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Promoting micro livestock farming to enhance animal product supply in sub saharan Africa

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ABSTRACT

In Sub Saharan Africa the demand for food of animal origin is growing much faster than production due to improved health education, higher income per capita and ever increasing population growth. Production of animal products has been outpaced with the dramatic increase in human population. This has necessitated increased production through engaging or production of alternative sources of animal protein. The discussion suggest the utilization of micro livestock species as a feasible option to meet the animal product demand. Owing to the pace at which populations are growing, in many Sub Saharan African countries livestock products will be beyond the reach of ordinary person, unless alternative sources of animal protein are sort. Micro livestock are likely to become increasingly important as a result of rapid increase in human population and urbanization. The space for raising conventional livestock have decreased and this scenario has called for keeping of smaller animals which are prolific. It is envisaged that serious consideration of micro livestock as one of the major component of the livestock production will alleviate protein deficiency in the majority of the population in the region.

1. Introduction

The biodiversity of Sub Saharan Africa's micro livestock provides a valuable asset and sustainable resource for improvement of animal product supply and food security. Micro livestock have a host of benefits and opportunities that conventional livestock do not present for livestock farmers. They can be differentiated from conventional livestock in the sense that they are inherently small by nature and may be a small species of a traditionally favored type of livestock (BOSTID, 1991). The class encompasses small indigenous vertebrates and invertebrates both domesticated and wild genetic animal resources which can be produced on sustainable basis for food, animal feed and as a source of income. In this discussion micro livestock refers to poultry, rabbits, bush rodents, snails, guinea pigs, etc., reptiles, snakes and birds have more recently been considered as eligible for micro livestock (Hardouin et al., 2003). Micro livestock farming if properly managed has considerable economic, social and ecological benefits to resource poor farmers, as well as acting as a vehicle to improved food security. Micro livestock production priority should be directed on resource poor farmers to promote consumption of animal products and food security through provision of comprehensive micro livestock support services and incentives. The purpose of micro livestock production should go beyond their direct output functions and include other significant economic and diversification activities, as well as various cultural roles related to status and the obligations of their owner. There is growing evidence that engaging in micro livestock farming has a potential to address the food insecurity in Sub Saharan Africa (Henry et al., 20121; Hardouin, 1995; Juste et al., 1995; Thys, 2001). However the knowledge about the adaptive value of micro livestock and their competitiveness versus conventional livestock is still very limited, It is postulated that most sustainable utilization strategy of micro livestock species will be achieved through their integration into the existing livestock production systems.

2. Strategies to promote utilization of micro livestock production to enhance animal products consumption and food security

The number of malnourished and food-insecure people is growing fastest in Sub Saharan Africa ,where livestock production is failing to meet the protein demand for the growing population. This has called for identification of alternative sources of animal protein supply. The idea about the possible future contribution of micro livestock farming to supplement animal products and enhance food security has been suggested. Identification and development of strategies which are environment specific based local livestock systems are imperative. Appropriate strategies for engaging in micro livestock farming as a major livestock component must primarily focus on how to improve traditional livestock systems. This is on the background that more often micro livestock farming has not been regarded as a domain for both subsistence or commercial farming and as such the promotion of micro livestock farming has received very little attention at national level. Achieving food security and supplying adequate animal protein foods will require a major shift in budgetary allocation and donor funded programs in livestock farming to promote lesser known micro livestock farming. It will require public policies that support resource poor farmers encouraging them to venture into micro livestock farming. Due to population growth limited space will force farmers to manage fewer livestock and smaller animals will be attractive to raise. It is more reasonable to suggest that resource-poor farmers would be able to raise a few numbers of micro livestock more successfully than raising conventional livestock on small pieces of land. Larger numbers of small sized animals will increase the likelihood that the farmer be able to successfully breed livestock and allowing meat products to be available consistently throughout the year. It is envisaged that the promotion of micro livestock production should simultaneously develop public demand for their product because if this is not done they are high chances of project failure.

The gradually expanding into micro livestock farmers will meet animal protein demand. With large animals is very expensive with gradually expanding with further development, but there is a point of development in many rural economies after which most farmers choose to stop raising livestock. Beyond a certain income level, livestock numbers for most households falls as productivity increases, and only a few specialized households evolve toward larger-scale commercial livestock operations. Local food production would be critical to eliminating protein deficiency and food insecurity in areas where the resource poor farmers do not have the capacity to purchase food from elsewhere. Producing micro livestock species and adaptable innovations and techniques to enhance productivity and at the same time protect the environment which sustain micro livestock species is called for. However, Ellis and Mdoe (2003) supported the idea that those individuals who engage in a wide variety of

livelihood activities are less susceptible to economic or environmental shocks within the community. Appropriate research into optimum environment for micro livestock production need to be addressed.

