WORLD RABBIT SCIENCE 1999, VOL. 7 (2), 51-58.

# RABBIT PRODUCTION IN NIGERIA : SOME ASPECTS OF CURRENT STATUS AND PROMOTIONAL STRATEGIES

ONIFADE A.A., ABU O.A., OBIYAN R.I., ABANIKANNDA O.T.F.

Department of Animal Science University of Ibadan, IBADAN, Nigeria.

**ABSTRACT :** Some aspects of the current status and promotional strategies of rabbit production in Nigeria were appraised in this study. This was because such data are lacking and rabbit production offers a great potential towards attainment of food security in terms of animal protein intake. Data were obtained principally from field survey, questionnaires administration, personal observations and experiences of authors, structured personal interviews of identified rabbit farmers, personal interview and observational data from agricultural extension agents, personal interview and visitation to markets and retail outlets for rabbit, proxy information from distant collaborators, recorded data from Government establishments and published data. All the information collected was synthesized to provide an informative blend on major aspects of rabbit production. From the data collected, it was found that rabbit production in Nigeria is largely a traditional, non-commercially oriented, family-consumption targeted, and smallholder type operation comprising an average of 2-7 does and 3 bucks. About 3.4-5.2% of the Nigerian population may be keeping rabbits with women and children being mostly involved. Rabbit keeping is both intensive and semi-intensive, though some scattered free range backyard rearing was recorded. Unlike the rural rabbit keepers, space is limiting for most urban rabbit keepers. Diets of rabbits in Nigeria are primarily forages, grasses and legumes, kitchen wastes while commercial feeds are rarely fed. Bucks and does are under-utilized, with does producing about 20 weaned rabbit per year and are usually offered for sale after four parities. Nigerian rabbits do not suffer any peculiar disease, however skin disease (mange) and coccidia infection are very common. There are high peri- and post-natal mortalities, and it was estimated that overall mortality between birth and marketing was between 30-40%, being highest in the young ones. The performance and reproductive productivity of rabbits in Nigeria are strongly correlated with the level of management. There exists a latent and growing market for rabbit meat in Nigeria especially as an alternative livestock species. We propose promotional strategies for sustainable rabbit production.

**RESUME : La production cunicole au Nigeria : état actuel et perspectives de développement.**
Les informations sur l'état actuel de l'élevage du lapin au Nigeria et sur ses perspectives de développement sont actuellement manquantes et cette étude tend à y remédier, d'autant que la production du lapin est du plus grand intérêt quant à la couverture des besoins alimentaires et plus spécialement en protéines. Les données proviennent principalement d'une étude de terrain, de questionnaires administratifs, de l'observation et de l'expérience personnelle des auteurs, d'interviews individuelles, d'éleveurs de lapins bien identifiés et d'agents de développement agricole, de visite de marchés et autres points de vente du lapin, d'informations locales de collaborateurs éloignés, des enregistrements des organismes gouvernementaux et des publications. Toute l'information collectée a été synthétisée pour donner une information globale sur l'élevage du lapin. On peut en déduire que la production du lapin au Nigeria est largement traditionnelle, non commerciale, dédiée à la consommation familiale, conduite en petites unités de 2-7 lapines et 3 mâles. Ces dernières sont conduites principalement par les femmes et les enfants, et concernent 3,4 à 5,2% de la population nigériane. L'élevage est intensif ou semi intensif, mais quelques cas dispersés d'élevages fermiers (en liberté au sein de la basse-cour) ont été enregistrés. Contrairement aux éleveurs ruraux, les citadins disposent de peu de place. L'alimentation des lapins est essentiellement composée de fourrage, d'herbes et de légumes, de déchets de cuisine, alors que les aliments commerciaux sont rarement distribués. Les mâles et les femelles sont sous utilisés, les femelles produisant environ 20 lapins sevrés/an et sont généralement vendues après 4 portées. Les lapins nigérians ne souffrent pas de maladies particulières, cependant les maladies de peau (teigne) et les cas de coccidiose sont courants. Il y a une forte mortalité péri- et post-natale et on peut estimer la mortalité globale entre la naissance et la vente (à l'âge de 15-17 semaines) entre 30 et 40%, la plus forte se rapportant aux lapereaux. Le taux de reproduction et les performances des lapins nigérians sont fortement corrélés à la qualité de la gestion de l'élevage. Il existe un marché latent et en progression pour la viande de lapin au Nigeria, spécialement en tant que production carnée alternative. Les auteurs proposent des stratégies pour la promotion d'une production cunicole durable

## INTRODUCTION

The rabbit (*Oryctolagus cuniculus*) described as a micro-livestock species (VIETMEYER, 1985), appears to be the cheapest and sustainable means of producing high quality animal protein for the expanding populations of the less developing countries like Nigeria. Indeed, peri-urban rabbit production can contribute to meeting the growing demand for fresh and affordable animal products in conurbation of developing countries. Also, rabbit production may provide the impoverished urban population and the resource-poor rural dwellers the opportunities to earn additional income on a sustainable basis.

