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A Survey on Premature Death in Early Chicks and the Assessment of the Responsible determinants: A Case Study in the Afigya Sekyere South District of the Ashanti Region of Ghana

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***Abstract*— *Objective**: An investigation was carried out in the Afigya-Sekyere South District to determine the rate of early chick mortality in the first four weeks and the factors that may have caused this.*
***Methods**: Structured questionnaires and personal observations were used to obtain information from twenty-eight (28) farm managers.*
***Results:** The study revealed that mortality was higher in the first and second week with an average mean mortality of 11.39 and 6.43 respectively. According to the farm managers, all the mortality reported was a result of disease infection. Statistical analysis also depicted that the source of the day-old chicks (local or imported), experience and educational level of the managers and the type of breed were the factors that affected disease occurrence on the farm which consequently caused early chick mortality.*
***Conclusion:** Diseases such as Gumboro and Coccidiosis were reported with a percentage of 35.7% and 39.3% respectively and these caused a mortality percentage of 33.86% and 36.99%. The studies further revealed that mortality increased with a decrease in the inefficiency of the managers. Statistical analysis also showed that local chicks were associated with higher mortality recording 0.80% as compared to 0.31% of the imported chicks in the first week. Mortality was also associated with the type of breed, with the Bovane black recording the highest percentage in all the four weeks recording 2.34% and 0.92% in the first and second week respectively.*
Keywords*— *Early, Mortality, Diseases, Day-old chick, infection.

I. INTRODUCTION

Chick mortality during the early weeks poses a great economic challenge to the poultry farmer and is a matter of great concern. Early chick mortality, in general, can be attributed to a number of factors of which some is traced to the hatchery where the chicks are hatched before they are transported to their designated farms. Diseases play a dominant cause of mortality in the early chick's life, and mostly these diseases are associated with the source of the day-old chicks. So it is always advisable to tackle the source of where the chicks are coming from since it is going to determine whether the day-old chicks are quality enough to minimize mortality.

The yolk sometimes becomes infected with bacteria during the hatching process which possibly results in mortality in day-old chicks. Mortality in the early chicks' can be attributed to a number of factors of which yolk sac infection causes a greater percentage of 31.45% as reported by Ghodasara et al (1992) and also causative agents are known to influence infection in chicks are mainly isolates of staphylococci and Escherichia coli as also reported by Bains, 1979. Some diseases such as salmonellosis, aspergillosis, and colibacillosis are known to increase mortality in the initial few weeks of the life of chicks (Shane, 1999).

Records of mortality during the first seven days of brooding have been used to assess the quality of chicks in the broiler industry according to Chou *et al*., (2004) and North (1984) and Kitsopanidis and Manos (1991) also reported a reduction in net profitability with increased mortality levels in chicks. Apart from diseases, mortality in day-old chicks can also be associated with poor management, inadequate brooding temperatures and heat stress in hot climates (Chou *et al*., 2004).

OBJECTIVES

The objectives of this study were to;

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1. To consider factors that may cause chick mortality from the day- old through the first four weeks.
2. To consider the management practices to adapt to minimize mortality on the farms.

II. MATERIALS AND METHODS

Sample area for the survey

The study area chosen for the collection of data was the Afiya Sekyere South district in the Ashanti region of Ghana **(Fig 13)** where the majority of the poultry farmers and poultry businesses are located. Also according to the (**Ghana statistical service 2010),** Chicken rearing dominates with 67,995 birds in the district and 2,697 keepers followed by goats with 19,756 animals and 1,826 keepers and the keepers of Sheep are 1108, that of are duck 150, that of guinea fowl is 133, and cattle 108 with 13,868 sheep, 2,093 ducks, 1,436 guinea fowls, and 1,198 cattle respectively **(Table 5).**

Type	Total	Number of keepers	Average animals per keeper
All livestock	110,231	6,263	18
Beehives	3	2	2
Cattle	1,198	108	11
Chicken	67,995	2,697	25
Dove	997	17	59
Duck	2,093	150	14
Goat	17,756	1,826	11
Grass-cutter	211	19	11
Guinea fowl	1,436	133	11
Ostrich	108	5	22
Pig	909	55	17
Rabbit	321	29	11
Sheep	13,868	1,108	13
Silk worm	262	17	15
Snail	27	3	9
Turkey	486	55	9
Other	331	36	9
Fish farming	230	3	77
Inland farming	0	0	0
Marine farming	0	0	0
Other	331	36	9
Marine fishing	0	0	0

Source: Ghana Statistical Service, 2010 Population and Housing Census

Data collection

Data were collected with well-structured questionnaires. The questionnaires incorporated both closed and open-ended questions and were designed to obtain data to meet the objectives of the study. A total of twenty-eight (28) poultry managers/owners were considered and the technique involved in the collection of data was through direct interrogation with the farm managers and where possible a review of the farmers' farm records. Observations were used to verify the data collected.

Data analysis

Parameters or questions included in the survey were the sex of the respondents (farmers), experienced group of the farmers in the poultry industry, the level of education of the farmers, source of the day-old chicks, breed of the day-old chicks, percentage distribution of the number of chicks by each farmer, source of feed for day-old chicks, factors responsible for mortality in the first four weeks, diseases causing early chick mortality and management practices to minimize mortality.

Statistical Package for Social Sciences (SPSS, 2007) version 16 was used to analyze all the data solicited from the farms and the results were presented in tables and charts.

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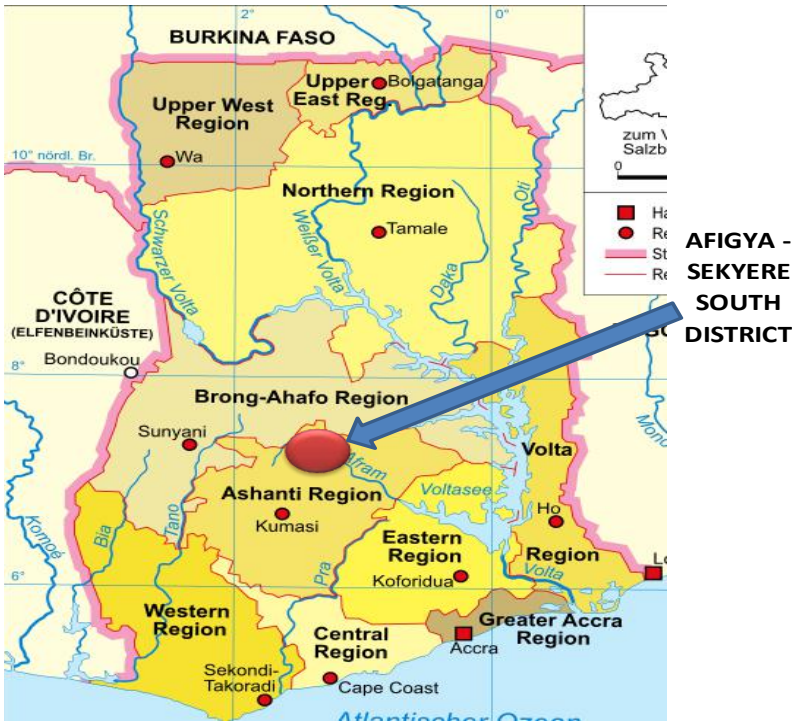

Fig.13: A map of Ghana depicting the various regions. Note the study site is shown with a blue arrow

III. RESULTS AND DISCUSSIONS

DEMOGRAPHIC/BACKGROUND OF RESPONDENTS

Gender of respondents and their corresponding percentage of the bird population

During the survey, it was revealed that out of the 28 respondents, only 3 were females representing 11% of the entire managers, and this indicated how males dominated the poultry industry in the Afigya-Sekyere south district.