3. Some little known small animal genetic resources with a promising economic future and their performance in food security

In Senegal Gueye et al.,(1998) in chicken and Teguia et al., (2007) in Muscovy duck reported that the relationship between live body measurements of carcass component in vivo depends on the correlation between body weight and chest circumference, keel length and thigh length. In vivo prediction of carcass components based on single trait are usually discouraged as not reliable (Ogah, 2011). Prvious reports in Nigeria (Vaccaro et al., 1968; Quijandria et al., 1983) suggested that a genetic basis exists for vital production characters of micro livestock such as guinea pigs for body weight and litter size. The implication is that a general improvement in these traits would occur when selection is practiced. Wright (1960) and Dillard et al., (1972) reported phenotypc and genetic correlations among weights of guinea pigs at different ages, weight gains and litter size. In Zimbabwe, persons without virtually nothing have manged to survive through the mopane worm project. Children, women and other marginalized groups have collected eggs and adults, raised the larvae of the mopane caterpillar and harvest and market the worms for an income (Taylor, 2003). Frost (2003) suggested that proven methods of processing and storing the worms may ensure a steady output and maintain quality for the product. Research focus on mopane worms include innovative and inventive methods for harvesting, processing and storage, which may potential increase the income for the resource poor farmers (Taylor, 2003). Rabbit have a shorter generation interval and could survive on variety of feeds including kitchen waste. A single rabbit could produce almost 30 times her own weight in one year if given good conditions and given less than good conditions, still could still produce 10 times its own weight. Due to body size, snails could be easily handled, transported and managed by children and women with minimum training, thus keeping down production costs (Ekanem and Umoh, 1997). Capital owing cost for snail production was low due to moderate level of expenses incurred on nutrition, small area of farm size and costs of equipment involved. This made production affordable for people with small compounds or poor ones. Farmed bush meat is still highly ranked in terms of taste and preference, and there is no doubt that a market exist if the necessary intensive management techniques including domestication can be developed (Hardouin, 2005). Juste et al., (1995) pointed out to the demand for bush meat, including micro livestock., in equatorial guinea. Leake (2000) gave clear evidence for international demand for bush meat to supply ethnic restaurants around the world which may translate into long term profitability of some micro livestock enterprises. The small size of micro livestock means a small amount of unit input, which in turn means more flexible production which suit very poor and food insecure households which include female headed households with children, HIV/Aids affected households, young unemployed people and elderly without pensions. They socially excluded people may engage in micro livestock farming out of necessity on a very small plots on often marginal, vacant open private or public land and around in/on their homes. For guinea pigs the small size of the breeding unit normally resuls in greater productivity in terms of their live weight produced per reproductive female per year. On the basis the productivity index is 6-10 for guinea pigs, 6 for sows, 2 for the ewe and 0.4 for the beef cow (Cicogna, 200). Xiccato et al., (2000) in a study on rabbits observed that early weaning of young rabbits could permit increased reproduction rate without negative effects on litter and does performance. Studies have also identified weaning age among other factors as influencing post weaning growth performance of rabbits (Afifi and Emara, 1988; McNitt and Lukefahr, 1996). The pre-weaning mortality was high in rabbits which was attributed to unsuitability of climatic condition, management and skills. The mortality in rabbits was higher in hot months which was due to direct effet of heat stress on the sensitive kits, reduction of dams milk (Ayyat et al., 1995). The grasscutter was reported by Clottey (1981) as the most preferred among the wild rodents wider domestication as well as an alternative with a promising future. More so rearing grasscutter in captivity still remain a relatively new initiative which requires further investigation on the successive rearing. Fibre levels in diet of grasscutter is associated with digestibility of dry matter, protein and fat which could lead to reduction in growth rate (Vanzyl et al., 1999). Due to small body size snails can easily handled, transported and managed by children and women with minimum training, thus keeping down production cost (Ekanem and Umoh, 1997). The small size of the micro livestock is undoubtedly one of their most significant asset since it makes it possible to produce and mange on small areas and in cluster (Thys, 2001). It makes production affordable for people with small compound or poor ones (Adinya et al. 2011)

