



# Climate Change Adaptation, Health and Shelter Management Practices for Dairy Animals by Smallholder Farmers in Nyanza District in the Southern Province of Rwanda

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## Introduction

Just like every other agricultural sub-sector, the dairy industry is prone to the impacts of climate change. Climate change forces water and land to become more limited for fodder production and causes temperatures rises, requiring changes to forage feeding systems. Also, increase in temperatures requires changes to forage feeding systems. Climate change is having substantial effects on the environment and other natural resources upon which the livestock sub-sector depends [1]. There is direct impact and indirect effects of climate change to dairy production brought about by change in feed and fodder supply which affects livestock production system [2]. Changes in mean temperatures and rainfall patterns leading to extreme weather variability have been experienced in recent years. These impacts have also affected water availability, heightened frequency and amount of drought incidences, floods, sea level rises pest and disease outbreak among other detrimental impacts [3,4]. However, an extensive array of possible practices have been recognised as sustainable means for smallholder dairy farmers to cope with the challenges of a changing climate is known as Climate change adaptation practice adaptation is the first priority; this may involve the use of improved breed of dairy animals which have the ability to cope up with high temperatures, and drier conditions.

## Materials and Methods

The study was conducted in Nyanza district in the Southern Province of Rwanda. Its capital is Nyanza town, which is also the Southern provincial capital. This location was selected due to its peculiarity to climate change especially drought events. Nyanza district has population of more than 320, 000 people (according to 2012 national census). Nyanza is predominantly rural with 7.9% urban and 92.1% rural. The study area has a total population of

2,500 dairy farmers. Proportional sampling was used to get the sample size of 243 respondents using sample size estimator. The data collection methods used included structured questionnaire, key informant interviews, and focus group discussions.

## Results and Discussion

### Health Management Adaptation Practices

Table 1 shows the health management adaptation practices of dairy farmers. About 39% of dairy farmers engaged in ethno-veterinary practices, 27% engaged in preventive measure like vaccination, 24% give regular health check-up for their cattle, while only 10% had not engaged in any health management practice.

**Table 1:** Health Management Adaptation Practices of Dairy Farmers.

Healthcare Control in adverse environmental conditions	Percentage
Regular vaccination (Preventive)	65 (26.7%)
Ethno-veterinary practices	94(38.7%)
Regular check-up	59 (24.3%)
No practice	25 (10.3%)

### Shelter Management Practices

Most of the dairy farmers (83%) of the farmers agreed to have modification in the shelter (housing unit) management during changing climatic conditions. The use of proper ventilation was the commonest practice adopted to cope with extreme weather (high temperature) condition (49%), other practices adopted include the use of bedding materials in winter (18%), tying of animals under shady trees during summer/hot times, use of sprinklers or mist in summer, and coverage of windows in winter (7%) (Table 2).

**Table 2:** Shelter Management Practices.

Items	Percentage
<b>Modification followed in Shelter Management in Changing Climatic Conditions</b>	
Yes	203 (83.5%)
No	40 (16.5%)
<b>Practices Adopted to Cope with Extremes of Weather</b>	
Use of sprayers/fog in summer	20 (8.2%)
Use of sheet in winter	43 (17.7%)
Covering of windows in winter	17 (7%)
Bathing during summers	3 (1.2%)
Wallowing	10 (4.1%)
Use of proper ventilation	118 (48.6%)
Tying under shady trees during summer/hot times	29 (11.9%)
Keeping inside during daytime and tying outside during night	-
Others (combination of practices)	3 (1.2%)

## Conclusion

Climate change impacts on dairy animals make water and land to become more limited for fodder production; and causes temperatures rise, requiring changes to forage feeding systems and these situations could affect the health and shelter management of dairy farming. Therefore, farmers have to be adopted suitable adaptation practices on health and shelter management.

## Recommendations

- Dairy farmers should be empowered by government and other relevant institutions (health and veterinary) to

encouraged to scale up climate change adaptation practices in order to mitigate against the effects of drought, pest infestation, disease outbreak, emergence of new vectors and livestock diseases occasioned by extreme weather variability and other occurrences occasioned by extreme weather variability.

- As a response to the effects of climate change, dairy farmers should invest in low-cost fodder development, conservation and conducive housing units (shelter) in order to sustain their dairy herd productivity (Figure 1).



**Figure 1:** Photographs: Researchers during field data collection, 2019.

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