From the survey, it was also revealed that the total number of birds by the 3 female farmers' was

26% while that of the male poultry farmer's was 74% which indicated that the male farmers had the largest number of birds.

LEVEL OF EDUCATION OF RESPONDENTS AND THEIR CORRESPONDING NUMBER OF BIRDS

All the respondents had some form of formal education with the majority attaining SHS/ A level / O level representing 57.14% of the entire farmer's and also with the largest number of birds (80.63%). This was followed by those in the middle/ JSS group which represented 25% of the entire farmer's with 8.36% of the population of the birds (**Fig 2**). The managers in the tertiary education group were 14.29% of the respondents and these had 10.19% number of birds. Finally, those in primary school group were 3.57% and had the least number of birds, 0.82%.

Personal observation depicted that the respondents in the SHS/ A level / O level group were managers of their own small-scale farms. However, the number of respondents who completed tertiary institutions was very low and these were employed to manage medium to large scale farms with a high number of birds. These stands to suggest that people with tertiary education will most probably like to sit in offices or manage farms owned by others whiles those with relatively low-level education are into the poultry business with a mostly small number of birds. Their level of education or curriculum vitae may not give them the opportunity to be managers of other people's farms or get the position of their choice in a poultry firm hence they enter into the poultry business with their own available resources.

MORTALITY REPORTED AND POSSIBLE CAUSES OF THIS MORTALITY

Mortality of the first four weeks

Mortality in Afigya-Sekyere District as can be inferred from (**Fig 3)** was highest in the first week and decreased throughout to the fourth week. The percentage distribution was 51.95% for the first week, 29.32%, 13.19% and 5.54% for the second, third and fourth week respectively. This showed that a farmer is more likely to record high mortality in the early days of the bird's life than the later days. Amin *et al*. (1995) and Singh *et al*. (1994) reported that higher

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mortalities of 26.23% were recorded during brooding (1-2 weeks) and 24.56% during growing (3-4 weeks).

DISEASES CAUSING THE EARLY CHICK MORTALITY

As can be seen from (**Table 1)**, coccidiosis was reported to have caused the highest mortality in the farms of the respondents throughout the week 1 to week 4. It recorded mortality percentages of 36.99%, 46.66%, 51.85% and 47.06% for week 1, 2, 3 and 4 respectively. This indicates that coccidiosis is the major disease that affected the chicks in the district and could occur at any point within the first four weeks in the life of the chicks. This supports what Lillehoj *et al*., 2004 found that avian coccidiosis is the major parasitic disease of poultry causing mortality, inefficient feed utilization, the impaired growth rate in broilers chicks, and reduced production in layer chicks. Boado *et al*. (1991) also reported that coccidiosis could occur at any stage of the chick's life and during any season of the year; however, it was found to be more prevalent in the summer season. From personal observation, it was seen that some farms had poor litter management practices. For example, wet bedding/litter was observed on some of the farms visited and the outside environment of most of the farms was unclean and lacked footpath at the entrance. All these could directly help to transfer diseases to the farm. However, wet litter can harbor and serve as a favorable medium or environment for coccidian growth *(Eimeria species)*. Also to buttress this point and also to support Hofstad et al (1978) findings, it can be said that a lot of conditions favors or triggers the sporulation of the oocyst such as a conducive house temperature in the range of 20-28^{o}C, wet bedding material and most importantly an unclean environment. Also, contaminated feed and water can also lead to coccidian infection causing mortality in day-old chicks.

This was followed by Gumboro which recorded its highest mortality in week 1. Mortalities caused by gumboro decreased with increased age of the chicks. From (**Table 1)** above, 33.86% of day-old chicks died in week 1 from Gumboro infection but the mortality minimized to 20.59% as the bird gets to the fourth week. Gumboro disease could cause massive damage in the early stage in the chick's life ranging from 10-75% and 80-100% according to the findings by Sah *et al*. (1995) and Chowdhury et al. (1996) respectively. It was also reported that birds of all ages were susceptible to gumboro but losses were greater (20-76%) between the ages of 1-12 weeks than at any other stage of life (Rao *et al*., 1990; Philip and Moitra, 1993; Prabhakaran *et al*., 1997). As stated above under coccidiosis, gumboro is also a disease that is prevalent in the filthy and unhygienic environment. They are therefore mostly referred to as the AIDS of chicks and breaks down the immune system of the birds creating the platform for the incidence of coccidiosis, and most factors that can cause coccidiosis. The vulnerability and the relative incidence of gumboro in chicks as reported by (Anjum et al., 1993; Farooq et al 2000) can be traced probably to an unhygienic environment, wrong way of vaccination and subjecting factors like coinciding infections with E.coli, Coccidiosis and other bacterial infections according to the findings by (Singh *et al*., 1994).

Therefore, care must be taken to administer vaccines at stipulated times and successfully overcoming predisposing factors working as contusive media for the outbreak of gumboro. Massive damage or losses as a result of gumboro diseases in chicken can be averted by following the standard hygienic plan and also averting simultaneous infections like coccidiosis and E. coli.

Chronic Respiratory Disease (CRD) caused high mortality after gumboro. This disease decreased with the age of the chicks. About 13.48% chicks died from this disease in week 1, 11.11%, 8.64% and 5.88 also died in week 2, 3 and 4 respectively. The early stage of the chick's life can become vulnerable to the disease at any time. This supports the findings by Javed *et al*. (1991) who explicitly said that, the chickens life is not immune to the disease and the disease can attack at any stage in the chicken's life in respective of the season however during the winter season, the rate or incidence of the disease is very high (66.6%) and also found to be more rife in 7days to 5 weeks with a percentage score of 35.7%. The chick becomes more fragile during the first few weeks of its life because of its poor resistance and poor growth. In like manner, the high rate of Infectious Bursal disease could also be triggered more during the winter condition because, at that time, the weather becomes uncomfortable and unfriendly to the chick. Thus, the high incidence of this incidence can be averted through the continual upkeep of a good environment and the sheltering of the bird from the extremely harsh weather. It is important to note that as coccidiosis was increasing CRD was decreasing. The reason is that coccidiosis increases in the summer seasons while the CRD increases in the winter seasons, therefore these two are inversely related in their occurrence.

Bacterial and yolk sac infections followed the CRD. Whiles the bacterial infection decreased with the age of the chicks the yolk sac infection increases with the age of the chicks. The Newcastle caused the least mortality in the chicks.

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EXPERIENCE GROUP OF RESPONDENTS IN THE POULTRY INDUSTRY

From the survey, as can be seen from (**Fig 4**), it was revealed that 89.3% of the managers were 1-20 years experienced in the poultry business and the percentage of birds they had was 67.13%. This was followed by those who were 20-40 years' experience in the business and they had 29.58% of the total birds. Those with above 40 years were the least with the minimum number of birds (3.29).

The above results depicted that more of the managers were in the 1-20 years' experience range and they also had the largest number of birds than the other experience groups.

EXPERIENCE AND EDUCATION AS FACTORS THAT MAY HAVE INFLUENCED MORTALITY

Experience and the level of education of managers are some of the factors that influenced management practices. However, it is known from the literature that disease occurrence, and for that matter, mortality is associated with management, it, therefore, implies that experience and education can influence disease occurrence and mortality on poultry farms. According to Chou *et al*., (2004) mortality in day-old chicks can also be associated with poor management, inadequate brooding temperatures and heat stress in hot climates.

Sometimes, experience in the poultry business can be synonymous with the education level of the manager. For example, one manager with 20 years' experience in poultry and Junior High School education may be as efficient as another manager with tertiary education in poultry management but only 1-year experience in the field. Sometimes too, some managers with a high level of education are very inefficient in spite of their educational background. It is therefore imperative to find how managers with the same experience in the poultry business but different level of education performed to reduce disease incidence and mortality on their farms or it is necessary to find how managers with the same level of education but different experience in the poultry business performed to reduce disease incidence on their farm.