4. Micro livestock genetic improvement to enhance productivity for protein supply and food security

Breeding programs should be considered for micro livestock species, which will at the same start generating data on phenotypic traits, reproductive parameters and carcass characteristics with the final aim of improving overall performance from an economic point of view. The reproductive capacity of these species is the most important factor which will affect their success as an important component of the livestock production system. The breeding criteria of most micro livestock can be more varied than the narrow production criteria of subsistence farming system. Most populations of micro livestock have been subjected to little or no deliberate selection for higher productivity. They have been no benefit of any organized local genetic improvement including established methods of selection for their locally preferred breeding objectives which unknowingly responded to the demands of low input system. This itself may have been an advantage in the sense that the survival traits were not compromised. Through natural selection micro livestock have been selected for genetic adaptation responses in more marginal environments since time immemorial. The selection should be centered on adaptation and productivity which augur well with the uncertainties of climate change. The recent high demand for livestock products need to refocus from conventional livestock to micro livestock to higher production targets to match their counterparts.

Genetic potential of micro livestock is unknown and hardly exploited because the common objective has been to meet the protein requirement and food security from large conventional livestock. The level of appreciation of the role of micro livestock in most developing countries is low. Previous reports in Nigeria (Vaccaro et al., 1968; Quijandria et al., 1983) suggested that a genetic basis exists for vital production characters of micro livestock such as guinea pigs for body weight and litter size. The implication is that a general improvement in these traits would occur when selection is practiced. Wright (1960) and Dillard et al., (1972) reported phenotypic and genetic correlations among weights of guinea pigs at different ages, weight gains and litter size. Research is almost negligible and virtually no information on the performance potential of micro livestock in their different native environments is available. Change in population dynamics in relation to demand of protein worldwide has never been looked into. Against this background the development of micro livestock species has not produced any distinct characteristics suited to different conditions. There has been little known about the adaptive value of micro livestock species and their functional role in subsistence production system. This entails that strategy to promote their use should focus on utilization and improvement of individual populations. Individual populations will only survive if superior production traits of economic relevance are identified. Assuming that in any market oriented drive of products derived from micro livestock will follow a trend through different phases which include growth, maturity and decline. Integration of micro livestock in the main livestock system will only take a centre stage through improvement of their overall biological and economic efficiency through provision of an optimized genetic potential meeting the needs of intended market or subsistence farming system. There is generally lack of information on the characterization and extent of genetic diversity in almost al micro livestock animal genetic resources worldwide. This is due to the fact that limited research studies have been conducted to evaluate the production characteristics of these animals. In the absence of research data production characteristics of micro livestock their genetic potential has not been well appreciated. This has led to the assumption that micro livestock are of low genetic potential. Consequently, most animal selection in their population has been left to natural forces or influence.

5. Potential constraints in sustainable micro livestock farming

Ogunjimi et al., (2012) cited problems confronting micro livestock farmers which included inadequate credit facilities, untimely supply of inputs, inadequate information, improper management skills, low extension contact and inadequate processing technology. However, mentioned community influence, farmland acquisition, characteristics of micro livestock, personality factor, economic status, formal education, household composition, external orientation, farm characteristics, social orientation group and communication tools as factors which influence farmers to participate in micro livestock production. Constraints in snail production included non adoption of recommended practices, poor storage facilities and stagnant production technologies among farming communities (Adinya 2006). Micro livestock is a minor constituent of livestock population hence it take less time to addressed challenges in this sector, bringing in rapid improvement in production. Micro livestock population and their productivity per animal is critical. The constraints which may hinder progress in this regard include little

support of relevant research activities to enhance productivity. Unlike conventional livestock production which has been given an overriding emphasis as one of the core sectors to solve the current challenges on food shortage and to bring future animal protein sustainability, not much investment has been channeled into micro livestock farming. Due to the fact that most micro livestock sub populations are small in size as resulted in them not perceived as a valuable assets. In most cases there is insufficient or lack of national micro livestock production policies which result in limited capacity for performance.

Micro livestock as compared to ruminants tend to have higher feeding requirements per unit of body weight than larger species, which is caused by biological restraints on efficiency of food digestion. As a result, small animals tend to require food that is higher in protein, with less fibre (BOSTID, 1991). Animal production and extension services are run through state schemes, breeding policies in livestock production often do not include micro livestock Despite the numerous advantages of micro-livestock, there are disadvantages as well. It is important to be aware of these disadvantages in order to mitigate any constraints small animal rearing may have on the investor. Disadvantages include high energy requirements, increased labor requirements, disease, predation, lack of research, and human resistance to new and small species (BOSTID, 1991).

