

IMPACT OF ENVIRONMENTAL FACTORS ON TREND OF MILK PRODUCTION: A STUDY BASED IN BATTICALOA DISTRICT, SRI LANKA

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Abstract

In rural area milk production is playing vital role to maintain the part food security in terms of the nutrition. Nowadays, all the countries are taking the policy making to maintain the agricultural base production for small medium entrepreneur activities to engage the fresh milk for healthy life. The milk contain all the nutrients, which are easily absorbed and assimilated by the body. The milk universally consumes production. Even though the environmental factors involve the milk yield production and management practice of the farmers. Mostly The smallholder farmers' livestock are a living bank that serves as a financial source for period of economic distress. Motivate the small scale dairy farmers invest in this filed to profitable enterprise with commercial dairy farming. The secondary data collected from Divisional veterinary regional office in Batticaloa. Furthermore, special interview with veterinary hospital doctors and livestock farmers were arranged to identify the major problems of decreasing the milk production and death of livestock during this period between beginning of 2018 and up to now. Regarding the discussion with above people who suggested that sudden dropped in milk production around 40% compared with past years and increase in death of cattle and buffalo due to several reasons and also stated, the drought is not that much reduce the milk production because this study found the inverse relationship with rainfall and above 28°C temperature but the major reason was lack of awareness on livestock management practices. Therefore, the present study was aimed to determine the correlation between environmental conditions such as atmospheric temperature and rainfall on milk production, influence of management factors on cattle and buffalos in Batticaloa District in Sri Lanka by using descriptive analysis. This paper recommended that, farmers should be considered the proper management practices to decrease the death of animals while increase the production based on environmental conditions. The policy makers should consider provide more awareness programs related to current issues among famers in this study area.

Key words: Milk production, livestock, climate changes, Sri Lanka, management

Introduction

In spite of steady technological advancements in agriculture, climate remains a limiting factor in farm production. Climate change is expected to bring about drier, hotter summers and an increased frequency of extreme weather events across Sri Lanka. Environmental considerations are receiving increasing priority upon political, social, and economic agendas, especially when related to agriculture.

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It has been well recognized that milk yield and its composition vary according to individual cows as well as to a variety of different environment conditions, such as temperature, rainfall, humidity and so on. The consumption and demand for foods of livestock is still in increasing trend in local and international as well. The livestock is playing a vital role for food security to maintain the protein, minerals and vitamins for healthy in such ways milk, curd, meat and other valuation of the production. Most of the rural smallholder farmers involve the livelihood activities for generating income sources. The milk contains all the nutrients, which are easily absorbed and assimilated by the body. The milk is universally consumed. Most of the milk consumed in the world originates from the group of cattle, buffalo, goat, sheep, yak and camels, whose marvelous digestive system enables to convert coarse forages into milk. The livestock sub-sector recorded total production 482.70 million liter, 3.9% growth during 2017 with 0.6% contribution to GDP (Dept. of Animal Production and Health, 2017). Pathumsha, (2016) focused the trend of the milk production from the 1977 liberalization period to current situation of dairy industry to identify the problems and prospects of this sector and adduce suitable policies to develop dairy industry in this country. It found the consumption of the dairy production rapidly increasing but domestic requirement of milk is unable to reach by the domestic production. Ranawana, (2008) stated about growing almost exclusively produced on smallholding. Usually farmers are involving crops with livestock. There is no large intensive milk production in rural areas. So that both activities are interlinked with agricultural farming. Mostly in this area grass land is not reserved for reassigning cattle. Animals are grazed in vacant lots and fallows or fed in stalls with cut grass, that are really no more than weeds cut from the road.

Ibrahim, (1999) discussed about the disease for cattle and buffaloes. Most of the farmers are careless to get treatment so that easily impact milk production. Moreover, fat cream of milk, its nutrition, marking and valued add production loss demand from consumers. Especially he highlighted bovine diseases are common in the dairy production area. This should be prevented through the health management practices to reduce the risk of infection by the better delivery of veterinary services to dairy farmers and to improve the quality of those services to provide regular vaccination and medicine. Perera, (2008) explained about the livestock farmers' living condition and need support from the government and private sector.

Most of the dairy farmers are poorest of the poor and under the poverty in the rural area. The smallholder farmers' livestock are a living bank that serves as a financial source for period of economic distress. Motivate the small scale dairy farmers invest in this field to profitable enterprise with commercial dairy farming. Department of Animal Production and Health (DAPH) is encourage to investment dairy production and implementation some project to import cattle with partnership between the public private partnership for innovation in this dairy sector. Moreover establishing number of milk chilling centers in island wide. The milk production is high nutrition liquid food for healthy life and also to reduce malnutrition for improve the nutrition level for the population. The district wise Batticaloa and divisional Secretariat wise Eravur Pattu also contributes the national milk production.