It can clearly be seen from (**Table 2)** above that for a specific experience group mortality decreased with increased level of education. For example in 1-20 years experienced group, mortality was 2% for those with primary education, which decreased to 1.75% for those with Mid/Junior High School (JHS) Education, 0.33% of mortality for Senior High School(SHS) or A level and finally decreased to 0.23% for those with tertiary education. These results showed that mortality in day-old chicks is associated with the level of education of the respondents. In other words, the level of education of a manager is a factor that can affect the incidence of mortality on his/her farm. The reason is that management will be different for managers with different educational background and according to Chou *et al*. (2004) mortality in day-old chicks can be associated with poor management and inadequate brooding temperatures. That means a person with a low educational background is more likely to poorly manage his farm than a person with a high level of education.

BREEDS OF DAY-OLD CHICKS USED BY RESPONDENTS

It was observed from the survey that the breed commonly raised by the managers/owners was the Lohmann brown chicks representing 76.5% of the bird population and the percentage of managers raising this breed was 67.9%. The reason according to the managers/owners is because the Lohmann brown breed is well adapted to harsh and tropical conditions and also they have high productivity and produced relatively large egg sizes in these harsh environmental conditions. This is also in agreement with findings by Hendrix, (2005) that the Lohmann brown breeds are able to lay for longer periods than the other exotic breeds.

From **Table 3** it can be seen that in week 1, the Bovane black, recorded the highest mortality (2.34%) followed by Isa brown (0.75%), Arbor acres (0.75%), Lohmann brown (0.43%) and White Cobb (0.10%). This pattern repeated itself for week 2, 3 and 4.

The above results showed that mortality in day-old chicks is associated with the breed of the chicks. It can be inferred from the results above that a manager rearing Bovane black chicks is more likely to record high mortality than a manager raising Lohmann brown chicks. This is because different breeds have different genetic make-up and show different responses to different conditions like diseases, hot temperatures. Therefore the breed which has been genetically engineered to withstand diseases and harsh environmental conditions will record low mortality.

SOURCE OF DAY-OLD CHICKS BY THE RESPONDENTS

About 64.3% of the managers/owners indicated that they took their day-old chicks from the local hatcheries in Kumasi and Accra namely; Sydal farm, Akate, Asamoah Yamoah, Mfum Afariwaa, Darko and Topmann farms. The total number of birds from these local hatcheries was 27,360 representing 44.95% **(Fig 6)**. Other managers/owners who imported their day-old chicks were 17.9%. These had 11,100 birds representing 18.24%.

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Finally, the managers/owners who took their day-old chicks from both the local hatchery and the imported were 17.9% and had 22,400 birds representing 36.81% of the bird population.

From the above results, it can be observed that most of the managers (64.3%) took their chicks from the local hatchery. The reason is probably that of availability and proximity of the hatchery to the manager. The reason, most importantly, would be the cost and ease of transportation associated with the local hatcheries. This is also in agreement with findings made by Bundy and Diggin (1968) who stated that birds suffer lighter stress over shorter distances than over longer distances.

From (**Table 4)** below, it is clearly seen that chicks from the local hatchery died more than the imported chicks in week 1. This pattern was repeated throughout the other three weeks. This result indicated that the source of the chicks, whether local or imported, influenced the rate of mortality. In other words, a manager raising chicks from local hatcheries is more likely to record higher mortality than a manager raising imported chicks.

The explanation to these high levels of mortality in the chicks from local hatcheries is based on the management practices at these hatcheries. In an interview, most of the managers reported that most of these local hatchery men do not do proper sorting out. They fail to separate the weak, deformed and diseased chicks from the healthy ones. This, therefore, results in the transfer of disease from the diseased chicks to the healthy ones causing mortalities.

SOURCE OF FEED FOR THE DAY-OLD CHICKS

The survey also revealed that 46.4% of the managers/owners preferred the already compounded feed or the feed from the outside source and the number of birds being fed on this source was 28.75% (**Fig 7**). The managers/owners who use both their own feed and also feed on outside amounted to 35.7% and their number of birds was 38.96% and also 17.9% of the managers/owners formulated their own feed with 32.29% number of birds.

From the above results it can be observed that most of the managers (46.4%) preferred the already compounded feed, Personal observation showed that those managers who used the already compounded feed had less number of birds and in order to save time and energy preferred to use already compounded feed instead of formulating their own feed which would take time and energy. Also from personal observations, due to the high feed ingredient cost, most of the managers tend to buy already compounded diet to feed their day-old chicks in the early stage of production when feed intake is low but as time goes on they tend to formulate their own feed due to an increase in the feed intake of birds. The managers, therefore, buy the ingredients in bulk/large quantities to reduce the cost of the diet in what the economist called 'economy of scale'.

MEANS OF TRANSPORTATION OF THE DAY-OLD CHICKS

From (**Fig 8)** below, it is seen that majority of the respondents, about 64% transported their day-old chicks using well-aerated vehicles and the rest using a truck. This indicates that mortality could be higher by the managers/owners using the truck which is not designed for such purpose. This poor means of transportation results in vibrations that can cause injury to the chicks and also chicks can be exposed to too much air which can affect them as compared to those using the well-aerated vehicles. With the well-aerated vehicles, there will be the low impact of air/ vibrations on the day-old chicks and because the vehicle is well enclosed, the required amount of ventilation will be ensured for the survival of the day-old chicks.

TIME FOR TRANSPORTING THE DAY-OLD CHICKS

From the survey, 71% of the managers/owners took their day-old chicks from the hatchery very early in the morning while the remaining 29% transported their day-old chicks in the evening (**Fig.9**)

This indicates that mortality could be higher in the day-old chicks by the managers who transported their chicks in the evening due perhaps to road traffic at that time keeping the bird in long hours of traveling. Again, during the evening temperatures are usually high in the tropics (especially when there was very high sunshine in the afternoon) due to the emission of long infrared waves from the earth/land that warms the atmosphere. This warmth can cause stress to the birds and in extreme cases may lead to death. However, when chicks are transported early in the morning, they experience cool and favorable weather which most may not lead to stress.

TEMPERATURE ADJUSTMENT IN BROODER HOUSE

From the survey (**Fig 10**), it was revealed that 67.9% of the managers/owners said that they adjust the temperature in the brooder house to suit the right temperature for the day-old chicks to avoid overheating which can possibly lead to mortality in chicks and the number of birds by this category of the managers/owners is 81.7%. This is in agreement with the findings by Gillespie (1992) who reported that the right temperature required for day-old chicks should be 32-35 ^{0}C

each week until it reaches 21-23.9 ^{0}C. Also, the remaining 32.1% of the managers said they do not adjust the temperature in the brooder house and the number of birds in this category is 18.3%. These managers/owners complained of frequent overheating in the brooder house and recorded high mortality than those who regulated the temperature of the brooder house. This is also in agreement with the findings by Osbaldiston and Sainsbury (1963) who they stated that incorrect brooding temperatures from the first day of brooding could result in poor growth of chicks with increased mortality rate. Another factor that could also influence mortality among the managers who do not adjust the temperature in the brooder house is poor ventilation which will deprive the chicks of oxygen which could make them also very weak and can even predispose them to respiratory diseases. This also supports findings by Corkish (1974) who reported that important concern to proper ventilation leads to prevention of a disease such as Coccidiosis.

