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Harnessing renewable natural resources towards food security and sustainable rural development in a rich agricultural resource-base community in Cameroon

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Many renewable resources the world over are increasingly becoming non-renewable owing to massive and/or abusive exploitation, and little conservation. There is growing quest to conserve resources and switch to dependence on renewable resources. World summits on environment recommend sustainable use of resources to guarantee sustainable development. How sustainably these resources are being used and the extent to which their usage brings about sustainable development especially in rural communities remains a debatable issue. Cameroon's rural milieu teems with abundant renewable resources which have lain idle, been under exploited and/or wantonly exploited for any sustainable economic growth and development of the areas. This paper examines goat and natural pasture as abundant renewable resources, the widespread involvement of the rural population in exploiting these resources in contrast with the low level of exploitation. The inherent potentials of these resources in guaranteeing food security and sustainable development of rural areas, and government neglect of small ruminant livestock production are assessed. The basic assumption is that the attention paid goat culture by farmers, government and research institutions is incommensurate to the available potentials for a profitable large-scale commercial agricultural activity. Primary and secondary sources were invaluable in providing data for analysis. Key findings depict that goats are valuable assets providing flexible financial reserves for poor rural farmers during periods of economic stress; a buffer against crop failure; and a source of cash income enabling farmers meet various needs. Despite its multifarious functions, very little progress has been made in utilising the available resources efficiently towards improving commercial productivity; nutritional level and general living standards of rural population. This paper suggests that these abundant renewable resources could be harnessed to increase food productivity and security; the economic status of rural population and boost their contribution to economic development.

Key words: Renewable resource, food security, traditional management systems, cash income, sustainable rural development, Donga Mantung.

INTRODUCTION

Rural areas, especially in Africa, often depend heavily on agriculture for their livelihood which accounts for more

than 70% of employment of the rural poor. Agriculture is the economic mainstay of the peasant population of the

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Donga Mantung Division of the North West Region of Cameroon. The cold montane climate, with over seven rainy months annually, offers a rich agricultural environment where both arable and pastoral agriculture are practiced. However, the economic potentials of its rich agricultural base have not yet been fully exploited. Arable farmers derive little financial benefits from the abundant crop harvests owing to poor state of farm-to-market roads and to the difficulty of evacuating farm produce to the major urban markets. Similarly, the full potential of the enormous natural pasture that abounds in this region is not exploited since utilisation is only during the early half of the rainy season and no haying is practiced. Besides, goat culture is still more of a micro-agricultural activity in Cameroon, undertaken mostly by peasant farmers and has received little attention and investments by the government, appropriate non-governmental organisations and/or research institutes. Very little progress has been made in utilising the available resources efficiently towards improving commercial productivity and the nutritional level or the general living standards of the entire population.

Goat is a small, manageable and omnipresent resource in *Donga Mantung* Division produced and marketed by virtually every household in the division; however, its production until now is only a small scale, sideline activity. Goat production and marketing is an important but neglected sector of livestock production and marketing in Cameroon. The deliberate breeding of goats for sale is a rare phenomenon. Goats are generally reared to meet family needs during cultural festivities and ceremonies such as births, deaths and marriages; and hardly to satisfy habitual and direct home consumption needs or market demands. Hence, goat farmers generally lack incentives to increase productivity and equally lack openings for large-scale profitable production. A characteristic feature of goat production in the area is the absence of commercial co-operative farming, consequently, the activity is subsistent and predominantly in the hands of individual farmers.

This small ruminant species whose production until now has been on a small-scale has enormous potentials as a medium of development. This falls in line with the views of LID (1999), (Delgado et al, 1999), and ILRI (1991, 2000); who hold that goats are capable of transforming feeds of low or no alternative value into high-value livestock products such as meat and milk. Goats can therefore be considered as an exploitable, renewable resource capable of being harnessed for viable agricultural and economic development.

METHODOLOGY

Primary and secondary data were the main sources of information. The activity was divided into goat production and goat marketing to bring out the particularity in their respective contributions. Interviews during the preliminary field surveys in *Ndu* and *Nkambe* Subdivisions revealed that each household rears goats; therefore,

the total population of goat farmers was derived from the 1987 national population census. Primary data was drawn from 187 farmers in 12 villages of the five subdivisions that make up the division and 25 goat buyers. For a clear and logical investigation, the population involved in each stage of the activity was identified and categorised, and three separate questionnaires were administered to specific groups, viz. goat farmers, buyers and veterinary officers. This helped to describe and properly assess the production and marketing processes; and the contribution of the renewable resources under study to the economic development of *Donga Mantung* Division. The quarterly and annual reports of the Ministry of Livestock, Fisheries and Animal Industry (MINEPIA) and weekly sales records of main goat markets in *Donga Mantung* Division were consulted to obtain viable statistical data to illustrate the activities. Qualitative data was equally collected from MINEPIA to assess government coordination and intervention in livestock production and marketing.

Concept perspectives

Two key concepts are of particular interest in this work viz. natural resource and sustainable development.