Thus, most of the papers are highlighting the dairy farming present and prospect of dairy production in Sri Lanka during particular period. The main objective of this study to analyze the current status and trend of milk production in Eravur Pattu Division with availability of data. The aim is to be investigated the influence of environmental factors and management practices in cattle and buffalo population. Because recently in this area cattle and buffalo suddenly dead due to climate change and farmers management practices to bring the policy making for this types challenges and particularly, this division is also playing divers role to produce milk to contribute national dairy production.

Methodology

Description of study area

This study was conducted in Eravur Pattu, Batticaloa district belongs to Eastern province of Sri Lanka. The climate of the study area comprises a wet season during North-East monsoonal period (November to February) characterized by high mean precipitation (1250 ± 230 mm) and a dry season during the South-West monsoonal period (May to August) marked by low mean precipitation (300 ± 23 mm). Mean temperatures range from 21.5 ± 7.6 °C (in the wet season) to 32.6 ± 5.4 °C (in the dry season) (Meteorological department, Batticaloa, 2017).

Data Collection and analysis

To assess the impact of weather and management practices on milk production of cattle and buffaloes, a study was conducted at Eravur Pattu, Batticaloa district. The monthly weather data of Batticaloa district were collected for a period of two years (2017 and 2018) from the Meteorological Observatory located at Batticaloa, Sri Lanka analysis to identify the factors directly and indirectly effect on milk production. Weather data comprised of important parameters like temperature, rainfall and relative humidity. The monthly milk production data used in the study was collected for a period of three years (2017 to 2019) from Divisional veterinary office in Illuppachchenai and Chenkalady in Eravur Pattu. Furthermore, special interview with veterinary hospital doctors and livestock farmers were arranged to identify the major problems of decreasing the milk production and death of cattle and buffalo during this period between beginning of 2018 and upto now. Finally, SPSS software was used for the statistical analysis and to develop interaction graph on milk productivity and weather variables.

Results and Discussion

Influence of Environmental Factors on the Milk Production in Cattle and Buffalo Population

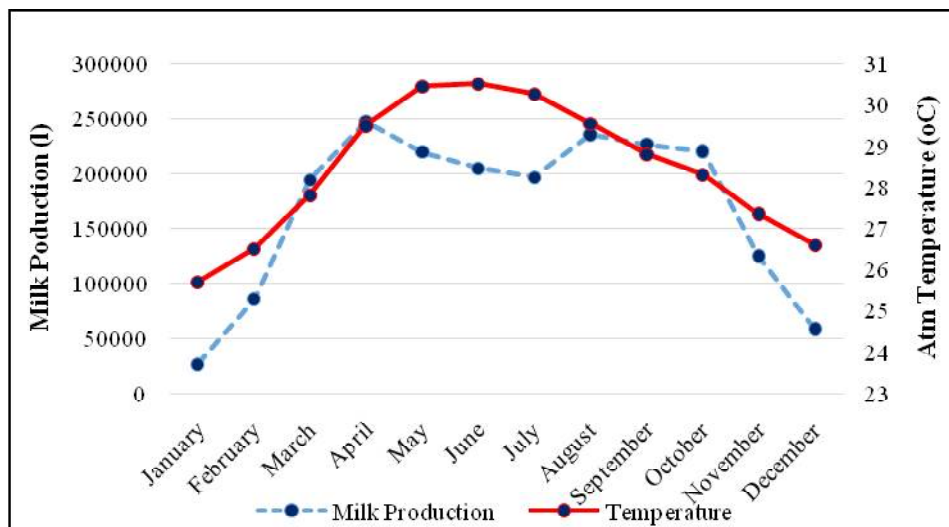


Figure 1: Relationship between milk production and atmospheric temperature in 2017

Heat stress is of major concern among livestock owners in almost all parts of the world. Cattles that are affected by heat stress show reduction in feed intake and milk yield and shift metabolism, which in turn reduces their milk production efficiency(Dahl, *et al.*, 2016). Figure 01 and Figure 02 illustrate the effect of atmospheric temperature on the milk productivity in 2017 and 2018. According to the figure 01 and 02, milk production was increased with increasing air temperature from January to April before being declined in mid of year in 2017 and 2018. Afterward, milk production experienced a downward trend in remaining months in both years. The major reason was temperature fluctuation around the year. It is mean that, Most livestock species perform well in the temperature range of 10-30°C, beyond this limit cattle tend to reduce milk yield and feed intake (Allen, *et al.*, 2013). Temperature above 35°C may activate thermal stress in animals directly reducing the feed intake of animal thereby creating a negative energy balance which ultimately affects synthesis of milk (Daset *al.*, 2016).