6. Micro livestock production, climate change and animal product supply

The negative impact of climate change on conventional livestock production has been considerable and there is need for alternative species in animal production. It is believed that livestock is the most susceptible sector to climate change and its predicted that climate change will have a graver effect in Africa than on any other continent (Scholtz, 2012). Climate change represents a major risk for long term contribution of livestock production to food security. Sub Saharan Africa may suffer the greatest share of damage in the form of declining livestock productivity due to greater frequency of climatic variability. This means livestock production in general will have to adapt to climate change and better prepared to respond to long term demand for animal products that will ensure that the growing population will be able to produce and have access to adequate animal protein. The challenges of climate change will call for a balanced type of animal which can produce in stressful environment. The use of adaptive genotypes such as the local micro livestock genetic resources may sustain production in this regard. Due to climate change some of the environmental factors which will have a negative effect on livestock production include high temperature, low humidity and changes in rainfall patterns. Livestock production systems will need to adapt to higher ambient temperatures, lower nutritional value of feed resources and new diseases and parasites occurrence. Adaptation to climate change will make livestock act as important assets during unpredictable environmental changes (Soussan et al., 2000). In fact, livestock are often seen as contributing to the adaptive capacity of a household or community during trying economic times (Alary, Corniaux, Gautier, 2011). Adaptive capacity can be understood as the ability to cope during unfamiliar changes and is closely linked to the concept of resilience (Folke et al. 2002). It can be seen that the present conventional livestock production system based on rangeland grazing husbandry systems, ecological destruction through climatic variability and overgrazing due to high stocking rates in areas where feed and water has been compromised due to high temperatures caused by climate change does not augur well for future livestock productivity and high demand for animal products. Limitations of feed resources both in terms of qualitative and quantitative value will have a negative impact on production of large conventional livestock. Several uncertainties due to climate change will limit the accuracy of conventional livestock production projections. One relates to the degree of temperature increase and its geographical distribution. Understanding the potential impacts of local environmental changes will be the first step to indulge in sustainable micro livestock species production for food security.

Through natural selection micro livestock have co-evolved in stressful environment over millennia and their adaptation to the prevalent climatic environment will be essential for productivity in future. The notion that the effects of climate change will be graver on the African continent than any other continent may be disputable, if only Sub Saharan Africa intensifies the utilization of the micro livestock on the continent. This is so because most of the mini livestock indigenous to Sub Saharan Africa have over the decades managed to survive, reproduce and produce in already stressed environmental conditions. The are adapted to produce under conditions of limited fed resources and low water availability. At the level of subsistence farming which is characterized by generally low input-output system, the sustainability of micro livestock production efforts to improve animal production becomes a dominant factor where climate change should be taken into account. The common multipurpose use of micro livestock by rural communities require that correlation among the different micro livestock traits with

climatic variability be understood. Insufficient data on climate change and its impact on micro livestock production and characterization of subpopulations may prevent progress in combating the effects of climate change on production. It would be a grave disservice endangering the micro livestock populations and unrecoverable loss of animal genetic material in the context of climate change. The major concern for using micro livestock is their adaptive traits which will be more important in climate change variability and other common environmental shocks. The challenges of production specialist in the context of climate change is to some extent improve livestock productivity potential to a satisfactory level without sacrificing adaptational qualities.

In the view point that with the foreseeable catastrophes of climate change the micro livestock must be carefully guarded. It would be a grave disservice in the long term if micro livestock are allowed to be left unattended. There can be little doubt that the opportunities for utilization of micro livestock are great if farmers are willing to accept the challenges of climate change and realizes the necessity for exploring adaptive measures in livestock production. The introduction of new livestock biotechnology such as genetic engineering which focus on micro livestock will widen the opportunities of utilization of this class of livestock. The efficiency of micro livestock production should be mainly determined in terms of protein nutrient requirements for household maintenance together with food security. Efficiency of micro livestock has too often in the past been measured only in terms of their productivity, whilst the efficiency to survive in stressful environment was ignored. The factors which negatively influence micro livestock productivity such as water stress, feed inadequacy and disease occurrence should be understood in order for them to survive the extremities of climate change.