A resource is an all-embracing term which has been perceived and defined differently over the years. From a loose and cursory definition as 'anything of economic importance or value' to more complex definitions, a resource can be natural or man-made, renewable or non-renewable and can be classified according to its physical, economic and/or social attributes¹. Irrespective of their nature, resources, if well harnessed produce basic wealth, engender human advancement and societal well being. Any element found under, on or above the surface of the earth which man perceives as useful and exploitable to provide an essential product for human life constitutes a natural resource. In this light, the goat and pasture in the *Donga Mantung* Division (available and abundant natural endowments) have thus been viewed as natural resources. Figure 1 demonstrates a framework of the available renewable natural resources whose judicious exploitation, usage and conservation could contribute to guaranteeing food security, in the division in particular and the nation at large; and in engendering sustainable rural development in the division.

Goats are, therefore, a significant part of the resource base of the human environment in *Donga Mantung* Division and obvious renewable natural resources whose predominance can be fully utilised in combination with the abundant, available natural pasture to engender sustainable rural development. Regrettably, maximum exploitation and the fullest utilisation of the potentials of these resources are yet to be undertaken on the one hand and on the other, renewable resources are becoming increasingly non-renewable due to demographic explosion and improper management. The growing need for food security within the backdrop of rising demands and pressures of a rapidly growing world population on depleting resources necessitates new production methods amongst small farm families. Thus the goat should be perceived as a valuable economic resource in order to conceive and adopt new techniques by which this potent, renewable resource can be sustainably exploited. This would raise the living standards of farm families on the one hand and increase animal food supply in the face of a growing population.

Sustainable development has been defined in many ways but the most common definition as coined by the Brundtland Report (1987)²

¹ Whyne-Hammond Charles, *Elements of human Geography*, 2nd ed. Unwin Hyman Limited, London, 1985

² Our Common Future (1987), Report of the World Commission on Environment and Development, World Commission on Environment and Development.

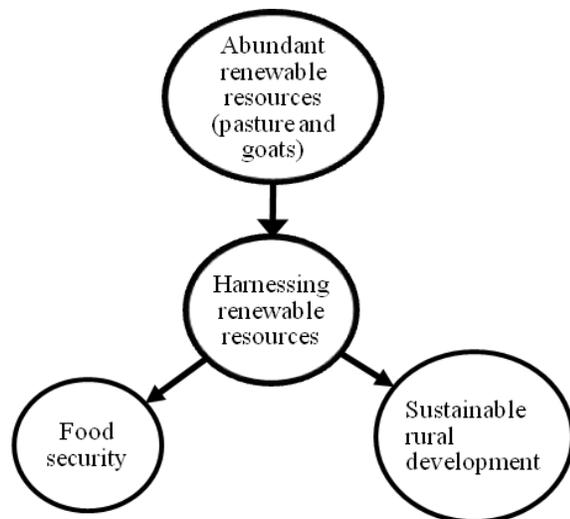


Figure 1. Renewable resource-food security-rural development framework.

is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' This is a process that depicts a complex dynamic relationship between socioeconomic variables notably resource and population. These are prerequisites to development and the possibilities or limitations imposed by technology and social organisations in exploiting available resources to meet human needs. A proper blend between these variables has a positive influence on human well being and the environment engendering higher standards of living while a poor mix endangers both the environment and human well being.

Looking at the interrelatedness of the variables that influence sustainable development, both the present and future dimensions have been considered within the context of this write up, but focus is more on a futuristic perspective. It thus evaluates the efforts by the local population to use the available resources of goats and pastures to meet their current food and other livelihood needs. Principally, it attempts an assessment of how far the production and marketing of goats in the *Donga Mantung* Division have and can potentially contribute to meeting the nutritional needs of the population and to the economic development of the division while maintaining the renewable potential of these resources.

RESULTS

Custom-dominated goat management systems

The management systems employed in goat rearing in *Donga Mantung* Division is predominantly influenced by the cultural beliefs of the local population. The systems reflect the level of the activity and determine the quality and quantity of the live goats and goat products produced; their economic value and consequently the living conditions and standards of the farmers. Production is rudimentary and subsistent with minimal labour inputs and poor husbandry techniques. The husbandry system adopted is therefore more a function and outcome of socio-cultural and ecological rather than economic

influences. Traditionally, goats are socially accepted in the rural community and are regarded as an integral part of each household; except in *Misaje* Subdivision where the indigenous population does not customarily rear goats. Hence the management systems used are not a result of any economic considerations but in most cases, is a consequence of societal norms.

The importance of crop production relative to livestock production in the area, equally dictates the goat management systems. In all parts of *Donga Mantung* Division food crop production is considered more important than goat production, thus more labour, time and resources are invested into crop production, especially maize production which is the base of the staple meal of the local population. Traditionally, goat farming on a large scale is regarded by 92.5% of arable farmers as an uneconomic activity compared to food crop farming and coffee cultivation. Goats are, therefore, reared on a low-input system, with very little labour and capital inputs. The goat farmers are content with whatever economic benefits they derive from their goats compared to the investments made in time, labour and finances. This largely explains the low level of productivity in goats and the low level of deliberate commercial production.

