotic chicken production under backyard become common practice in Northwest Ethiopia. In this system of production, village chickens were raised for income generation (76.0%), hatching (0.50%), home consumption (14.5%), egg production (7.50%) and other purposes (1.5%). This finding is in line with the reports of Halima *et.al.* (2007)and Fisseha *et.al.* (2010) which indicated that village chicken are raised in northwest Ethiopia for various purposes. The average age (years) of the respondents were 37.36, 36.97 and 34.19 years respectively for high, mid and low-altitude areas respectively. The average land size per household was higher in low-altitude areas (3) than that of mid-altitude (2.74) and high-altitude (2.68 ha). On the other hand, the mean family size of farmers was higher in middle-altitude (5.85) than that of high altitude (5.76) and low-altitude (5.64) agro-climatic zones. However, this finding is higher than the reports of Halima *et.al.* (2007) which indicated the average land size per house hold is below 2 ha.

The educational level of the households in this survey indicated that only 21.5% were illiterate and 31.5%, 21.5% and 13.5% of the respondents were completed their high school, grade 7-12 and able to read and write respectively. This may be due to the fact that for exotic chicken rearing activity education was considered by extension experts for selection of farmers. Similarly, assessment of the occupation of the respondents indicated that 49.0% of them were farmers and the remaining were merchants (15.0%), teachers (8.0%), students (17.0%) and unemployed (11.0%) respectively (Table1).

The overall mean day-old chicks distributed all agro-climatic zones of Amhara Regional State was 70.06. The mean day-old chick distributed was higher in mid-altitude (71.89) than that of high-altitude (53.29) and low-altitude (69.11) areas. The mean of RIR day-old chicks (39.38) distributed were found higher than that of LOH (30.64) (Table1).The variation in the mean number of chicken distributed in the three agro-climatic zones

may be the accessibility of mid-altitude zones Government poultry Farms to mid-altitude areas than that of low-and high altitude agro-climatic zones.

b) Farmers' perception on the use and management practices of exotic chickens

In this survey, it was indicated that respondents engaged in day-old chick rearing activities have higher preference of LOH (27.0%) than that of RIR (22.0%) breeds. However, 39.0% of them have a preference of both breeds of chickens (Table 2).The reason for high preference of LOH than LOH may be associated with high egg production capacity of LOH breeds of chickens. However, the respondents indicated that RIR breeds (52.5%) are more adapted the existing environmental conditions where as 27.0% and 20.5% of the respondents indicated LOH and both breeds more adapted in their locality respectively. This finding is in line with the report of Sonayia (1995) which indicated RIR breed is a multipurpose breed, whereby farmers in the study sites and in many African and Asian countries rear them mainly for the purpose of meat and egg production and in addition they have higher prices on market when sold alive.

Table 1 : Socioeconomic status of households involved exotic chicken rearing activities in three agro-climatic zones of Amahara Regional State.

Parameter	Agro-climatic zones			
	Low altitude	Mid-altitude	High altitude	Total
Purpose of exotic chicken raising (%)				
Income	5.5	56.0	14.5	76.0
Hatching (breeding stock)	0.00	0.50	0.00	0.50
Consumption	0.50	11.0	3.00	14.5
Egg production	1.00	5.5	1.00	7.50
Others	0.00	1.00	0.50	1.50
Average age of respondents (years)	34.19	36.97	37.36	36.47
Education level (%)				
Illiterate	2.0	15.0	4.5	21.5
Reading and writing	0.5	8.5	4.5	13.5
Grade 7-12	1.0	15.5	5.0	21.5
Above grade 12	2.0	25.5	2.0	31.5
Occupation (%)				
Farmers	4.0	34.0	11.0	49.0
Merchants	1.0	10.5	3.5	15.0
Teachers	0.5	7.0	0.5	8.0
Student	3.0	13.5	0.5	17.0
Unemployed	1.0	9.0	1.0	11.0
Sex (%)				
Male	9.5	46.0	2.5	42.0
Female	4.5	28.0	9.5	58.0
Mean land size (ha)	3.00	2.74	2.68	2.75
Mean family size (no. of persons)	5.64	5.85	5.76	5.82
Mean day-old chicks distributed	69.11	71.89	53.29	70.06
Lohmann white day-old chicks distributed	21.84	34.13	17.57	30.64
Rhode Island Red day-old chicks	47.18	37.72	35.71	39.38

