

# The Development of a Potential Local Dairy for an Emerging Peri-Urban Population of Cameroon

Zephania N. Fogwe

Laboratory of Environment, Hazards and Sustainable Development

Department of Geography, Faculty of Letters and Social Sciences

Box 3132, Douala, University of Douala

Tel: 237-696-769-640 E-mail: [nfogwez@yahoo.co.uk](mailto:nfogwez@yahoo.co.uk)

Received: October 4, 2015 Accepted: November 27, 2015 Published: December 25, 2015

doi:10.5296/wjbm.v1i2.8776

URL: <http://dx.doi.org/10.5296/wjbm.v1i2.8776>

## Abstract

Dairy milk development guarantees income small graziers and nutritive balance of the population but its perishable and bulky characteristics requires a special production attention especially in the North West region of Cameroon where indigenous breeds of zebu cattle notably the Gudali, Red Mbororo and White Fulani grazed in nomadic to semi-nomadic systems year round. Primary and secondary data collected and treated statistically allude to the fact that Tubah-Sabga is an archetypical rangeland continuum where this activity has deepened its roots years past with a timidly growing human population that is a prime production and potential market. The population rise within this zone consequent of student influx has soared the demand potential for the dairy products that have been on a near abandonment to indigenous efforts. The current dairy production levels have a high potential to be enhanced by the emerging educational institutions emerging in the zone so as to guarantee a self-sufficiency for the local peri-urban community in the making.

**Keywords:** Dairy farming, Development, Graziers, Sustainability, University, Zero grazing

## 1. Introduction

### *1.1 Overview*

Dairying took its roots in Mesopotamia and spread the world over practiced by traditional and non-traditional milk producers though on a general decline. There exist efforts to develop the dairy farming in Cameroon focusing on genetic improvement through cross-breeding local with exotic breeds of cattle; improving nutrition through pasture improvement and supplementary feeding; better health, hygiene and sanitation; and better access to markets for dairy products (IRZV 1990 cited by Njwe et al., 2000). These pastures are lacking and supplementary feeding with concentrates and minerals are absent worsened by transhumance to river valleys imposed by the severity of the dry season. The breeders consider meat as the primary product while milk is secondary so dairy production is still on a small-scale, experimental and embryonic level despite the human population pressures.

Though dairying has a direct impact on income generation, poverty alleviation and availability of animal protein, the dairy farming sector in Tubah is far from satisfying local rising demand for milk and milk products which is an opportunity for a huge development in local milk production. This can draw from the huge primary resource base of rangelands (pasture) and water availability maintained by an inter-annual variability and steady trend of rainfall that can assure a dairy farming as an alternative to subsistence farming. As a result of annual burning of range land, the less fire-resistant pasture species are eliminated so livestock becomes malnourished and predisposed to disease. To obtain a sustainable dairy production requires a radical departure from the extensive system of grazing.

### *1.2 The Problem*

This paper probes into the current status and potential of dairy farming in Tubah to suggest sustainable measures for the development of a dairy farming in Tubah an area where cattle numbers are called to grow same pace-level with a rapid human population increase resulting from a proliferation of higher institutions of learning in record time within Bambili and Bambui. This study opines that a significant relationship between seasonal changes and low milk production will not meet the development challenges needful of the doubling or miracle pace population upshot of Tubah that Bambili and Bambui offer a perfectly inelastic demand with a very high propensity to consume dairy products. Student population was about 3000 at the creation and start of The University of Bamenda in 2011-2012 academic year but has grown and projected to reach 15,000 students in 2015-2016 (Vice-Chancellor's projection at commissioning of appointed Registrar on September 25, 2015), representing a five-fold growth in student population alone. This state of production is likely to cause a demand push in prices to that would be unfavourable to the livelihood of burgeoning student community whereas enormous potentials for a successful improvement exist from the part of the grazers themselves and The University of Bamenda whose Department of Animal Technology in the College of Technology is a window opened for a win-win partnership in development and business.

The cattle rearing sector and dairy farming must begin its journey into the United Nations

Sustainable Development Goals (SDGs) to eradicate hunger and poverty so as to attain zero hunger and zero poverty by 2030 because clear indications point to the fact that the halving hunger by 2015 by Millennium Development Goals Millennium has failed for Tubah. Since grazing land is perfectly inelastic and instead constricting from other emerging competing land uses, it is only but proper to consider a qualitative and qualitative improvement of the protein support base for the “new” population in rearing through dairying. For the 17 SDGs and 169 targets several trillions of US dollars would go in the form of development spending and so there should be no apprehensions concern any part of Africa that has 2065 regional agenda of the African Union.