7. Adoption of appropriate micro livestock research and extension strategies to enhance food security

Increased investment in research and development for sustained livestock productivity growth is one of the many essential conditions to close the demand supply gap in livestock products. Research and extension are still lacking on micro livestock production in most African countries due to a traditional emphasis on large domestic livestock and lack of related training and education. Since the term 'micro-livestock' was coined in different parts of Africa, very little empirical research has been published exploring the roles and opportunities of these smaller types of livestock in agriculture or livelihood development. Research published on micro-breeds and small species of sheep, goats, and pigs rarely differentiates the livestock type as unique from conventional livestock. Assessment of constraints to micro livestock production for the purpose of setting sound research priorities is required. Production issues related to micro livestock have not been reasonably researched and simply not known locally. Research on indentifying productive traits and estimating the determinants of production in production is scarce. Definition of comprehensive micro livestock production strategies incorporating specific, immediate and long term strategies production was found lacking in most micro livestock. Specific or targeted research related to micro livestock which give solutions to ensure sustenance of individual households. The events in terms of micro livestock research in Africa have not been keen on production traits, as a result many livestock species will be unable to cope with the demand for animal product. Micro livestock research should be redirected to consolidate the already known production traits which micro livestock species posses. The focus of micro livestock research should change to encompass the animals ability to survive in stressful environment. Livestock research locally has been driven by the desire to improve productivity of conventional livestock. It is reasonable to suggest that this research trend imposed on Africa does not take cognizance of the unforeseeable role of micro livestock to supply protein due to population growth has a graver consequence on the continent. Research on micro livestock adaptive measures and capacity need conservable attention to reduce vulnerability especially in smallholder livestock sector. Research geared at development of collaborative work by all stakeholders to support the adaptation of livestock systems to better cope with the demand for animal product will be critical. However it is not possible drastically to change the livestock production culture of the livestock producers especially the smallholder farmers for at least for decades to come for inclusion of micro livestock. To achieve success in micro livestock research in the context of the uncertainties of food security it is necessary to look at livestock production system holistically and involve smallholder livestock producers at every stage in the planning and integrating the livestock . It is also important that micro livestock research should have a component of subjecting animals to simulated impacts of climate change. This will assist in substantiating the responses of livestock to nutritional stress, water deprivation and increase in environmental temperatures. Livestock farmers need to be exposed to extension services for awareness of the role of micro livestock to mitigate its effects on livestock production. It seems that commercial livestock producers have access to extension information concerning conventional

livestock production. It is highly unlikely or decrease the probability that smallholder micro livestock farmers may take up measures to ameliorate the effects of insufficient protein provision because of poor flow of information from extension to farmers. Given the need, awareness and increasing information now available for some of the micro livestock species it is time for increased investment in this form of livestock production for food security and poverty alleviation.

Research leading to sustainable utilization of micro livestock genetic resources is relatively new and requires long term investment and commitment. The cost of crucial micro livestock research remains beyond reach of most developing countries., unless national capacity is strengthened. There has been a misconception on the direction of livestock research in these country, where most livestock scientist were engaged in conventional livestock studies. This was prompted by the availability of funding for such studies from national budgets. Livestock research thrust as perceived individual countries disregarded the micro livestock group. However research targeting conventional livestock has failed to give solutions to our animal protein demand and food security. Previously, despite having more conventional livestock research programs from national budget, the impact on livestock production to meet the animal product demand has been minimal hence need for alternative sources of protein such as micro livestock species. The refocus of research programs should be the improvement and utilization of micro livestock species for poor alleviation and food security.

8. Application of new approaches and technologies in micro livestock production to increase productivity and enhance food security

Suppose micro livestock has been undergoing constant genetic change which is the normal state of any animal genetic resources in general. Micro livestock development should be taken as a dynamic process of genetic change driven by environmental conditions and artificial selection. While most gains in the use of new approaches and technologies have occurred in developed countries, there are considerable same opportunities to increase livestock productivity in developing countries on conventional livestock, very little if not has been done on micro livestock. Assuming the contribution of micro livestock production to the national animal protein yield was greater in terms of kg of protein production per hectare per year as perceived any inclusion of such agricultural activity will solve our protein demand issue. This may mean that any micro livestock intervention which influence changes in value and attitude of smallholder livestock producers from the present consideration for conventional livestock as status symbol, would provide solutions to more important objectives of higher productivity and socioeconomic benefits which are food security oriented. The sustainable use of micro livestock species in the mainstream economy should not be over emphasized.

