Available online at www.worldscientificnews.com

World Scientific News

WSN 30 (2016) 68-88 EISSN 2392-2192

Endangered indigenous cattle breeds of Nigeria a case for their conservation and management

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ABSTRACT

The Nigeria cattle breeds and their productivity were reviewed. A case was made for their conservation and management, an action plan was also proposed for the Nigerian government. The indigenous cattle breeds of Nigeria have short calving interval, are hardy and trypanotolerant, known for early maturity with low mortality rate for total herd (2% and 4.7% for Muturu and Keteku respectively). The Kuri has high potentials for milk production and can calve up to twelve times in life time. They also have enormous contribution to source of income to many cattle rearers in Nigeria. The indigenous cattle breeds of Nigeria are endangered. The Muturu, N'dama and Keteku are endangered due to extensive uncontrolled crossbreeding with exotic breeds. There is also waning interest among farmers in the use of intact indigenous breeds. The Kuri and Biu cattle breeds are endangered due primarily to environment factors. The civil war also had a significant effect on the elimination of some indigenous cattle breeds especially the forest breeds. The endangered indigenous cattle breed can be conserved by the In-situ techniques. The cost of maintenance of the insitu preservation is often high, but it is to be preferred because it is less technically involving and can be well manage given adequate technologies and funds. The inbreeding effect and maintenance of natural habitat can be reduce by use of appropriate mating system and preservation of the original environment. The live conservation techniques can be organise into park with wild life for revenue generation. Rural farming communities can also be organize to form National indigenous cattle breed ownership Scheme (NICABROS), as a community based conservation management technology are action plans that are propose for insitu conservation of Nigerian endangered cattle breeds.

***Keywords*:** Cattle-breed, Conservation, endangered, genetic-diversity

1. INTRODUCTION

The challenge to achieve food security for all is greater now than ever with one out of six people in the world currently been underfed, (Hammond and Leach, 1996). Thus, this necessitates the need to increase substantially production of food and livestock productivity to meet the ever increasing demand for these regions. The compelling need to produce enough food for the growing population in developing countries in most cases often result in negligence of Agricultural conservation policies (land, wide life and livestock), (Fahmy et al. 1996). Several efforts to increase livestock production in Nigeria has being through breeding strategies and policies that encourage the replacement of the indigenous breeds with those of the temperate region (Stetshwaelo and Adebambo, 1992). The imported exotic breeds could not survive because of inadequate provision of ideal environment and management systems. Hence most of these programes have to discontinue in the 1970s. Breeders later realized that such policies of breeding that encourages the replacement of indigenous breeds were futile; nonetheless, extensive uncontrolled crossbreeding continued for some time which has resulted in loss of some indigenous breeds while others continued to be diluted (Adebambo, 1992).

The Muturu, N'dama, Kuri, Biu cattle and the Keteku cattle breeds in Nigeria have been subjected to a long process of natural selection, and have thus acquired adaptive and or productive traits for the diverse ecological conditions found in Nigeria (Almando, 1989). These breeds are observed to have been displaced in the Northern Nigeria by the zebu after the Fulani invasion (ILCA, 1979). So also is the possibility that they would be displaced by the N'dama and Zebu crosses in the tse-tse infested areas. Further more interest appears to be waning among farmers due to the introduction of tractors particularly in the forest areas thereby reducing the traction role played by these indigenous breeds (Adeniyi, 1985). The qualities of these indigenous breeds which include high breeding potentials, short calving interval, low mortality rate for entire herd, good draft, hardness and trypanotolerance, wide distribution through out the country cannot be overlooked. Muturu and N'dama are also used for traction, and may play an important role in cultural values at village levels.

The wide range of production environments as they existed in Nigeria requires an equally diverse range of genetic materials to enable substantial production (Adebambo, 1992). However, most livestock improvement programmes has emphasizes the development of one or more breeds in each species at the expense of the others. The worse of this is that, these resulting new genetic materials of the development regions are often introduced too rapidly, into high stress agro-ecosystems of the developing regions often to the detriment of local highly variable genetic materials needed to underpin and further develop production, productivity and sustainability in those production environments (Hammon and Leicth, 1996). Unfortunately, most of these populations are in advanced state of genetic dilution and/or extinction, thus their future importance as a vast gene pool from which selection and breeding could be manipulated in order to improve their productivity is being jeopardized. Therefore, the conservation of these indigenous breeds is of paramount importance, and as noted by Swarajasingam, (1986) that if African countries are to achieve productive and well adapted livestock breeds, they should take cognizance of their indigenous breeds in a selection programe with rural herds as the point of collection into an open nucleus system. It is therefore important that these local indigenous breeds do not disappear completely or become extinct in order to safeguard the indigenous genetic materials.

This review considered endangered cattle breed in Nigeria, their productive potentials, available conservation and management techniques with view of making a case for their conservation and management

Nigeria indigenous cattle breeds

There are 11 breeds of cattle (Ingenious) in Nigeria. Namely Azawak, Wadara, Bunaji, Rahaji, Adamawa gudali and the Sokoto gudali belonging to the Bos indicus group. Other are Biu cattle, N'dama, Keteku, Kuri and the Muturu all of Bos tuarus group. All the taurines that is, N'dama, Kuri, Biu cattle, Keleku and Muturu breeds are endangered.

