PREVALENCE OF CATTLE DISEASES AND ITS IMPACTS IN DRY ZONE, SRI LANKA

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ABSTRACT

Socio-cultural and economic well-beings of rural households in Asian Countries are being mainly long lasted by rearing cattle and buffalo. However, there are several factors influences on determining the level of production performances of the cattle while disease outbreak and dissemination cause severe threat to the above benefits and lead to the negative impact on the national GDP of the agricultural sector. Therefore, there are needs on identifying the dominating factors which influence the production performances as well. So that, a questionnaire was developed and data were gathered and analysed using SPSS (version 22) software to indicate the significant relationship among the parameters. At the study location, 70.42% were the non-descriptive local breeds in comparison with Indian (21.13%) and European Crosses (9.45%). Further, 28.12 ± 2.08 ⁰C and $77.29 \pm 5.64\%$ were the mean $\pm$ SD of the environmental temperature and relative humidity, respectively. And also, disease such as Foot and Mouth Disease (FMD), Black Quarter (BQ), Bovine Tuberculosis (TB), Haemorrhagic Septicaemia (HS), Brucellosis, Bovine Viral Diarrhoea (BVD), etc. were dominant in Eastern Province of Sri Lanka. HS infestation was higher in Batticaloa District during both Hot (May) and Rainy Season (October) while it was dominant in rainy season (September) in Ampara District. And also, more than 80% of the infested animals were died without curing. Meanwhile, FMD infestation was higher than the other diseases where more than 87% of the people knew about these cases and they were concern over it. In 2018, the number of deaths were 205 while the clinical identification was meant by 5,240. At the study, only few respondents (32%) mentioned about their previous experiences in BQ while the infestation is very much lower at the study location. During the study period, 86.3% deaths were recorded by BQ. Due to the vaccination, epidemic issue of Bovine Brucellosis was only 22%. Finally, 1,870 calves born to imported cows were tested with ELISA in all over the country where 2.6% of calves showed positive to BVD. Therefore, these conditions are critical and indicates the lower potential at Dry Zone and also, further attention is needed to reach high success rates to overcome the disease impacts, as well.

KEYWORDS: Cattle, Diseases, Dry zone, prevalence, out break

1. INTRODUCTION

Production performances of livestock has been stepping intensively in Sri Lanka to achieve the policy goal of producing sufficient animal protein such as milk, milk-by products and meat production, as well. The total cattle population has been recorded as 1,105,590 with the sum of local (828,120) and Improved (275,450) breeds of cattle in 2020. In addition to that, total buffalo population has been recorded as 325,020 with the

sum of local (284,020) and Improved (38,980) breeds of buffalo at the same year too (Department of Census and Statistics, 2020). Meanwhile, total milk production of cattle was 471,592,800 and 396,198,000 liters in 2018 and 2017, respectively. As the results, cattle milk production has been increased by 19.02% year on year, where domestic milk is sufficient with the achievement of 42% of the total demand at present. However, the per capita availability of Milk has been recorded as 9.27 (Kg/Year), as being the percentage of Milking Cows has been reduced by 5.6% (284,400) in 2017. Therefore, the availability of total milk within the country was increased by 1.6% (to 1,158 million liters) which led to the per capita availability to 52.81 liters in 2020 (52.26 liters – 2018). Although there was a decreasing trend in livestock population and technical aspects in 2020 to 2018, the number of livestock holders are increased with the year. As the result, fluctuation of production is common in the country (Department of Animal Production and Health, 2017).