Tubah created in 1992 as one of the five Sub-Divisions of Mezam Division, North West Region of Cameroon (Figure 1).

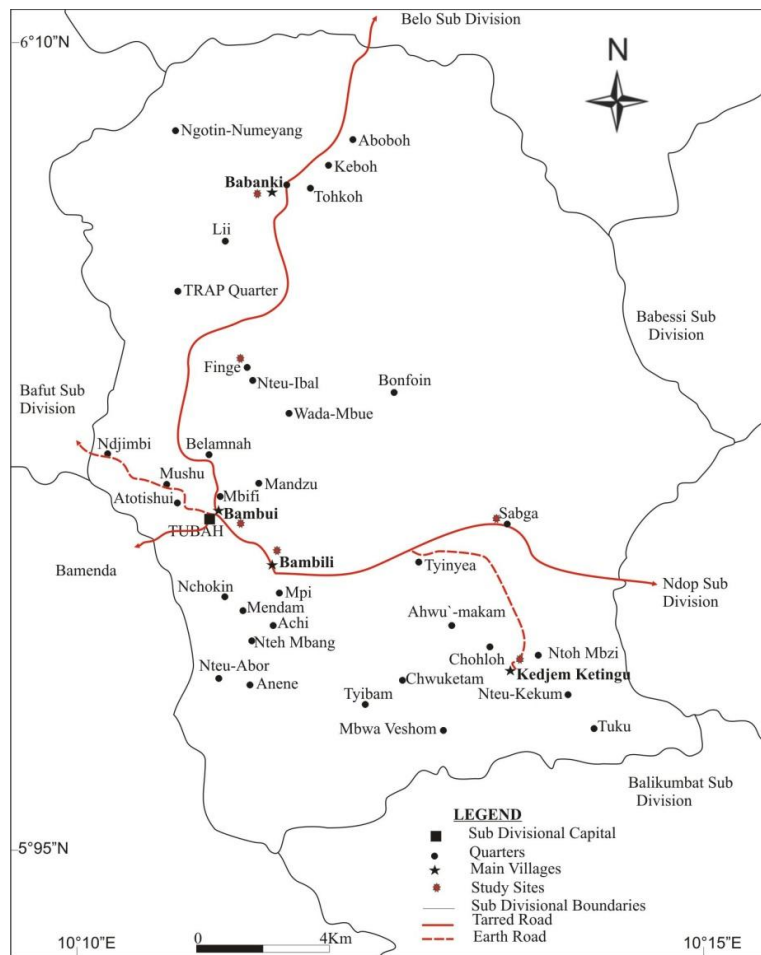


Figure 1. Communities within the Tubah dairy zone

Tubah lies between latitudes 5°95' and 6°10' North of the equator and longitudes 10°10' and 10°15' East, bound to the North by Belo Sub-Division, to the South by Balikumbat, to the East by Bafut and Bamenda Central Sub-Divisions and to the West by Babessi and Ndop Sub-Divisions which are subdivisions where cattle grazing are significant activities. Dairy

farming is practiced in the Tubah villages of Sabga, Kejem Kitungo, Finge, Bambui and Babanki though a great an important part of the population practices extensive grazing alongside a few zero grazing farms in upland areas where the dairy cows graze on natural pasture by the Fulani community. Pamo (2008) found that the Fulani lifestyle centres on cattle rearing and most of their income derives from cattle on natural pastures. In this light, Tata et al (2012) concluded that the quantity of milk produced would significantly depend on the availability of this resource base to the cows. This agrees with the findings of Tambi (1987) that the constraint to dairy production in Cameroon is the extensive cattle rearing on low- nutritive value unmanaged pastures which lowers animal productivity because of the uncontrolled stocking rates that result in over- and under- grazing.

Nell (1992) described five dairy production systems in Sub Saharian Africa: pastoral, agro pastoral, mixed farming, intensive and peri-urban some of which are found in Cameroon at various stages. However, the intensive system of industrial milk production was not found in the Western Highlands because dairying is at small scale level because three stock rearing systems are practiced in Cameroon being pastoral, semi-intensive and intensive (Kameni et al 1999).