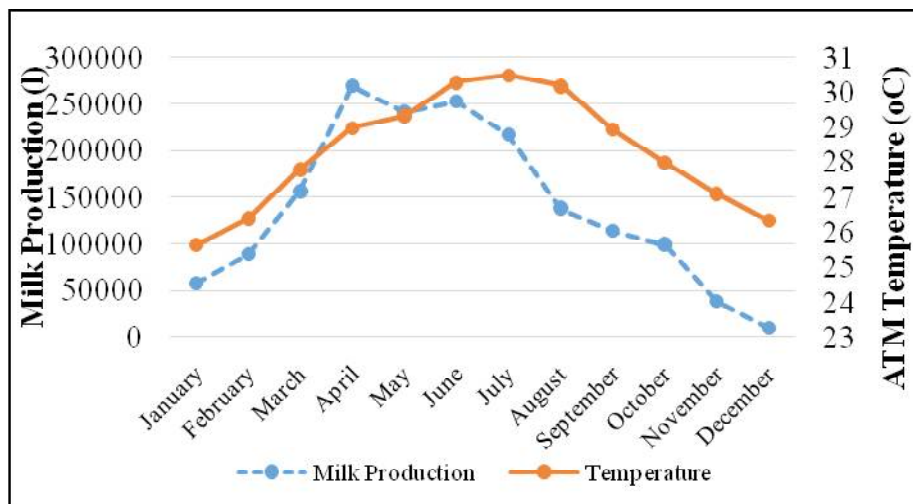


Figure 2: Relationship between milk production and atmospheric temperature in 2018

Heat stress occurs when animals experience conditions above their thermal comfort zone and are unable to dissipate enough heat to maintain thermal balance (Kadzereet *al.*, 2002). An animal's thermal tolerance is also affected by solar radiation and the velocity of ambient air (Hammamiet *al.*, 2013), while increasing precipitation is associated with declining milk production (Stull *et al.*, 2008). Heat stress can makes changes in the feeding pattern, rumen function andudder health ultimately leadstodecreased milk production.Over 50% of the cattle population is located in the tropics and it has been appraised that heat stress causes severe economic loss in approximately 60% of the dairy

farms around the world (Daramola *et al.*, 2012). The negative relationship between temperature and milk productivity is depicted. It means with increasing temperature milk yield decreases. Therefore, exposure to high ambient temperature is the major constraint on cattle and buffalo productivity. This is due to the fact that it evokes a series of drastic changes in the animal's biological functions that include depression in feed efficiency and utilization (Figure 02).

Influence of heat stress on milk composition in cattle

Heat stress apart from affecting the milk yield can also influence milk composition and milk yield especially in high yielding breeds (Gantner, *et al.*, 2011). Internal metabolic heat production during lactation can reduce the resistance of cattle to high ambient temperature, resulting in altered milk composition and reduction in milk yield (Gantner, *et al.*, 2011). When the temperature rises above the zone of thermal neutrality milk composition changes and Heat stress was found to reduce the protein and fat (Kadzere *et al.*, 2002).