In addition, there are several factors determine the production performance (milk and meat) and causes economic threat to the marketing sector, significantly. In such situation, Environmental factors, improper management practices (feeding, watering, vaccination, health care management practices, etc.) lack of balanced feed (especially on production period), lack of techniques (Animal breeding techniques, adopting modern and automatic systems) physiological nature of the cow (age, weight, physiological stage, etc.) and physiological factors cause the severe impacts on cattle and leads to the physiological changes which can be quite costly and far-reaching later on. Finally, it creates an opportunity to the reduction of cattle population in Sri Lanka and threats the farmers to be reluctant on promoting more and more towards the betterments. In addition, process of milk secretion is involved with high metabolic activity (Bauman and Currie, 1980). However, balanced nutrition and proper management practices lead to the minimal influence on disease outbreak (Fleischer *et al.*, 2001). Not only that, healthy animals grow very faster and produce more profit for their owners at the determined time. However, relationships are observed among environmental, physiological and management factors which ultimately causes the physiological changes and causes diseases in cattle. Therefore, it is vital to maintain the physiological nature of the cattle same as it is. Otherwise, it can cause a drastic loss in farming, as well. In addition, there are several studies depicts the reduced production capacity such as milk, meat and meat products (Pritchett *et al.,* 2005) due to the diseases. As the result, high economic impact is created to the consumers, producers, and industries. Therefore, it is vital to make accurate assessment of losses risen by disease and find out mitigation alternatives.

Among the total of 823,890 local cattle population, 82630 (10%), 63910 (7.7%) and 45570 (5.5%) cattle are reared in Eastern Province of Sri Lanka especially in Batticaloa, Ampara and Trincomalee Districts, respectively. It is obvious that the highest level of local cattle population is produced in Eastern Province while comparing with the other provinces in Island. On the other hand, the sum of 262120 improved cattle is reared in national wide where 8060 (3.07%), 5690 (2.17%) and 3070 (1.17%) take part in Batticaloa, Ampara and Trincomalee Districts, respectively (Department of Census and Statistics, 2020). Moreover, it is clear that fewer improved cattle breeds are reared in Eastern Province which is now under the consideration as well. Therefore, it is vital to cover the major diseases along their impacts in Dry Zone for the productions performances as integral components of general social, economic and agricultural development while protection of humans against diseases transmitted by animals and the production of safe food are the major secondary priorities too. So that, there are needs on developing a study to forward a clear identity on causes of diseases, dominant diseases, various physiological stages, and its consequences, as well. For that, the current study was conducted in Eastern Province which is located in the Dry Zone of Sri Lanka by encompassing three administrative districts, namely Batticaloa, Trincomalee and Ampara, as well. Against this backdrop, present study was mainly focused on four different objectives as mentioned below: To study the occurrence of cattle diseases in both Local and European Breeds during the period of 2013-2019 in Eastern Province of Sri Lanka; to relate the dominant diseases with various physiological stages of cattle (Local & European) in three different districts of Eastern Province and compare the variation with different

territorials; and to correlate the factors which influence more on the disease infestation in all the management aspects of livestock farmers.

2. METHODOLOGY

The current study was carried out to understand the prevalence of cattle diseases and the factors which impacts their productivity in Eastern Province (Dry Zone), Sri Lanka.

2.1 Data Collection

At the current study, primary and secondary data were collected from the selected Veterinary Ranges for the further concern of determining various dominant factors of both local and European breeds in Dry Zone of the country.

2.1.1 Primary Data Collection

A questionnaire was developed with five different sections. Personal and demographic information (gender, Age, education, income and nature and type of farming activities, etc.), Information of farms (management factors -farming system, nature of rearing, feeding patterns, and consultation of veterinary doctors when it is emergency, etc.), information of Farm Breeds, information of Diseases and personal willingness on adaptation of proper techniques to overcome the challenges that they experience in the current situation were the first, second, third, fourth and fifth sections, respectively. Along with the questionnaire, direct interview was carried out with the farmers, as well. A random sampling method with the sample size of 500 (targeting the farmers) who rear livestock especially cattle in different scale at the study location.

2.2 Secondary Data Collection

At the present study, secondary data was collected from the each veterinary ranges (Monthly records and Annual records), Annual Reports of Department of Animal Production and Health (DAPH), Census and Statistical Report from the Ministry of Agriculture, etc. to get the ideas of the documented cattle diseases and its prevalence.

