

RESEARCH ARTICLE

A survey on management practices and attitudes of broiler buy-back farmers towards farm animal welfare in Gampaha district, Sri Lanka: a case study of a commercial broiler chicken processing company

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ABSTRACT

Contract grower/buy-back farming system is well established in the present poultry industry in Sri Lanka. This study assessed farmer profile, key management practices and attitudes of the buy-back farmers towards broiler chicken welfare. A total of 40 buy-back farmers in Gampaha District, Sri Lanka were interviewed via telephone conversations using an open structured type questionnaire. Data were statistically analyzed using SPSS version 23.0. Relationships among variables were computed by Ordinal Logistic Regression. Majority (56%) of the farmers were in between the age group of 35-50 y, and 17.6% were females. The most popular flock sizes were in between 1000-5000 birds (64.1%). All the farmers stated that they purposely check for sick or injured birds and 97.4% of them practiced isolation of sick birds. However, no one euthanized severely injured or sick birds. All farmers informed that they practice up-right position when catching and handling birds. Half of the farmers (56.4%) were not well aware of concepts of farm animal welfare. Farmers' attitudes on farm animal welfare, transportation, and slaughtering were compared with farmers' profile and resulted in no significant relationship. There was a positive relationship that tend to be significant ($P = 0.051$) with welfare awareness (YES) vs the welfare positive attitudes on handling of birds. When flock size increased, farmers' awareness of pain of birds was significantly decreased ($P < 0.05$). In conclusion, a considerable number of buy-back farmers had poor or uncertain attitudes regarding broiler chicken welfare, and their management practices were mostly production-focused. It is suggested that poultry welfare awareness programs would be beneficial to improve farmers' positive attitudes to ensure the welfare of broiler chickens.

Keywords: Animal welfare, attitudes, broiler chickens, buy-back farmers

INTRODUCTION

The poultry industry has recently taken a more favorable position among other livestock industries in Sri Lanka. According to the Department of Animal Production and Health, since 1980, poultry population has grown from 6.3 million to 34.86 million in 2021 as well as the per capita consumption of chicken meat had changed from 100 g in 1980 to 10.68 kg in 2021 (Livestock Statistical Bulletin, 2021). Currently, the Sri Lankan broiler chicken industry

is dominated by the private sector. Contract grower or the buy-back farming system is well established in the current poultry industry in Sri Lanka. In buy-back broiler farming system, there are advantages for both producers and the company. The commercial company supply inputs including day-old chicks, feed, vaccines, drugs, and extension services. Chickens are purchased by the company after 39 to 42 d. Buy-back farmers need to provide housing facilities, electricity, water and the labor force that is required for broiler rearing.

According to the definition of the World Organization for Animal Health (WOAH), if an animal is healthy, comfortable, well-nourished, safe, and able to exhibit inherent behavior and not suffering from unpleasant states such as pain, anxiety or distress; it is in a good state of welfare. Accordingly, disease prevention and veterinary care, adequate shelter, nutrition management, humane handling and humane slaughter are all necessary for good animal welfare.

Current broiler chicken strains are developed to obtain a fast growth rate and higher feed conversion efficiency. Moreover, new feeding and management techniques also promote the growth of broilers. As a result, there are various welfare issues generated in commercial broiler chickens. Metabolic diseases such as sudden death syndrome and ascites are two problems that are strongly connected to the higher growth rate of broiler chickens. Reduced locomotor activity and more time spent sitting or lying on the floor are usually associated with rapid growth rate and unbearable body weight. Furthermore, as management practices, stocking density, feeding and providing water, litter quality management, ventilation and temperature controlling, handling, pre-slaughter catching, transportation, and slaughtering are also affected on broiler chicken welfare (Jong and Guémené, 2011).