## **2. Methodology**

Primary data started with a reconnaissance survey of the area. Personal and group interviews were conducted as well as focus group discussions with dairy cooperative members. Based on a 10% sample size, some 100 questionnaires were administered to appraise the consumption rate of milk and beef in households being 20 questionnaires administered per village. The sampling technique used was stratified random sampling targeting 100 dairy farmers in the five study sites. Secondary data was obtained from the Divisional Delegation of Livestock, Fisheries and Animal Husbandry (MINEPIA), Tubah, the Sub-Divisional Delegation for Livestock, Fisheries and Animal Husbandry for Tubah, and agents of Heifer International Cameroon and the veterinary doctors of Sabga and Finge. Essential data was also provided by Dairy Farmers Cooperative Groups, Feed the Nation Dairy Farming Group, Vesonah-Angwah, Sabga Dairy Farming Group), the MINEPIA Centre at Sabga and Tubah Rural Council. Emphasis was on the situation of dairy farming in Tubah by determining the number of dairy cattle, capacity of grazing land and mode of grazing, quantity of milk produced, dairy cooperatives and the availability of dairy products to the population. Secondary data was made possible by documentation research, interviews, administration of questionnaires and complemented by field observation. Descriptive and inferential statistical tools were used to analyse the data. Sample of the ethnic groups in Tubah was made to include four villages of Bambili, Bambui, Kedjom Keku (Babanki) and Kedjom Ketinguh made up of Tikars, apart from the Fulanis and Hausa at Sabga. Dairy farms of individuals or farming cooperatives in areas such as Sabga and Finge were consulted

## **3. Results and Interpretation**

### *3.1 Dominance of Small Scale System of Indigenous Dairy Farming in Tubah*

Though an outstanding agrarian basin of the North West Region, crop and especially dairy

farming low compared to its potentials (fertile volcanic arable land, man-power and a ready and growing market offered by a galloping student population). The tropical savanna grows in the form of short grasses and few stunted shrubs on rich volcanic soils. Only patches of natural forests are left due to human encroachment, bushfires and grazing pressure. In response to the vegetation drying up in the dry tropical highland climate cattle is moved from November to mid-March for long distances searching for natural pasture so lose weight and directly reducing their milk production capacity as compared to the rainy season from mid-March to October marked by heavy storms and warmer temperatures. This alternation of seasons causes pastoral nomadism on the plain at Bambui and hills which stretches to Bafut, Kedjom Ketinguh, Ngubi, Nguh Mbonyam and Nguh Aseh in Kedjom Ketinguh; Munduba in Bambui; Vumih and Mbi in Kedjom Keku, as well as Bambili being zones of hill top grazing practicing small scale system of indigenous dairy farming.

This timid dairy farming supported a largely homogenous and indigenous population of 48,542 inhabitants in 2005 (BUCREP, 2005), with small scale cropping of tubers, cereals, legumes and fruits (potatoes, beans, maize, groundnuts, cassava, rice, yellow yams, cocoyams, bananas and plantains). Bambili and Kedjom Ketinguh do market gardening of lettuce, leeks, onions, celery, parsley, carrots and cabbages.

However, some zero grazing and extensive grazing for milk and beef is identifiable at Sabga, Finge, Kejem Keku, Bambui and hills of Bambili. Such indigenous dairying fails to be sustainable because of the imbalance between social, economic and environmental characteristics of the Tubah communities especially as the rangeland, water resources and soils are degraded and greatly hampers farm profitably especially as with the low nutritional value of cattle grazed extensively. Environmental pressure and other problems in Tubah would entail that dairy farmers invest much for food safety (high water quality, stock health, dairy hygiene and milk fit for purpose), animal welfare and care for the environment as well as a habitat provided for native species. Such requirements were not forthcoming and so brought pressure on the few indigenous dairy farms. This paved the way for some improvements in the sector in Tubah by Heifer Project International that targeted enjoyable, profitable dairy farming that looks after the environment for future generations of farmers.

### *3.2 A Modernization within a Difficult Cultural Setting Dairying Sector in Tubah*

Events after 2005 showed rapid population growth, grazing land shortage and increased interest in production and consumption in dairy products caused major shifts in the indigenous subsistent farming to become market-oriented using high grade animals and/or higher inputs. This was promoted in the Tubah villages by Heifer Project International with as objective to improve on milk consumption by the poor families (nutrition improvement) and increase farm returns (income generation and poverty alleviation).

The dairy farming system evolved slightly as some farmers benefited from the assistance of Heifer International but unequally distributed (Table 1).