Categorization of endangered cattle breeds of Nigeria

Wildlife conservations use five "Status" categories (IUCNN Red data book, Brook and Rhyder, 1978), based on current numbers and the rate of decline, and have suggested that the same should be used for domestic species. These categories are:

Endangered
Vulnerable
Rare
Not threatened at present
Indeterminate (Insufficient data) (Helen, 1978).

However, in developing countries including Nigeria, little is known about the population size of most animal species/breed. This is because accurate census data are not available (Stetshwaelo and Adebambio, 1992). Available information however, indicated that the Nigerian endangered cattle breeds can be categorized using the wildlife status into

Endangered – Muturu, Kuri
Rare-Biu cattle breed
Indeterminate (Insufficient data), Keteku
Not threatened at present, N'dama (Adeniji, 1985; Stetshwaelo and Adebambo, 1992)

2. PRODUCTIVITY OF THE ENDANGERED INDIGENOUS CATTLE BREEDS IN NIGERIA

Muturu breed

Origin and distribution

The trypanotolerant Muturu cattle breed is one of the least known cattle breed in west Africa. It distribution, morphological characteristics and performance have received little publication (Adebambo, 2001). Early reports showed that, the Muturu were once distributed widely across the west African subregion until the Fulani invasion of 1820 (Epstein1971). The Muturu were found in all coastal countries and also in the southern part of Upper Volta (Burkina Faso). They originated from the short horn humpless (Brachyceros) cattle which

appeared in ancient Egypt in the second millennium BC and were first recorded in west Africa during the first half of the first millennium.

Characterization of muturu

Morphometric characterization of Muturu revealed colour shades of ebony black, faun black and white, black with white patches, white with brown or black spots of varying frequencies (Adebambo, 2001).

There are two groups or Muturu breeds in Nigeria. The savannah Muturu which is the larger type and the dwarf type (forest Muturu) which appears to have evolved through adaptation to the humid forest environment. Body size is the only distinction between the two as they are both called Muturu. The population of this breed estimated at 25,000 are found in West African coastal regions, heavily infested with tsetse flies and as a result through adaptation and selection have become tolerant to trypanosomosis, resistant to ticks and tick-borne diseases (Adeniyi, 1985). The population of Muturu breed in Nigeria is not reliably available, but is definitely lower than 25,000, this makes the breed endangered.

The productivity of the Muturu breed

Performance traits of Muturu have been evaluated under the traditional management system with no tsetse control and under field station with tsetse control. Muturu cattle improved its performance under field station compared to the traditional system with no tsetse control. The calving rate under the traditional system was reported as 57 percent as against 92 percent under field station. Muturu calved early 635 days compared to 761 and 684 days for zebu and its crosses; had a calving interval of 350 days compared to 403 and 363 days of zebu and zebu crosses respectively (Adebambo, 2001). Muturu cattle are fertile, producing viable calf per year (Oyenuga, 1967; Adeniyi, 1985). The calving interval was 18-24 months under the traditional system and 10-15 months under improved management. The animals under a tsetse free environment were found to perform better than those in a tsetse infested environment even under improved environment.

Table 1. Productivity of Muturu breed under improved conditions with tsetse challenge and without tsetse challenge.

Traits	Raav-ranch (no. tsetse challenge)	Village Conditions (Tsetse challenge)
Age at first service (mths)	18.0-30	24.0-36
Age at first calving (mths)	27.0-39	36.0-48
Calving interval (mths) calf	19.5-21	12.0-24
Mortality rates (%)	05.0	10.8

Source; Uza, (1987)

The productivity of the Muturu under ranching and village conditions in the southern Guinea Savanah of Benue State, Nigeria, where feed supplementation was not practiced was studied by Uza (1987). The results obtained is shown in Table 1.

Table 2. Productivity of Muturu breed under traditional, improved conditions with tsetse challenge and without tsetse challenge.

Ecological Zone	Production traits	Management systems		
		Traditional	Improved conditions	no. tsetse challenged
Sub-humid Hot- humid	Age at first calving	48-60 months	26 months	21 months
Sub-humid Hot- humid	Milk production	-	421 kgs/Ann	-
Sub-humid Hot- humid	Calving interval	450-720 days	330-390 days	350 days
Sub-humid Hot- humid	lactation length	-	216 days	-
Sub-humid Hot- humid	Birth weight Male	-	11.16 kgs	13.7 kgs
Sub-humid Hot- humid	Birth weight Female	-	11.14 kgs	13.9 kgs
Sub-humid Hot- humid	Weaning weight Male	-	91.119 kgs	82kg (9 months)
Sub-humid Hot- humid	Weaning weight Female		92 kg (12 months)	98kgs
Sub-humid Hot- humid	Age at weaning	-	-	82kg (9 months)
Sub-humid Hot- humid	Live weight at laughter	-	196 kgs	255 days
Sub-humid Hot- humid	Age at slaughter	-	36 months	36 months
Sub-humid Hot- humid	Mortality rate	Very low	2%	-

Source; Otchere, (1986) oyedipe et al.(1982) Pullan, (1980), , Uza, (1987), Wheat and Broadhaust, (1986)

Keteku breed

This has a white coat colour, often with black points (ear and nose), in addition, some are white with black sports or black and white. The hump is usually inconspicuous while the horns are quite short. This breed is larger and taller in the North than they are in the South (Adeniyi, 1981). The Keteku happens to be a crossbred between the muturu and the zebu. The production traits of Keteku are shown in show in Table 3.