The human-animal relationship is one of the most extensively used concepts to explain the human influence on animal welfare where mainly the attitudes of the stockmanship manipulates animal performance and welfare (Hemsworth, 2011). Farmers' knowledge, skills and abilities were amongst the most important factors that influenced the implementation of farm animal welfare innovation (Peden *et al.*, 2018). An insight into how farmers view and value animal welfare can focus to better development of knowledge transfer, policies, and management initiatives directed at maintaining healthy animals (Balzani and Hanlon, 2020). To our knowledge, the attitude of the Sri Lankan buy-back broiler farmers regarding the welfare of the chickens has never been published in scientific literature. Thus, the attitude and knowledge of poultry buyback farmers in Sri Lanka towards animal welfare is unknown. This study consisted of three major objectives; to obtain information about the buy-back farmers of a commercial broiler processing company in Gampaha

District, to know about the key management practices in broiler chicken buy-back industry, and to determine the buy-back farmers' awareness and attitudes on farm animal welfare and broiler chicken handling, transportation and slaughtering.

MATERIALS AND METHODS

Study location

The survey was carried out during the period of May to June 2021 in randomly selected 40 broiler buy-back farms in Gampaha district, Sri Lanka. Contact details of the broiler buy-back farmers and the location details of the farms were gathered from a leading commercial broiler meat producing company in Gampaha district. Many of the selected farms were located in Danowita, Kalagedihena, Pugoda, Hanwella, and Thunnana areas in the district. These areas belong to WL1a and WL3 Agro-ecological regions in the wet zone, low-country in Sri Lanka. All the selected buy-back farmers (Contract broiler chickens producers) were dealing with this particular broiler chicken processing company

Study design

A questionnaire was prepared based on broiler management practices (housing, handling, feeding, providing water, catching, and treatments for diseases), and buy-back farmers' awareness and attitudes towards broiler chicken welfare. Both close- and open-ended questions were included in the questionnaire. The rating scale, grouping and 4-point likert scale test (1- surely not, 2- probably not, 3- probably yes, 4- definitely yes) were followed to ensure the homogeneity of data and to reduce the subjectivity.

The questionnaire had 5 sections: 1-Farmer profile (age, gender, education level, experience), 2- Housing facilities and feeding (stocking density, batch size, batches per year, brooding, feeding), 3- Health management of birds, 4-Handling, pre-slaughter catching and loading, 5- Awareness of the farmers on farm animal welfare, and farmers attitudes towards the welfare aspects in handling, transportation and slaughter of broiler chickens.

A trial questionnaire was tested by interviewing randomly selected 10 broiler buy-back farmers via telephone conversations. It provided feedback related to the questionnaires' format, language, layout, and answer options as well. Following that, some questions were removed, changed and modified for the easiness of farmers to response to the questionnaire. The new version of the questionnaire was used for gathering the information by a telephone conversation with the buy-back farmer. The interviewee was the person who was responsible for broiler chicken management.

Data Analysis

Individual questionnaires were observed carefully to remove outliers and statistical analysis was conducted using SPSS 23.0 version (IBM® SPSS® Statistics). Descriptive statistics were calculated to observe farmers' profile (age, gender, education, experience), and management practices. Corresponding pie charts and bar charts were generated using Excel 2013.

One single question was not sufficient to distinguish the attitudes of buy-back farmers. Hence, answers for each question were categorized into a particular group of attitude (attitudes of farmers on farm animal welfare, handling, transportation, and slaughter) for the statistical comparison with farmers' profile. Mean scores of each group of attitudes were compared with farmers' profile using Ordinary Logistic Regression. The significance level was set at $P \leq 0.05$. The relationship between farm characteristics (floor type, space allocation, flock size) and farmers' profile (age, gender, education, experience), and the relationship between farm characteristic and attitudes of the farmer were also statistically analyzed using cross tabulation.

RESULTS AND DISCUSSION

Farmers' profile

The studied sample consisted of 82.1% of male farmers and 17.9% of female farmers. Almost all the studied broiler buy-back farmers of the commercial broiler processing company were Buddhists (94.9%) and fewer were Christians (5.1%). The majority of farmers (56.4%) were aged between 36 – 50 y and only 7.7 % of farmers were belonged to the group of more than 65 y (Figure 1).