The above possibilities derive from the exceptional attributes of rabbits which include: affordable or low-cost management requirements, small-bodied size, short generation interval, fecundity, rapid growth rate, genetic diversity, ability to utilise forage and agricultural by-products, and adaptation over a wide range of ecological environment.

Rabbit production in Nigeria could be described, at best, as rudimentary, developing or emergent when compared with France, Hungary, China, United States, etc. This is evident from the small rabbit keeping population in which gender bias and sociological status of rabbit keepers, weak inventory of rabbit keeping infrastructure, low consumption rate of rabbit meat, absence of organised or thriving market for rabbit meat products, and lack of governmental and institutional support, limit the expansion of rabbit production. Employing the above for parametric assessment of meat

animal production and consumption in Nigeria:, it falls sixth rate after beef; fish; mutton; goat-meat (chevon) and «bush meat» or game animals.

The above notwithstanding, rabbit production is witnessing a burgeoning public interest due to several reasons amongst which economic initiatives to source for alternative meat types and animal protein ranked highest.

Further encouragement is obtained from institutional and governmental promotion of rabbit keeping. There is also increasing public awareness of rabbit meat nutritional characteristics: high protein; low sodium, fat and cholesterol levels, which compared favourably with the local «bush-meat.» Hobbyist rabbit keeping is also gaining popularity amongst residents of highbrow settlement in Nigeria.

Consequent upon the above, and more importantly because of the lack of previous documentation on rabbit production in Nigeria, unlike the report for China and East Europe (COLIN, 1993), this paper documents the findings of our survey on the current status, management practices, marketing and consumption of rabbit meat in Nigeria. Policy suggestions for sustainable expansion of rabbit production were also explored.

## MATERIALS AND METHODS

### Methodology of Survey

*Sources of information*

The information contained in this article was obtained principally from the following sources: (i) field survey; (ii) questionnaires administration; (iii) personal observations and experiences of the first and second authors; (iv) structured personal interviews of identified rabbit farmers; (v) personal interview and observational data from agricultural extension agents; (vi) personal interview and visitation to markets and retail outlets for livestock (rabbit inclusive); (vii) proxy information from distant collaborators; (viii) recorded data from Governmental establishments and agencies; and (ix) published data.

*Scope, Areas and Period of study*

The intended geographic coverage of the study was Nigeria, and the approach was systematic assessment of some selected areas where reasonable information and sizable population of farmers were resident. Much information was also obtained by proxy from our collaborators from many areas that we could not visit. Our limitations were manpower and finances. and to optimize our assessments, data obtained were compared with recorded and observational accounts of elite rabbit keepers and rabbit researchers.

The actual administration of five hundred questionnaires took about six months, however personal interviews, visitations, records appraisal, etc., took a longer period of approximately one and half years. Much of the information compiled in this study was obtained from non-questionnaire sources because less than 50% of the questionnaires were returned. In addition, both the first and second authors have been involved in rabbit research for ten years and both were resident at Southern and Northern parts of Nigeria, respectively. The questionnaires were administered to all the above-mentioned major sources of information.

### Data collection

Primary data on rabbit population, capacity utilization, reproductive and performance traits were determined by physical assessment. During the data collection, rabbit farmers were visited and all necessary questions were asked, and when permitted, direct measurements were taken and, if records were available, these were also considered.

### Interpretation and presentation of the data

Information provided by the different sources was carefully matched and appropriated under specific major aims and aspects of the research. Data obtained from the field were also compared to theoretical published information in literature and recorded data at some governmental agencies and our personal data bank. For population estimates, the data were projected because a definitive census of rabbits and livestock population in Nigeria was not available to us during the study. All our information was presented to provide an informative blend of directly observed, returned questionnaires, theoretical and experiential backgrounds of the authors, and some available published information to the authors

### History and current status of rabbit production in Nigeria

The historical record of rabbit keeping in Nigeria was not available to us, however this could be speculated to commence with the advent of slave-trading and European adventure into Africa when most exotic agriculturally important crops and livestock were introduced.