Table 3. Productivity of Keteku under the traditional production system.

Ecological Zone	Production traits	Management systems	Performance
Sub humid humid hot	Age at first calving	Traditional	38-47 months
Sub humid humid hot	Calving interval	Traditional	578 days
Sub humid humid hot	Weaning weight at 12 months	Traditional	131 kegs
Sub humid humid hot	Weaning weight at 12 month female	Traditional	149kgs
Sub humid humid hot	Age at slaughter	Traditional	48 months
Sub humid humid hot	Mortality rate for total herd	Traditional	2.2%
Sub humid humid hot	Pre-weaning mortality	Traditional	4.2%
Source: upper	Ogun ranch,	Olutogun,	(1976)

Kuri breed

This is a humpless longhorn breed (Malbrant et al, 1947). They were introduced into Nigeria in 1944 by the importation of a nucleus breeding herd consisting of 10 cows and a bull (Adeniyi, 1985). The Kuri breed is either generally white coloured or white speckled with black or grayish black in particular, around the neck ears, the head and front part of the chest (Adenyi, 1981). It's a heavily built animal of 151 cm in height, and massive vertical high bulbous horns. This breed has a high potentials for milk production and can calve up to 12 times in a life time. Table 4 shows the productive characteristics of Kuri breed.

Table 4. Productive characteristics of Kuri breed under traditional system under subhumid and hot humid ecological zone of Nigeria.

Breed	Ecological zone	Management system	Production traits	Performance
Kuri	Sub –humid, hot- humid	Traditional	Main use, milk, beef limited use	
Kuri	Sub –humid, hot- humid	Traditional	Age at first calving	40 months
Kuri	Sub –humid, hot- humid	Traditional	Calving interval	445 days

Kuri	Sub –humid, hot- humid	Traditional	Milk production	1255kgs
Kuri	Sub –humid, hot- humid	Traditional	Average,lactation length	280 days
Kuri	Sub –humid, hot- humid	Traditional	Birth weight male	25 kg
Kuri	Sub –humid, hot- humid	Traditional	Birth weight female	23 kg
Kuri	Sub –humid, hot- humid	Traditional	Live weight at slaughter	250-300 kgs

Biu cattle breed

This breed is restricted to a hilly volcanic area of Borno State, Nigeria. Number not more than 1000-2000 heads (Stetshwarlo and Adebambo, 1992). Not much information is available on this breed.

N'dama cattle breed

The N'dama cattle is generally small hardy and light brown in colour (Sada 1968). The population of this breed is not well known, but had been estimated to be below 25,000. They are found in West African coastal regions heavily infested with tsetse flies, and as a result through adaptation and selection have become hardy, tolerant to trypanosomiasis, resistant to ticks and tick-borne disease (Adeniyi, 1985). The population for Nigeria is not reliably available but had been estimated to be below 10,000 (Sada, 1968). This makes the breed endangered. The productivity of N,dama under village condition in the forest and southern guinea Savana of Nigeria were studied by Demelters et al (1976) Stewart, (1951) and Sada (1968). Their result is presented in Table 5.

Table 5. Productive characteristics of N'dama under the traditional system.

Ecological zone	Productive traits	Management system	Performance
Sub-humid, hot-humid	Age at first calving	Traditional	39.2 months
Sub-humid, hot-humid	Calving interval	Traditional	457.1 days
Sub-humid, hot-humid	Birth weight	Traditional	10.4 kg
Sub-humid, hot-humid	Length of service period	Traditional	184.2
Sub-humid, hot-humid	Length of gestation	Traditional	288.5 days
Sub-humid, hot-humid	Age at slaughter	Traditional	35 months

Sub-humid, hot-humid	Live weight at slaughter	Traditional	203-254 kg
Sub-humid, hot-humid	Preweaning mortality	Traditional	2.3%
Sub-humid, hot-humid	Mortality rate for total herd	Traditional	1.8%
Sub-humid, hot-humid	Weaning age	Traditional	12 months

Source. Sada, (1968), Stewart, (1951), Demetters and Anwana, (1976).

3. NEED FOR CONSERVATION OF NIGERIAN ENDANGERED CATTLE BREEDS

International Union for Conservation of Natural Resources (IUCN) has defined the need for conservation as " the management for human use of the biosphere so that it may yield the greatest sustainable benefits to present generations while maintaining its potentials to meet the needs and aspirations of future generations (IUCN, 1980). This position may not be realizable due current high rate of extinction, our descendants will inherit a far less genetically rich and diverse selection of livestock breeds and thus agricultural options, unless action are taken to conserve them. Food and Agricultural Organization (FAO) defined need for conservation of animal genetic resources eligible for conservation as those populations with economic potential, scientific use and cultural interest.

