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Research Article

The Factors Affecting Poultry Industry in Northern Province of Rwanda, A Case Study of Rulindo District, East Africa

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ABSTRACT

The aim of this research was to analyze the factors affecting poultry industry in Rulindo district, Northern Province of Rwanda, characterization the poultry farmers in Rulindo district, identifying the type of chicken raised there and to identify the constraints faced by Rulindo district farmers in poultry production. Descriptive study design was used to collect a structured questionnaire to the poultry farmers where 60 poultry farmers were taken as sample representing other farmers in this study area. The data revealed in this study showed that few people were keeping exotic breeds (11.7%), 15% are those who mixed up local breeds and exotic breeds, for those who raised cross breed are found in the percentage of 23.3% among the respondents while the majority of farmer poultry who raised local breeds are the half of the respondents (50%). This was due to the reason that local breeds do not require much care, and they were thought to be easy to herd although they did not have high productivity. The data revealed in this study showed that the main type was the layer hen with the percentage of 85 of the respondents' respondents, followed by the female starting from 1 to 8 weeks with the rank equal to 70% while the female grown from 8 to 20 weeks and cocks occupied the lower proportion of mean rank equivalent to 65% and 60% respectively. Critical constraints of the factors affecting poultry production in the study area were partially due to the higher cost of concentrate, unavailability of breed chickens and, lack of proper health care. It has been concluded that the chicken production systems in the study area is the intensive system based on the exotic breed of chickens and market follow a specific channel.

Key words: Poultry Farmers, Poultry production, Poultry productivity, Chicken

INTRODUCTION

Rwanda is a small land-locked country with a hilly terrain, land area of 26,338 km2 with 10.7 million of population; and the majority, (87 per cent) live in rural areas (NISR, 2012). The annual demographic growth rate is 2.8 per cent, and according to the vision 2020 plan, the population is expected to increase to about 12 million by 2015. Population density is the highest in Africa, with more than 370 persons/km², and the physiological density (people per area of arable land) is in excess of 500 people per km2 (UNDP and UNEP, 2006).

The country is predominantly agricultural with few options that would reduce the pressure on land resources. With Only 52 per cent of the total surface area of the country, representing approximately 1,385,000 hectares of arable land (ROR, 2004), agriculture contributes 47 per cent of the GNP and accounts for 71 per cent of the country's export revenue. The agriculture sector which currently contributes significantly to national Gross Domestic Product (32.6 per cent) is envisaged to contribute 33 per cent to GDP by 2020. Agriculture is not only the main source of income for 87 per cent of the population (MINAGRI, 2006) but also provides employment for 86.3 per cent of the country's working population (NISR, 2008). Unfortunately, the high population density in fragile ecosystems exposes the country's natural resources to degradation (REMA, 2009).

Rwandan economy is essentially based on agriculture which contributes nearly 46% of GDP and occupies 90% of active population. The livestock sector contributes very little on GDP, about 8.8% only. The major animals raised in Rwanda are cows (1 006 572), goats (1.263, 962), sheep (686,837), pigs (326,652), chickens (2,841,399) and rabbits (643,927) (MINAGRI, 2004).

National Hatchery in Rubirizi produces and sells one day chicks that are sold to modern farmers as layers and meat chickens to provide meat and eggs to the urban

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population and institutions. Kigali City alone has 14% of the poultry farming in the country. The main objective of raising chickens is to raise incomes. The chickens and eggs are mainly sold in the urban centres. The owners consume only 5.6% of their production, according to a MINAGRI survey conducted in season 2006B. Poultry plays an important role (2,328,610 chickens) in livelihoods of the population in Rwanda.

In spite of the importance of poultry to population well-being, it also contributes to the growth of national economy. View the great importance of poultry field in developing countries this domain is mainly practiced in poor conditions which causes low productivity. The majority of birds are chickens. The breeding of other species such as turkeys, ducks, pigeons, gooses, guinea-fowls etc is not developed. The sector is also affected by a number of avian diseases such as Newcastle disease, avian typhoid, coccidiosis, Gumboro sickness. Due to these diseases; there are lots of losses of chickens during their production cycle.