SOURCE OF HEAT IN THE BROODER HOUSE

Majority of the respondents use charcoal pots as their main source of heat in the brooder house which represent 64.3% and the number of birds by this category is 67.37% followed by the managers who use incandescent bulbs representing 28.6% (**Fig 11**). This indicates that overheating could easily be controlled by those using the incandescent bulb by just putting some of the lights off or reducing its height if it is too close to the grounds whereas with the charcoal pot more heat is generated than needed and also in allowing for a little ventilation, ash from the charcoal could also be blown onto the day-old chicks leading to mortality.

NUMBER OF RESPONDENTS WHO SENDS THE DEAD BIRDS FOR POSTMORTEM

From the survey, it was also reported that 28.6% of the managers/owners had no post-mortem done on their dead birds in the first week while 71.4% did a post-mortem on the dead birds. In the week 1 those who did not do post-mortem recorded mortality of 0.61% whiles those who did record 0.5% mortality. This trend is seen throughout the other three weeks even though the percentage mortalities reduced as the birds aged/ as the week goes by **(Fig 12)**. From these, it can be deduced that mortality will be high among the respondents who do not perform post-mortem as they will not be able to know the diseases responsible for the death of the chicks or what caused mortality in the chick so as to prevent it next time. Trauma is one of the most common features found at postmortem examination. Bayliss (1986) and Gregory and Austin (1992) found signs of trauma in 35% of the DOA examined. In addition, Bayliss (1986) again pointed

out that 40% of the DOA was due to stress and suffocation after a post-mortem examination was done. So with these findings, knowledge can be imparted to the veterinarian so as to educate the managers so that caution can be taken to minimize this defect next time.

IV. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSION

From the research survey, it was found out that the inefficiency of the managers/owners, the type of breed of the day-old chicks, the source of the day-old chicks, source of feed of the day-old chicks, source of heat for the day-old chicks and diseases such as Coccidiosis and Gumboro were all associated or covary with early chick mortality.

5.2 RECOMMENDATIONS

After the research survey, it was realized that these major factors causing early chick mortality were as a result of poor management and poor sanitary conditions both from the hatcheries and also on the farms and lack of access to the veterinary services. I, therefore, recommend that;

- Correct sorting must be done at the hatcheries to remove deformed, weak birds, small chicks, and dehydrated chicks during packaging into the cartons.
- Farmers should seek advice and the services of Veterinary officers in the district.
- Also, container cartons should be disposed of after use to avoid infections in day-old chicks as some managers/owners claim they sell to other people as a form of business which is not only unhygienic but the source of infection.
- Out of the 28 (twenty-eight) respondents, 13 reported overheating in their brooder house and such practices should be checked to avoid death in chicks.
- Lastly, the litter material should be changed when wet or that portion removed immediately to avoid coccidian spores which cause coccidiosis.

CONFLICT OF INTEREST

I certify that there is no conflict of interest to declare regarding the material discussed in the manuscript.

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FIGURES 1-12

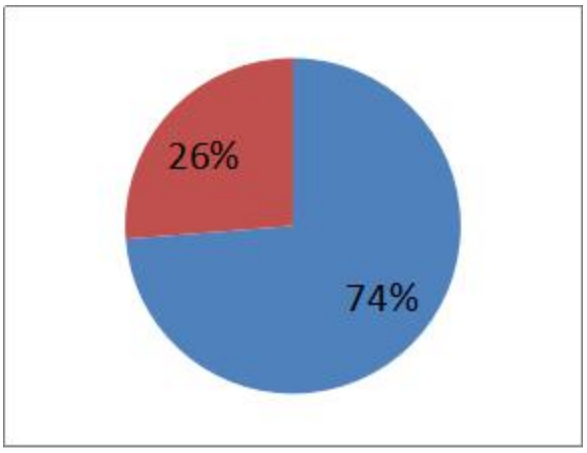

Fig.1b: Percentage of bird population by gender of the farmers

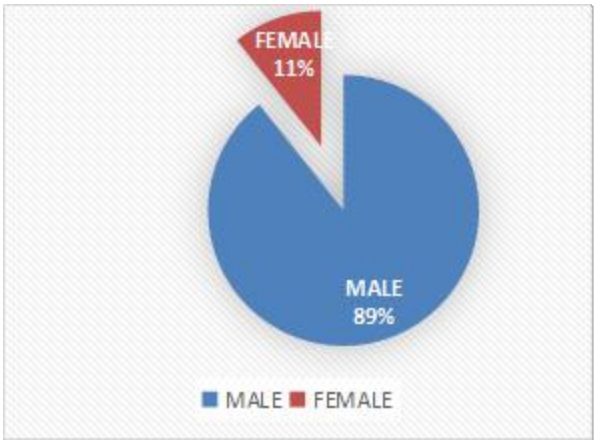

Fig.1a: Sex of Respondent

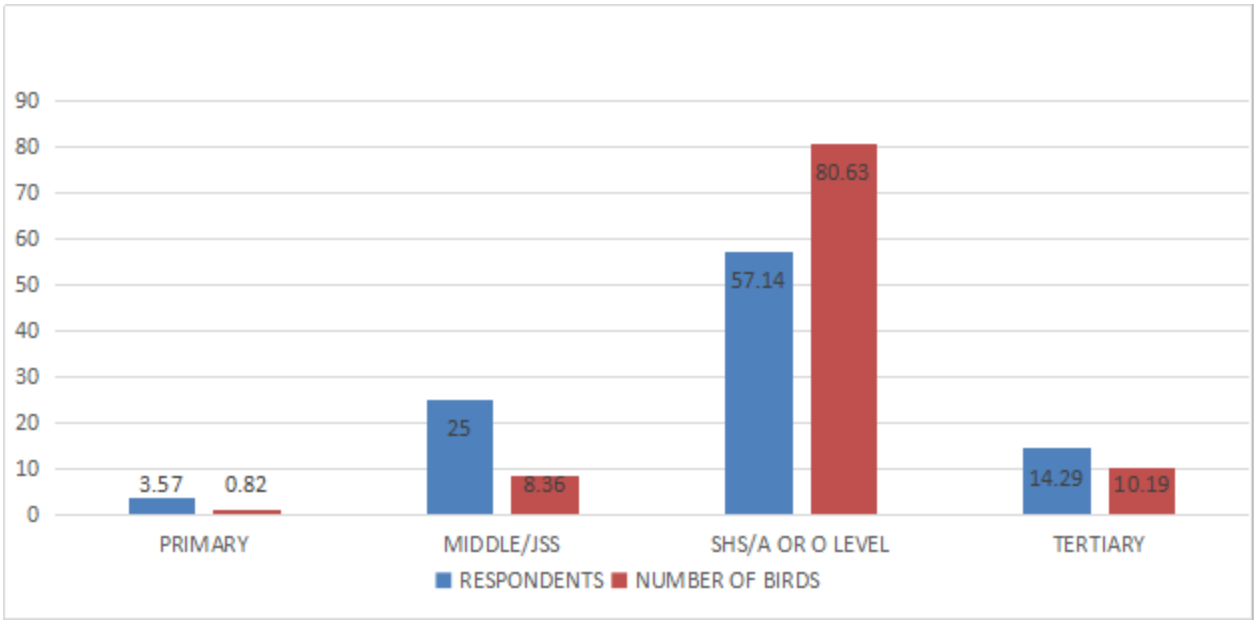

Fig.2: Level of Education of the Respondents and their corresponding number of birds