Economic potential

The Nigerian endangered cattle breeds should be conserved for their potential economic use in the future. These breeds have regional adaptation developed for the Nigerian environment that may also be beneficial in other areas of the world where similar or complementary conditions exist. The zebu cattle breed for instance had been used successfully indiverse regions of the world (Devillard, 1985). Animals with distinct characteristics may be beneficially incorporated into breeding programs of other countries (Maijala et al., 1990).

The Nigerian endangered cattle breeds are trypanotorelant, unselected for a particular product or traits, that have evolved and valued under challenging environment and should not be compared with other breeds in improved, modified conditions or under intensive management. There are many examples where growth rate, prolificacy or milk production have been used to illustrate the inferiority of the purebred indigenous stock over that of exotic imported breeds or their crosses (Hodges, 1986). However when survivability of the offspring, fertility and longevity are taken into consideration, the indigenous stocks are often found to be very productive overall. For instance, the productivity of the panteneiro cattle of Brazil and the Tswana goats of Botwana in South Africa have proven their superiority in overall productivity compared to the exotic and their crosses. The genetically controlled ability of a population or breed to survive or produce in a region is only one function of its economic efficiency. The economic efficiency of a breed at any one time is dependent on many man-made variables. A change in any of these manmade variables may shift the balance and enhance the economic value of one breed type over the other. For instance, climatic

changes and economic melt-down may affect quality of soil environment and incentives to support crop production, elicit new diseases or increase the prevalence of existing diseases. This inturn will affect the cost of feeding grains to livestock, increase cost of animal health management that will determine the choice of breeds used in human food production towards more forage efficient and disease torelant or hardy stocks. The challenging environment may lead to high production cost that may render the use of imported stocks uneconomical

The Nigerian endangered cattle breeds should not be discarded on the ground of economic efficiency, comparing them with the exotic and their crosses. They should be considered in respect to their biological efficiency and adaptation, operating under challenging environment, on genetic material that has not been selected and whose gene frequencies are guided only by unconscious and natural selection.

Cultural interest

Many populations of livestock breeds have played important role in specific periods of national or regional history. There are also breeds that are associated with social and cultural development. The muturus have an important place in the traditional and cultural lives of the Nigerian ethnic groups where this breed abounds (Adebambo, 2001). There is strong spiritual attachment to the animals which are considered sacrilegious. The animals have special protection and can wander freely in the fields and destroy crops with impunity.

Objectives for conservation of Nigerian endangered cattle breeds

The conservation of animal genetic resources focuses on two separate but interlinked concepts “conservation of genes and breeds or populations”. The objectives for conservation of Nigerian endangered cattle breeds were to conserve breeds and populations to ensure the survival of populations of the breeds as defined by the range of genetically controlled characteristics it exhibits. This form of conservation is developed to ensure the conservation of all the characteristics inherent with a given population, including many which may not have been recognized, defined, identified or monitored.

4. REASONS FOR BEEN ENDANGERED

The substitution of indigenous unimproved breeds of livestock with improved breeds resulted in loss of many genes characteristics of and restricted to the indigenous breeds (Stetshwarlo and Adebambo, 1992). The trends in genetic erosion of indigenous livestock breeds have been more pronounced with the cattle, pigs and poultry (Stetshwarlo and Adebambo, 1992).

The history of genetic erosion of indigenous breeds could be traced to 1926 in Egypt where several Bos Taurus, Freisian, short horn Jersey and Guernsey were introduced (Fahmy et al, 1976). In Sudan, Butana females were crossed to dairy short horns imported in 1925 and to Freisian Holstein bulls in 1927, Crossbreeding of Bos Taurus and Bos indicus with the Local Arsi cattle commenced in 1968 (Kiwawa et al, 1983). The Kenya Sahiwals were crossed with Ayrshires in 1939. Breeding work at the livestock production research institutes at Mpwapwa in Tanzania dated back to early 1930s with the development of mixed In do-African Zebu breed with a small proportion of Bos Taurus inheritance (Marcfalane, 19790).

In Nigeria, upgrading of the Local cattle breeds towards a European breeds for milk production started in 1964 at three stations of Shika in Northern Nigeria, Agege dairy near Lagos in Southern Nigeria and at Vom on the plateau where crosses were bred between the white Fulani (Bunajis) and the Freisian. In addition, nomadism and pastoralism, the common extensive systems of cattle production on Nigeria had occasionally brough the Zebu from the producing area into contract with the trypanpotolerant breeds of tsetse infested areas where crossbreeding occur, and the resultant crossbred have become stabilized (Adeniyi, 1985). This crossbreeding resulted to dilution of the indigenous gene materials and /or loss of some of the indigenous breeds. At present in Nigeria, there are stabilized population of Muturu, and Keteku, Zebu and Muturu or N;dama and Muturu crossbreds.