Three principal husbandry systems are used throughout the division viz. tethering, free-range or extensive subsistence and semi-intensive systems (Figure 2).

Tethering and free-range systems are the most predominant, popular systems used throughout the region. Their usage is determined by seasonal variations, food crop farming patterns and the economic value the local population attaches to goat farming. The tethering system, a low-input system in terms of time cost and finances is practiced by 90.4% of goat farmers. This system predominates in the rainy season—March to September—when there is abundant pasture and also coincides with the main cropping season of the area. This system is adopted during this period mainly as a protective measure against crop destruction by ruminants. The free-range system is practiced by 93% of farmers and predominates in the dry season—October to March—soon after crop harvests. During this period, goats scavenge on farms, streets, markets and garbage heaps. No specific breeding programme is followed; however, 62.6% of farmers affirm that kidding is higher within the free-range period during which the goats can freely mate unlike when they are tethered. Notwithstanding this, free-ranged goats cause damages on any available vegetative material found around the houses. This method of goat farming has set in place a single cropping season in *Donga Mantung* Division unlike the neighbouring *Bui* Division with similar climatic tolerances which has two cropping seasons. It is also uncommon to find small vegetable gardens around homes during the dry season. Freely roaming animals damage crops resulting in conflicts amongst villagers. Over 43% of goat farmers suffer from such conflicts. In some localities like *Dumbo*, destruction of crops and conflicts account for 80 and 72%

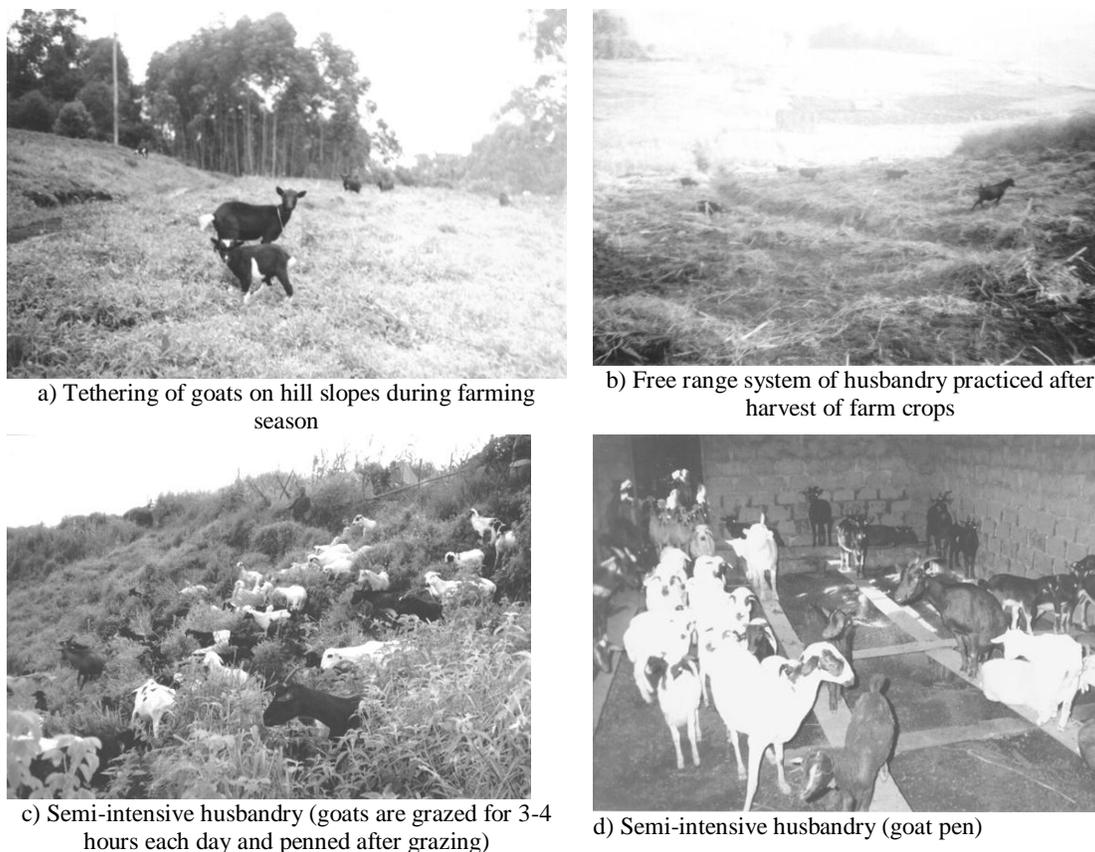


Figure 2. Principal goat husbandry systems in practice in Donga Mantung Division.

respectively as the major problems faced by goat farmers. This evidently has repercussions on goat productivity.

The semi-intensive system is a compromise between the extensive subsistence and intensive methods. The goats are confined and pen fed; and also allowed to graze or browse in the open for a few hours daily (Figure 2c and d). This system is not widespread and is practiced by only 4.8% of goat farmers in the division, especially in *Nwa* Subdivision under the auspices of *Heifer International* and in *Nkambe* town. It is more productive than the former systems with higher flock size owing to better management, feed supplementation and more intensive veterinary care. It involves higher crop-livestock integration that maximises the use of goat droppings on arable farm plots and crop residues for feeding of goats.