2.3 Data Analysis

The collected data was statistically analyzed in order to produce the study's main research questions and objectives. The data collected from the questionnaires were summarized and analyzed by using SPSS (version 22.0). Frequencies and descriptive statistics were carried out to summarize main data of respondents to get an overview and to conduct further analysis. Then, Associative analysis one way ANOVA was carried out among dependent and independent variables to identify the significance at 5% and 1% level. Based on the results, relationship was interpreted. .

3. RESULTS AND DISCUSSION

Present study was designed in order to correlate the factors which influence more on the disease infestation in all the management aspects of livestock farmers at the selected study location of Sri Lanka. The following results were gathered from the structured questionnaire and the records which were gathered at the study location.

3.1 Prevalence of Animal Disease Situation

3.1.1 Haemorrhagic Septicaemia (HS)

Haemorrhagic Septicaemia (HS) HS is one of the most important contagious bacterial diseases in cattle and buffaloes in Sri Lanka.

This was recorded in six veterinary ranges in Eastern, Northern, and North Central provinces which was confirmed by the laboratory experiments as well. The cases numbered 218 with overall 200 deaths (Annual Report, DAPH, 2018/19). However, the precautionary measures were taken to control this infestation which was depicted by the farmers during the face-to-face discussion. "Vaccination is practiced using the alum precipitated and oil adjuvant vaccines which are produced locally. During the year 2018, all the animals in outbreak areas have been vaccinated against HS by divisional veterinary officers" (DAPH, 2019).

Along with the Table 3.1, HS infestation was higher in Batticaloa District during both Hot (May) and Rainy Season (October) while it was dominant in rainy season (September) in Ampara District. And also, more than 80% of the infested animals were died without curing. So that, it is obvious that the pandemic outbreak is higher in hot season in all the other districts, as well. However, 2 veterinary divisions were recognised with the HS infestation in Ampara in 2017 where 2 bovines were died among 191 identified cases. As the same, 3 veterinary divisions were recognised with the HS infestation in Ampara in 2017 where no bovines were died among 14 identified cases. So that, the death has been increased with the year while the number of recognitions is lower than previous year. During the survey period, farmers from Batticaloa and Ampara denoted this infestation was higher during the previous period (78%) which was controlled with the proper precautionary actions given by the Veterinary Doctors.

Table 3.1: Spatial and Temporal Distribution of HS in 2018 (Annual Report, DAPH, 2019)

No.	District	No. of VS range affected	No. of Cases	Deaths	Month(s) of Occurrence
1	Ampara	1	14	12	September
2	Batticaloa	2	19	13	May, October
	Total	**3**	**33**	**25**	

3.1.2 Foot and Mouth Disease (FMD)

According to the report of Department of Animal production and Health (2019), FMD was an uncontrolled disease due to the movement of cattle by traders, herdsmen and approved organizations without the knowledge of the veterinary authority. Further, legislative measures are needed to the controlled movement of cattle from one place to another and it can lead to minimise the disease outbreak. At the current study, most of the farmers mentioned that the FMD infestation is higher than the other diseases where more than 87% of the people knew about these cases and they were alert over it. According to the records available in Sri Lanka, this particular disease was significantly recorded its value in 69 Veterinary Ranges in 16 districts during the period of 2018/19. In 2018, the number of deaths were 205 while the clinical identification was meant by 5,240.

Table 3.1: Spatial and Temporal Distribution of FMD in 2018

No.	District	No. of VS range affected	No. of Cases	No. of Deaths	Months of Occurrences
1	Batticaloa	5	171	2	January, April, December
2	Ampara	7	187	2	January, February, April, May, June
3	Trincomalee	2	113	0	September, December
	Total	**14**	**471**	**04**	

However, this number was tremendously lower in 2017 where the death was only 09 while the total affected animals were 848. FMD epidemics in Sri Lanka always commenced during the north- east monsoon between December and February. Therefore, the season especially rain or the cold/ mild cold encourages the spreading, as well. Hence, implementation of legislative measures pertaining to animal movement has to play a key role in controlling disease spread. As shown in Table 3.2, disease occurrences were higher in *Maha* Season in all the three districts which was agreed by the respondents during the study period.