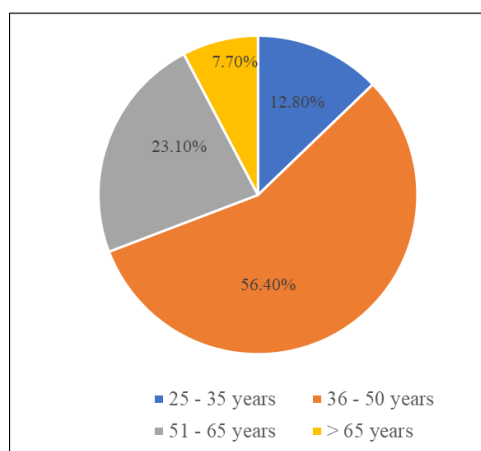


Figure 1: Age distribution of the buy-back farmers surveyed in the study.

The results revealed that the majority of the farmers (71.8%) had completed Ordinary Level whereas 23.1% of farmers had completed Advanced Level. However, none of the farmers had followed any certificate course in poultry management or any professional training. The broiler company, that farmers were dealing with had provided information on broiler management and organized few meetings and workshops for farmers to develop farmers' skills and knowledge about broiler farming. Among the surveyed farmers, 43.6% farmers had more than 10 y of experience on broiler rearing and 41% farmers had 5 – 10 y of experience (Figure 2).

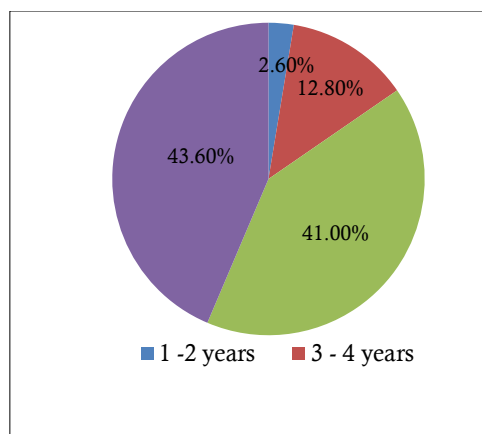
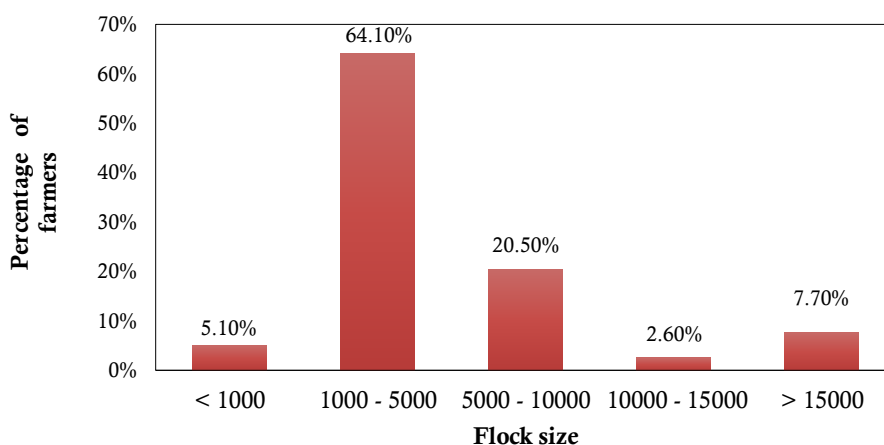


Figure 2: Experience levels of buy-back farmers surveyed in the study

Housing facilities and feeding

The most popular flock sizes were 1000-5000 birds (64.1%) and followed by 6000-10000 birds (20.5%). Interestingly 7.7% of farmers reared more than 15000 birds in their flocks. Many female farmers reared lower than 1000 birds (5.1%). Figure 3 shows the flock size variation among farmers. Among the studied farmers, 79.5% of farmers reared 6 – 8 batches per year and all female farmers were belonged to this category. Other 20.5% of farmers reared 10 – 12 batches per year. Specially, this 20.5% of farmers maintained a separated brooder while rearing an older broiler flocks in their site.