The most affected being the Muturu whose Muturu and Zebu crossbreds and N;dama and Muturu crossbreds have become stabilized (Adeyi, 1985). The increase in size of these stabilized crossbreds further encourage their uses by farmers to the detriment of the indigenous breeds. This extensive crossbreeding has displaced the indigenous cattle breeds in the Northern Nigeria by the Zebu (ILCA, 1979). There is also the possibility that the stabilized crossbreds in the tsetse infested areas will displace the indigenous breeds since they are also trypanotolerant (Adenyi, 1985). The productive potentials of the crossbreds in terms of body sizes and breeding efficiency with increase in the zedu blood further aggravate this trend (genetic erosion); with the crossbreds making up to 70% of the trypanotolerant cattle breeds in Nigeria (Hammond and Leicth, 1996). Thus, the Muturu, N'dama and Keteku are endangered due to extensive uncontrolled crossbreeding with exotic breeds, there is also waning interest among farmers as tractors replace draught animal power particularly in the Southern area. The Nigeria civil war also has a significant effect on the elimination of some indigenous cattle breeds especially the forest breed (Stetshwaelo and Adebambo, 1992). The Kuri and Biu cattle breeds are endangered due to environmental effects and waning interest by farmers. Adenyi, (1985) observed that the Kuri breed in Nigeria is delineted by rinderpest and drought. There is little information about the condition of the Biu cattle breed in Nigeria.

5. CONSERVATION OF ENDANGERED NIGERIAN INDIGENOUS CATTLE BREEDS

The value of the indigenous breeds as biological materials relative to their performance that is superiority, versatility, temperament, heterosis complementary expectations in crosses, and fertility, and other special characteristic of adaptation to environmental conditions are profound importance in tropical areas (Manson, 1983). The current unfavorable economic climate and limited financial resources in most African countries especially South of the Sahara, opportunities to alter the livestock production environments to suit the high potential temperate breeds are now on the decline compared to the period of 1940s – 60s (Adebambo, 1992). This places emphasis on the indigenous breeds. Few countries in the tropical areas are beginning to recognize the significance of local breeds' conservation, but for most the conservation of indigenous breeds programmers' are not on the priority list of developments budgets. Nonetheless, few programs have being directed at those breeds known to have some production potentials or a specific role in the food production system of the country concerned, characterization and improvement of Agoni, Barrotse and Tangu cattle on government stations in Zambia. The government of Bostwuana embarked on the conservation

of the Tsuana cows, sheep and goat in 1987 (Stetshwaelo 1990). Ramsey The conservation of the indigenous cattle breeds in Morocco, Egypt and Algeria, Linya, Tunisia as meat animals is not unexpected since these animals especially the N'dama breeds is known for its prolificacy which satisfies the cultural and religiousn needs of these countries (Laqonkassi, 1987). The conservation in Barki, Ossimi and raliman cattle breeds in been pursed on government farms in Egypt (Aboul, Mago and Elseraty, 1988). The foggers cattle conservation in Ethiopia (kebede, 1981), the Kenana, Butana, and Bagara indigenous cattle conservation of Sudan, the conservation of trypanotolerant cattle of west Africa, N'dama in Guinea, (Devillard, 1984), the lagoune in the republic of Guinea (Adenyi, 1985) and the N'dama cattle of Senegal, the Azaousk cattle for milk and meat production and drought power in Niger, the Bororo and N'dama financed by the African development Bank (ADB) are some of the breeds conserved by the government of the respective counties (Trail and Dieteren, 1989). The unfortunate fact about these programmes is the small size sample population maintained for selection or maintenance of a random bred population which will inevitably have a major setback due to inbreeding and genetic drift (Stetsewhealo, 1992). In most projects the conservation is concerned with the improvement of the indigenous livestock specifically as a resource for the poor small-holder farmers in the traditional system. The aim of conservation is to maintain genetic variation, and this need governs the principles of preservation which are similar for all livestock (Kelen, 1987).

6. CONSERVATION TECHNIQUES

The available conservation methods are:

Insitu preservation

Breeding flocks of live animal
Exsitu preservation
Frozen semen
Frozen embryo
Regional gene banks

Breeding flocks of live animal

An actively breeding population could be maintained, perhaps each or? Varity in a different farm to reduce cost (Siverajasingam, 1987). The type of selection to be practiced without altering the genetic variability is a major problem (Siverajasingam, 1987). The cost of maintenance is often high given the fact that a small sample size population would result to homogeneity of the population gene pool due to inbreeding detrimental to the programme.

The advantages of the live animal preservation are however numerous

- They are always available for immediate utilization when required
- They would also contribute to education and community awareness of the indigenous fauna.
- They could be organized into a recreation park with wildlife for revenue generation
- Animals are an integral part of man and should be kept in its physical form for the purpose.

Frozen semen

This involves the collection and preservation through storage of semen collection from sires of stock whose survival is at risk (Almendo, 1987). Frozen semen has become a practical approach to con- serving genetic stock of endangered breed.