On the other hand, the perceptions of individuals on the reasons of adaptability were ability to survive in high and low temperature extremes (40.0%), disease resistance (33.5%), and low predation (15.5%) and productive in the adverse conditions of feed shortage (11.0%) (Table 2). The reason for high adaptive characteristics of low and high temperature may be associated with optimum temperature requirement of day-old chicks for survival and growth.

Respondents of this survey have also indicated the preconditions for involving in village-based exotic chicken development strategy were access for market and extension service (43.0%), preparation of brooders and feeding equipment (25.5%), supply of formulated chicken feed (24.0%) and chicken house construction (7.5%) (Table 2).This finding is not in line with Kama *et al.* (2000) which reported, chickens in rural areas of Angola were left without structural investments for extension services and preventive sanitary measures.

Table 2 : Farmers perception on the use of exotic chickens and management practices across the study agro-climatic zone.

Parameter	Agro-climatic zones			
	Low altitude	Mid-altitude	High altitude	Total
More preferred breed for production (%)				
Rode Island Red	1.5	14.0	6.5	22.0
Lohmann White	2.5	31.0	5.5	27.0
Rode Island Red & Lohmann white	3.0	29.0	7.0	39.0
More adapted breed in the locality (%)				
Rode Island Red	4.5	39.5	8.5	52,5
Lohmann White	1.5	20.0	5.5	27.0
Rode Island Red and Lohmann white	1.0	14.5	5.0	20.5
Criteria for adaptability (%)				
Disease resistance	1.5	25.5	6.5	33.5
Low predation	2.5	12.5	0.5	15.5
Productive in the adverse conditions of feed shortage	1.5	7.5	2.0	11.0
Survive in high and low temperature extreme	1.5	28.5	10.0	40.0
Breed of chicken growing in you locality (%)				
LOH	12.0	32.5	2.5	47.0
RIR	7.0	41.5	3.5	52.0
Both	0.0	0.0	1.0	1.0
Criteria for increased number of flocks				
Disease resistant	1.5	12.0	1.5	15.0
Fast growth	1.5	10.0	1.0	12.5
Large number of day-old distributed	14.0	44.0	4.0	62.0
Hatchability is high	2.0	8.0	0.5	10.5
Precondition for rearing exotic chickens				
House construction	0.5	6.5	0.5	7.5
Supply of formulated chicken feed	1.0	18.0	5.0	24.0
Preparation of brooders and feeding equipment	1.5	17.5	6.5	25.5
Access for market and extension service	4.0	32.0	7.0	43.0

c) Feed and feeding

In this study, 61.5 % of the chickens were found to be managed under scavanging system where chickens roam freely in the surrounding environment with grain supplementation (Table 3). This finding is lower than the reports of Halima *et al.* (2007) from Ethiopia and Mapiye and Sibanda (2005) from Zimbabwe. Both authors have reported that about 96.6% of the farmers practiced poultry rearing in the backyard system with partial supplementation of feeds to chickens. The supplementation of grains such as maize, millet and rice) (58.5%) lower than the findings of Halima *et al.* (2007) and Mapiye and Sibanda (2005), who reported that about 99.27% and 96.6% of chickens to be managed under extensive management system by scavenging freely with little or no supplementation of feeds of any kinds. Low availability of feed ingredients is one of the major constraints during feed formulation and 97.5% of the individuals faced feed shortage during rainy season. On the other hand cease of egg production (45%) and body weight loss (18%) were the main problems associated with feed shortage.

Table 3 : Feeding system of village-based exotic chicken and major constrains related to feed and feeding in Amahara Regional State, Northwest Ethiopia.