Rabbit production in Nigeria at present is traditional, non-commercial oriented, family-consumption targeted, and smallholder type comprising a range of 2-7 does and 3 bucks on average. From our tentative population estimates obtained in the survey

**Table 1 : Average rabbit population among category of rearers and their capacity utilization in Nigeria**

| Category | Number of rabbits[1] | Capacity utilization[2] |
|---|---|---|
| Hobbyist | 3-4 | 95-100% |
| Backyard keepers | 5-15 | 94-100% |
| Small-scale farmers | 15-25 | 73-92% |
| Commercial producer | 70-100 | 60-85% |
| Research Institute and Universities | 35-50 | 40-55% |
| Government Agencies | 20-150 | 7.5-45% |

Source: Field Survey
[1]Number of rabbits include all categories (does, bucks, weanlings, kits) found and it is different from classical European estimation.
[2]Percentage of cages utilized with live rabbits inside as a proportion of the cages present in the rabbitry.

and returned questionnaires we arrived at the following conclusions that:
(i) between 3.4-5.2% of the Nigerian population keep rabbits;
(ii) the rabbit population is greatest in the North, followed by South Western and South Eastern Nigeria;
(iii) rabbit keeping is predominantly rural-based being carried out by the resource-poor;
(iv) female gender was more involved in rabbit keeping in the ("the" or not "the") Southern Nigeria than in the North;
(v) Nigerian rabbit keeping employs family and child labour, and
(vi) the scope of production is limited, and the goal is for family consumption or at as food security.
Demographic data obtained showed that the females and the children are more involved in the routine management and are particularly tasked during the dry season. Nigerian men generally consider rabbit keeping as a pastime. The age brackets of children involved in rabbit keeping fall between 5-17 years of age, while older children (17-25 years) work only in cases where they have their own herd. Female gender involvement in rabbit keeping up to 55-60 years of age was obtained unlike most men who often abandon rabbit keeping beyond 40 years of age except at research based institutions. The average rabbit population among rearers and capacity utilization in Nigeria is depicted in Table 1.

An early major impetus to rabbit production was achieved through the defunct Directorate of Food, Roads and Rural Infrastructure (1989-1991), and the States' Agricultural Development Projects. A rabbit breeding programme was embarked upon by the above agencies albeit with the inadequate planning, and lack of sufficient capacity and over ambitious expectations. Regrettably, the successes initially achieved in some states were not sustained, and the de-establishment of the Directorate of Food, Roads and Rural Infrastructure naturally terminated the growing awareness of rabbit keeping. This is unlike Ghana's National Rabbit Project or the National Farms of East European countries where direct efforts at increasing rabbit production were conclusively pursued.

## Management Practices

Management of rabbits in Nigeria is traditional or rudimentary, but information on housing and management is well developed at research institutes and universities. Discussion on management will involve: the general description of housing; the facilities-drinkers and feeders; the nutritional, feeding and reproductive management.

*Housing management of rabbits*

Rabbit keeping in Nigeria is both intensive and semi-intensive, though some scattered cases of free-rein (free range) backyard rearing were recorded. Rabbits are frequently housed in cages of varying dimensions that are usually smaller than the conventional spatial requirements. This is particularly evident in urban and densely populated areas where a representative cage measurements for a pair of rabbits are 48 x 36 x 44 cm for the length, width and height unlike the cages in the institution that measured 60 x 60 x 50 cm, respectively. Spatial allowance tends to be bigger in the rural areas where space is non-limiting, and there are local materials for making the houses. In the rural areas, houses/hutches are made from planks, woods or wood barks or bamboo. Houses built with mud having cemented or non-cemented floors are also common. Institutional or research centres keep rabbits in cages made of iron, steel or wood. Adaptation of abandoned layer cages into rabbit housing cages were also observed. Local people use wooden cages because of cheaper cost although they are less durable. Most local rabbit houses do not have deep litter floor, the left-over straws from green leaves fed are kept on the floor for 2-3 days after which they are swept out, and there is continuous replacement. Expectedly, rabbits reared on the floors are dirtier than those kept in cages; the incidence of disease may be greater in rabbits reared on the floors because the rabbits are in contact with their excreta.