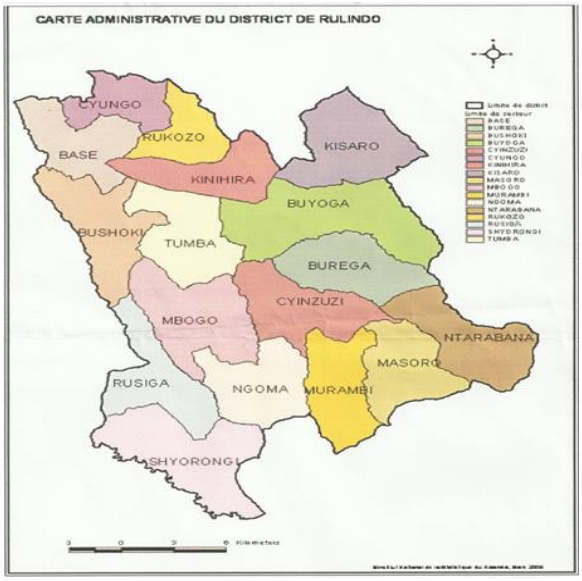
Although its high production there are factors which affect poultry industry are the major challenges of low poultry production; famers are constrained by the unavailability of sufficient feeding, good selected chickens and the health care of poultry industry. Hence this study aims at determining the factors which affected the poultry industry in the Northern Province of Rwanda.

MATERIALS AND METHODS

Description of the study area

Rulindo district is the one of thirty (30) districts located in the Northern Province of Rwanda, it is located the central plateau of Rwanda. The average altitude is about 1200m whereas the culminating point of mountain is with 1200m (Rulindo district, 2007).

The animals found in the area are: cows, pets ,goats, sheep ,rabbits, dogs ,pigs .In addition to domestic birds, one funds wild birds such as the corbels, the partridges, the shallows, the sparrows, the owls, the bald people mouses as well as large variety of raptors(Rulindo District,2009). Economic activities are mainly agriculture and livestock. The big private enterprise is URWIBUTSO enterprise of SINA GERARD and COTRAF.



Research design

Muaz, Jalil M. 2013, defined a research design as the set of methods and procedures used in collecting and analyzing measures of the variables specified in the research problem research. The design of a study defines the study type (descriptive, correlation, semi-experimental, experimental, review, meta-analytic). Therefore, descriptive research design was used in this research design type. A descriptive research is not only for the quantitative studies but instead it can utilize elements of both the quantitative and qualitative studies.
The study was based on a mix of quantitative and qualitative approaches and focuses on poultry farmers in Rulindo district to ensure that the information obtained is relevant to the research problem and it was collected through objective and economical procedures.

Sample size calculation

The target population of the study was the smallholder growers of poultry industry in Rulindo district. The sample size of farmers to be interviewed was determined using a formula provided by Dagnel (2006). The sample size will be calculated using the following formula:

$$n = \frac{Z^2PqN}{d^2(N-1) + Z^2Pq}$$

Where:
n: Sample size
N: Size of the population (Number of farmers for five sectors)
Z: coefficient of normal distribution
q: Probability of failure
d: Margin of error
p: Probability of success

We assumed a margin error of ±10% then the confidence level of 90%, our probability of success is p=0.5, failure probability is q=0.5, as $Z_{0.25} = 1.65$.

For the case of Rulindo district the total number of farmers having above 100 chickens is 980 farmers. Therefore, the sample size is calculated as follow:

$$N = \frac{Z^2 \text{ x } P \text{ x } q \text{ x } N}{d^2(N-1) + Z^2Pq} = \frac{(1.65^2)(0.5)^2 980}{(0.1)^2(980-1) + (1.65^2)0.5} = 60 \text{ farmers}$$

The sample size was calculated at the sector level, the sample size (number of farmers to be interviewed) was determined using the formula below:

$$ni = \frac{Ni \text{ x } n}{N}$$

Where:
ni: The sample size proportion to be determined
Ni: The population proportion in the stratum S
n: The sample size
N: Total population

So, the proportion of farmers in five sample sectors namely Bushoki, Mbogo, Shyorongi, Rusiga and Tumba is presented in the table below as it is calculated with the help of the above formula.

Table 1: Determination of the representative sample for five Sectors of Rulindo District.

Sector's name	Farmers rearing chickens	Sample taken
Bushoki	201	13
Mbogo	185	11
Shyorongi	198	12
Tumba	200	12
Rusiga	196	12
Total	980	60

Source: Researcher, 2017.