Methods of preserving genetic stock of endangered breed

Methods of preserving and estimated cost of semen are provided by (FAO/UNEP, 1983). Smith, (1984b) also ascertained the efficiency of alternative methods for minimizing the loss of genetic variability of frozen semen. For periods of over five years, semen storage became the cheapest form of conservation as an urgent safeguard to protect endangered stock. Semen collected from unrelated sires lacking performance data could be used rotationally on each sires daughters in order to reduce inbreeding and genetic drift or drift in gene frequencies (smith, 1987).

Frozen semen techniques of breed conservation is observed to have the Following advantages.

- Cheaper in cost compared to the insist method
- It result to reduced inbreeding and genetic drift
- It eliminates selection and mating problems as observed in the insist method employed to avoid inbreeding

Frozen embryos

This also involves the collection and preservation of embryos through storage (frozen techniques). The storage of embryos would be desirable when it is important to preserve the capability of reconstituting a breed or strain and maintaining it with low inbreeding (Almando, 1937). Although the cost of preservation through frozen embryos is observed to be very high, it has the following advantages.

- It maintains the breeds reconstituting capability
- Eliminates the problem of mating techniques and inbreeding depression
- The genotype is intact
- Small number would be sufficient for the conservation of the endangered breed e.g a collection of 25 embryos each from 25 donors would be sufficient for conservation purpose (Smith, 1984a).

Regional gene banks

Many of the indigenous breeds are spread across may countries so that genetic Resource management requires the co-operation between countries (Armando, 1987). FAO/UNEP, (1983) recommended that intercountry co-operation in the exchange of germplasm should be encouraged with due regards to quarantine precautions. This will enhance the availability of the breeds in their pure genetic form and individual countries could widen their genetic base, or arrest genetic dilution of common breeds by use of the breeds in pure form from the regional gene bank.

7. THE ROLE OF NIGERIAN GOVERNMENT IN CONSERVATION OF LIVE ANIMALS

Conservation of indigenous cattle breed of Nigeria genetic resources for future use requires the attention of policy makers to be successful. Development and implementation of national policies for the conservation of indigenous cattle breeds of Nigeria must be embedded in an overall developmental plan and be integrated into polices ensuring provision of incentives for promoting exports and investment in the development of indigenous cattle breeds of Nigeria.

Specifically, government attention can be directed towards the following areas:

(i) Promotion and the valuation of indigenous cattle breeds of Nigeria: It is well known that, in the absence of economic estimates for indigenous cattle breeds of Nigeria or their unique traits, government or international donors may be less willing to provide financial incentives to farmers to promote conservation. On the other hand, a defined value of indigenous cattle breed of Nigeria genetic resources is instrumental in attracting incentives for conservation (Clemens, 2001).

(ii) Promote the conservation of between or within breed diversity; conservation focuses on conserving inter species variation as paramount importance (Weizman, 1993). The Muturu in Nigeria is known to have two strains, the Savanah and the forest types (Rege, 1999, Rege and Tawh, 1999). Though the N'dama, Biu, Kuri, and the Keteku species are known as single breeds, it can be interpreted that these breeds are genetically less diverse (Clemens, 2001). A national policy will direct the allocation of resources, choice of locations, breeding systems, to promote the formulation of adequate breeding objectives, the development and coordination of decentralized breeding programmes to maintain breed diversity and within breed variation characteristics of a conservation programme.

(iii) Identification of the optimum allocation of funds for promoting in-situ conservation: identification of funds needed to provide incentives, to conserve populations of indigenous cattle breeds of Nigeria under threat of extinction may set pace for budgetary allocation and mobilization of funds for conservation. In Nigeria, phenotypic data (biological, performance and economic) are not extensively available on indigenous cattle breeds, however, important information about unique traits or population dynamics that could be utilized in future have been reported (Sada, 1968, Stewart, 1951 and Dettmers et al, 1996b) In the short-term, and under the pressure of time to conserve and utilize the remaining indigenous breeds, rapid survey, and estimation of population size by species, breed/strain, identification of distribution pattern within agro-ecological zones, would provide sufficient initial information for government to obtain an overview of the national indigenous cattle herd. This will enable government to estimate the optimum fund needed to conserve the existing population of indigenous cattle breed of Nigeria in their habitat.

(iv) Providing incentives to intensify the use and development of indigenous cattle breed: The provision of direct or indirect incentives to rural farming communities utilizing IcaBrN would possibly lead to a self-sustaining conservation programme. Incentives may be provided as:

(v) Special Intervention: The integration of conservation and sustainable use of IcaBrN diversity into relevant sectoral or cross-sectoral plan and programmes, like incorporating the IcaBrN herd into the National Veterinary Research Institute (NVRI) Vom, the National Animal Production Research Institute, (NAPRI), Shika and other livestock research institutes will not only provide effective conservation, but may also offer an avenue for systemic recording of phenotypic, diversity and performance data. The creation of National indigenous cattle breeds ownership Scheme (NICABOS), to be located at each agro ecological zones where these breeds abound, with full participation of farming communities would be effective conservation and sustainable strategy. NICaBrOS however, must be supported by revolving funds for group breeding schemes and open nucleus or adequate grading systems to maintain within or between breed diversity. NICaBrOS could be organized such that the participating farmer communities are the full custodian of the animals and are responsible for their management. The government on the other hand provides incentives, extension services and supervisory roles to the farmer-communities. Promising individual farm-families rearing ICaBrN. The intensified use of local ICaBrN population targeting farmers in their communities is the key strategy for maintaining genetic diversity in conservation programme involving rural farmers. This is so because, inter-species diversity of indigenous livestock animals is a function of natural selection and random or systematic human interventions (Chemens, 2001).