Table 1. Current distribution of dairy farming cattle in Tubah

Locality	Farming group	Number of dairy cattle	Percentage	Specie of cattle	Number of cows under	
					Zero grazing	Extensive grazing
Small Babanki Group	Sabga Dairy	112	71.34	Local breed	-	112
	Feed the Nation	07		Holstein	07	-
	Vesonah Angwah	22		Hostein Heifer species	17	05
Finge	Ngante Dairy Cooperatives	9	28.66	Hostein Heifer species	9	
Bambui Sisters	Dominican Sisters	07		Hostein Heifer species	7	
Total		157			40 (11%)	117(89 %)

Source: Fieldwork, 2013.

Of the about 5100 cattle in Tubah, there were 157 dairy cattle mostly of the local Zebu specie owned by the Fulani and grazed extensively on natural pastures by small scale dairy farmers at Sabga. The zero grazing dairy cattle were the Hostein and Freisan hybrid species given by Heifer Project International. It can thus be established that though cattle rearing is the main activity of the Fulani, keeping cattle mainly for milk is carried out only by few grazers and a greater area of Tubah surface area is under extensive grazing (Figure 2).

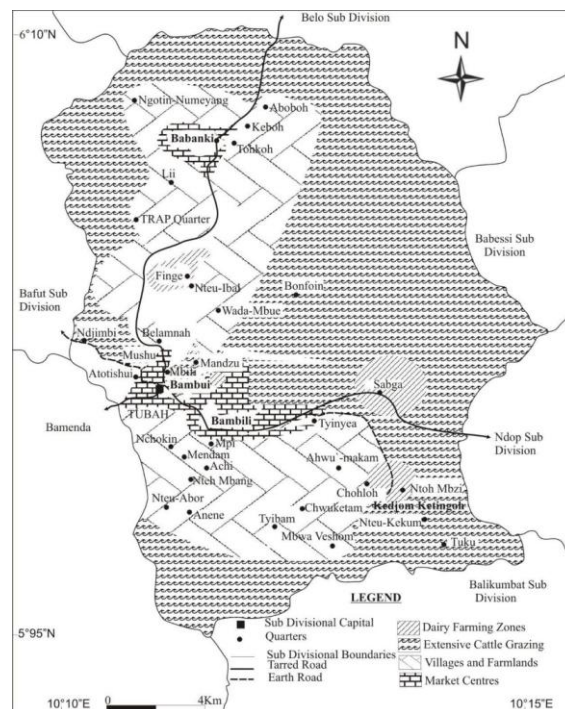


Figure 2. The dairy farms and grazing systems in Tubah

Source: Field work (2013).

Two main areas of dairy farming in Tubah are Kedjom Ketinguh where Vesonah Angwah, Sabga and Feed the Nation dairy groups are found. The other is at Finge with the Ngante Dairy Group and to a lesser extent at Bambui where the Dominican Sisters also practice it for self-consumption. All the farming groups practice zero grazing apart of the Sabga Dairy Group made up of Fulani. Some 71.34% of dairy cattle were local breeds such as the red and white Zebu species and only 28.66% were found to be of the Holstein and Friesian species. The dairy cattle numbers have not been increasing because farmers were not more receiving assistance from Heifer Project International especially as the project closed down.

However, Heifer Project International did provide two breeds of cattle for what has emerged as a small-scale dairy farming in their initiative to enhance the livestock sector and improve upon the livelihoods of the local communities as has been the case in Zambia (Sharon (2011)). Farmers who benefited from the breeds were technically trained to maintain animals in stables with sustainability specificities as least 3m high, 8 to 10 m long and 6.5 m wide, made of 2 cubicles, a raised floor calf pen, a milk parlour, corridor, store and feeders. The roof of the stable was either to be made of grass thatch, raffia thatch or aluminium sheets. The floor was to be designed to slope into a gutter on one side to ease evacuation of urine and dung for eventual farmyard manure. Each dairy cow was to be fed each time with a minimum of 16kg of different grass species of fresh and chopped forage cutting, three times a day (at 8 am, 12 noon and 5 pm; being 30 to 50 kg every 24 hours).

Another system consisted of semi-intensive dairying using crossbred cattle with improved pasture and supplements such as rice bran, palm kernel cake, cotton seed cake, wheat bran, and soya beans, all in small amounts. Fencing was done for rotational grazing on crop residues of maize stems, ground nut and beans, rice chaff, and banana forage. Animal feed in this system was supplemented with agro-industrial by-products as brewery grains and legumes as *Leucaena* spp., *Stylosanthes* spp and *Desmodium* spp.).