Data collection and analysis

Semi-structured questionnaires were used to collect data through the farmers of poultry farmers in Rulindo district which represent the sample of the study. The Sixty (60) questionnaires were distributed through the famers of poultry and also the representative farmers were interviewed as the primary data methods whilst the secondary data also were used in order to obtain relevant information about the subject matter. After data collection, processing of the data were preceded by coding, editing and tabulating in the meaningful ward to ensure consistency, uniformity and accuracy. The data were analyzed the descriptive numerical data by using MS Excel and SPSS (16.0) while the qualitative by content analysis.

RESULTS AND DISCUSSION

This section is divided in three subsections. The first subsection describes the demographic characteristics of farming households, Main findings of the study basing on the aim of the study and discussing the results.

Table 2: Demographic characteristics of the respondents.

Characteristics of the respondents	Categories	Frequency	Percentage (%)
Gender	Males	43	71.7
	Females	17	28.3
Age	20-30 years	13	21.7
	31-40 years	25	41.6
	41-50years	22	36.7
Marital status	Single	3	5.0
	Married	50	83.3
	Widow(er)	7	11.7
Education level	Illiterates	5	8.3
	Primary	15	25
	Secondary	38	63.4
	University	2	3.3

Source: Primary data (2017).

Demographic characteristics of the respondents

The data revealed in table 2 showed how the farmers participated in poultry farming in Rulindo industry, it has been indicated that the males (71.7%) are higher than females (28.3%). Concerning to marital status, 83.3% was married while the less proportion of respondents were single (5%) and widows (11.7%). The majority of respondents found in the range of age 31-40 years (41.6%), from 41 up to 50 years the respondents represented 36.7 years whilst those who found in the young age are found from 20-3 years old. These findings show that indigenous chicken farming is practiced by the peoples who have a strong labor force. This also could be explained by the fact that many people who are in this age group have many things to take care of like paying school fees for their children, getting them food, and clothing and require them to have reasonable income. Also, people of age between 31-50 years are development oriented and they have to prepare for the future when they will not be able to work. It has been reported a positive but insignificant value for the effect of marital status on efficiency on of small-scale poultry egg production in Nigeria (Ashagidigbi & Adesiyan & Suleiman, 2011).

The study also showed that the poultry farmers who were married were higher (83.3%) than single (55) and widowers (11.7%). The majority of being married for the poultry farmers are higher due to seriousness of responsibilities to being charged on their families which leads to raising economy of their households 'members.

From the table above, it has revealed that 63.4% of household heads interviewed has been studied secondary level, followed by those who completed primary education (25%) while the least proportion of respondents are found to those who have not studied (illiterates, 8.3%) and graduated in University/Institutes (3.3%). It has also been revealed that, educational level of farmers had positive and significant relationship with average production which could be due to sound knowledge and efficient management required of poultry farmers to ensure profit-ability in poultry business (Adeabayo & Adeyola, 2005).

Table 3: Characterization of poultry famers industry in Rulindo District.

Chicken types	Frequency	Percentage
Local breeds	30	50
Exotic breeds	7	11.7
Cross breed	14	23.3
Local breeds and exotic breeds	9	15
Total	60	100

Source: Primary data, 2017.

Characterization the factors affecting poultry industry in Rulindo district

The data revealed in table 3 showed that few people were keeping exotic breeds (11.7%),15% are those who mixed up local breeds and exotic breeds, for those who raised cross breed are found in the percentage of 23.3% among the respondents while the majority of farmer poultry who raised local breeds are the half of the respondents (50%). This was due to the reason that local breeds do not require much care, and they were thought to be easy to herd although they did not have high productivity. In the very few cases in which the intensive management system was practiced, it is the small-scale option that is adopted. The choice of system is largely determined by the availability of resources and inputs, i.e. housing, cages, feed, drugs and time/attention (Guèye, 2002a). The level of inputs also depends on the keeper's or households' socio-economic circumstances. The most part of the national poultry is mostly constituted by local breed animals, whether for chickens, ducks or guinea fowl. However, for chickens, though they are of local breed, they are far from being homogeneous. They present a high variability from one farm to another and phenotypic differences may even be observed within the same farm. It should also recognize that even if Rwanda has less than 3 million of chickens and domestic poultry

(RARDA, 2008); these types of livestock are essentially found among small farmers and are economically valuable.