Farmers followed company guidelines when providing auto drinkers and feeders. For 1000 birds, 12 – 15 auto drinkers and 28–30 feeders were provided by the farmers. In overall, 82.7% of farmers stated that they have provided approximately 1.5 ft² of space per bird in accordance with the company guidelines. Bird weight is a key factor in planning appropriate stocking densities. According to poultry welfare guidelines, stocking densities for broiler chickens must not normally exceed 31 kgm⁻² (NFACC, 2016). However, optimal stocking density is significantly affected by housing factors, such as ventilation, litter management, and the method of delivery of both feed and water. The interaction of all these factors effect on bird welfare and performance, rather than a single maximum stocking density allowance (Dawkins *et al.*, 2004).

As a roofing material, the majority of broiler buy-back farmers (46.2%) used metal sheets, followed by Asbestos (23.1%). Amano sheets were used by 10.3% of farmers. Only 2.6% of farmers used coconut fronds. Other than that, 17.9% of farmers used a combination of two or three types of roofing materials. According to the farmers view, higher daytime temperature (32°C- 33°C) in Gampaha district is experienced during the months of March and April in every year. Thus, poultry houses with metal sheets and asbestos roofing materials could cause heat stress for the birds resulting poor welfare especially during the warmer period of the year. However, all farmers had open houses where all four walls were consisted of wire mesh facilitating better ventilation. All the farmers confirmed that the roofing condition of poultry houses are at good level without any damage or leakages.

Majority of farmers (84.6%) added paddy husk as the litter material in their poultry houses and followed by 10.3% farmers who add mixture of paddy husk and saw dust medium. Only 5.1% farmers added saw dust as the litter material. All farmers practiced periodic racking of the litter to maintain litter quality. Among them, 71.8% of farmers practiced racking and addition of new litter material after 30 d of age. Few farmers (10.5 %) added ash while practicing racking and adding new litter to poultry house, to maintain litter quality, and to reduce ammonia emission. However, 58.9% of farmers confirmed that litter materials were turned to wet and sticky at the end of broiler rearing period. Wet litter is one of the major welfare issues in broiler farming. Previous studies showed that wet litter can resulted in lower broiler weight gain (Kaukonen *et al.*, 2016). Quality of litter has been identified as the key factor that affected on footpad dermatitis in chickens (De Jong *et al.*, 2014). In overall, 23% of farmers said that formation of cake (caking) under auto drinker was a common problem.

All farmers made a brooder for broiler chicks, and also all of them provided a heat source for chicks to protect them from cold stress especially at night. The majority of farmers (74.4%) kept the bird in the brooder for 7–10 d period where as few farmers kept birds inside the brooder lower than 7 d (12.8%) or more than 10 d (12.8%). All farmers confirmed that the length of brooding period could be increased with lower temperature, especially in rainy seasons. The heat source of the brooder was also varied among farmers. Electric bulbs were used by many farmers (46.2%) as the heat source, and followed by fire in barrels (33.3%). Only 7.7% of farmers used gas lamps. Few farmers (12.8%) applied more than one type of heat sources to provide the heat to chicks. For the fire in barrels, farmers used woods, coconut husk, and saw dust. These fuels were available around their household and poultry houses. Among the farmers who used fire in barrels to heat the brooder, 77% of them had 700–5000 flock size since fire in barrel as a heat source is cost effective for small flock sizes. Moreover, burning saw dust in barrels maintain a constant temperature throughout the brooder.

All farmers followed a restricted feeding programme according to the guidelines of the company. In the first 14 days of life, broiler chicks are fed 3–4 times per day. From 14 to 30 d, birds are fed with 2 times per day. However, after 30 d of age, birds are fed only during the cold period of the day (6.00 p.m. to next day 10.00 a.m.). At 10.00 a.m. feeders are elevated from the ground level until 6.00 p.m. to avoid feeding. This is resulting 8 hour feed restriction in the adult broiler chickens and we identified this practice as a welfare problem, because throughout the day time period, birds are suffering from hunger. The other welfare issue is

none of the farmers calculated the recommended feed amount according to the flock size and always offered guessed quantity to the birds.