Low productivity despite enormous natural potentials

The spatial distribution of goat population in the North West Region reveals that *Donga Mantung* Division has the highest goat population owing to the enormous potentials for pastoral farming as depicted on Tables 1 and 2 and the cultural importance of goats to the local population.

Goats represent a major under-exploited resource in *Donga Mantung*. They are raised largely by crop farmers as a small-scale sideline activity even though goats are an integral part of farm households in *Donga Mantung*. Often they are reared alongside other small scale farming activities notably maize cultivation, besides local pig keeping and poultry. Traditionally, farm families keep two to four breeding animals, mainly does on which spending is minimal. In general, farmers provide no special feeding, housing or other inputs, and production is risky due to high mortality from diseases and low or in-existent veterinary attention.

The main pasture lands are located away from the village vicinity while goats are reared on small patches of land in the village closet by both landed and landless settlers; therefore, the abundant available pasture is not fully exploited. The common grass species fed to goats are *Pennisetum purpureum* (elephant grass), *Andropogon* (oil grass), *Kikuyu* and *Sporobolus africanus*—a species of low nutritive value and low palatability. In addition, tree leaves of many varieties notably fig tree, pear tree and plantain leaves are traditionally fed the goats. The use of these leaves is of particular significance as asserted by Ogwang et al. (1992) because of the ability of goats to convert them into animal products of value to man.

Table 1. Goat production and distribution in the North West Region of Cameroon.

Division	Population 1981-1982	Percentage of total	Population 1992-1993	Percentage of total	Population 2010	Percentage of total
Donga Mantung	171 214	63.43	135 596	57.91	161 547	58.47
Mezam	45 200	16.74	40 150	17.15	43 982	15.91
Bui	24 675	9.14	31 000	13.24	35 481	12.84
Momo	17 608	6.52	17 120	7.31	19 936	7.21
Menchum	11 256	4.17	10 300	4.39	15 325	5.54
Total	269 953	100.00	234 166	100.00	276 271	100.00

Source: MINEPIA, North West Province Annual Report, 1981/82, 1992/1993, 2010.

Table 2. Range land area in the North West Region by administrative divisions.

Division	Land area of division (Ha)	Range land Area (Ha)	Percentage of total range land in the province	Range land area as percentage of total land area in the division
Donga Mantung	1 144 996	305 714	28.8	26.7
Mezam	1 467 597	105 667	10.0	7.2
Bui	627 906	108 000	10.2	17.2
Momo	1 061 538	124 200	11.7	11.7
Menchum	1 116 486	415 333	39.2	37.2
Total	5 418 523	1 058 914	100.0	100.0

Source: The Environment Situation of the North West Province, Ministry of Environment and Forestry, and UNDP Project, CMR/92/008, Bamenda 1994.

The surveyed farmers had small numbers of animals with herd sizes generally ranging from 1-5 goats. There appeared to be a correlation between remoteness, human population density and flock size. The more remote localities like *Akwesse* and *Dumbo* in the *Ako* and *Misaje* Subdivisions respectively with lower population densities had larger herd sizes of 30-60 goats (Table 3). These two subdivisions are the least populated of all the subdivisions in *Donga Mantung* Division hence there is available grazing land. Over 60% of goat farmers here have a herd of more than 10 goats unlike in *Nkambe* Central Subdivision, where less than 5% of farmers have herds with over 10 goats. Land availability for grazing the goats is the most probable explanation for larger herds in these localities.

The level of low productivity can equally be observed by the crop-livestock integration relationship which is very insignificant as illustrated in Figure 3.

Food crop fields are located away from the village vicinities where goat rearing is predominant. Little benefits are thus derived from the droppings of goats in the form of farm manure on the one hand, and on the other, the gleanings of farm residues after harvest by the animals. Some crop-livestock integration is practiced under the semi-intensive husbandry method, however only to a minimal degree (only 4.8% of goat farmers), thus much of the available potentials lie unexploited.