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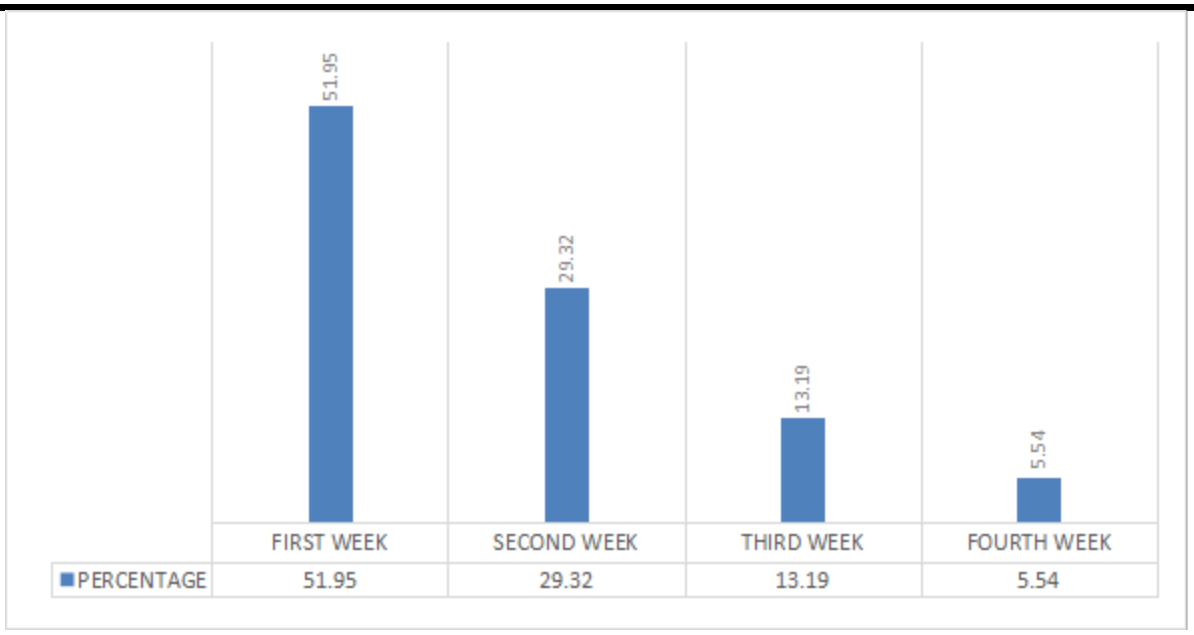

Fig.3: A chart showing mortality percentages for the first four weeks

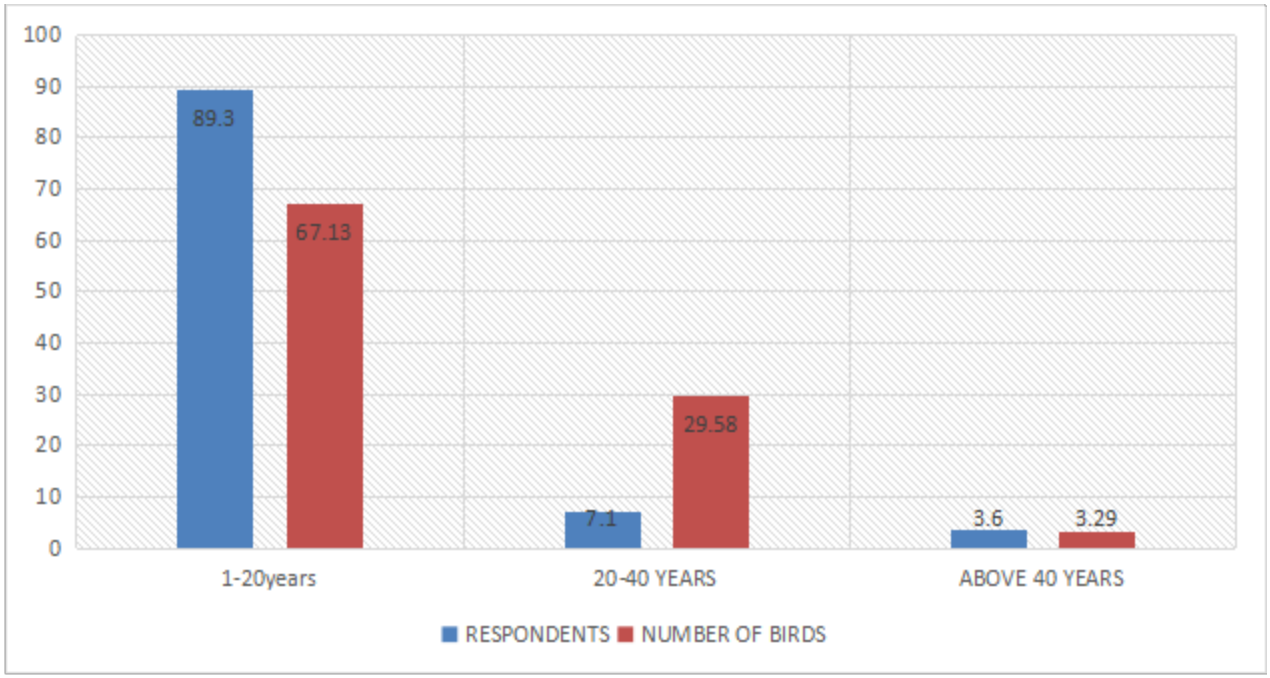

Fig.4: Experience group of the Respondents in the poultry industry

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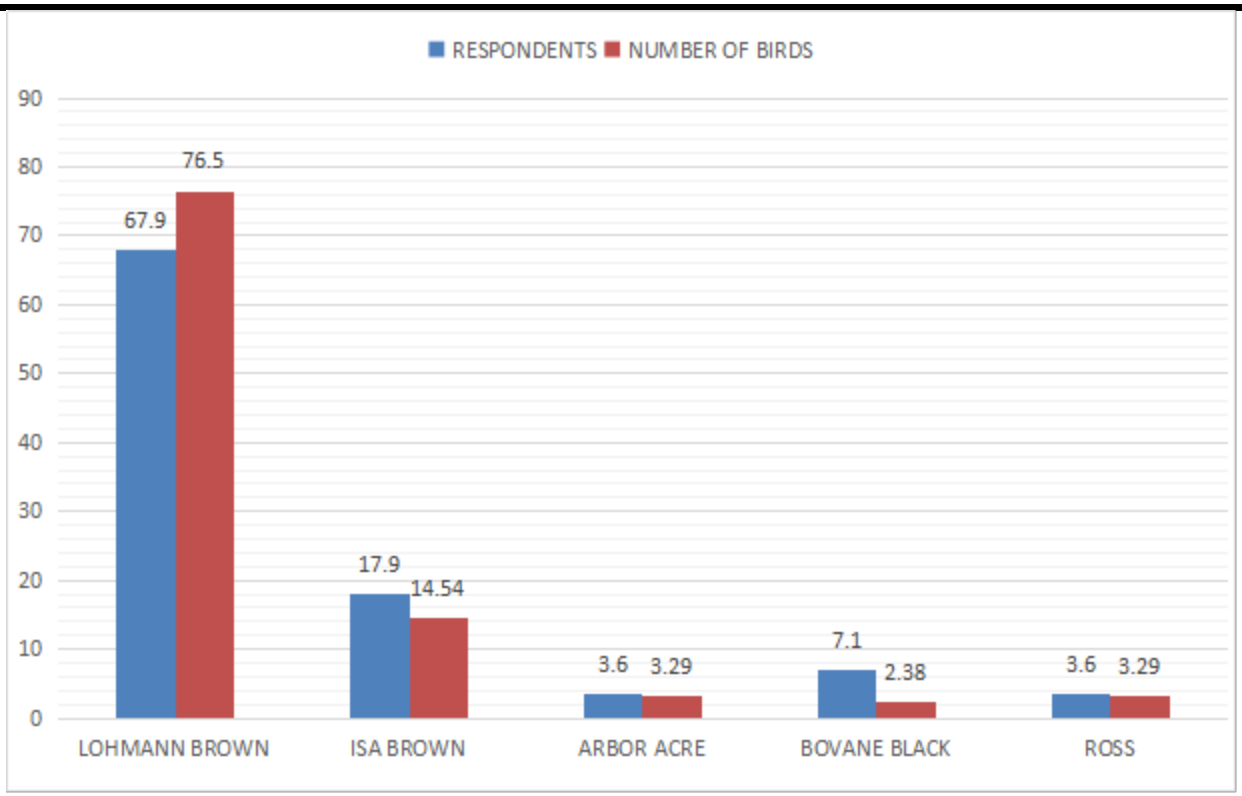