Regular clients of live bird of the poultry industry of Rulindo District

The results obtained in figure 1 shows that 65.0% of poultry farmers interviewed told that the live birds (chickens) productions was sold to the consumers coming from out the country due to its habits of eating them, 26.7% of them said that they have a few number of clients in the study area who are collecting the live birds (chickens) for transporting to the sellers on the market , this is due to the limited market that requires the fewest quantity of live birds while the lowest number of buyers of its live birds (chickens) were the neighbors because they need small quantity of live birds (chickens) used for their daily diets at home.

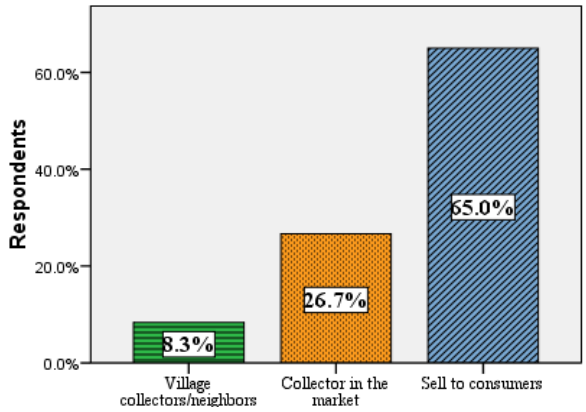


Fig. 1: Buyer of the live birds' productions of the poultry industry of Rulindo District; **Sourc**e: Primary Data, 2017

Average number of eggs per day in the poultry industry of Rulindo District

As shown in table 4, we found that 56.6% of poultry farmers told that the average eggs productions was greater than 500 eggs per days when it is well managed, 31.7% of them got the productions ranged between 300-500 eggs while the lowest eggs productions obtained per day was ranged between 100-300 eggs that is due to the irregularity of giving the food and lack of the products coming from out of country used to make the food concentrates of chicken and bad mixture of different kind products imported in the country for making the concentrates food of those chicken.

Main types of chicken located in the poultry industry of Rulindo District

The data revealed in table 5 shows the main types of chicken available in the poultry industry was the layer hen with the percentage of 85 of the respondents' respondents, followed by the female starting from 1 to 8 weeks with the rank equal to 70% while the female grown from 8 to 20 weeks and cocks occupied the lower proportion of mean rank equivalent to 65% and 60% respectively.

Based on the data found from the above table it means that the farmers of chicken of Rulindo District are getting the highest production of eggs due to the large numbers of hen breed in the study area and it is sold to the market in order to get the highest income and starter female of 1 to 8 weeks was necessary for replacing the oldest layer hen when the eggs production was reduced.

The data revealed in figure 2 shows different challenges encountered in poultry industry of Rulindo District where high cost of feed and feed ingredients come on the first place with the rate equal to 71% because it required the cost or money for buying the concentrates from out of the country, followed by unavailability of chickens and the veterinary health care of drugs at the rate equal to 20 and 7% respectively and finally the last challenges faced by the poultry farmers of Rulindo District was inefficient land at the rate of 2% because they possess their owner land for constructing the poultry house without using the money to purchase the land.

Table 4: Production of eggs per day produced in the poultry industry of Rulindo District.

Average number of eggs per day	Frequency	Percentage
100-300 eggs	7	11.7
300-500 eggs	19	31.7
<500 eggs	34	56.6
Total	60	100

Source: Primary data, 2017.

Table 5: Main types of chicken located in the poultry industry of Rulindo District.

Chicken types	Frequency	Percentage
Female start from 1 to 8 weeks	42	70
Female grow from 8 to 20 weeks	39	65
Layer hen	51	85
Cock	36	60

Source: Primary data, 2017.

Insufficient Food resources are a very important problem, as poultry are in competition with human being for grains. This makes feed expensive and not everyone is in a position to provide adequate feed to his flock. Thus as long as long as adequate supplies of grain do not exist within a country, intensive forms of poultry production cannot be practiced. So Feed cost represents 70 percent of the total cost of broiler production (British Poultry Science 2006), in broilers production feed efficiency may be improved correlated response to selection for decreased age of market weight. Increasing body weight at a given age increased both maintenance cost and fat yield at a given age, but this did not hold to a given body weight (Pym,1990). Feeding process then is a very important factor upon which economics of production depends. Feed has its impact not only upon the quantity of poultry production but also upon the quality of the bird. The proper feeding process is that which use a less quantity of feed at a cheap price to give the highest production quantity at a best quality, in other words the economic feeding process is that which gives the highest profitability.