The current contribution of micro livestock to the national economy is regarded as low. Among some of the reasons given for unsatisfactory contribution by micro livestock is due to their unknown genetic potential, lack of information sources, inadequate training of farmers in management practices and cultural traditions. Micro livestock species are essential due to their potentiality for multipurpose use, suitable for backyard family production and can be produced by marginalized groups such as children and women. Future priorities of micro livestock farming will rely on a wide use of education and extension and systematic courses at all level planned production of micro livestock farming. The small size of micro livestock animals means a small amount of input per unit, which in turn means more flexibility in production. Most livestock programs in the past have focused on promoting specific technologies on conventional livestock and have largely failed because they ignored socioeconomic and institutional issues of resource poor farmers. Hence future strategies on livestock production should drive livestock farmers especially in rural supply areas towards small micro livestock species. A number of on the shelf technologies are available, and appropriate for livestock production (Saunders, 1997). However, there is need to consolidate these technologies and develop extension packages as well as train extension staff to realise maximum benefit which include micro livestock. Adoption of a series of development in biotechnology to support micro livestock production in Africa are expected to speed up on going developments in the livestock sector, with major potential on increased animal products. New approaches and technologies about micro livestock production based on: the use of genetic engineering to improvement on the genetics of various micro livestock species for higher output, embryo transfer, and immune-genetics; artificial insemination and cross-breeding for quick genetic gain in hybrid vigour; improvement of reproductive efficiency through which has enjoyed vast use in developed world could be effective in improving the genetic potential of this unique animal genetic resources in Africa, without compromising the adaptive traits.. Under these new approaches in animal

production local superior genotypes can be distributed and used across the country more easily which may positively affect production. The tools of molecular genetics are likely to have considerable impact in future on micro livestock. For example, DNA-based tests for genes and markers affecting traits that are difficult to measure currently, such as meat quality and disease resistance, will be particularly useful (Leakey et al., 2009). If these new developments in livestock production are applied to micro livestock will enable to explore and possibly utilize micro livestock in a manner that were not possible before. However, the application of new development in biotechnology require sufficient resources in form of trained manpower, equipment and supplies. Previously, the use of new technology in livestock production may have not been viewed as a priority by either government or farmers and this should change for complementary use of different new technology in livestock production to enhance productivity. Use of various technology to support livestock production have a great impact in increasing productivity in micro livestock species.

Livestock production in the developed world has advanced to the current stage mainly due to the presence of adequate and appropriate infrastructure and rapid technological developments. In contrast, infrastructure and application of new technology for national livestock production are lacking in Africa. However, the need for such technologies and facilities is paramount for successful improved micro livestock production programs. State sponsored research institutions should be part of the drive for technological innovation and micro livestock production. On station breeding units may provide the centers for rapid distribution of superior local micro livestock genotypes through improved technologies, which as Smith (1988) states, are area model for the role of sophisticated technology in improving indigenous breeds and developing production systems. The results of new developments in reproductive physiology which makes various manipulations possible opens up entirely new horizons for increased production in micro livestock animal genetic resources utilization. New technology can achieve immediate improvement through selection of foundation livestock from local populations and attain faster and more effective performance improvement. The pace of technological change world over is now so rapid that universities must endeavor to train students for careers which do not even exist at present such as micro livestock production. Education which develop ability to think, read and observe will enable graduates to change within a fast micro livestock production changing world. The diversity of career opportunities occupied by micro livestock production specialists which encompasses fields as varied as molecular biology, genetics, reproductive physiology and many others provide hope for the future in the knowledge of that micro livestock production specialists does indeed posses that unique quality- the ability to adapt.

9. National collaborative networking of public and private sector in micro livestock production

Both the governments and the private sector have an important roles in micro livestock industry. The stakeholders in on include all groups involved in livestock production chains, which include livestock farmers and their communities, specialized breeders, consumers, scientists, policy makers in livestock production and any groups that aim to influence policies in livestock production with backgrounds in environment, development, commerce and culture. Economic viability through greater productivity in micro livestock production may be the solution to engaging in national collaborative networking of public and private sector in micro livestock production for poverty alleviation and food security. The private sector has developed with multiple players at each level of the food chain-producers, abattoirs and processors, retailers, and as well as a well developed service industry. Developing specific value chain for micro livestock production can enhance efficiency in animal product supply and marketing, through participation of public-private sector partnerships between major players in livestock production such as government institutions, private organizations, non- institutions governmental and independent research organization. The poor resource farmers have been operational from time immemorial and consists of numerous smallholdings with small numbers of livestock. It forms a very small component of the national livestock industry because of the low off take because their prime objective to livestock farming is food self sufficiency for the household, however this may be augmented by micro livestock production