Parameter	Agro-climatic zone			Total
	High altitude	Mid-altitude	Low altitude	
Provision of supplementary feed (%)				
Yes	16.0	61.5	6.0	83.5
No	3.0	12.5	1.0	16.5
Type of chicken rearing system				

Scavenging	0.0	0.5	0.0	0.5
Scavenging + seasonal supplementation	12.5	43.5	5.5	61.5
Intensive system	6.5	30.0	1.5	38.0
Types of supplementary feeds				
Maize, millet and rice	7.0	47.0	4.5	58.5
Wheat ,oat and barley	10.5	19.5	1.5	31.5
Home left over	0.5	1.5	1.0	3.0
Bran and oil seed cakes	0.5	1.5	0.0	2.0
Constraints during feed formulation (%)				
Low availability of feed ingredients	5.0	40.5	2.5	48.0
High cost of feed ingredients	5.0	21.0	2.5	28.5
Lack of knowledge on feed formulation	9.0	12.5	2.0	23.5
Season of year faced feed shortage (%)				
Rainy	17.0	73.5	7.0	97.5
Dry	1,5	0.5	0.0	2.0
After rainy	0.5	0.0	0.0	0.5
Problems associated with feed shortage (%)				
Cease of egg production	8.5	33.0	3.5	45.0
Body weight loss	3.0	13.5	1.5	18.0
Increased in mortality rate	2.0	9.0	0.0	11.0
Decreased in hatchability	1.5	8.5	0.5	10.5
Cannibalism	4.0	10.0	1.5	15.5

d) Housing type, hygiene and health status

About 81.5% of individuals were found able to construct separate chicken houses and 60.5% of them constructed a type of chicken house which is stone made with grass roof. It was also indicated that 83% of individuals were found regularly cleaning chicken houses (Table 4). . Yongolo *et al.* (1996) also indicated that about 69 % of the farmers in Tanzania occasionally clean the night shelter for their village chickens. The majority of individuals engaged in village-based chicken production (94%) have incriminated disease as the most important cause of death in chickens. Local names of diseases of chicken that have been frequently mentioned were *Fengle* (95.60%) and *Fentata* ((2.5%). Disease symptoms described for these diseases were dullness and roughling feather (50.50%) and greenish/yellowish diarrhea (22.0%).In this survey, it was also indicated that 95.5% of them have got vaccinated day-old chickens at least once (Table 4). At present, the most important challenge at the door is the failure of early diagnosis and reporting of the different poultry diseases when they occur and this has hindered the success of control mechanisms implemented in some parts of the country (Tadelle and Jobre, 2004). Lack of integrated approaches for the control of predisposing diseases has led to the ineffectiveness of vaccination programs.

Table 4 : Housing system, hygienic and health status of village-based exotic chickens in Amhara Regional State, Northwest Ethiopia.

Parameter		Agro-climatic zone		Total
	High altitude	Middle altitude	Low altitude	
Construction of separate house (%)				
Yes	15.0	61.0	5.5	81.5
No	4.0	13.0	1.5	18.5

Type of poultry house (%)				
Stone made with grass roof	12.0	45.0	3.5	60.5
Stone made with corrugated iron	5.5	14.5	2.5	22.5
Wood made with grass roof	0.5	5.5	1.0	7.0
Wood made with corrugated roof	1.0	9.0	0.0	10.0
Regular cleaning of chicken house (%)				
Yes	15.0	62.0	6.0	83.0
No	4.0	12.0	1.0	17.0
Occurrence of chicken disease (%)				
Yes	18.5	68.5	7.0	94.0
No	0.5	5.5	0.0	6.0
Local name of the disease (%)				
Fengile(Newcastle disease)	17.0	65.5	6.0	88.5
Cannibalism (biting)	0.0	1.0	0.0	1.0
Fentata(Pox)	0.5	2.0	0.0	2.5
Unknown name	1.5	5.5	1.0	8.0
Disease of symptoms (%)				
Loss of appetite	0.5	5.0	0.5	6.0
Diarrhea	6.0	15.0	1.0	22.0
Dullness and roughling feathers	9.0	39.0	2.5	50.5
Dropping of wings and heads	0.0	1.5	1.0	2.5
Circling and paralysis	0.0	3.0	0.0	3.0
Increased respiration rate	2.0	4.0	1.0	7.0
Torticolis and noise before death	1.5	6.5	1.0	9.0
Vaccinating chickens against at least once NCD (%)				
Yes	18.0	71.5	7.0	96.5
No	1.0	2.5	0.0	3.5