Buffer against economic stresses

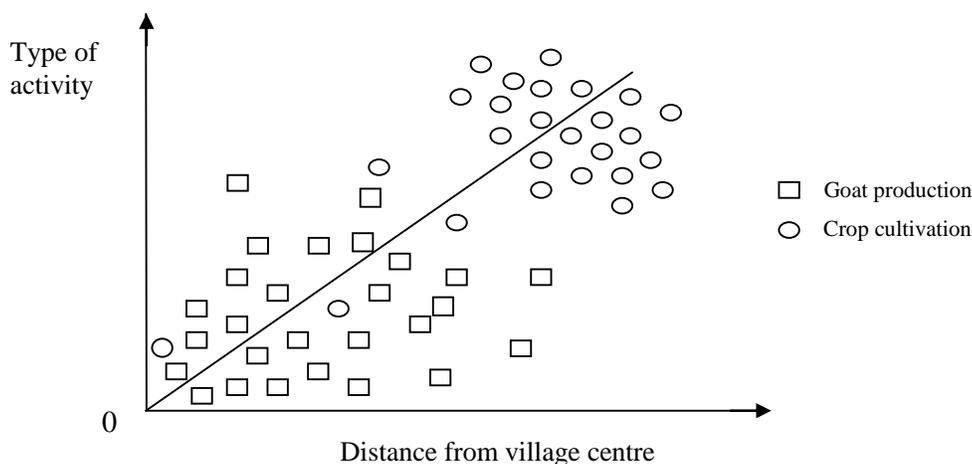
Livestock and goats in particular, transform feeds with low or no alternative value into high-value livestock products such as meat, milk, etc³. The presence of abundant pasture in *Donga Mantung* provides a good base for goats as a buffer against economic stresses for the predominantly rural agricultural population. In this area, goat culture is traditionally an important socio-cultural activity, undertaken by about 95% of the households. It performs a multitude of functions: valuable assets to farmers, provides flexible financial reserves for periods of economic stress and a buffer against crop failure; and is a source of cash income enabling farmers to meet various domestic, economic and cultural needs. Reasons for sale of goats range from education of children (75.4%), medical care (57.8%), improve standards of living (40.1%), ceremonial needs (13.9%), tax payments (13.4%), check disease spread (2.7%), and savings (2.1%). In addition, the proportion of goat farmers who depend on the sale of goats as a buffer to economic stress is higher in the more remote localities where poverty is rife than in the more urban areas (Table 4). Overlapping in percentage is due to multiple uses of goats in the study area.

³ LID, 1999

Table 3. Average goat flock size in *Donga Mantung* Division.

Subdivision	Village	No of households*	Average distance (km) from Nkambe**	No of households interviewed	Average no of goats per locality interviewed	Average flock size
Nkambe	Njap	371	15	8	90	11.3
Central	Binka	1 218	20	45	347	7.7
Ndu	Kakar	366	42	26	404	15.5
	Njirong	50	39	7	99	14.1
	Jirt	183	32	12	104	8.7
Misaje	Dumbo	611	38	25	272	10.9
	Akwesse	70	65	2	85	42.5
Ako	Ako	386	50	15	148	9.9
	Nguri	40	47	4	57	14.3
	Mfe	226	56	11	76	6.9
Nwa	Nwa	428	52	19	59	3.1
	Nwanti	142	41	13	65	5.0
Total		4 091		187	1 806	9.7

Source: *Household figures based on 1987 census figures and field survey. **Nkambe is the administrative headquarters of the *Donga Mantung* Division.

**Figure 3.** Food crop-goat production relationship in *Donga Mantung* Division.

This corroborates the assertion that poverty is still largely a rural phenomenon.⁴ Livelihood of the rural poor could therefore be improved through investments in the livestock sector notably in goats that are raised by at least 95% of the rural households in *Donga Mantung*.

Underutilised natural resources

One of the most valuable but underutilised resources of

this division is its natural pasture growing on the rolling hills and valleys. The livestock management systems in use fail to make utmost use of the abundant natural pastures notably during the rainy season. No conservation of fresh pasture as hay or silage is practiced; hence maximum economic benefit is not derived from much of the abundant available pasture. In addition, climatic conditions favour rapid lignification of pasture and decline in crude protein content with maturity thus reducing the nutritional value of these forages⁵. During the dry season,

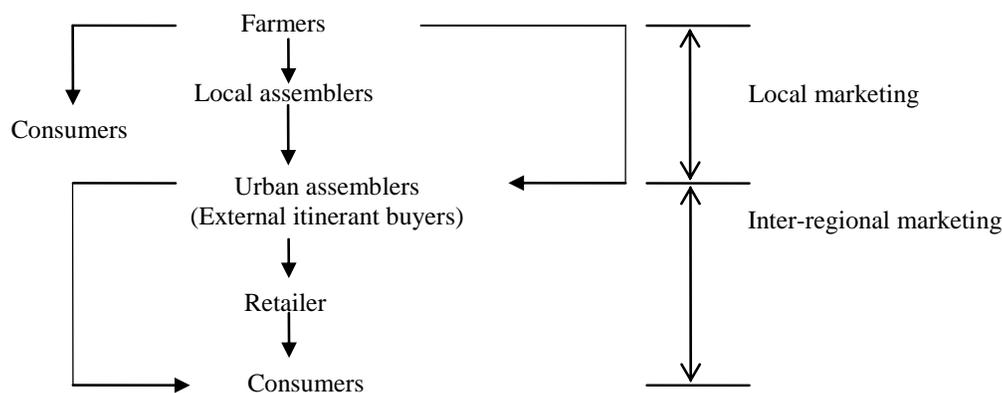
⁴ Ibid 3

⁵ ILRI, 2000

Table 4. Correlation between mode of disposal and accessibility/remoteness of locality*.