The relevant broiler company transport commercial feed to each farm every week. Therefore, farmers can buy commercial feed every week. The majority of farmers (61.5%) fed birds with only commercial feed (the company recommended feed type). Other 38.5% of farmers used another type of feed ingredients to mix into the commercial feed. Among them rice polish, coconut poonac, and cake (bakery waste) were the most popular ingredients. In general farmers add 7kg of coconut poonac; 10kg of Rice polish; 25kg of bakery waste to the 50 kg of commercial feed during the mixing process. According to the farmers' views, the objectives of mixing other ingredients into the commercial feed was mainly to reduce the feed cost by enhancing the volume. Farmers mentioned that birds fed with bakery waste resulted in higher growth rate and their palatability is higher for the bakery waste. Farmers who mixed other feed ingredients, purchase only the required amount of commercial feed that needed to mix with other feed ingredients. However, if there are any remaining commercial feeds in farms, the company re-purchase them.

Health Management

The majority of the farmers (97.9%) purposely checked the flock for sick or injured birds. Among them, 74.4% of farmers daily checked the flock for occurrence of any disease or injuries and few farmers (20.5%) checked the flock 2 – 3 times per week.

Overall, 97.4% of farmers isolated sick birds from the flock. However, no one euthanized severely injured, sick or abnormal birds. This was one of the major welfare issue observed in this study since sick, injured or bird with birth defects in legs often are unable to walk. As a result of that, these birds cannot walk to feeders or auto drinkers. These birds are suffering from hunger and thirst, and also they cannot behave normally as others. Moreover, these birds suffered from pain due to wound, injuries or leg deformities until the end of production period. Literally, it completely deviate the welfare guidelines (NCC, 2017; NFACC, 2016) which explained to euthanize the birds who are unable to recover the health without allowing them to suffer. In overall, 71.8% of farmers provided treatment based on their experience for common diseases or nutrient deficiencies. In general, 51.3% of farmers treated birds on the same day which they have observed symptoms in birds. However, in a severe disease outbreak, farmers seek the assistance from the buy-back company for veterinary services.

Handling, pre-slaughter catching and loading

In the present study, almost all the farmers explained that they generally hold the bird in an upright position by picking up from the birds' abdomen while keeping two wings close to its body. This holding method is in accordance with welfare guidelines that stated birds must be handled in such a manner that minimizes stress and/or injury and birds must not be carried solely by the head, neck, one wing, or tail feathers (NFACC, 2016). Mishandling and incorrect methods of catching often cause trauma that can result in injury while causing psychological effects such as those produced by human approach or social mixing (Knowles and Broom, 1990). Injury has been identified as a significant factor (30%-35%) for the deaths on arrivals in broiler chickens (Gregory and Austin 1992; Nijdam *et al.* 2006) whereas the injuries included fractures, dislocations, ruptured liver, and head trauma. However, buy-back farmers did not involve in the pre-slaughter catching and loading processes, instead people from the company involved in this process. In general the company inform farmers about the time of the company vehicle reaching the farm. Farmers used to restrict feed by removing feeders 8 hours before loading. The important fact is that none of the farmers restrict water to birds. This is accordance with the current advice of providing unlimited access to water for as long as possible before loading and remove water only when necessary. Some studies revealed that death on arrivals in broiler chickens were due to dehydration and this could be associated with poor access to drinking water during rearing (Gregory and Austin 1992; Butterworth *et al.* 2002). Furthermore, the consequences of dehydration may be severe when the birds with prolonged periods without access to water are exposed to high temperatures, because they use water for evaporative cooling via respiration (Jones and Huston 1967).