e) Comparative mortality rates of chickens

The overall mortality rate of distributed exotic chickens at the age day-old in the three agro-climatic zones of Amahara regional State was 45.00% (Table 4). This finding is in line with the previous reports from both Ethiopia (Alamargot, 1987) and other countries (Farooq, 2001) which indicated the mortality of commercial chickens from egg to adult is in the range of 20% to 50%. However, this finding is lower than the reported by Mazengia and Eshetie (2008) which indicted the overall mortality rate in parent stock flocks of Andassa Poultry Farm was 29.9%.

The mortality rate of LOH breed of chicken (29.34%) was found higher than that of RIR (16.18%) and there was also statically significant difference ($p<0.05$) in mortality rates between the two breeds of chicken. The higher mortality rate in LOH breeds, compared to the RIR breeds, may be due to cannibalism in which LOH breed of chicken are known to have high tendency of cannibalism (Chauhan and Roy, 1998). This finding are in agreement with the works of others (Susan and Asamays, 1998; Chauhan and Roy,1998) which suggest that LOH breeds are more prone to cannibalism when there is deficiency of protein and increased temperature in poultry houses than other chicken breeds.

The age dependence mortality rates in 0-2 weeks, 2 weeks to 2 months and above 2 months of age were 5.67%, 7.73% and 2.79% for RIR breeds and in LOH-12.63%, 12.09%, and 4.61% respectively. There was no any statistical significance ($p>0.05$) in mortality rates among the three age groups of LOH and RIR

chicken breeds. The mortality rate declined in both breeds above 2 months of age. The pronounced age dependence of the mortality rate observed was in line with previous findings of Farooq (2001) and Mazengia and Eshetie (2008) in which the total mortality of young chicks were up to 24% and 4-5 mortality rates in older groups. This may be due to the increased resistance acquired with age increased and thus through previous exposure to infectious agents prevalent in the farm (Susan and Asamays, 1998; Chauhans and Roy, 1998, Mazengia and Eshetie, 2008).

The mortality rate of exotic chickens in low-altitude districts (52.98%) was found higher than high altitude (48.88%) and mid-altitude (43.25%) districts. The higher mortality rate of exotic chickens in low-and high-altitude areas may be associated with extreme cold and hot temperature for newly distributed day-old chicks in these areas.

The mortality rate of chickens vaccinated against NCD up to booster doses (44.58%) was lower than that of the mortality rates of chickens not vaccinated up to booster doses of NCD vaccine (56.58%) but was no any statistical significance($p>0.05$) in mortality rate was observed between the two vaccination regimens (Table 4). This finding in line with reports other countries (Spradbrow, 1995) which indicated vaccination is the most important method of Newcastle disease control which results in a quite significant increase in chick survival. The mortality rates of chickens in dry, rainy, before rainy and after rainy seasons were 47.35%, 47.51%, 44.90% and 43.66% respectively but there was no any statistical significance ($p>0.05$) in mortality rates of chickens among different seasons of study period (Table3). This finding is not in line with previous reports of Mazengia and Eshetie (2008) which reported higher mortality rate in wet season than dry season in parent stock flocks of RIR and LOH in Andassa Government Poultry Farm. On the other hand, among the major causes of chicken loss in the study agro-climatic zones, disease (47.35%) and cannibalism (45.50 %) were identified as major cause of chicken loss (Table 3).This finding is in line with the previous report of Mazengia and Eshetie (2008) which indicated that majority of chicken losses in Anadssa poultry Farm is due to diseases of many types. Similarly, Mavale (2000) from Mozambique and Bamhare (2000) from Namibia have reported that the main causes of village chicken losses identified were disease and parasite, predators, theft and cold weather.