Farmers in another system used the local Fulani cattle breeds to produce milk that grazed on natural communal grazing land or fallow land. The cows with calves are tethered around the homes because no land is made available for livestock feed production or green fodder for animals. There has been the use of shrub and tree fodder feed but concentrate are served as a function of milk produced (1 kg of concentrate for every kg of milk produced after 10 litres of milk). Lactating animals are hand milked twice a day at 6:00 a.m. and 5:00 p.m. Concentrate supplements are prepared on-farm and based on combinations recommended by Heifer Project International but consist of ingredients ranging from wheat or rice bran (20 %), cotton seed cake or soya bean meal (20 %), corn flour (50 %), bone meal (0.5 %) and salt (2.5 %) and water. Crop residue such as fresh corn stalks, bean stems and leaves and plantain leaves are fed animals whenever available.

Farmers owned between 1 and 3 cows, with low milk production due to the constraints that they face as a function of their gender differences. In dairy livestock and milk production the contribution of women is relegated to roles judged not difficult by the men since they dominate the sector (Table 2).

Table 2. Gender involvement in dairy farming in Tubah

Dairy farm group	Number of farmers	Number of males	Number of females
Sabga Dairy Group	155	132	23
Feed the Nation	7	5	2
Vesonah Angwah	24	16	8
Ngante Dairy Cooperative	8	5	3
Dominican Sisters	3	1	2
Total	197	159 (80%)	38 (20%)

Source: Field work (2013).

The Table 2 shows the gender disparity in the ownership of dairy cattle as the males own many as four times as the females (80 to 20 percent). This plays on the overall dairy farming management decision (Table 3).

Table 3. Disparity in household role playing in dairy farm management in Tubah

Activities	Household level of production chores (%)			
	Husband	Housewife	Family members	Collective
Cattle feeding	21.5	49.8	21.1	6.2
Breeding	69.1	7.3	12.5	7.5
Management	13.1	48.8	19.6	12.4
Veterinary care	34.5	2.9	19.2	11.0
Marketing	28.5	7.25	15.0	46.3
Milking	27	65	0	8
Milk selling	20	35	0	45
Stable cleaning	11	58	0	31

Source: Field work, 2013.

The involvement of women in decision-making activities relating mainly to feeding, breeding, management, veterinary health care and marketing products of dairy cattle. Constituting the greater bulk of the population this means that the female ability leaving the dairy sector below its development potentials.

### 3.3 Potential Dairy Sector Production and Market Development Potential in Tubah

An unexploited production potential provided by secondary data from the Institute of Animal Research, Bambui, on the performance of Holstein-Friesian cross-breeds (Holstein-Friesian with Red Fulani) and local Red Fulani show that under tropical conditions the Holstein-Friesians produces more milk 3 361 litres for a lactation period of 319 days (10.5 l/day) but have a longer calving interval (472 days) and a relatively higher mortality rate (12.7 percent) compared with the crosses, which produce 1 501 litres for a lactation period of



221 days (6.8 l/day), and have a calving interval of 403 days and a mortality rate of 6.8 percent. For the Red Fulani, milk yield averages 330 litres for a lactation period of only 114 days, i.e. 2.9 l/day (Mbah, Mbanya and Messine, 1984).

Sustainable milk farming illustrates the mechanisms involved in the production at local farms, problems and possible outcomes. Milk products are marketed either directly by the producers or are collected and sold by organized milk producing cooperatives. Milk not taken by calves is either home consumed, spoiled or marketed if no cooperative collects milk.

The existence of nearby market for milk and dairy products is a strong motivating factor for milk producers in Tubah. The organization of the market requires gathering of milk from the different producers and transforming it into marketable products before they are delivered to consumers at a desirable time and at an affordable price. The collection and cooling involved high cost and so to break even requires larger quantities so as to have lower average cost of transactions which can be achieved either by installing cooling centres in milk production areas or organizing farmers into dairy cooperatives for a minimum milk supply level to be reached to make the operation profitable.

Two systems of milk marketing exist in Tubah. The village system is the most dominant occurring where milk from small holder farmers owning 1 or 2 cows is marketed to consumers by middlemen or sold in quarters to local consumers at 250 FCFA to 300 FCFA per litter. The second involves wholesale of the milk through small-scale distributing traders from farmers for processing into milk products (cheese, butter and yogurt) and marketing by dairy cooperatives.