Subdivision	Target village	Mode of goat disposal used by sampled farmers			
		Eat (%)	Sell (%)	Gifts (%)	Traditional sacrifices (%)
Nkambe	Binka	17.8	97.8	35.6	37.8
	Njap	100.0	100.0	0.0	12.5
Ndu	Njirong	42.9	85.7	14.3	42.9
	Jirt	25.0	83.3	8.3	41.7
	Kakar	3.8	90.1	7.7	0.0
Dumbu	Dumbu	56.0	84.0	4.0	20.0
Ako	Ako	73.3	68.0	6.7	60.0
	Akwessee	100.0	100.0	0.0	100.0
Nwa	Nguri	50.0	75.0	25.0	25.0
	Nwanti	53.8	100.0	0.0	15.4
	Mfe	45.5	54.5	9.1	27.3
	Nwa	52.6	63.2	15.8	10.5

*See table 3 for distances.

**Figure 4.** Goat marketing agents and channels in *Donga Mantung*.

pasture is generally unavailable, thus goats are free-ranged and allowed to scavenge on the streets, markets, garbage heaps and on peelings of crops. The most common feed during this time of the year are twigs, maize and 'ngajiri' (a by-product of processed maize).

Dynamics of goat marketing

Goat marketing in *Donga Mantung* can be described as micro-marketing since it is an activity by small-scale goat farmers operating at individual levels. Overhead costs are small and products are sold in the simplest form—live goats—. Marketing is done at various levels and by a host of marketing agents viz. producers; many different kinds of intermediaries, direct consumers, council and veterinary officials. The last two in the chain

control the quality of goats sold in the local markets (Figure 4).

Goat marketing like goat production is unplanned as such the farmers do not derive maximum profits from the sale of their goats. Farmers do not forecast the needs of potential consumers hence production is not market-oriented. Marketing behaviours and practices are dictated by the prevailing culture in the region. Marketing is done throughout the year but peaks in September and December, which coincide with the start of a new school year and end of year festivities. Farmers are their own merchants, selling their produce in the local markets directly to consumers or to local middlemen who buy from their homes. The intermediaries derive more profits from goat marketing than the farmers due to the inefficient, complicated and unorganised channels.

Live goats constitute the main product sold. The only

other products that are sold by farmers at a very limited scale are goat skins (4.8%) and droppings (10.7%), notably in *Nkambe, Binka, Njirong, Jirt, Kakar, Dumbu* and *Nwa*. The rearing methods and low level of crop-livestock integration does not permit the collection of goat droppings. The skins are used for the making of drums used for traditional dances. The marketing or use of goat milk, hooves, horns, blood and bones is non-existent. Goat meat is not sold in the open market; however, cooked goat meat and 'sawyer' are sold in restaurants in *Ndu* and *Nkambe* towns. The production and marketing of goat products is not yet a vital aspect of goat culture in *Donga Mantung*.

Possibilities of raising productivity and farmers' incomes

Donga Mantung has enormous potentials that can be harnessed to boost livestock productivity, improve farmers' incomes and guarantee food security despite the growing population numbers and changing climatic conditions. The natural pasture constitutes one of its most valuable resources. Pasture is abundantly available in the rainy season but scarce in the dry season. This imposes nutritional problems for stable goat development. Overcoming this problem will necessitate adopting new methods of pasture management such as haying and silage. In addition, improved pastures like *Guatemala grass, bracharia, Hyparrhenia* and *Leucaena* which grow easily in the region can also be adopted by most goat farmers. This will help to curb the dry season shortages and increase productivity to meet up with the increasing demands for live goats in the major cities in southern Cameroon.

The goat species that is reared constitute another valuable resource. The West African Dwarf (WAD) goat is renowned for its high proliferation rate, with a tendency of twin and triple births, especially under intensive husbandry methods and improved nutrition (Ademosun, 1992). Upgrading and improving management systems greatly improves on the performances of this goat species. Studies have revealed that live weight per doe per year increases from 10.9kg under the traditional system to 24.2kg under the intensive system as improved management (better nutrition, veterinary care, housing, etc) results in higher litter size at birth and increases survival and growth rate of kids (Ademosun, 1992). This depicts that improving the management systems for WAD will not only improve goat performances but will equally increase saleable quantities, farmers' incomes and sustenance.

Figure 5 depicts the high prolificacy of this goat species with the possibility of three kiddings within a two-year period, and a greater probability of healthier does and kids. This implies that three kiddings are possible within a period of 26 months, if the management system allows a dry period for the does (Devendra and McLeroy 1982).

The WAD is reported to kid normally at about 144–150 days (5 months) after conception with a mean litter size of 1.6 kids giving an annual average reproduction rate of 2.4 kids per doe. Considering its potentials for multiple births, this posits that the WAD doe can yield 6 to 9 kids within a two-year period. This means that a herd with only five healthy does will yield 30 to 45 kids in two years under improved management systems. In *Donga Mantung*, farmers' responses revealed that kid survival rate is low especially for does that kid before 12 months of age (32.1%) resulting from still births and lack of veterinary assistance during delivery. Survival rate of kids will, therefore, be higher with improved nutrition and veterinary care, thus improving productivity and farmers' economic power.

DISCUSSION AND SUGGESTIONS

The pattern of goat ownership in *Donga Mantung* differs from that of cattle. Only a comparatively small percentage of the population owns cattle and rears them on distant hills away from the villages while almost every household owns goats and rears them within village walls. Cognisant that goats are raised by over 95% of households in the division any direct investments into goat culture will have a more direct impact on the rural poor. Investments into goat culture are less demanding than into other livestock species notably cattle. The incidence of such investments will improve the lot of the rural poor since it will impact more than 90% of the population.