Depending on the location of housing, the cages may be separately erected on bamboo or wooden legs raised platforms. Roofs are made of grasses or palm fronds, planks, broken asbestos or at best used corrugated iron sheets. Houses constructed with bamboo or planks provide sufficient ventilation, but the construction exposed the rabbits to cold during the wet season and the long «harmattan» period of northern cold

winds in West African countries. Therefore, such houses are usually covered with sack cloths or polythene sheets during these periods. In the (yes or no) Northern Nigeria where ambient temperature can be intolerably high, rabbits are occasionally raised in warrens.

In Nigeria urban and peri-urban settlements, rabbits are largely raised in wooden cages. The cages are provided with feeders and drinkers. Colony rearing is common, and at best a population of 3-4 rabbits of same sex per cage is common. The cages are frequently located under staircases, in garages, veranda, balconies or near side walls for space economy. There is certainly space problem for most urban rabbit keepers, and this constitutes a great problem to their interest to expand. Rabbit keepers in urban areas are an ideal target group for expanding rabbit production in Nigeria, because they are well educated, and well disposed to adopting effective technologies unlike their conservative rural counterparts.

*Feeds and feeding*

Like housing, feeds and feeding of rabbit in Nigeria remain traditional and rudimentary. Feeds are served in feeding troughs made of wooden or earthen material, iron, metal, half-split bamboo, and cans or tins of beverages. The use of metal fabrications as utensils is usually placed on the floor; thereby wastage is minimised. Feeds are frequently and carefully sprinkled with little amount of water to cause some stickiness to reduce dustiness and wastage. Feeds are usually unpelleted except commercially prepared diets. Diets of rabbits in Nigeria are primarily forages, grasses and legumes. Indeed in most rural, peri-urban and sub-urban areas, rabbits are fed solely on vegetables- green leaves.

In Nigeria, it is a common belief that rabbits cannot be raised without green leaves as supplementation. ONWUDIKE (1995) made the observation that Nigerian rabbit keepers believed that the access of rabbit to green feeds allows for better rate of growth when compared with rabbits which do not have access to green feeds. Various leaves are fed, however, edible vegetables (for humans) are seldom fed except when overgrown or when the parts are not consumed (e.g. carrot leaves or stems of green vegetables). Pasture cultivation for rabbit feeding is non-existent despite the sole dependence on green plants. Thus, feed security becomes critical during the dry season particularly in the (idem) Northern Nigeria. This is because many of the green feeds traditionally fed to rabbits are annuals that are not high yielding. Thus, it is not uncommon for rabbits to lose weight at this period, and breeding is also somewhat affected. Most smallholder farmers are not aware of the superior nutritional value of leguminous tropical plants such as pueraria, stylosanthes, centrosema. The rabbit keepers are, however, mindful

**Table 2 : Proximate composition[1] and gross energy of some by-products feedstuffs utilizable for rabbit feeding in Nigeria.**

| Sample | Gross energy kcal/kg | Dry matter % | Crude protein % | Ash % | Crude fat % | Crude fibre % | Nitrogen-free extract % |
|---|---|---|---|---|---|---|---|
| Maize offal | 4.08 | 90.69 | 9.07 | 1.00 | 0.80 | 7.70 | 81.43 |
| Bean offal | 4.50 | 89.48 | 23.35 | 4.00 | 0.90 | 9.30 | 62.45 |
| Sorghum starch residue | 4.81 | 91.72 | 20.36 | 1.76 | 2.30 | 13.20 | 62.38 |
| Maize starch residue | 4.335 | 91.19 | 15.48 | 0.15 | 2.85 | 9.01 | 72.41 |
| Cocoa husk | 4.83 | 94.18 | 7.48 | 11.14 | 2.20 | 30.58 | 48.60 |
| Wheat offal | 4.45 | 91.86 | 17.06 | 6.33 | 0.70 | 12.17 | 63.74 |
| Brewers grain | 4.40 | 94.16 | 17.00 | 4.00 | 4.20 | 17.00 | 57.80 |
| Palm kernel meal | 4.60 | 92.51 | 17.32 | 4.70 | 6.67 | 16.00 | 55.31 |
| Cotton seed cake | 4.51 | 93.32 | 41.20 | 4.85 | 4.70 | 12.00 | 37.25 |
| Rice husk | 4.54 | 92.62 | 7.88 | 13.79 | 0.80 | 42.91 | 34.62 |
| Maize cob | 4.70 | 90.79 | 3.35 | 3.00 | 0.71 | 31.00 | 61.95 |
| Tomato juice residue | 4.57 | 83.35 | 14.76 | 14.29 | 0.95 | 25.00 | 45.00 |
| Pineapple juice residue | 4.67 | 89.23 | 2.01 | 2.15 | 0.10 | 12.40 | 83.34 |
| Plantain peel | 4.17 | 91.19 | 5.99 | 7.00 | 3.10 | 14.60 | 69.31 |
| Cassava peel | 4.59 | 92.75 | 7.29 | 6.12 | 2.46 | 15.27 | 68.86 |
| Yam peel | 3.87 | 89.31 | 6.06 | 5.62 | 0.30 | 10.30 | 77.72 |
| Cocoyam peel | 3.93 | 89.86 | 4.80 | 4.89 | 0.40 | 6.40 | 83.02 |
| Ground nut hull | 4.62 | 93.52 | 14.50 | 5.80 | 0.20 | 47.70 | 31.80 |
| Sheabutter cake | 4.62 | 89.56 | 17.52 | 6.00 | 14.80 | 19.60 | 42.08 |
| Molasses | 7.78 | 21.43 | 3.20 | 6.87 | 0.00 | 0.00 | 89.84 |