In Tubah, milk marketing is neither having such cooling centres nor organized cooperative network. Rather milk is either bought at the farm by individuals or farmers carry it to the market place at prices that fluctuate. Such price fluctuation is detrimental to the farmers because they cannot increase their stock of high yielding animals and so make more money. Worst is that in times of low prices farmers would choose to rear or sell off their animals in favour of meat at the detriment of milk. Yet with the advent of a growing student population the consumer demand for fresh milk and milk products is high and would remain so for a long time and the farmers would be unable to meet up with the direct sales. The short and medium term option is increased production at farm level positively increasing the quality and quantity of types of breeds kept and their management.

The dairy farming in Tubah is highly localized and dairy products are consumed where they are produced with only a small fraction traded in open markets. Field observation showed that averagely well fed cows under zero grazing produce about 10 to 13 litters of milk daily (a monthly milk yield of 300 litters and an annual milk production of 3.6 tons). Milk yield is 4 to 5 litters daily for cows under the extensive grazing system (Table 4). Milk production was noted to be reducing with the age of the animal and health related problems.

Table 4. Current dairy milk production potential in Tubah

Locality	Farming Group	Number of DairyCattle	Average daily production of a cow	Quantity of milk produced (litters)	
				Daily	Monthly
Small Babanki	Sabga Dairy Group	112	4.5	504	15,120
	Feed the Nation	07		77	2,310
	Vesonah Angwah	22		198	5,940
Finge	Ngante Dairy Cooperatives	09	11	99	2,970
Bambui	Dominican Sisters	07		77	2,310
Total		157	15.5	955	28,650

Source: Delegation of MINEPIA, Tubah, Veterinary Post Sabga, 2013.

Cattle under zero grazing can produce about 10 to 13 liters of milk per day thus an average of 11 liters per day if well fed. Those cows under extensive grazing can only produce from 4 to 5 liters thus an average of 4.5 liters of milk per day. Monthly total milk production stood at 28,650 liters being 28.65 tons (Table 4). Total yearly milk production was estimated at 343,800 liters (343.8 tons). These are therefore huge potentials for the dairy sector in Tubah that if well managed can provide much income to the dairy farmers, generate employment and equally enhance the nutrient intake of the fast growing population.

### *3.4 Bracing Up with the Needs: What Options and Role Modelling of the University*

There is urgent need for more dairy cooperatives in Tubah. Cooperatives as economic and social actors help farmers acquire and share knowledge with fellow farmers and also establish a common market for their products while providing a ready market for their milk as they are linked to the processor. Such cooperatives will teach dairy farmers feeding technologies and technical assistance capable of guaranteeing the supply of inputs such as stock feeds, drugs and other inputs of the dairy production chain and thus ensure good quality milk and even the quantity that is on a decline whereas consumer numbers and marginal propensity to buy is on an increase. It is observed that the in milk production decline in Tubah is poverty driven, inadequate feeding of the animals, and the stop in the supply of hybrid species as well as other problems (Table 5).

Table 5. Relative weighting of dairy farmer problems in Tubah

Farming Group	Percentage weighting of problems				
	Adverse dry season impact	Animal health	Financing management	Marketing dairy products	Obtaining cow feed
Sabga Dairy Group	4	2	1	3	5
Feed the Nation	2	1	3	4	5
Vesonah Angwah	1	2	4	5	3
Ngante Dairy Cooperatives	2	3	1	4	5
Dominican Sisters	2	1	4	3	5
<b>Total</b>	<b>11</b>	<b>9</b>	<b>13</b>	<b>19</b>	<b>23</b>
Percentage	14.66	12	17.33	25.33	30.66

Source: Field work, 2013.

Dairy farming in Tubah is faced with many challenges ranging from the upkeep of the animals, processing and marketing of their products, financial constraints, rangeland degradation, animal health, problems related to training and the management of the cows in stables which could be met on even in the short run.

Insufficient animal feed: Result from the field indicate that with the current increase in crop area, coupled with population growth, less land is available for grazing. Forage forms the main and cheapest feed for ruminants such that grazing livestock depend on poor and degraded rangeland (Plates 1) that is often of very low nutritional quality.



Figure 1. Malnourished dairy cows at Finge

Source: Field work (2013).