(vi) Promotion of market faculties: For sustainability of the in-situ conservation programme under community-based management technology, the participating farmers must have ready market and economic gain on their investment. At the onset, the government may have to purchase directly from the farmers as a form of incentive. The government can also create an avenue, either by organization of indigenous cattle trade fair, or animal club show to coincide with appropriate festivals. The government can as a matter of policy, ensure that all government functions within the chosen festive periods utilize meat product of indigenous cattle. This will overtime become a stable sales period that could be targeted by indigenous cattle producers.

(vii) Government may as well create enabling environment to attract private individuals, and enterprise to support the development of local products, value-added products or specified labels that could be a further strategic option to convert a market failure into a market success for local breeds.

(viii) Promote capacity for training and research in genetic and phenotypic characterization of local available indigenous cattle breed populations to provides essential information to make rational decisions for improvement and development of effective breeding programmes (Clemens, 2001). The conserved genetic resources of IcaBrN would have no future use if there will be no intellectual materials, scientific methodology and knowledge of IcaBrN genetics and breeding. Government can create enabling environment to attract the private sector collaboration, with emphasis on scientific methodology for evaluating indigenous knowledge in Animal breeding; and how this can be incorporate into innovative breeding programmes for improvement. A national policy that promotes capacity for training and research in the breeding and genetics of IcaBrN will produce

intellectual materials that will utilize the conserved genetic resources and available knowledge to improve on their performance even in the phase of changing environment in future.

(ix) Management of breeding flocks of live animals: The cost or maintaining breeding flocks of live animals is enormous given the fact that a small population is detrimental to the programme.

However, government may as a policy exploit the following technologies to reduce maintenance cost.

(a) Organization of indigenous cattle breed of Nigeria into a park with wildlife: Organization of indigenous cattle breed of Nigeria into a park with wildlife can become an attractive tourist site. If well managed, may develop into another arm of the tourism industry especially where the socio-cultural life of the people relating to these breeds are also preserved along as entertainment package. This will not only provide employment and revenue which may cut down cost of maintenance. The biggest advantage of this technology is to be able to conserve the breeds and their environment simultaneously. On the other hand, the inability to secure sufficient land mass required for desired population is a major disadvantage.

(b) Integration of rural farmers into the community conservation management technology. Potential farmers, farmer-communities or farmer villages could be identified and organized into community-based conservation management technology either as National indigenous cattle breed ownership scheme (NiCaBrOS), or as potential individual-farmers. Under the community-based management, the farmer owned the animals and are responsible for their management. A government policy direct the management strategies in accordance with conservation goals and provide incentives (Extension services, market outlets supervision etc.). The routine maintenance cost are showdered by the farmer who consider the outfit personal, and invest accordingly. The Government through its incentives direct management to achieved desired objectives Cost will be greatly reduced under this scheme.

The advantage of this technology is its ability to maintain breed and within breed diversity by targeting the local rural farmers. It may also enhance record keeping through extension services.

The utilization of indigenous cattle breed genetic resources and diversity targeting individual Local rural farmer-families, farmer-communities and villages employing Appropriate breeding strategies decided by policy, will aside enhancing and Sustaining their conservation, will improve productivities of the indigenous Cattle breed, food security revenue base, standard of living and may lead to general reduction in the level of poverty among participating farmer-families.

All these cannot be achieved without enabling policies by the Nigerian government. It is for this reason that an action plan for the conservation of Indigenous cattle breed of Nigerian'' (ICaBrN) is proposed for policy makers in Nigerian to be concerned and take action now.

8. MANAGEMENT SYSTEM IN A CONSERVATION POLICY

The ultimate aim of any conservation programmed is to maintain the genetic variability constituting the gene pool for an environment. Hence, preserved animal herd genetic constitution is prevented from being diluted by cross breeding or loss of some genes due to lethality, and a decrease in heterozygousity or increase in homozygousity due to inbreeding.

To established the technology for the maintenance of an endangered herd, the first task is to choose the system of mating and to subordinate all the other elements of the technology used to this system (Bodo, 1987).

Another threat for endangered breeds are infections diseases; for commercial herds, the eradication of the whole herd or population and subsequent replacement with new animals after a period of time is the usual method. However, this may not be possible for an endangered non commercial herds, thus other veterinary solutions to quarantine the survival of the animal (for instance by separation of the offspring's from the dam or even by embryo transfer) must be employed (Bodo, 1984). The environment should be monitor constantly to ensure that it does not pose a threat to the maintenance of good health of the animals (Bodo et al, 1984) in a preservation programme, it is also important to preserve the original environmental conditions for the animals.