The concerted effort from government and private sector should aim at empowering resource poor farmers and transform them into well informed participants in market oriented micro livestock production. This would improve competitiveness of micro livestock production and consequently contribute to poverty alleviation and food security. National governments should be responsible for policy development in micro livestock production and have to balance conventional and nonconventional (micro livestock) production needs with other priorities of the country. Livestock production programs have been usually financed and executed by relevant government

ministries with occasional assistance from donor funding for conventional livestock production. National government was also the main source of short and medium term livestock production activities. There is need to partner with other stakeholders on long term micro livestock research, because of the potential benefits involved. Most of external participation from donors were shy on micro livestock work prefer on conventional livestock programs. Strategic research in collaborative networking on on-farm can assist in performance improvement location specific micro livestock production systems.

Research coordinated by networking should cover a lot of aspects of micro livestock production. Government departments which coordinate and give technical support should be strengthened. Collaborative research in micro livestock production should be active in all aspects of animal production. Periodic assessment should be done to measure progress resulting in planning of future research targets and micro livestock development programs. As regards to national collaborative networking of public and private sector in micro livestock production, the greatest difficult is the shortage of funding. Financial budget allocation from government on micro livestock production is inadequate or not there, while the interest of private players in livestock production and the meat industry has so far not reflected any interest in supporting micro livestock production in smallholder farming sector. In view of the present status of micro livestock production in Africa and of uncertainty of breeding material markets, livestock production private enterprises are not prepared to set aside investment for micro livestock production although the cost of production are reasonable for this sector.

10. Possible role of education and training in micro livestock production

There is a general agreement on the high priority to be attached to education and training in micro livestock production as a possible avenue to reduce poverty and enhance food security on the continent. The need to set up micro livestock training programs for both trainers and farmers with well defined goal should be one of the future priorities to alleviate poverty and food security through livestock production. Adekunle (1978) stated that technical and commercial education broaden the farmers intelligence and lay the basis for vocational training. In addition, it enables the farmers to perform farm activities intelligently and with full appreciation of their contribution to the final product. Education and training should promote the sharing of expertise with outside experts but at the same time balancing this with local personnel with good knowledge of micro livestock production. Before embarking upon a discussion on training as a priority to support micro livestock production, systematic courses on planned production should be indentified. This should take into account the individual countries livestock industries which normally ranges from small subsistence farming to modern commercial livestock farming practices existing side by side. In the past decades the commercial livestock industries have been able to feed the rapidly expanding population, and some African countries such as Zimbabwe were generally considered to be livestock products exporter even to the EU. On the basis of the above mentioned scenario no one will therefore deny the great importance of livestock production.

Most African countries have agro-based economies and training in livestock production at all levels should be aimed at developing a human resource base capable of making a living out of agriculture and working in improving livestock related institutions to support the country's economic growth. It is logical to assume that broad based micro livestock training is the key factor in developing the sector to meet the protein demands of local populations. Training personnel and providing technical equipment in micro livestock production should be the fundamental bases for acquiring knowledge, skills and techniques for animal production management and improvement that are needed to translate a mini-livestock enterprises for higher productivity and profitability. Stewart (1975) concluded that education acquired by farmers had a positive influence on farmers labor and income. It is considered, therefore, that the introduction of suitable designed micro livestock courses at college level could serve as a basis for both university and college training and would have the benefit of bringing potential good students into direct contact with realities and problems of micro livestock production at an early stage and will provide an insight into applied micro livestock production. Graduates churned from colleges should be able to apply principles and tools of micro livestock management for the husbandry of various classes and types of micro livestock namely guinea pigs, rodents, snails, rabbits, poultry, lizards, birds etc. On completion of micro livestock production courses beneficiaries should have been sufficiently equipped with knowledge on concepts of the subject, interrelationship between traditional scientific methods of producing livestock, roles, constraints and strategies associated with micro livestock. Various universities, colleges and institutes on the continent offer tertiary training courses in conventional livestock production, but very few offers micro livestock specific

curriculum. There are also various courses available for farmers in livestock production however these programs favor conventional livestock production, there is little emphasis in other mini-livestock species or on resource poor oriented farming. Consideration needs to be given to more rapid training throughput of micro livestock courses to meet the growing demand for animal product. There is need to broaden the curriculum to include mini-livestock species in rural communities. This may require retraining of current staff in micro livestock production systems.