Fig.5: Breeds of day-old chicks reared by respondent

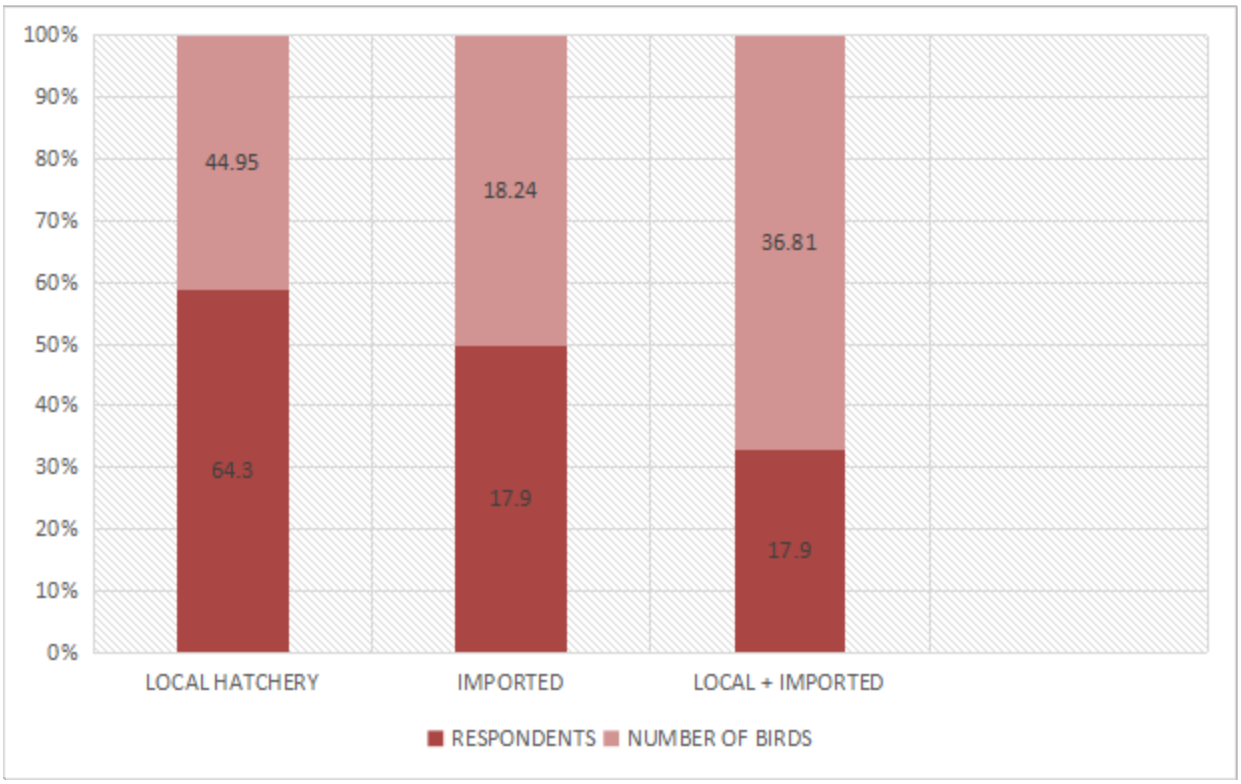

Fig.6: Source of day-old chick by the Respondents

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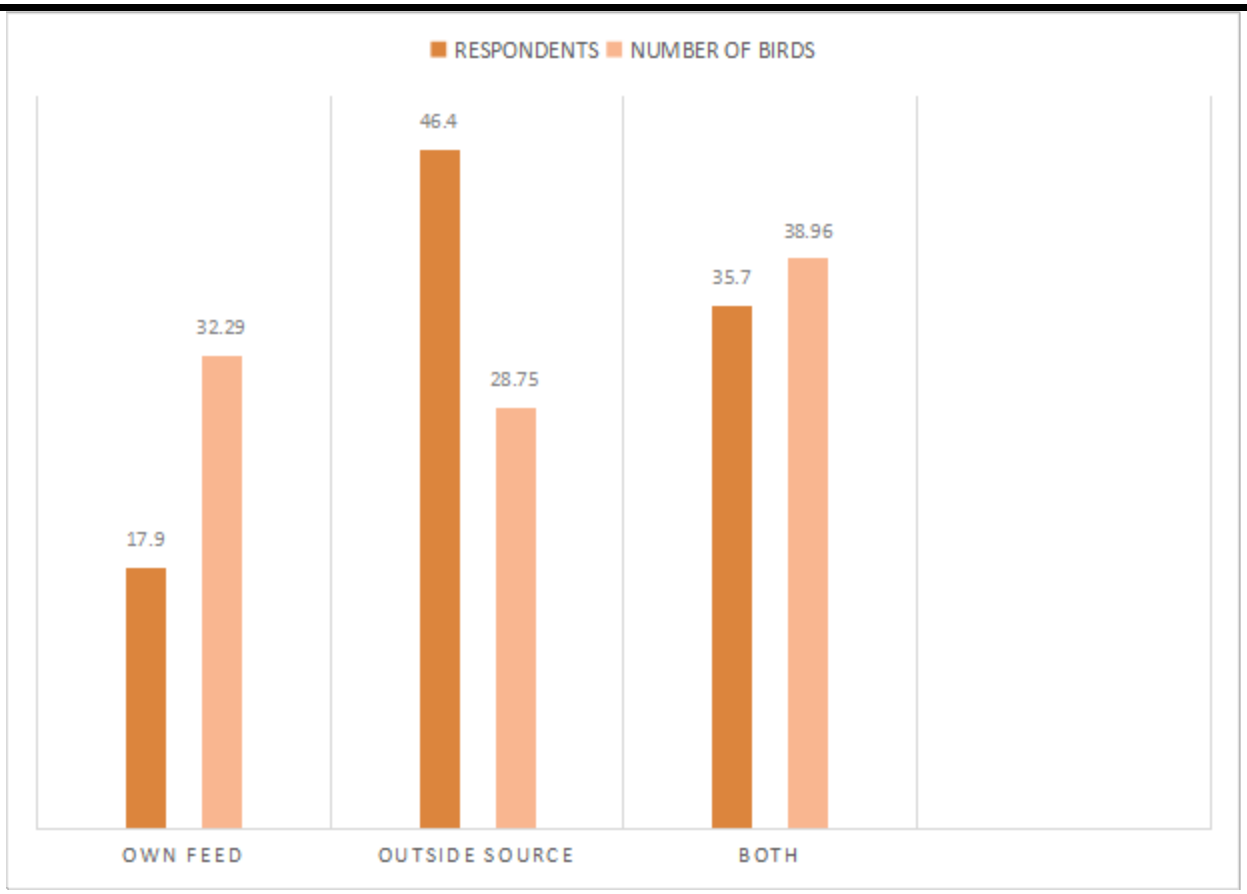

