

## An Impact Assessment of Climate Change on Milk Production in Nyagatare District of Rwanda

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### Abstract:

*The present study is aimed to evaluate the impact of climate change on milk production in Nyagatare District, Eastern Province, Rwanda. Nyagatare District has experienced small quantity of rains and hot temperature. It is characterized by two main seasons: One long dry season that varies between three and five months with an annual average temperature varying between 25.3<sup>o</sup> C and 27.7 <sup>o</sup>C. The monthly distribution of the rains varies from year to another. The annual rain falls are both very weak (827mm/an) and very unpredictable to satisfy the needs in Agriculture and livestock. It is having little number of rivers, this constitutes a serious problem, where government should respond and provide safe water for people and animals. Climate change may affect milk production because of the sensitivity of dairy cows to excessive temperature and humidity. Milk production is decreasing in dry season which can vary from three to five months.*

*The hydrographic network is very limited in the District of Nyagatare. A part from the River Muvumba that cut across the District, the Akagera and Umuyanja Rivers passing the District constituting its limits with Tanzania and Uganda , respectively, there is no other consistent river that can be exploited by the population in Nyagatare. Few of the rivers found there such as Nyiragahaya, Kayihenda, Karuruma, Nayagasharara and Kaborogota are erratic and intermittent. The weak river network constitutes a serious handicap to responding to the needs of water for people and animals.*

**Key words:** Climate, Milk Production, Nyagatare District

## **Introduction**

Nyagatare District is the largest and second most populous District (Akarere) in Rwanda. Located in Eastern Province, Rwanda, Nyagatare occupies the Northeastern extremity of Rwanda. Its capital is Nyagatare city, the former capital of the now defunct Umutara Province. Nyagatare District borders Uganda in the North, Tanzania in the East, Gatsibo District of the (Eastern Province) in the South, and Gicumbi District of the Northern Province in the West. Nyagatare District has an area of 1,741 km<sup>2</sup>, what makes it the largest District in Rwanda. With a population of 466,944 in 2012, Nyagatare is the second most populated district of Rwanda only after Gasabo District of Kigali City with 530,907 inhabitants.

Agriculture and dairy farming are highly depending on specific climate conditions. Here we have to understand the overall effect of climate change on milk production. The study indicate climate change has a positive or negative impact on milk production because in rain season where cattle have enough water and grasses, milk production increase, where it decreases in dry season because lack of enough water and grasses for feeding cows.

The reduction of milk is one of major impacts of climate change in dairy cattle. There significant decreasing of milk production in dry season, because dairy farming and agriculture production depend on climate conditions.

The Nyagatare district leadership has vowed to expand agriculture mechanization and hillside irrigation as well as livestock modernization in a bid to achieve self-reliance for sustainable development.

The vow was made during the ongoing 2012-2013 districts Imihigo evaluation taking place around the country. In Nyagatare, out of 17 imihigo under the objective of increased agriculture, livestock production, productivity and value

addition, seven of them are related to livestock (small animals and cattle) production and product improved.

Under this output, 1,105 cows were distributed to poor families, 3,544 cows were inseminated, activities for livestock watering system are ongoing, Nyagatare animal laboratory was rehabilitated and equipped.

Eight milk collection centers were transformed into dairy business centers, fencing and clearing of farms is ongoing, valley dams were constructed, over 90,000 cattle were vaccinated and 168 community animal health workers were trained and equipped.

The scarcity of water across the district and the long dry season were highlighted as major challenges that hinder the district performance in areas of hygiene and sanitation, greening and beautification as well as biogas utilization and agriculture and livestock professionalization. However, efforts are underway to address this problem and projects have been initiated.

## **Methodology**

The present study is designed to assess the impact of climate on milk production in Nyagatare District in Eastern Province of Rwanda. The main focus of the study is to know the variation of milk production in dry season and milk production in rain season. The study is based on secondary data (Reports, Journals and Website informations) and is based on Descriptive method.

## **Statistical Analysis**

The comparative analysis of milk production in two seasons (Rain season and Dry season) was carried out with the help of tables with simple statistical calculation. Where they indicate

the variation of milk collected in this two periods and show the difference in production.

### Objective of the Study

The following is the objective of the study:

To found out the milk production in two season (rain and dry season).