The Department of Animal Technology, College of Technology of the University of Bamenda must be an inexcusable asset in this domain, not only for the sake of science but as a moral responsibility to the university host community.

The analysis of the results indicates that 30.7% of dairy problems in Tubah relates to the feeding of the animals both in quantity and quality. Farmers indicated that a mature cow needs at least 16kg of grass per day of different species but most farmers do provide the same

type of grass species, which does not give a balance diet for the cows. In most cases, the insufficiency of grass species is compounded by the seasonal changes especially the effects of the dry season. This problem usually occurs when farmers have to trek for long distances to fetch for fresh grass causing the animals to lose weight which subsequently, reduces their ability to produce milk.

Marketing and distribution problems: Marketing problems accounts for 25.3% of the total problems and could be broken down into poor road network coupled with lack of transport facilities; lack of processing and storage or conservation equipment for fresh milk; inadequate demand in the immediate environment of the farmers and low milk prices etc. it was indicated by farmers when milk is not sold immediately to retailers, it either gets spoilt and they have no option than to sell to pet animals or throw it away because of the lack of storage facilities and processing techniques. Farmers also complained of low prices for milk as compared to their input in terms of man power and finances to carter for the animals.

Financial difficulties emerge from insufficient savings to finance investments, limited access to credit as a result of land title requirements as collateral especially by credit unions while waiting for the opening of the Farmers' Bank of the Ministry of Agriculture and Rural Development. Although access to 'njangis' as informal credit is relatively easier, but some farmers find this source unable to satisfying productive needs as concentrate food supplements, pay veterinary health workers, maintain cows in stable and get high yielding species of milk producing animals.

A compendium of sustainable measures must be embraced to ensure the adequate supply of milk to the fast growing population of Tubah. The College of Technology in The University of Bamenda cannot dare to add another scarcity, that of dairy products to a teaming student population that is already crushing under the thirst of water scarcity that the Bambili community cannot immediately overturn. The University has the know-how blended in enormous human, intellectual and material resources to show case its other side of the coin—that of contributing to development. The time is very ripe for expertise now to chart out Tubah a University of Bamenda high-tech dairy production Corridor like what obtains in California. This would not only fulfil regional in national emergence come 2035, it would raise Tubah to 20-20-20 (amongst the 20 top dairy producers by 2020) in Africa thereby achieving the UN SDGs a decade before.

This would be an accomplishment of the 2012 stock rearing aspect of Heads of States resolution in Maputo in 2003 to develop a multidisciplinary platform for the reinforcement of veterinary governance in Africa. Even in Malabo, African Union Heads of States Summit had agreed to eradicate hunger in 2025 by taking concerted actions in the agricultural sector (with an injection of 1300 billion FCFA) bringing together concerned government ministries, stockbreeders, private sector, and non-governmental organisations. This mutualisation of ideas will improve the dairy sector, contribute to the Gross National Product, eradicate hunger, generate income, employment and offer growth opportunities towards the Vision 2035 of the Republic of Cameroon.

Some options for the university role modelling in Tubah comprise:

- 1) Increasing milk production, both quantitatively and qualitatively by selecting and helping in the breeding the best animals based on characteristics like muscle formation and size so that farmers might apply indigenous knowledge considering their low educational background. Student and Departmental research and internship from the Department of Animal Technology could guide farmers.
- 2) Cross breeding local cattle with high yielding exotic breeds through speeding the findings of (Bayemi et al 2005) in order to on farm income and in adapting crossbreeds to local conditions since costs and feeding of exotic bulls are prohibitive for local farmers relying on low input production systems.
- 3) Improving on all time animal health by developing knowledge and specializations on veterinary so that in the long run poorly accessible areas could be covered.
- 4) Increasing milking frequency from Fulani herders and develop scientific techniques of feeding the animals to assure improved production and assure nearby market to absorb milk the produced. It does not necessarily need to start big because Welamira, et al (2010) has proven that small scale dairy farming contributes substantially to household welfare in Tanzania on the same range as those from crop production and small scale business.
- 5) Improving on milk storage and/or processing facilities for farmers developing strategic hygienic conditions of production, placement of cooling facilities and processing equipment at reachable costs. Farmers will be motivated to shift their production goals from subsistence as the case in Sabga to a more market-oriented dairy production
- 6) Organizing farmers into activity groups would make milk production cheaper zonal grouping of farmers in a bid to ease collection and time delays that may affect milk perishability and information dissemination on production techniques. Results of the work of Kaah (2005), show that dairy farmer cooperatives contribute to food security in Cameroon.