Fig.7: Source of feed of respondents

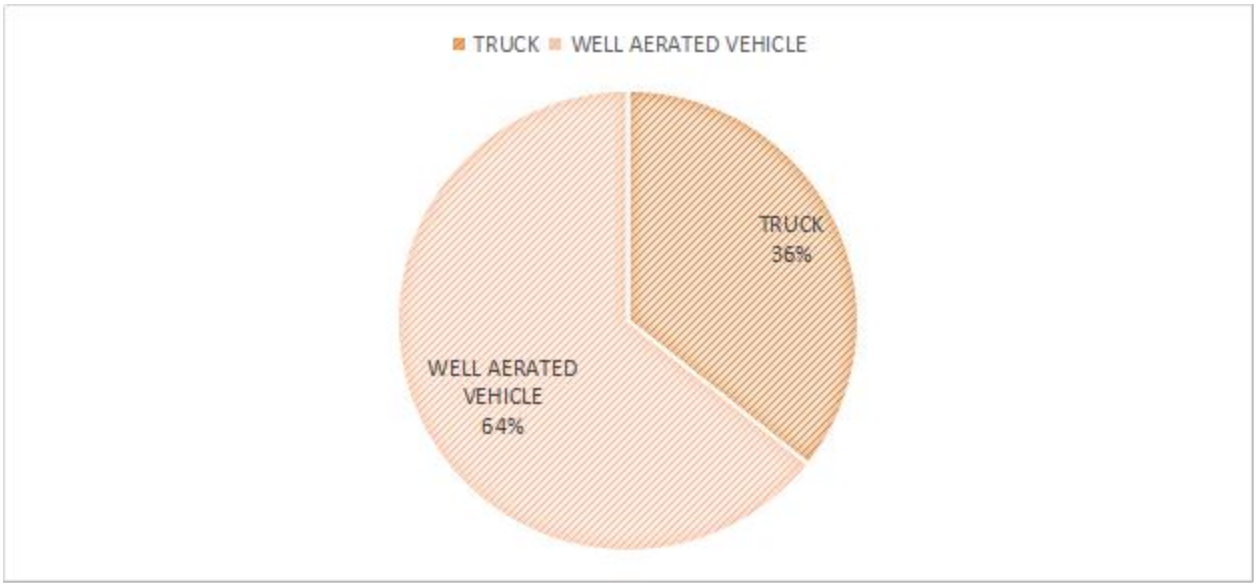

Fig.8: Means of transportation of day-old chicks by respondents

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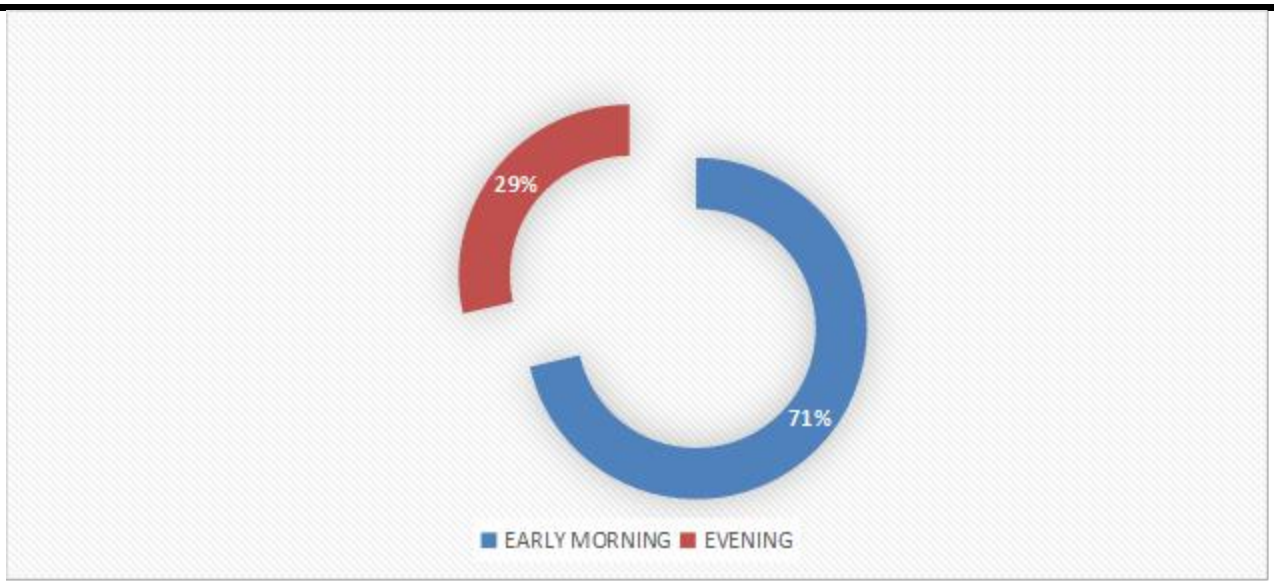