The need for poverty reduction in the rural and urban areas to achieve food security and sustainable agriculture through small and medium-size farmers is a priority issue. Achieving poverty reduction, food security and sustainable agriculture can best be attained through the collaborative efforts of institutional authorities and farmers under the auspices of the institutions. The question about increased goat productivity in the *Donga Mantung* towards raising farmers' incomes is, 'why have there been changes in farming systems in the livestock sectors of some countries like Denmark and The Netherlands which have resulted in a boosting of livestock farming to the status of a viable industry employing thousands of farmers, and generating high incomes; and not in African countries?' Livestock farming has become the mainstay of many farmers in The Netherlands who derive their livelihood from it. This sector has witnessed the development of different facets of the livestock industry, notably through co-operative efforts by the farmers.

Changes in the perception of the livestock farmers, their willingness to accept and embark on the adoption of new and 'uncertain' organisational and technological changes in livestock husbandry systems was instrumental in transforming the livestock sectors of these countries from a primitive, unproductive and undependable activity into a viable, remunerative and sustainable economic activity. Such could be emulated by the livestock sectors

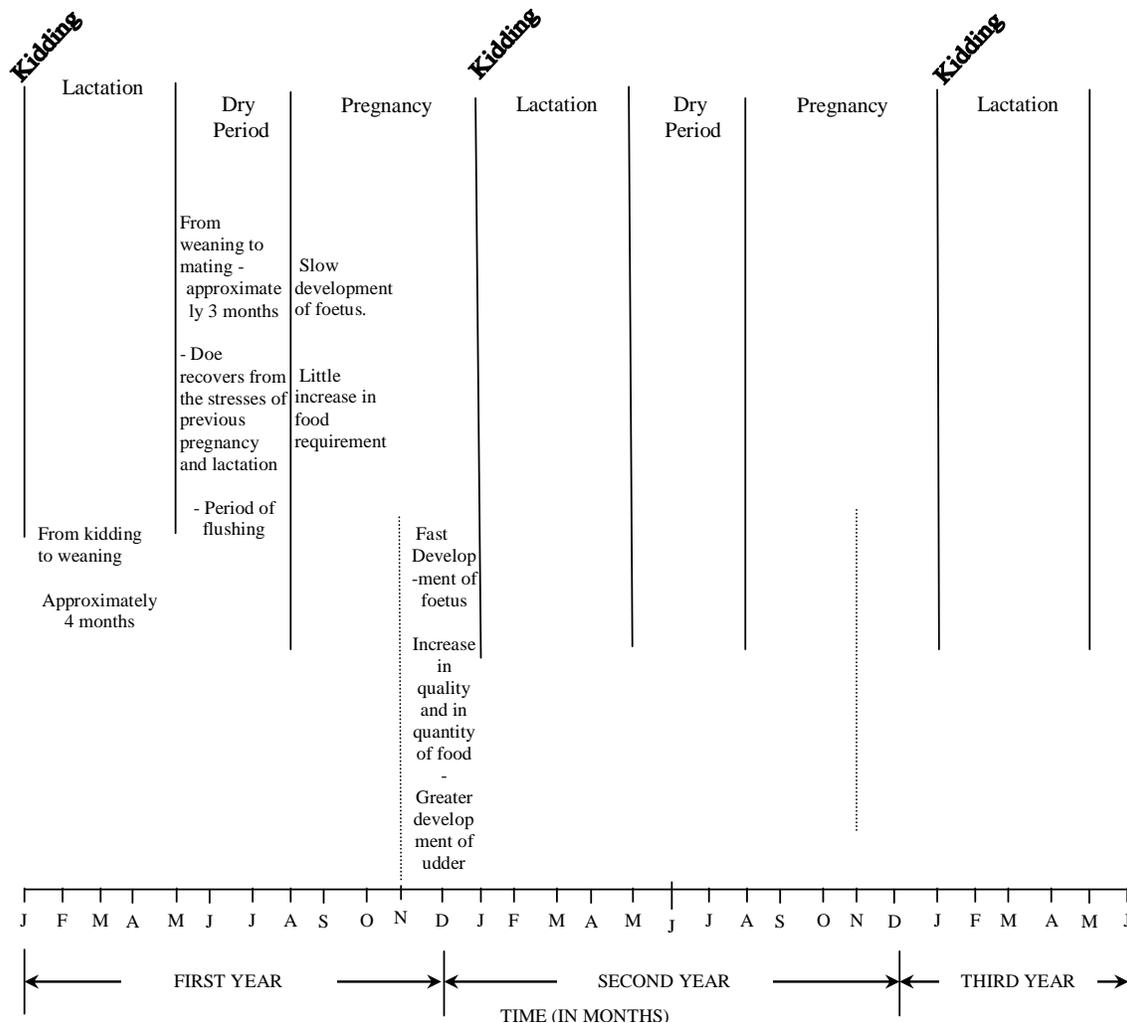


Figure 5. Physiological stages in the management of breeding does. Source: Derived from Devendra and McLeroy, 1982. p 94.

of most Sub Saharan regions as *Donga Mantung*. Adopting cost effective organisational and technological changes in husbandry systems are likely to boost meat production and that of other by-products from small ruminants in *Donga Mantung* especially considering the available natural potentials.