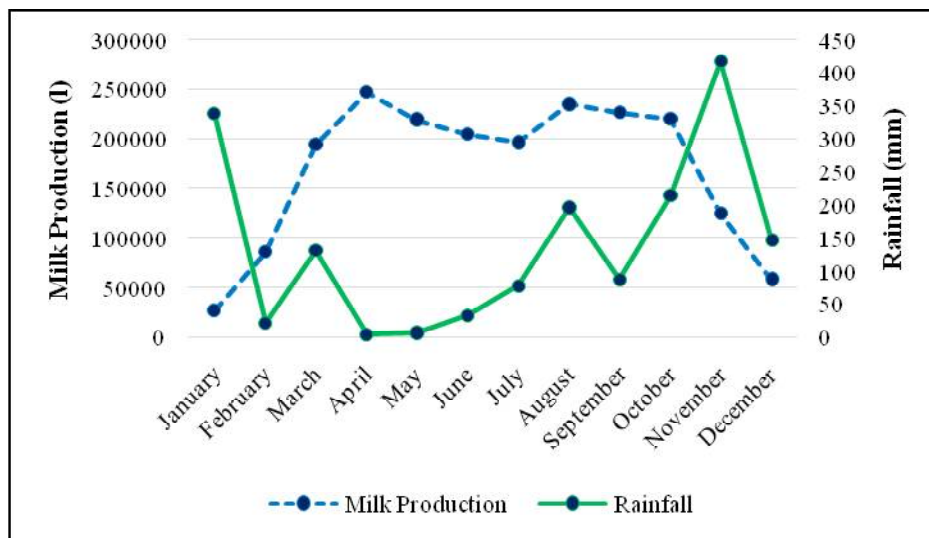


Figure 3: Relationship between milk production and rainfall in 2017

Figure 03 and Figure 04 illustrate the effect of rainfall on the milk productivity in 2017 and 2018. According to the figure 03 and 04, milk production was shown a fluctuation in both years with the variations of amount of rainfall in Batticaloa district. The reason for low amount of milk production in November to February is high amount of rainfall experienced during this period. Therefore, it will lead to reduce the availability of pasture land and increase the disease due to flooding.

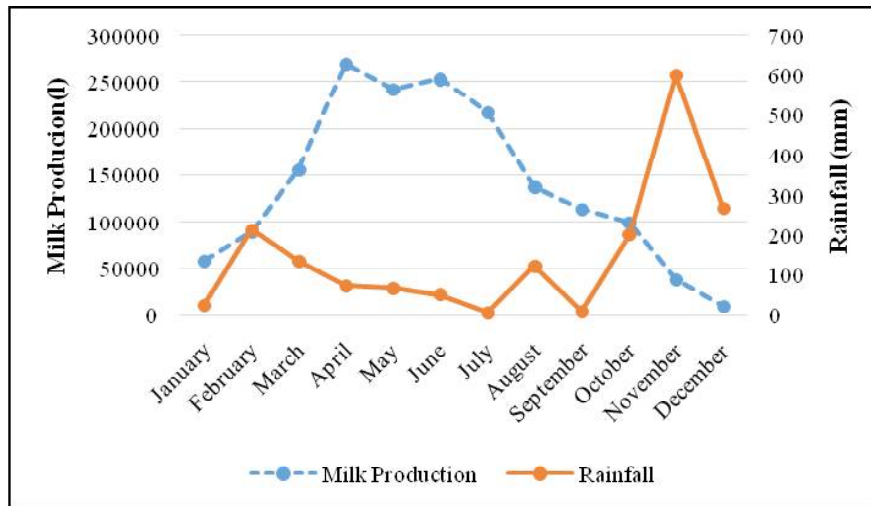


Figure 4: Relationship between milk production and rainfall in 2018

Figure 05 gives the information on the comparison of milk production in 2017, 2018 and 2019 in Eravur Pattu, Batticaloa District in Sri Lanka. Overall, highest amount of milk production had experienced in 2017 and lowest proportion was in 2019 due to increasing atmospheric temperature from 2017 to 2019. Furthermore, another important reason for lowest production is death of animals due to various factors such as climate changes, poor management practices, lack of pasture and fodders and so on.