Fig.9: Time of transportation of day-old chick by respondents

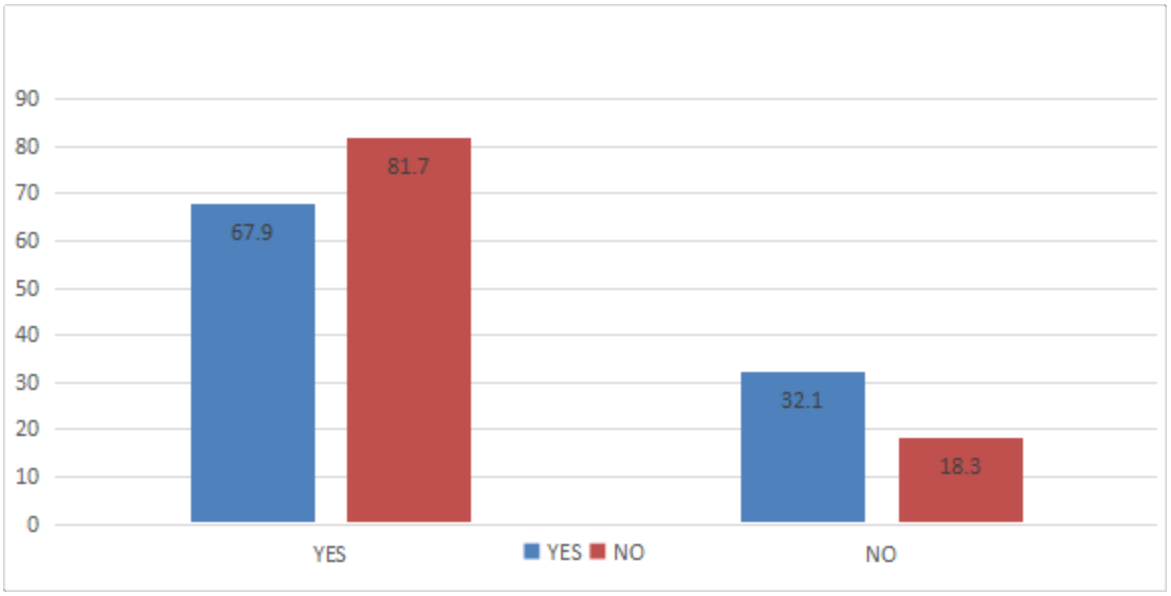

Fig.10: Temperature adjustment in the brooder house by the respondents

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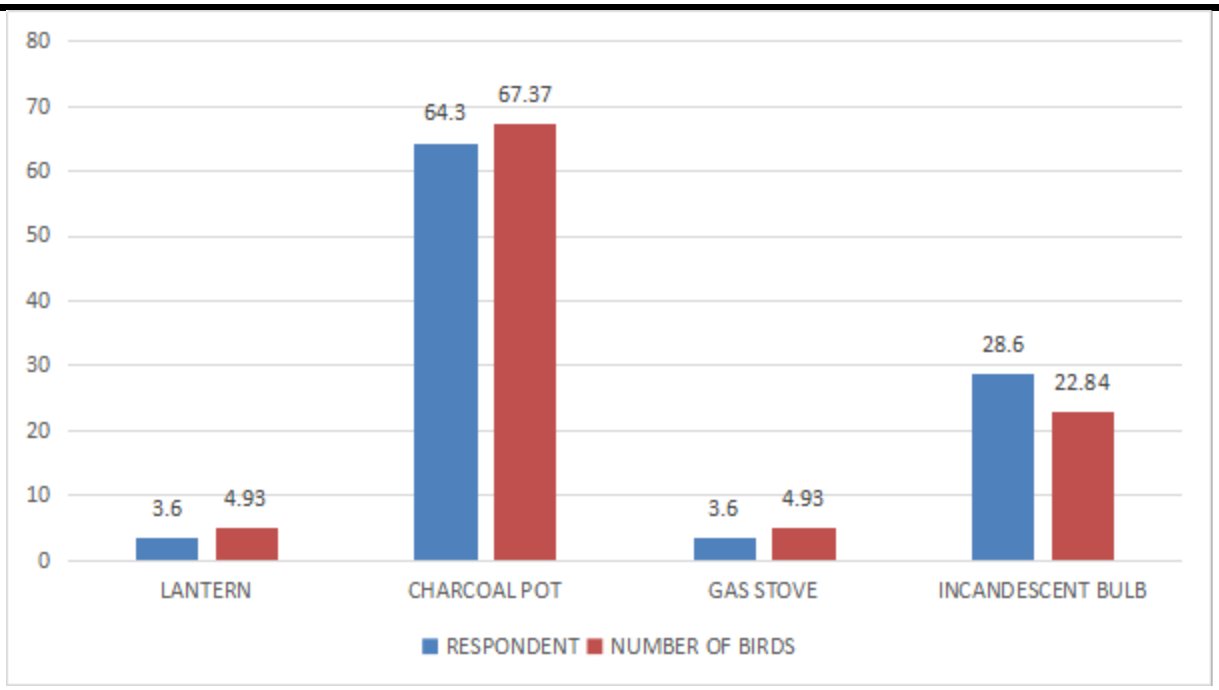

Fig.11: Source of heat in the brooder house by respondents

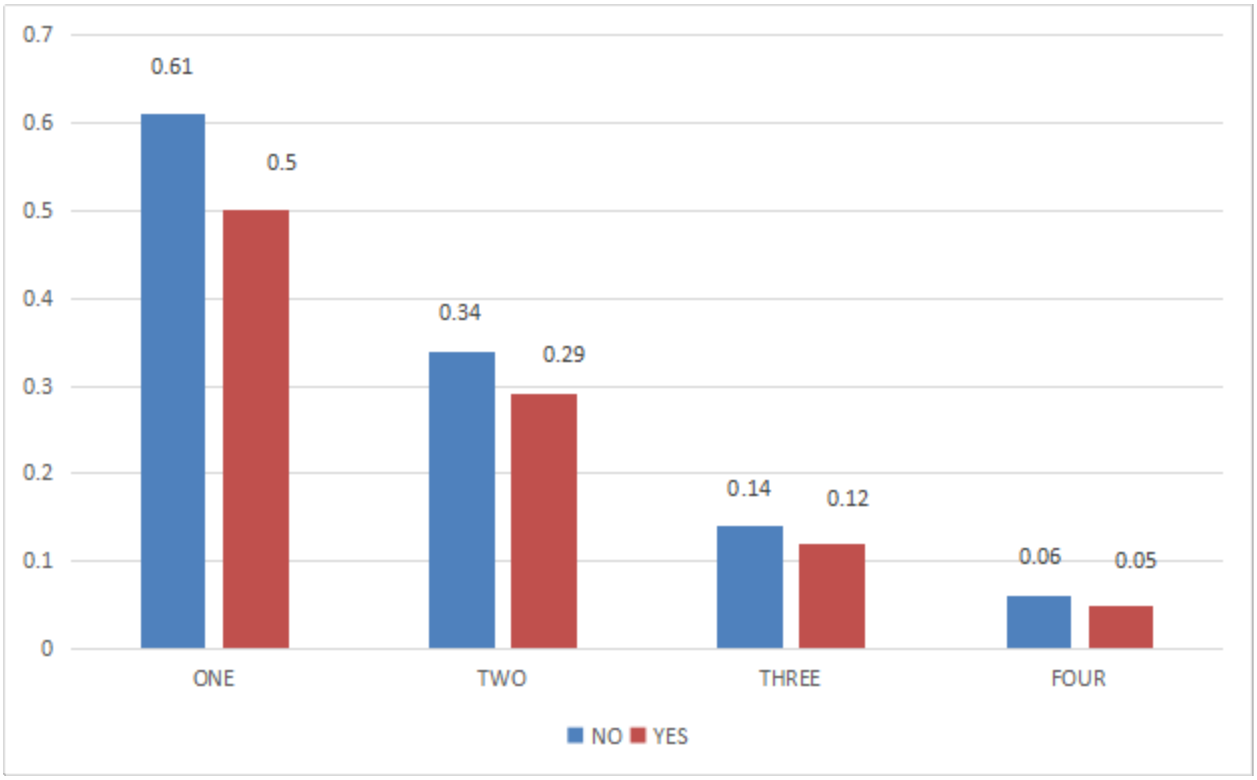

Fig.12: Number of Respondents to request for post-mortem examination

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TABLES 1-5

Table.1: Major diseases causing early chick mortality

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	TOTAL
COCCIDIOSIS	36.99 (118)*	46.66(84)	51.85(42)	47.06(16)	260
CRD	13.48 (43)	11.11(20)	8.64(7)	5.88(2)	72
YOLK INFECTION	6.27 (20)	8.33(15)	9.88(8)	23.53(8)	51
BACTERIAL INFECTION	6.27 (20)	5.56(10)	6.17(5)	2.94(1)	36
NEWCASTLE	3.13 (10)	2.78(5)	2.47(2)	0(0)	17
TOTAL	319	180	81	34	614

***- Figures in the brackets are the number of birds**

Table.2: Effect of experience and level of education of managers on mortality

EXPERIENCE					Total
	Primary	Mid/JSS	SHS/O level/A level	Tertiary	
1-20	10 (2.0)	89 (1.75)	162 (0.33)*	14(0.23)	275
20-40	0	0	20 (0.041)	18(0.29)	38
Above 40	0	0	6 (0.012)	0	6
Total number of mortality	10	89	188	32	319
Total number of birds	500	5090	49070	6200	60860

***- Figures in the brackets are the percentage mortalities**

Table.3: Breeds of birds and their percentage of mortality in the first four weeks

	BOVANE BLACK	ISA BROWN	ARBOR ACRES	LOHMANN BROWN	WHITE COBB
WK 1	34 (2.34)*	66 (0.75)	15 (0.75)	202 (0.43)	2 (0.10)
WK 2	13 (0.92)	50 (0.57)	10 (0.50)	105 (0.23)	2 (0.10)
WK 3	7 (0.50)	20(0.23)	3(0.15)	50(0.11)	1(0.10)
WK 4	3(0.21)	8(0.09)	1 (0.05)	21 (0.05)	1 (0.05)

***- Figures in the brackets are the percentage mortalities**

Table.4: Source of day-old chicks for the respondents

	LOCAL HATCHERY	IMPORTED	BOTH	TOTAL
WK 1	218 (0.80)*	34 (0.31)	67 (0.30)	319
WK 2	105 (0.39)	27 (0.24)	48 (0.22)	180
WK 3	45 (0.17)	14 (0.13)	22 (0.10)	81
WK 4	18 (0.067)	7 (0.063)	9 (0.040)	34
Total number of mortality	386	82	146	614
Total number of birds	27360	11100	22400	60860

***- Figures in the brackets are the percentage mortalities**