This ensures the effect of natural selection in the same way as it was before; sometimes, it is even more difficult to preserve the original environmental conditions for a breed than the preservation of the breed itself (Bodo, 1987). In the course of history, natural and artificial selection kept the balance against degeneration of the population. A real danger exists, that a population can loose its valuable traits when no selection is made over more generation even if it's artificially attempted by scientific methods to keep the gene frequency unchanged (Bodo and Helen, 1987).

Problem of inbreeding

The cost of maintaining a non-commercial herd would definitely be considerable, and in an attempt to reduce the number of animals preserved, the danger of inbreeding is an important point (Bodo, 1987). Regarding the livestock size, the critical status of the population (population of the breeds in danger of extinction) is estimated to lie in the range of 10-15 (Bodo et al, 1984). Smith (1984) calculated small numbers and narrow sex ratios which Can only be kept in research conditions as shown below:

Species	Male	Female	No. of Breeding year	Animals Entering
Cattle	10	26	10	5
Sheep	22	60	22	12
Pigs	44	44	44	18
Poultry	72	72	72	72

Source: Smith (1984)

The Cornell control white leghorn population have a breeding scheme designed to reduce or minimize inbreeding and maintain genetic variability. Fifty sires and 250 dams constitutes the breeding population in each generation (Bodo Et al, 1984). The damage by inbreeding can either be on the qualitative traits or quantitative traits. The diminishing variation of the characteristics of qualitative traits, that is, lack of colour, hair, tail, shortened legs etc., can be eliminated by using special mating systems to discover the carriers and being subsequently eliminated (Bodo, 1987). The situation is certainly more dangerous if the signs of inbreeding appears in the quantitative traits, that is, infertility, calving difficulties, increased mortality of young animals. (Bodo, 1987). Wright's coefficient can be used for measuring the degree of inbreeding when pedigree data are available, and where these data are lacking, the blood groups and other blood polymorphisms can be used to characterize the level of inbreeding in a given breed. The frequency and the existence of possible factors and alleles in the population, one can conclude on the degree of inbreeding in the given population (Bodo et al, 1984).

The damage by inbreeding can be avoided by the following management policies:

- Increasing the number of animals to stabilize the preservation strategy; most important action but sometimes difficult to realize.

Rotational mating system – This requires pedigree data. It can be carried out by keeping the population as a whole unit or forming several sub-populations which will be crossed only after some generations. Keep the sex ratio as narrow as possible, the best effective population size can be obtained by a ratio of 1:1. However, this may not be possible under natural conditions, but for laboratory yards, often changing the males instead of using the best ones for a long time is a possible solution. If some, possible exists to control the blood groups or other blood polymorphism, these data may be used as an aid for mating and culling the dams and for selection of the sire (Bodo, 1987).

A case for their Conservation of endangered Nigerian cattle breeds.

The only hope for the endangered breeds are the very few traditional settled farmers who use the intact indigenous breeds, but the tendency to cross these with some exotic breeds in order to improve productivity is high (Cunningham, 1987). Therefore, the Muturu, N'dama, Kuri, Keteku and the Biu cattle breeds are doomed to extinction and are being seriously threatened. These actions could be pioneered by governments, non governmental and private organizations. In Zambia, for instance, Ramsey (1986) reported the conservation, characterization and improvement of Agoni, Barotse and Yangu cattles on government stations in Zambia. The government of Bostwana embarked on the conservation of the Twuana cows, sheep and goats in 1987 (Steteshwaelo, 1990). The available conversation methods and incentives from world bodies like FAO and UNDP of the United Nations could be excellent attractions.

The choice of any of the conservation techniques depends on affordability and preference as each has its own merits and demerits. The exsitu conservation techniques though cheaper in cost is technically complex giving the technological advancement of Nigeria. The insitu conservation techniques would be most effective in Nigeria, though expensive but less technically involving and can be well managed given adequate technologies, fund and trained personnel. The conserved herd could be organized into park with wildlife as a recreational center for revenue generation. Rural farmers may be integrated to form community-based conservation management technology in order to reduce cost. The

strong link between animals and man also makes it important that endangered animals be preserved in their physical forms.

The problems of insitu preservation aside the cost are inbreeding effect and maintenance of animal's natural environment. This must be preserved as adaptation can only be done by natural selection in their natural environment

9. CONCLUSION

The population of the Muturu, Kuri, N'dama Keteku and Biu cattle breeds of Nigeria have declined to such a level that their survival is being threatened and are therefore in imminent danger of extinction. The N'dama and Keteku are defined as threatened breeds that are liable to become endangered in the foreseeable future. A case is therefore made for the conservation and management of these breeds in Nigeria in order to maintain the genetic variable of these for future use. An action for the conservation of these breeds is also proposed for policy makers in Nigeria to be concerned and take action now.

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(Received 11 November 2015; accepted 24 November 2015)