Table 5 : Comparative mortality rates and associated risk factors for mortality of RIR and LOH chicken breeds in Amhara regional state, northwest Ethiopia.

Risk factors	RIR				LOH				Overall
	0-2 wk	2wk-2mths	>2moths	Sub total	0-2 wk	2wk-2mth	>2moths	Sub total	
Agro-climatic zone									
High altitude	8.02	7.98	3.61	12.89	13.78	13.10	6.51	33.40	48.88[a]
Mid-altitude	6.13	7.74	2.42	16.29	11.89	11.33	4.02	27.25	43.25[a]
Low altitude	1.74	8.26	5.05	19.71	17.32	17.43	5.69	40.45	52.98[a]
Vaccination against NCD up to booster doses									
Yes	5.67	7.96	2.88	16.51	5.67	11.63	4.67	28.61	44.58[b]
No	5.71	1.43	0.00	7.14	5.71	25.01	2.91	49.44	56.58[b]
Season of mortality									
Before rainy	5.83	5.38	2.41	13.63	13.74	9.79	5.99	29.52	42.81[c]
Rainy	5.68	6.97	4.18	16.83	13.87	14.34	2.37	30.59	47.51[c]
After rainy	6.27	10.11	2.44	18.83	9.27	11.34	5.45	26.07	44.90[c]
Dry	4.52	8.97	1.18	14.68	13.79	12.40	5.52	31.72	43.66[c]

Causes of chicken loss									
Disease	6.02	7.94	3.27	17.23	12.30	12.83	4.88	30.02	47.35[d]
Cannibalism	2.71	5.14	0.00	7.86	21.11	17.39	6.28	44.79	45.50 [d]
Suffocation	5.58	9.84	2.51	17.93	12.25	8.09	2.75	23.09	40.00 [d]
Predation	5.37	5.56	1.55	12.48	9.46	7.97	3.78	21.21	33.99 [d]
Overall mortality	5.67	7.73	2.79	16.18[e]	12.63	12.09	4.61	29.34[e]	45.00

Figures with similar superscripts indicated non-significant differences.

IV. Summary

The present study discloses the most important aspects of village-based exotic chicken production in three agro-climatic zones of Amahara Regional State, Northwest Ethiopia. In exotic chickens, more emphasis is placed on its genetic potential for higher production, rather than on its acclimatization to odd environments or ability to resist disease. Better care of the flock starting from the age of hatching, maintenance of healthy environment, protection of birds from extreme climatic conditions, proper cleaning and disinfection of houses, equipment and workers, and appropriate floor and house construction are the key factors in preventing higher mortality.

The farmers engaged in village-based exotic chicken development strategy manage chickens under backyard low input system in all three agro-climatic zones. Farmers raising improved exotic chickens have been applying various husbandry practices and managenmt while rearing these chickens. However, low supply of inputs for like formulated feed, veterinary drugs and vaccines are the major bottle-necks for production of village-based exotic chickens. Moreover, higher mortality of chicken is seriously affecting the survival of these chicken breeds and contribution of chickens to the households.

The present observations indicated that exotic chicken distributed to farmers in different agro-climatic zones are exposed for to various risk factors that predispose for high chicken losses. Furthermore, the existing improper management such as improper nutrition, substandard hygienic standard, lack of appropriate disease prevention and control program are major constraints for exotic-chicken production and these contributed for high mortality rates chickens.

Hence, an important measure to improve the situation is the Bureau of Agriculture should fill the gaps with respect of inputs like extension services and packages for better implementation of poultry development strategy. Further in-depth researches on the heath status and management schemes of chickens are needed.

V. Acknowledgement

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