In the developed world the direction of livestock production has changed due to new establishments in livestock biotechnologies. The integration of such issues into the curricula of animal production is lacking at tertiary level in most developing countries. Most lecturers and trainers are not well versed on issues of new approaches to livestock productions. This has created information gaps on livestock production in general, which means a systematic and planned courses on new technologies in micro livestock production are called for at university level. Africa should take advantage of the inventions in livestock biotechnology which provides a technical and operational framework for assisting livestock farmers to increase production. The training of new young scientist in new livestock technologies will exposed beneficiaries to the demands and challenges in micro livestock production. The failure of micro livestock improvement may be a result of lack of qualified personnel in new concepts in small livestock. The introduction of marker assisted selection could be a future strategy for micro livestock selection programs. If the livestock specialist is to effectively tackle the thorny issue of increased livestock productivity, must either be a broadly trained professional with knowledge of sociology, economics, land use planning and integrated rural development as well as micro livestock production issues. It has been noted that livestock production programs offered by many universities disregard micro livestock production. This aspect need possibly to be addressed at university level by introducing the micro livestock production curricula, and this should be a prerequisite for an effective extension services. The private sector service industry which traditionally served the conventional livestock producers has shrunk rapidly over the last decade due to decreased viability. This has also resulted in declining in for animal products to support the ever increasing populations.

11. Implications

From the foregoing discussion it is suggested that alternative sources of livestock products should be made a priority if high prevalence of food insecurity is to be corrected, taking into account the high demand for livestock products for the ever increasing human population on the in Sub Saharan Africa. Improved household food security can be accomplished through increased potential of micro livestock species. The low level of involvement in micro livestock farming is a result of inadequate training, research and extension information in individual countries. The improvement of micro livestock production should aim on the increase in the product output per unit of input involving a complex relationship between factors such as feed input, maintenance feed requirement, level of reproductive and productive performance and income per unit of sold product. Improving overall biological and economic efficiency of micro livestock production through provision of an optimized genetic potential fulfilling the needs of the local market Micro livestock farming is a sustainable solution to food security and opportunities for livelihood diversification are needed to address the problem of greater demand for animal protein which is expected to increase rapidly due to population explosion.

Intensification methods which can be applied in the context of micro livestock farming is the maximization of use of local mini-livestock species where these had not been not previously used to provide animal protein. There also need to intensify use of limited and vertical spaces. Diversification and adaptation to space constraints setting more attention is needed for technology development regarding processing and storage of micro livestock products. There is an urgent need to fully characterize micro livestock species as an important livestock genetic resource, this will greatly contribute to the well being of resource poor subsistence farmers in rural areas. Micro livestock production if properly promoted may constitute a very important agricultural activity at household level. Their smallness entails easy management for disadvantaged groups and rural household may derive ready income from sale of micro livestock. Micro livestock production can be sustainable in long term by adopting adequate adaptive measures against climate change in response to adverse environmental effects. They represent a genetic resource which is resilient to climate variability and should not only be conserved for future use in the event of climate change but should also be fully utilized to serve the increasing population. As the adverse impacts become more frequent and severe on conventional livestock, farmers need for alternative source animal products to deal with climatic variability with the objective of maintaining food security. Micro livestock scoping study confirmed great opportunity to improve livelihoods among the rural households, provided that livestock productivity is

enhanced and appropriate input and services can be availed. Demand for animal protein is expected to increase in developing countries hence the integration of micro livestock into main agricultural activities for the resource poor, can provide many direct and indirect benefits for food security. The success of integration of micro livestock production into the main stream agricultural activity will depend on efficient micro livestock policy formulation and implementation, roper supervision of all mini-livestock programs through the relevant arms of government. Investments in rural roads, irrigation, credit systems, and agricultural research and extension serve to stimulate food production. Research and eextension should be up to date and supported by both private and public sector with proper financial programs. Per capita consumption of micro livestock products should increase, but this growth is should be sustainable with introduction of modern farming practices. Micro livestock in the developing world are expanding slowly and will remain an important source of high-quality food for many of the world's poor, particularly in Africa. Strategies and program of action that will enable micro livestock farming to contribute to optimization of food production and enhance food security in Africa on equitable, sustainable and environmentally sound basis are recommended. Through adoption of alternative animal species such as micro livestock, it appears likely that growing food needs can be met in the foreseeable future, notwithstanding a growing list of technological, distributional, food safety, and health issues that require serious attention and action.

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