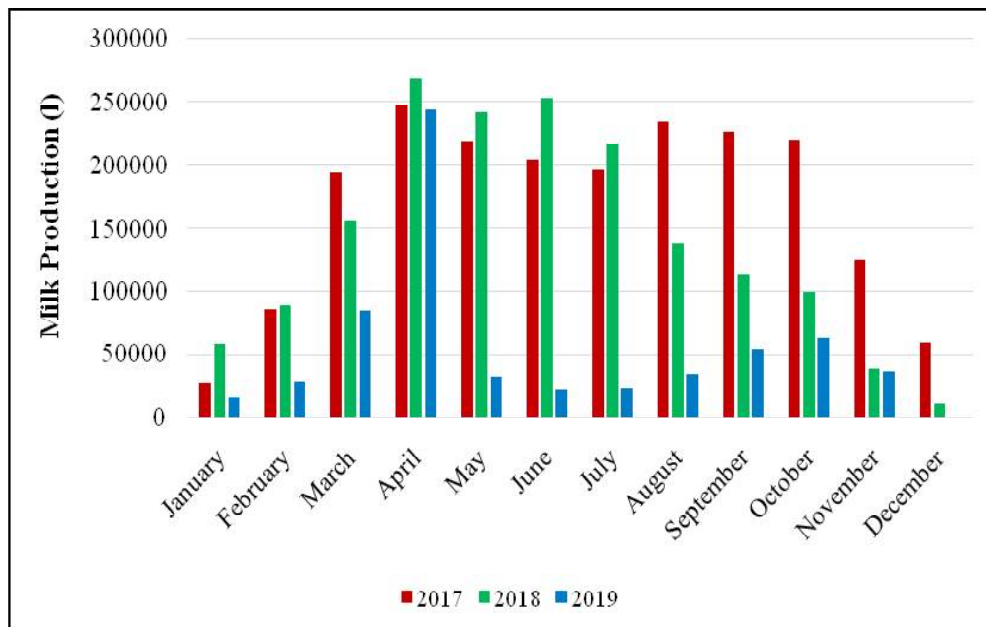


Figure 5: Comparison of milk production in 2017, 2018 and 2019

Climate change will have direct effects on livestock performance and welfare, mainly through increases in temperature and the frequency of extreme weather events, and will also affect animals indirectly through changes in the availability of fodder and pasture and the distribution of pests and parasites (Gaulyet *al.*, 2013). High temperatures are associated with a greater incidence of heat stress in livestock, which can have negative effects on milk yield (Hammamiet *al.*, 2013), fertility (Hansen, 2009) and health (Sankeret *al.*, 2013), and increase the risk of mortality (Vitaliet *al.*, 2009).

Influence of management practices on the Milk Production in Cattle and Buffalo Population

The above figure 05 shows that monthly trend of milk production almost same last 3 years in April but suddenly declined the milk production from May to August in this year 2019 compared with last two years milk harvesting. In this special case interviewed with dairy farmers they mentioned the continually death of cows and buffaloes due the disease, drought and not enough the feeding grass, water and etc. on the other hand interviewed with Veterinary Doctors also pointed out the disease and drought. Apart from that they identify the major reason, which was lack of management practice for extensively growing cattle and buffaloes. Mostly cattle farmers did not have experience to prevent disease because the seasonable disease spared one cattle to other cattle and buffaloes. Disease is one of the major problems associated with dairy production or milk productions system. Disease can causes mortality of both the calves and cows and reduced milk production. Diseases of lactating animals such as, mastitis, ketosis, hypocalcaemia, milk fever, are serious economic problems for dairy farmers. The huge percentage of mastitis in dairy herd causes losses by lowering milk production, calve death and even the dairy cows (Nigusset *al.*, 2017).

Moreover, farmers are not register and put ear tag for each and every cattle, not keep drinking water for cattle during the whole night period, not regularly provide vaccinations and medicine, density of cattle and buffaloes population increase in one place during the paddy cultivation period, very difficult to maintain the livestock intensively. As a result death rate was increased in cattle and buffalo population. Furthermore, the Veterinary Doctors mentioned about the raising the cattle and buffalo in intensively it will give more benefit for dairy farmers compared with extensively growing. Because the intensively cattle farmers can be registered for insurance but the extensively farmers can't claim in any case of the lost. During flood period, automatically milk production will go down because there is no any other natural conservation practices follow-up up by the cattle farmers. Some of cows and buffalo are harvesting milk litters fluctuating due to age wise of

cattle and buffalo, feeding place and etc. Hygienic milk production is important and should take into account the sanitation of the barn, personnel involved in milking and the utensils used to collect and store milk. Cleaning of the teats before milking contributes to hygienic milk production (Nigusset *al.*, 2017).

Conclusion

In this context, the two issues that have become crucial for dairy farm sustainability are localized assessments of climatic conditions risk and potential adaptation strategies and improving managerial performance, often measured by technical efficiency. Environmental factors and management practices are considered to be the primary factor reducing milk production in cattle and buffalo which ultimately culminates in severe economic loss to livestock farmers in Eravur Pattu in Batticaloa District. Temperature not only reduces the milk production but also affects the quality of milk by altering various components of milk. This study provides a clear insight into how environmental factors and management practices affects milk production and elucidates the mechanisms through which the reduced milk production is brought about while an animal is exposed to adverse weather conditions and poor management practices.

Suggestions and Recommendations

A limitation to this study is that food intake and quality can also depend on weather, and animals consumed different diets when they were indoors and outdoors. However, diet and management system are associated under typical farming practices, so this does not reduce the practical relevance of these findings. This paper recommended that, farmers should be considered the appropriate controlling practices to decline the death of animals while increase the milk production based on environmental conditions and government could be organized more awareness programs related to current issues among farmers in this study area. Further work is needed in order to analyze possible opportunities for decreasing the environmental impact and improving management practices in livestock husbandry.

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