In the present study, pre-slaughter catching is practiced under dim light conditions, especially in between 6.00 p.m. to 4.00 a.m. Catching under dim light is important to reduce the fear and stress of the birds as well as to restrict the movements of the birds (Knowles and Broom, 1990). During catching and handling, birds display escape responses which increase the possibility of damage to themselves. Broilers are less active when the light intensity is 1 lx than when it is 10–40 lx (Deep *et al.* 2012). Farmers explained that they provide wood frames to restrict the movement of birds and trap to a corner during the catching process. Two catchers from the buy-back company are involved in catching and loading. According to the farmers' explanation, the approximate time for catching and loading of 1000 birds is 45–60 min. However, the catchers hold the bird inverted position from one leg. Moreover, catchers carried 10 – 12 birds into both hands

(in general 7 for right hand and 5 for their left hand). According to the welfare guidelines of the National Chicken Council for broilers (NCC, 2017), the number of birds in the catchers' hand depends on the size of the bird and must not cause injury to the birds, and for birds weighing more than 1.8 kg, the maximum number of birds per hand is five. If hand catching is undertaken carefully, injuries need not occur (Kettlewell and Turner 1985).

Based on the farmers' explanation loading crates are located on loading vehicles (more than 2 feet above the ground level) during the process of pre-slaughter catching. Therefore, the catcher does not throw birds and, it is easy to place birds inside the crates. The crate stocking density is determined by several factors including bird weight, number of birds to be loaded in relation to the capacity of the trailer, and the weather conditions (Bayliss and Hinton 1990), and the crate stocking density can be adjusted by varying the number of birds within a crate. The surveyed farmers informed that eight birds are loaded to a crate when birds are more than 2 kg. If birds are lower than 2 kg, 10 - 12 birds are loaded into a similar size crate. The stocking density may affect the thermal conditions within the crate, the degree of stress, the behaviour of the birds, the risk of injury and suffocation. Studies revealed that handling increased the body temperature of broiler chickens (Yalçin *et al.*, 2004; Edgar *et al.*, 2013) creating a possibility of hyperthermia and mortality. Nijdam *et al.* (2004) reported an increased percentage of death on arrival under increased crate stocking density.

Awareness of the farmers on farm animal welfare, and attitudes towards broiler chicken welfare

Among the 40 farmers, more than half of farmers (56.4%) were not well aware of concept of animal welfare. Farmers' awareness and attitudes on catching and handling of broiler birds were assessed based on dichotomous variables (Yes/No). Considerable number of farmers did not consider handling methods of chickens (48.2%), and 33.3% farmers stated that handling is not an important factor to consider. Many farmers (84.2%) stated that handling does not affect on meat quality. In overall, 51.35% farmers believed that handling cause pain and stress to the birds. None of the farmers were aware about correct/recommended handling methods for broiler chickens. Careful bird handling has been identified as a critical element in lowering mortality, carcass downgrading (hemorrhages, bruises and broken bones) and poor meat quality (Petracci *et al.*, 2010). Results of the present study revealed that farmers' awareness on importance of handling of broiler chickens was in unsatisfied level.

Farmers' attitudes on livestock welfare, transportation and slaughtering were assessed based on a four points Likert scale (1- surely not, 2- probably not, 3-

probably yes, 4- definitely yes), and the results are shown in Figure 4, Figure 5, and Figure 6 respectively.