As population growth rates increase, available rangeland reduces and farmers find it difficult to depend on nature alone. It is therefore necessary to teach and encourage farmers to practice haying and silage during the rainy season in order to save up the abundant pasture for dry season fodder. This will go a long way to check pasture shortages during the dry season, encourage productivity, reduce farmer-grazier conflicts that are preponderant at this time of the year, increase farmers' incomes, etc (Figure 6).

The current need for improvement in small ruminant productivity is not only recommendations of techniques of increased productivity but willingness by small ruminant

producers to accept and adopt effective organisational and technological changes in animal husbandry. The government and NGOs are to play the role of facilitators. Education, therefore, holds the key for such effective and radical changes among these largely unorganised rural livestock rearers. This has to take the form of non-formal education. Technologies should therefore be simplified enough for their level and prove more profitable to their ventures. This is where tremendous exercise of patience, understanding and adequate investments by government and interested NGOs into appropriate low cost technologies developed for the proper and more elaborate training of the farmers is of paramount importance. For any improvements to be effected, the government and NGOs need to bring farmers to perceive the need for such changes and be willing to adopt them. Farmers have to realise the possibility of earning a living solely through goat production, so that they embrace goat breeding as a viable economic activity and sustainable

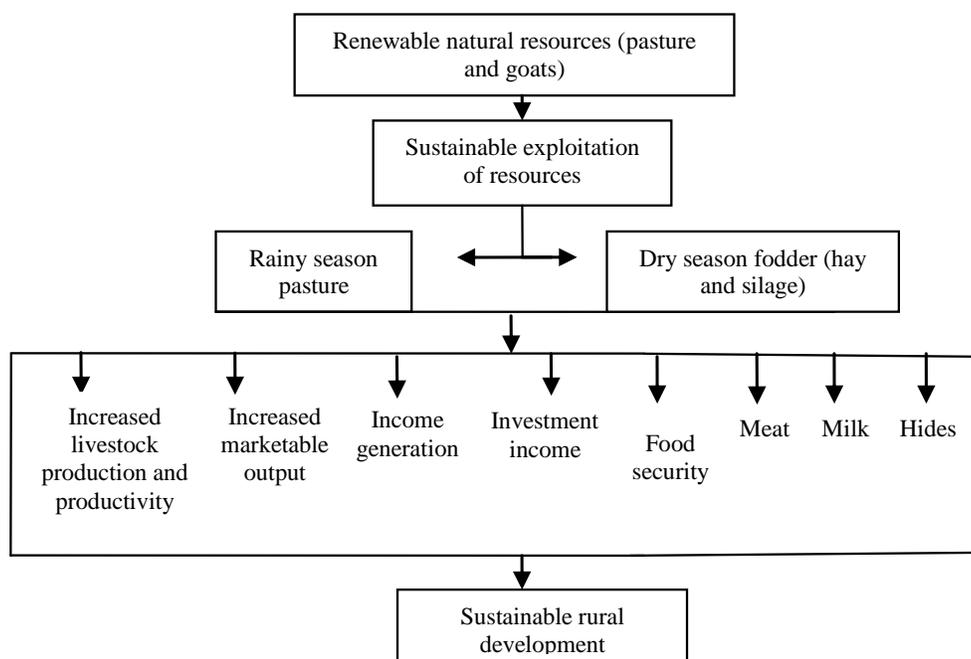


Figure 6. Harnessing renewable natural resources for growth and development.

means to livelihood. As such, investments in goat production will be commensurate to goat productivity potentials, using more intensive system with better nutrition, especially during the dry season, in place of free-range methods and the habit of exploiting the scavenging qualities of goats. This will help to improve productivity and reduce the impact of disease susceptibility and mortality. Organisational changes will enable farmers gear towards market-oriented goat production as this will enhance sales of their goats, give them a greater command of the market situation and, elevate and stabilise their incomes from goat production. This can best be achieved through constituting livestock farmers' cooperatives.

Conclusion

Small ruminants play a significant support role in small farming communities in most African countries in the form of employment and food supply. Unfortunately, researches and investments in these countries have focused more on improving crop farming to the neglect of the livestock sector. Recent market trends have shown increasing prices of meat sources such as beef, poultry, and sheep, consequently the demand for goats will probably rise steadily. Such rise in demand will serve as a booster to small ruminant farming necessitating innovations in existing husbandry methods and use of forages.

Modernising the agro-pastoral sector is not a panacea towards achieving socioeconomic development in the

rural milieu of Cameroon as efforts towards modernisation must take into consideration the cultural dictates on agro-pastoral production. It is however a truism that the available pasture and livestock are actual and potential abundant natural resources whose judicious use is likely to improve the lot of the rural population and engender economic growth and/or development.

Conflict of Interests

The author has not declared any conflict of interests.

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