1: Composition expressed on percentage dry matter basis
Sources: Longe and Fagbenro-Byron (1990); Olorede *et al.* (1996); Abu and Onifade (1996); Onifade and Babtunde (1997)

of some toxic weeds that are frequently determined using goat (West African Dwarf) as indicator. Forages such as *Panicum maximum* (Guinea grass), *Tridax procumbens*, potato leaves, cassava leaves and haulms, *Talinum triangulare*, though less nutritive are commonly fed to rabbits by local people. Feeding of the leaves of multipurpose leguminous trees like *Leucaena leucocephala*, *Gliricidia sepium*, *Acacia albicans* and the lesser known types are carried out mostly in research institutes.

In a recent comparative study, ONWUDIKE (1995) found *Gliricidia sepium* supporting better weight gain of rabbits than *Leucaena leucocephala* supplementation. In our unpublished study, we observed that a daily allowance of 50g of fresh *Leucaena* leaves to the rabbits fed a balanced diet supported higher growth rate that was comparable to those fed supplemental antibiotics as growth promoters.

Propriety rabbit feeds are pelleted and used by commercial farms and elite hobbyist keepers. Commercial rabbit feed production constitutes less than 0.3% of the local livestock feeds producers in Nigeria (ONIFADE and NASIRU, 1997). This underscores the traditional dependence on greens. According to ONIFADE and NASIRU (1997), the low patronage of commercial rabbit feed pellets has forced commercial livestock feeds producers to stop production or at best produce minimally or requisitionally. However, when used, commercial feeds are usually served in the mornings, while greens are offered as supplements in the evenings. Smallholder keepers supplement the rabbit diet with a variety of kitchen wastes. Rabbit are however, in competition for the domestic wastes with dogs, cats, pigs, sheep and goats belonging to the same family. Food processing wastes are frequently purchased from local markets to supplement rabbit diets.

Wastes such as banana, plantain, yam and cocoyam peelings, beans, cowpea, soyabean or groundnut testa are offered as mixtures to rabbits early in the morning. By-products like brewers dried grains, palm kernel meal, maize offal, maize starch residue, cassava starch residue, rice husks are also fed. The chemical composition of some Nigerian by-products used for rabbit feeding is shown in Table 2. Furthermore, our recent studies (ABU and ONIFADE, 1996; ONIFADE and ABU, 1998; ONIFADE *et al.*, 1999) have shown significant increase in performance and improved health status of rabbits fed diets based predominantly on by-product feedstuffs, which were supplemented with yeast (*Saccharomyces cerevisiae*), antibiotics, and copper sulphate as growth promoters.

*Reproductive management*

Both sexes of rabbit are kept. The ratio of buck: doe differs depending on the scale of production. At the smallholder level a ratio between 1:2 or 1:3 is common largely as a result of economic and spatial constraints. The buck and the doe are usually kept distance apart to avoid «familiarity».