3.1.3 Black Quarter (BQ)

At the study, only few respondents (32%) mentioned about their previous experiences in BQ while the infestation is very much lower at the study location. This was evidenced with the report of DAPH, 2018 where 86.25% deaths were recorded in Sri Lanka during the period under review. The cases were reported in Northern Province (Vavuniya, Vavuniya North, Thunukkai, Manthei East and West), North Central province (Horowupathana) and Eastern province (Kokkadicholai and Thubenkerny). However, this situation is not reached the worst condition in other two districts while the death cases and severity are minimised with the immense action of the proper Veterinary Services.

Table 3.3: Spatial and Temporal Distribution of BQ in 2018

No.	District	Veterinary Range	No. of Cases	No. of Deaths	Month(s) of Occurrence
1	Batticaloa	Kokkadicholai, Thubenkerny	4	2	August, October
		Total	**4**	**2**	

3.1.4 Brucellosis

Study revealed that certain part of the Eastern Province farmers mentioned (22%) about the epidemic issue of Bovine brucellosis. As being vaccination was carried out by the Veterinary Investigation Centres during the year 2018, disease outbreak was much lower than the expected. Adverse effect in economy is common by Bovine brucellosis and zoonotic in nature as well. Therefore, S-19 Brucella vaccine has been practiced in certain parts of Eastern and North-Central provinces of Sri Lanka.

3.1.5 Bovine Tuberculosis (TB)

It was evidenced by 737 in number in Sri Lanka in 2018 where the test was done using Comparative Tuberculin Purified Protein Derivative (PPD) test. However, programs on controlling the disease is being continued national wide.

3.1.6 Bovine Viral Diarrhoea (BVD)

Nearly, 2.6% of the calves were found positive to the Bovine Viral Diarrhoea (BVD) and the ELISA test was conducted in VRIs. And also, it is the first detection by using antigen in Sri Lanka. Not only that, it was further confirmed by OIE reference laboratory Weybridge. However, it was not shown with the huge impacts in Eastern Province which was confirmed by nearly 69% of the respondents.

3.1.7 Vaccination strategies

There are several strategies have been developed to control or minimize the disease outbreak in Eastern Province of the country where cattle were vaccinated to control the diseases. Around 67% of the farmers mentioned that their livestock were frequently observed by the Veterinary and Livestock Development Officers especially in intensive management system. However, the chances were failed as being continuous extensive management practices are adopted in most of the rural areas. Not only that, disease symptoms were not recognised by the extensive farmers at the beginning which were clearly observed only after the symptoms were severe. Therefore, vaccination was not success in some cases as well. Kodituwakku (2000) has stated that there are several strategies such as stamping out, tracing outbreaks, legislation, quarantine, movement control, vaccination, import and export regulations, and zoo sanitary measures can be followed to control the diseases. However, major epidemic infectious diseases can be controlled by the successful vaccination program parallel to enhanced herd's immunity as well. Fernando, 1969 has also supported that low vaccination coverage can lead to the lower immunity of livestock.

In Sri Lanka FMD disease outbreak is higher due to the lower coverage of vaccination and results huge economic loses too. Not only that, famers' knowledge and adaptation of proper care and attention are important to control (Kodituwakku, 2000) where Farmers' knowledge about the disease is very important for an effective control program.

3.2 Relationship among the variables

Type of farming including crop farming, vegetable cultivation and livestock rearing is highly influenced by the education level of farmers. It is focused more based on how the knowledge and current techniques passed from one generation to another. At the study, there was a positive significant relationship was obtained between the types of farming and the education ($p<0.01$, $r = 0.637$) (Sinniah and Pollott, 2006) level of the farmers. Further, while the farming activity is carried out in full time basis; there was a rapid income gain was obtained and it was positive and significant at the current study, as well ($p<0.01$, $r = 0.893$). And also, farmers decided the different type of rearing named as intensive, semi-intensive and extensive system based on their farming size. While the number of cattle is higher, they mainly adapted the extensive system and willing to utilize the available resources than the other types. It was supported as the positive significant relationship with the systems and the number of cattle ($p<0.01$, $r = 0.877$). Therefore, it showed that the bond between adaptations of new techniques highly depended with the systems (intensive, semi-intensive and extensive).