#### **4. Conclusion**

The practice of dairy farming in Tubah evolved positively for the seven years the assistance of Heifer International towards stable (zero grazing) dairy cattle capable of producing 10 to 13 litres and only a small proportion allowed to graze on natural pasture that produce an average daily milk yield of 4 to 5 litres of a total daily milk production being 955 litres and a monthly milk yield of 28,650 (28.65 tons). More than half of the problems of the dairy sector in Tubah emanate from feeding (30.7 %) for quantity and quality and marketing (25.3 %) for transport facilities, processing and storage as well as equipment for fresh milk. These challenges in milk production identified (dry season feed scarcities, lack of appropriate breeds, disease outbreaks, poor management practices, and the lack of technical staff maintain the dairy sector in a state of development lethargy whereas enormous prospects exist to permit a leap forward. Such would equilibrate milk supply with the rising demand of an increasingly cosmopolitan population of Tubah especially Bambui and Bambili which is a trend called to last for a new generation of civilisation.

This civilisation is born and fostered on the pivots of higher institutional research for development offered by the College of Technology (The University of Bamenda), School of Agricultural Engineering (National Polytechnic, Bamenda) as well as the School of Agriculture and Rural Development (Bamenda University of Science and Technology) that cannot run away from but cheerfully embrace the fact that their siting within Tubah is a blessing earned and must be harnessed for the dairying farming sector as the best bid alternative to crop farming in this agrarian basin. As observed by Mesa et al (2011) just as many communities in Kenya rely on livestock products, so too can Tubah make its mark. These institutions are equipped with the intellectual and technological ingredients of reminiscent innovation that can revolutionise the dairy and labour productivity in this sector. This study finds this easily obtainable by linkages and co-ordination of research programmes among national and regional research institutes or universities. This study limited itself to the cow dairy sector, nevertheless, countless opportunities exist for even other dairy farming practices based on small ruminants such as goats and sheep in Tubah.

## References

- Bayemi et al. (2005). Participatory Rural Appraisal of Dairy Farms in the North West Province of Cameroon. *Journal of Livestock Research for Rural Development*, 17(6). Retrieved November 27, 2012 from <http://www.lrrd.org/lrrd17/6/baye17059.htm>
- HPI (Heifer Project International). (1999). *Evaluation of the dairy program of Heifer Project International (HPI) in Cameroon*. Report, Bamenda Cameroon.
- Mbah, D. A., Mbanya, J., & Messine, O. (1984). Performance of Holsteins, Jerseys and their zebu crosses in Cameroon: First results. *Annual Report: 99-III*. Wakwa, Cameroon, Institute of Animal Research.
- Mesa, S., & Moseri. (2011). Influence of dairy farming on livelihood of self-help group members in Ekerenyo Division, Nyamira County, Kenya. Retrieved from <http://erepository.uonbi.ac.ke:8080/handle/123456789/4756>
- Ndambi, et al. (2007). Activation of the Lactoperoxidase system as a method of preserving raw milk in areas without cooling facilities. *African Journal of Food Agriculture Nutrition and Development*, 7(2).
- Njwe, K., & Gabche, T. (2000). *Contributions of Heifer Project International (HPI) to small-scale dairy development in Cameroon*. Heifer Project International (HPI), Bamenda, Cameroon.
- Sharon, N. (2011). *Pathways to technology adoption: understanding small holders' dairy farmers in Southern Zambia*. Master Degree Thesis, Rural Livelihoods and Global Change, Haque, Netherlands, p. 44.
- Tambi, E. N. (2000). *Dairy production in Cameroon: Growth, development, problems and solutions*. Produced by: Agriculture and Consumer Protection of the FAO. Retrieved March 12, 2013 from <http://www.fao.org/docrep/.../u1200T0g.htm>

Tata, S., Kometa, S., & Amawa, S. (2012). The Implications of Rainfall Variability on Cattle and Milk Production in Jakiri Sub-Division, North West Region, Cameroon. *Journal of Agricultural Science*, 4(10).

Wirnsungrin, T. (2011). *An Economic, Social and Environmental Analysis of Farmer-Grazier Conflicts in Kumbo Sub-Division*. Unpublished DIPES II Thesis, ENS Bambili, University of Bamenda, p. 99.

### **Copyright Disclaimer**

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).