### Presentation and Analysis of Data:

**TABLE No.1: MILK PRODUCTION RAIN SEASON**

MCC	MONTHS									TOTAL
	SEPT	OCT	NOV	DEC	JANV	FEVR	MARCH	APR	MAY	
KKZ	163,224	185,080	210,889	239,138	21,438	155,062	172,441	226,075	238,664	1,372,873
KFC	46,618	44,744	49,147	54,363	51,972	48,306	54,060	57,904	58,359	411,110
RDFC	91,207	109,106	148,349	185,515	122,679	78,770	107,736	128,373	138,943	925,163
A M S	13,461	16,404	22,213	26,472	25,861	19,872	18,325	30,276	31,778	178,190
IGG	46,988	58,939	83,055	103,252	95,743	73,549	75,312	106,265	115,007	654,858
T M	39,447	49,329	69,241	83,012	66,402	51,587	50,320	74,193	88,339	488,858
BCRK	48,838	60,361	73,322	101,955	88,786	83,381	85,627	94,160	102,825	637,300
MATWOKI	57,822	72,839	107,652	147,950	128,888	72,954	110969	139975	140107	831,206
A B	22,357	31,101	46,060	59,149	29,060	23,928	22,171	35,502	39,241	249,420
NYAGATARE	29,383	32,421	49,285	68,063	22,928	14,861	10,977	29,653	31,202	220,710
BWERA	33,861	38,173	46,630	64,271	62304	49,524	57,508	66,269	71,249	425,518
GRAND TOTAL	593,206	698,497	905,843	1,133,140	716,061	671,794	765,446	988,645	1,055,714	6,395,206

Source: NYAGATARE DAIRY FARMERS UNION (NDFU) 2014 REPORT

**TABLE N°2: MILK PRODUCTION (DRY SEASON) IN THE MONTHS OF JUNE, JULY AND AUGUST 2014**

MILK COLLECTION CENTER	MONTHS			
	JUNE	JULY	AUGUST	TOTAL
KKZ	228,673	118,505	97,221	444,399
KFC	59,306	42,996	37,367	139,669
RDFC	138,946	54,618	41,575	235,139
AMS	41,555	14,379	9,259	65,193
IGG	125,237	45,017	30,320	200,574
TM	97,438	40,687	20,630	158,755
BCRK	113,725	50,277	36,455	200,457
MATWOKI	132137	57,145	37,537	226,819
AB	45,324	18,449	10,910	74,683
NYAGATARE	32,734	17,833	5,991	56,558
BWERA	81,259	36,740	23,220	141,219
GRAND TOTAL	1,096,334	496,646	350,485	1,943,465

Source: NYAGATARE DAIRY FARMERS UNION (NDFU) 2014 REPORT

## **Results and Discussions of Findings**

The table N<sup>o</sup>1 indicates that the quantity of milk has increased in rain season which starts in September and ends in May. Rainy season offers milk production increase due to availability of grasses and water. Cattle didn't need to run far to get foods (Grasses and water). Therefore, this table clearly shows how milk production in Nyagatare District changes over the season where it can change accordingly. The production of milk in September was 593,206 liters, October 698,497 liters, November 905,843 liters, December 1,133,140 liters, January 716,061 liters, February 671,794 liters, March 765,446 liters, April 988,645 liters, May 1,055,714 liters. The grand total of milk production in 9 months (September to May) is six million three ninety five thousand two hundred and liters (6,395,206 liters). If you take 6,395,206 liters divide per 9 months of rain season, the monthly is 710,578 liters.

The table N<sup>o</sup>2 indicates that milk production in dry season has decreased in the months of June to August 2014. There is decrement of milk production because lack of enough food (Grasses and drinking water). The milk collected is: June 1,096,334 liters, July 496,646 liters, August 350,485 liters.

The grand total of milk collected in 3 months of dry season is 1,943,465 liters. If divide per 3 months the average of milk production per month is 647,821 liters.

## **Conclusion and Recommendations**

The aim of this paper is to establish the important climatic considerations in assessing its impacts on milk production. Milk production decrease strongly because of geographic conditions where it increase in rain season and decrease in dry season.

The results of milk collection report of 2014 indicate that in dry season milk production is reduced because of shortage of grasses and water. In this season cattle movement especially

crossbreeds affects their production, it is because of lack of enough foods (grasses and water) and also doing long journey in search water and grasses, this also affect milk production decreasing its quantity.

In response to this problem of low production of milk during dry season, Ministry of Agriculture and Animal Husbandry should provide or distribute water across farms in district because low milk production it is not only the loss to dairy farmers but also it affects national economy by decreasing milk production.

## **REFERENCES**

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