Feeding is highly linked with the success and the failure of the cross-breeding programs and resistance to the diseases, as well. Bred animals should be taken care a lot during their systems on feeding as being bred animals are highly sensitive to the external parameters including both environment and management, as well.

Concentrates and roughages should be focused more on their feeding charts which derived as the positive significant relationship (p<0.01, r = 0.413) as being their immune systems are functionable against diseases. Animal Production and Health Section, (2019) suggested the quality semen used in Artificial Insemination was also influence the optimum conception rates. However, there was a negative significant relationship obtained between number of cattle and the disease resistance while nourishing them well. Not only that, these AI technicians can be the harbor on bringing the parasites to the herd too.

According to the study, in very few cases of particular VS Ranges; interest of the farmers on the new techniques was not based on their education level. At the time, number of cattle determined their adapting patterns where the number of cattle in extensive system created the environment to focus more on being updated (p<0.01, r = 0.589). It was fully agreed by the Abeygunawardena *et al.,* (2001) that areas of the dry zone possess a harsh climatic conditions where cattle is reared under extensive systems in communal grazing grounds and it is located far away from the farmers' dwellings. Further, majority of the cattle is indigenous and the expression of heat signs is not well marked. Not only that, farmers in these areas rely on traditional knowledge rather than on modern technologies and creates problem for various veterinary services as the intended recipients are not well motivated to get the benefits of such a service and are unable to detect heat signs and get the animals served in time (Abeygunawardena *et al.,* 2001). And also, adopting new technologies showed the negative significant relationship with their personal willingness (p<0.01, r = 0.747). Further, respondent who know well about disease symptoms positively approached to obtain the services and attend awareness programs. On the other hand, cow factors influence more on the increased resistant rate of the animal where system of raring, feeding pattern, method of reproductive techniques and management practices contributed more among the responded issues. According to the results revealed, there was a positive significant relationship between the system used for rearing livestock and the different breeds (p<0.01, r = 0.464). In very few attempts, disease to the European Cross showed the negative relationship with the management system where the relationship was significant (p<0.01, r = 0.513). And also, farmers preferred to rear the livestock breed which is highly fitted to this particular climatic condition as well. Personal interest on Sahiwal and their crosses significantly correlated with the successful production as being they have the highly adaptation over the region as well (p<0.01, r = 0.543).

Furthermore, experience of LDO & veterinary services showed the positive significant relationship with the resistance over the identified diseases (p<0.01, r = 0.814). However, there was a positive significant relationship was obtained among uncontrolled movement of cattle by traders, Herdsmen and Approved organizations without the knowledge of the veterinary authority (p<0.01, r = 0.645) with the dissemination of diseases. Bond was medium in strength between experiences on the services (p<0.01, r = 0.427) with the disease prevention, as well.

3.3 Information of awareness over the diseases

Around 86% of the total respondents among all the VS ranges mentioned that it easy to receive the veterinary services from the Veterinary Office at the needed time. However, some of the respondents (63%) mentioned that Veterinary offices are located in convenient distances while few were located far away from their farming areas. And also, veterinary ranges conducted workshops and seminars to the farmers regarding the disease recognition and proper precautionary measure where nearly 57% of the respondents participated at the awareness programs / seminars regarding the disease control and prevention. Moreover, it was possible to receive services from veterinary Offices, frequently.