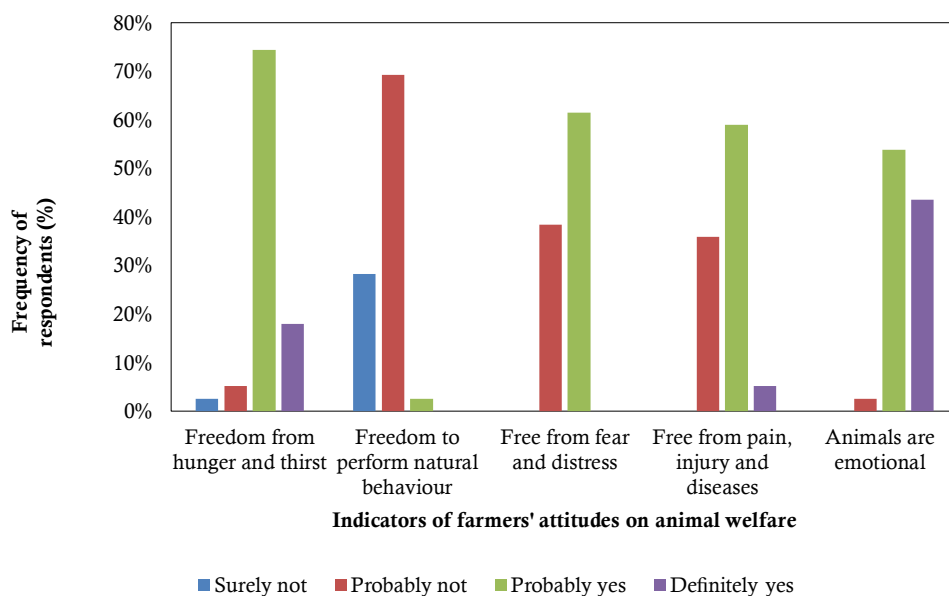


Figure 4: Buy-back farmers' attitudes on key animal welfare issues

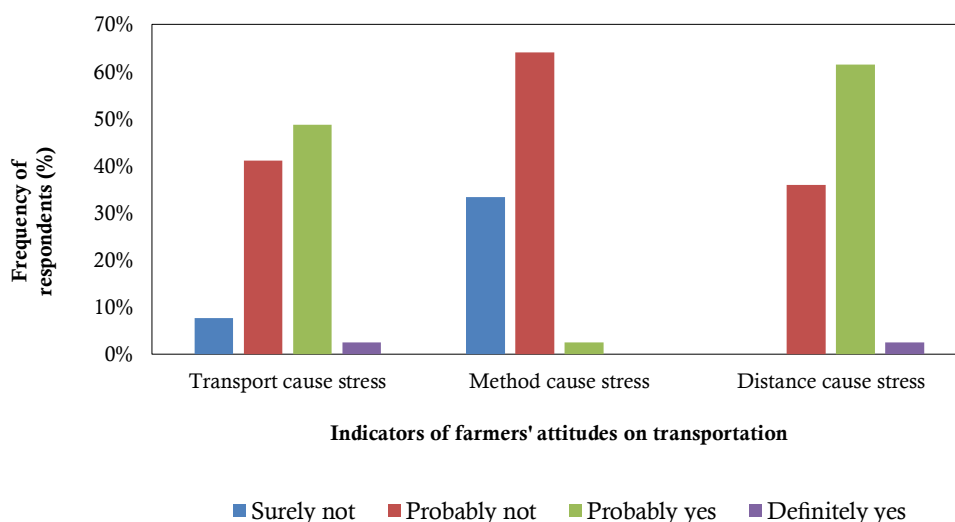


Figure 5: Buy-back farmers' attitudes on transportation of broiler chickens

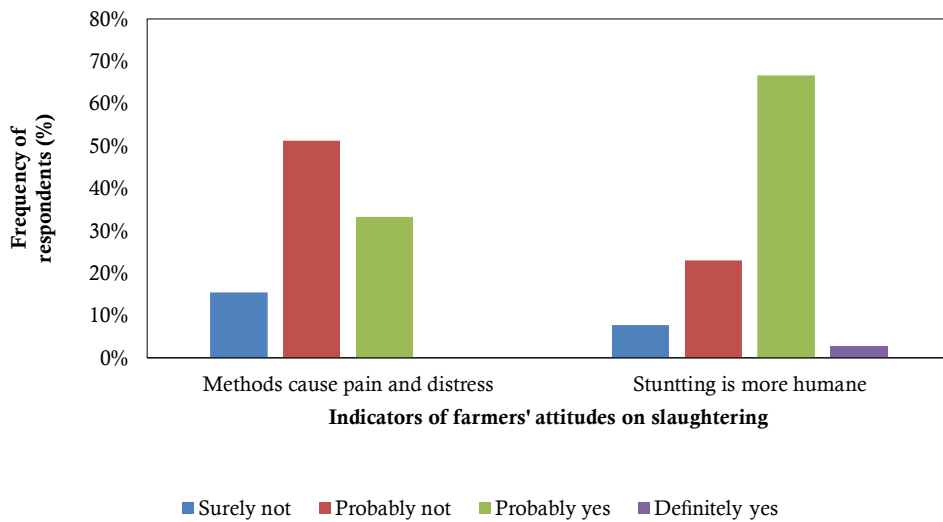


Figure 6: Buy-back farmers' attitudes on slaughtering of broiler chickens

Attitudes on livestock welfare was assessed based on the five freedom concept of animal welfare (Freedom from hunger, thirst and malnutrition, freedom from discomfort, freedom from pain, injury and diseases, freedom to express normal patterns of behaviors and freedom from fear and distress; Brambell, 1965). Results revealed that many farmers were positive towards that the animals should free from hunger and thirst, and animals are emotional. Moreover, more than half of the surveyed farmers agreed with farm animals should be free from fear and pain. These results indicated that there is a potential to change the farmers' attitudes towards welfare positive aspects of the farm animals. However, around 25% of the farmers strongly disagreed with that farm animals should have freedom to express their normal behaviors and 69.2% farmers also stated it is probably not.

When considering the attitudes related to transportation of broiler chickens, half of the studied farmers did not believe that transport cause stress to the birds. More than 95% of the farmers stated that transport method may not affected on the level of stress in birds. Therefore, the results indicated that farmers' awareness and attitudes on transport stress of the birds were less and were poor from welfare grounds. However, considerable amount of farmers (64%) believed that the distance effect on the degree of transportation stress and this can be considered as a welfare positive attitude in the surveyed farmers. Warriss *et al.* (1992) reported an increase percentage in death on arrivals from 0.1% after a journey of 2 h, to about 0.8%, after 8 h. Previous studies suggested longer journey may cause more opportunity for a bird to die, and the causes were identified as from a

chronic disease that decreased the ability of the bird to cope with the transport conditions, from an injury sustained during catching and loading, or from environmental extremes possibly aggravated by the period without access to food and water (Nijdam *et al.* 2004; Caffrey *et al.* 2017).