Major poultry diseases found in the poultry industry of Rulindo District

The results obtained in figure 3 shows that the main disease found in their poultry industry was verminosis at the level equal to 71.7% due to the non treat water and food contaminant during the preparation and storage of concentrates while the disease of coccidiosis on the chickens were appeared at the percentage equal to 28.3 because of none controlled of virus in the poultry house.

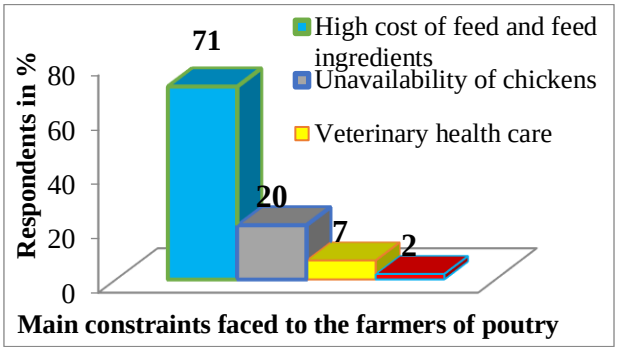


Fig. 2: Main constraints faced the poultry industry of Rulindo District. **Source**: Primary Data,2017

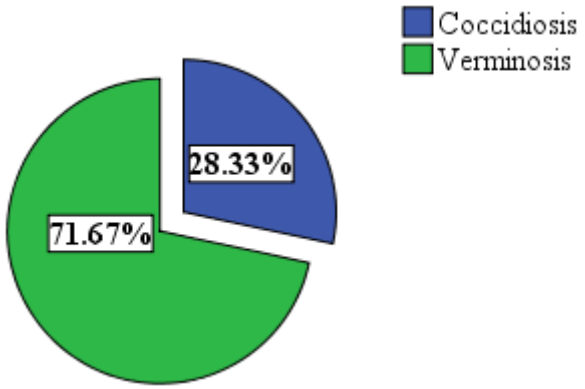


Fig. 3: Diseases found in the poultry industry of Rulindo District.

Conclusion and Recommendations

On account of the interpretation of collected and analyzed data during the course of this study, the researcher came up with the following conclusions. Poultry production in Rwanda is a chain of interrelated economic activities undertaken within the rural and urban area. These activities can range from the raising of poultry to the buying and selling of poultry and poultry products. Understanding the situation of poultry production, and marketing chain, and the dynamics within the system will be crucial to develop strategies and improve the system.

Thus, 60 households owning at least 100 birds and 5 veterinarians of sectors (livestock officers) were interviewed to assess the factors affecting poultry industry in Northern Province case study Rulindo Districts. All household members actively participate in poultry production activities using the improved chicken breeds and skill in poultry management to generate income and/or to develop their District.

The chicken production systems in the study area is the intensive system based on the exotic chickens with concentrate feeding and the separate house for chicken also with regular clients of eggs live chicken in the stage of culling. The hens start to lay at 18 weeks old, with the laying point of 80%. The findings on diseases frequency show that the verminosis come on the first place and coccidiosis also take a significant importance. The marketing systems of eggs and live chickens follow a specific way. The main customers are coming from Rubavu and Goma. The prices also are stable because of a big number of farmers available in Rulindo District. Through this survey, it has been also found that the concentrate feeds are given at all categories of poultry and the water.

Recommendations

According to the findings of this study the following recommendation should be taken into consideration:

- Formation of both production and marketing groups and establishing a stable marketing chain is important so that the farmers could obtain premium price of the markets.
- There is a need to link production with marketing focusing on market-oriented production of chickens and the extension intervention should address both production (productivity) and marketing.
- Training for both farmer and extension staffs focusing on disease control, improved housing, feeding and market entrepreneurship.

Thus, for rural family poultry keepers, it is more appropriate to maintain and improve local birds to meet the increasing demand of conservative meat consumers.

Government and Non-Governmental Organizations should support the poultry farmers in providing and train them on appropriate feed for chicken in order to increase the productivity.

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