At the meantime, some of the farmers are aware about the vaccine or drugs name that is fed for the diseases. It was only 56% of the responses, as well. And also, 100% of the vaccines are provided with the support of LDOs and Veterinary Doctors at the study location. However, services were sometimes not available on the

spot of needs so that, farmers adopt traditional methods to control the diseases, temporarily. Moreover, it was obvious local breeds were somehow tolerant to environment-based diseases than the European breeds in Dry Zone of the country. However, nutritional issues and metabolic diseases were highly visible with Local breeds as well.

3.4 Factors influencing on disease dissemination

3.4.1 Environmental Factors

There are two main seasons prevail in Sri Lanka which is common in all the region of the country. While focusing the climatic conditions, latter part of the October to early part of the January called as Maha Season where the annual rainfall is quite higher (1500 mm) while comparing with the other season. And also, February to September (Yala Season) is the season where most of the farmers highly depend on irrigation water. The average annual temperature of the dry zone is 28 Degree Celsius and the annual rainfall is lesser than 1750 mm (Meteorological Data, 2019) which is similar to the study location and matched with the respective values during the period of data collection. According to the study, disease outbreak was higher in Maha season while the micro-conditions are favorable over dissemination. Around 63.4% of the respondents mentioned that they used to adapt the guidelines provided by the LDOs while 36.6% of the respondents are highly concern about the nutritive level of the animals as well.

3.4.2 Physiological Factors

And also, physiological status of the animal is another factor which is predominantly linked with the rate of resistance mainly over the diseases. Hence the study revealed that 39% of the farmers used heifer while 61% of the total used with cow which was with the age range of 3 to 7 years. Similarly, several large-scale studies showed that dairy heifers and milking cows quickly showed the symptoms (De Jarnette et al., 2009). The idea using vaccination would be more successful in cows' production performances which is under the concern now. Further, the correlation was analyzed between the disease diagnosis and the status of the animal where no significant relationship was observed during the study period. And also, Cow and heifer had no significant relationship as well. Further, the age of the animal undergone to the diseases should be tender and young for the maximized success rate of production. Breed is another factor influenced a lot to bear the optimum success via the new bio technologies. At the current study, majority of the farmers (70.7%) rear Sahiwal for their livelihood activities while comparing with the other European Crosses. Based on the reduced infestation, continuous is not recommended for cows (Linderoth, 2008).

3.4.3 Management Factors

There is considerable need for a greater understanding of the role of feeds relative to the onset of estrus, pregnancy, milking, dry period, etc. This may be related to the initiation action which should be satisfied at the beginning of the lifespan of the animal. As resulted at the present survey, more than 80% of the respondents diagnosed that their cows were highly resistant to the disease while nourishing them with the balanced food in the herd while 19.5% of the total were not with lack of awareness. However, the awareness programs and the time of vaccination done are the two linked natures should be carefully undertaken for the successful production, as well. Even though the cows were recognized with their diseases, around 62.2% mentioned that the veterinary services are provided on time, as well. And also, it was supported by 87.8% of the respondents that precautionary measures were already discussed for each and every disease.

3.5 Effect of Perception on understanding the nature of diseases

Study was conducted to determine the Prevalence of Cattle Diseases in Both Local and European Breeds: Dominant Factors and Its Impacts in Eastern Province (Dry Zone), Sri Lanka. Likert scale (1-5) was used to

measure the statements (strongly disagree, disagree, not sure, agree and strongly agree) and obtained mean value for each statement. The statements were designed to analyze the respondents' perceptions towards the range of opinions exists about Prevalence of Cattle Diseases in Both Local and European Breeds: Dominant Factors and Its Impacts in Eastern Province (Dry Zone), Sri Lanka over several factors. Average mean score was calculated to obtain the relationships among the variables. The following table shows (Table 3.4) the mean values obtain for each statement from the respondents.

However, the 63.7% respondents were not very conversant about the quality of food which is used to feed the animals at different physiological status. The perception of the farmers is highly relied on the positive beliefs which the respondents have about precautionary actions and veterinary services which is strongly agree by the respondents (46.7%) too. The ANOVA test for the perception reveals that there is a significance relationship between the perception of farmers and following the guidelines provided by the veterinary officers ($p<0.01$, $r = 0.747$).