Humane slaughtering is one of the major aspects in farm animal welfare. In humane slaughtering, loss of consciousness should be induced first and followed by death with a minimum of pain and distress (AVMA, 2020). According to this phenomenon, broiler chickens are stunned prior to killing to ensure humane slaughter. Results revealed that majority of surveyed farmers (69%) believed that stunning cause less pain in killing of birds. However, 67% of farmers did not believe that different killing methods cause different level of stress and pain in birds, and these results indicated that poor awareness of the farmers on slaughtering techniques.

As the final assessment of this study, attitudes of farmers on livestock welfare, handling, transportation, and slaughtering were compared with the farmer's profile (variables of gender, age, experience, and education) to find any possible relationship. Results of cross tabulation revealed that there was no effect of the farmers' profile on the studied farmers' attitudes ($P>0.05$). Other than the farmers' profile, relationship in between the awareness of the farmers on concept of animal welfare and farmers' attitude on handling, transportation, and slaughtering were assessed. Interestingly, the relationship was tended to be significant ($P=0.051$) between the awareness of livestock welfare and the attitudes on handling the birds. Increased awareness of farmers' on livestock welfare, improved the welfare positive attitudes of handling of birds. Moreover, relationship analysis results revealed that when farmers' awareness of pain and distress of bird is decreased the rearing flock size was increased ($P=0.001$). Therefore, it seems that farmers who did not concern on the pain and distress of birds tended to raise higher number in their flocks. These farmers may mainly focus on profit and may try to increase the number of birds rearing with minimum or no attention on birds' welfare. Assessed farm characteristics (floor type, space allocation, flock size) were not affected by the farmers' profile ($P<0.05$).

CONCLUSION

Majority of buy-back farmers of the studied commercial broiler chicken processing company were males with more than 10 y of experience on broiler chicken rearing, and many of them were of aged in between 36–50 y. Key management practices were mainly production oriented and, less attention was given to welfare of broiler chickens. Farmers' awareness of animal welfare was positively related with welfare friendly handling attitudes, and farmers'

awareness on pain perception of birds negatively correlated with the flock size. Farmers' attitudes on farm animal welfare, transportation and slaughter had no relationship with gender, age, experience, and education level. We suggest that buy-back farming systems of other commercial broiler chicken processing companies in Gampaha district and other regions of Sri Lanka need to be conducted to generalize the findings.

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