Table 3.2: Frequency results of the respondents' perception over controlling the factors influencing the dissemination of diseases

Statements	Strongly Agree (1)	Agree (2)	Unsure (3)	Disagree (4)	Strongly Disagree (5)	Mean
It is convenient as being the Veterinary ranges are nearby.	28%	33%	21%	13%	5%	2.3
It is easier to access Veterinary Services because number of VS Ranges provides its services at the time of our needs.	29%	28%	21%	17%	4%	2.4
Convenient Veterinary Services: because it does not lead the physical stress of the livestock.	29%	47%	17%	5%	3%	2.0
Livestock adapted well with our climatic conditions.	6%	27%	27%	26%	14%	3.2
Information of awareness over the diseases are provided on time.	42%	33%	15%	7%	4%	2.0
Uncontrolled movement of cattle by traders, Herdsmen and Approved organizations without the knowledge of the veterinary authority	4%	39%	19%	29%	9%	3.2
Statements	Strongly Agree (1)	Agree (2)	Unsure (3)	Disagree (4)	Strongly Disagree (5)	Mean
Some of the diseases are correlated with seasonal outbreak which can be controlled with proper vaccination.	63%	21%	7%	9%	0	2.7
It is safer to the farmers because vaccination programs are scheduled as the precautionary measures.	7%	21%	8%	0	0	1.4

(Source: Survey, 2018)

4. CONCLUSION

Based on the current study, Ampara, Batticaloa and Trincomalee VS Ranges fall under different urban, sub-urban and rural categories where the farming systems also varied as intensive, semi-intensive and extensive in most of the farming nature. Therefore, prevalence of cattle diseases in both Local and European was significantly varied with the socio-economic conditions and needs of the respondents who are mostly depended on the livestock rearing. And also, the disease resistance and adoption rate were obviously high in intensive management system where the feeding, management and health care services were given in the confined intensive conditions. Moreover, the access of veterinary services were quite lower in Ampara District even the land and number of cattle was higher there. Therefore, farmers are needed to be educated more than the current regarding the adaptation of all the precautionary measures for all the above VS Ranges.

According to the data, there were positive significant relationship ($p<0.01$) obtained between the disease resistance and the cow factors (breeds), LDOs (experience, education) and the nature of farmers (systems of rearing, concentrate feeds and knowledge on cross breeding techniques). Further, the relationship was negative ($p<0.01$) with the number of cattle available in the extensive systems which led to the poor performance in an inefficient way. And also, Sahiwal and its crosses showed high adaptation rate along with all the environmental dependant variables during the study period. However, European breeds and their cross breeds showed the high tolerance level under the confined management level which was vice versa to the conditions. Moreover, season was another factor significantly determined (($p<0.01$, positive) the disease outbreak and dissemination, as well. While considering the animal factors, Location, age, sex, Body score (BCS), Feeding types, Disease prevention/ Immunity, Consumption/day, Physiological Status significantly influence the level of disease tolerances. Disease susceptibility was comparatively higher with the increased age of the cattle and BCS. Here, the lactation period showed the most influential stage of the animal where disease occurrence was tremendously higher in cows/ heifers. Meantime, uncontrolled movement of cattle by traders, Herdsmen and Approved organizations without the knowledge of the veterinary authority were the most influential factors on transmitting the diseases as well. However, those were controlled with the proper management practices in intensive system. The systematic upgrading programmes, which were effective for several decades have been disturbed in the war affected areas. The ready-made market available for livestock and livestock products in those areas was also badly effected due to lack of transport and other infra-structure facilities such as fuel, electricity etc. In spite of the regular disease monitoring and control programs there had been disease out breaks such as Hemorrhagic Septicemia (HS), Foot and Mount Disease (FMD), Black Quarter (BQ), which has affected the security of local and locally adapted extensively managed cattle herds. However, those were highly impacted the daily livelihood activities of farmers and finally led lower productive performances of the herd as well.

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