The Nigerian large-scale producers do have 1:5, and sometimes a greater ratio. Bucks are apparently under-utilised at the smallholder level when compared with the conventional optimal ratio of 1:8 or 1:10. However, there are some cases of over-utilisation of the buck's capacity when they are rented out to service does on other farms. Renting bucks to service does on other farms is a way of preventing inbreeding, and optimising the potential of the buck. Similarly, does are brought in for mating proven buck on other farms, if the former is resident. Artificial insemination is not practised.

Traditionally, most rabbit keepers allow the doe to be introduced to the buck, and watch the mating accomplished after which time the doe is immediately separated. In most cases separation of the doe takes place after fifteen minutes; if the doe urinates, there is a re-mating. Cases of mortality during mating are uncommon. Although, organised breeding programmes are not common ; farmers prevent indiscriminate mating. Once pregnancy is confirmed, the doe is usually separated and feeding or diet allocation is made exclusively. Provision of a kindling box is rare at the smallholder level, however, separate accommodation is usually reserved for the doe (and the kits) immediately after pregnancy confirmation. Nigerian does kindle about 5-8 kits per litter, and on the average 4-5 kits reach weaning stage. The high mortality is largely attributed to poor nutritional management and housing environment of the does. Mortality is frequently greater under inexperienced smallholder and hobbyist farmers.
In some cases where accommodation is not properly delimited, trampling or overcrowding could account for high mortality. Poor understanding of ante- and post-natal management of does also leads to high peri-natal mortalities of rabbits in Nigeria.

Other extraneous factors, such as predatory attack of the young ones by cats, rats, soldier ants, snakes and other animals play contributory roles in the number of weaned kits. Traditional practices forbid touching with bare hands the kits before ten days post-parturition when their eyes are expected to open. Thus, if the doe rejects the kit(s) it can die of starvation. If cases arise to touch the kits, the hand is covered with polythene bags or rags or wood ash is sprinkled on the hand before touching the kit. The use of gloves is practised at research centres because it can be afforded.

Does are usually re-mated between 6-8 weeks post-parturition. Thus on the average, the Nigerian doe produces about twenty (20) weaned rabbits per year. This is low when compared with their temperate counterparts. The average reproductive life cycle of the buck is longer than the doe. After four parities most does are offered for sale because of declining fertility, economic reasons or peculiar reason(s)

*Health management*

Rabbits in Nigeria do not suffer from any peculiar diseases. Frequent attack of skin disease (mange) is common and this is treated locally using sulphur ointment, rubbing of a mixture of used engine oil and salt or kerosene or at best ivermectin upon veterinary consultation.

There is an increasing awareness to seek veterinary attention, but most farmers do not attend or have poor access to veterinary clinics. Cases of coccidia infection are also rampant, but the farmers apparently do not understand the symptoms. Some rabbit keepers do put the animals on unprescribed medication of terramycin (oxytetracycline) or in combination with aspirin (acetasalicylic acid). Some green leaves as *Aspilia africana* locally called «yunyun» and pawpaw (*Carica papaya*) leaves are fed to rabbits for their medicinal properties against diarrhoea. We could not ascertain fully during the survey the extent of morbidity of rabbits, and the implications on their productivity in Nigeria. However, it was estimated that the overall mortality between birth and marketing (irrespective of the categories) was between 30-40% being highest in the young ones is common in Nigeria.

**Productivity of Rabbits**

The productivity of rabbits in Nigeria is strongly related to the level of management. The indices of productivity both for growth and reproductive performances of Nigeria rabbits are inferior to their temperate counterparts (Table 3). The lower growth rate and poor feed conversion ratio are resultants of poor nutritional management.

Grasses and forages given to rabbits in Nigeria are of low nutritional value; yet leguminous forages are seldom fed singly or in combination to the rabbits. Indeed, performances of rabbits fed standard diets at research institutes have not compared with values of 42g/day/rabbit obtainable in temperate climate. This situation tends to implicate the high ambient temperature of tropical climates found in Nigeria for this inferior productivity; other possible reasons are lack of animal protein supplementation in rabbits diets; possibility of low genetic ability as a result of uncontrolled breeding programme that is suggestive of inbreeding depression.

**Marketing and consumption of rabbit**

Certainly, markets for rabbit meat exist in Nigeria. However, there is no organised or festival-targeted marketing and sales of rabbit in Nigeria. This is unlike beef cattle, sheep, goats, broiler or spent laying chickens. The reason could be the subsistence level of rabbit production. Nonetheless, the increasing popularity of rabbit among the populace is gradually expanding the market for rabbit meat.

Rabbits in Nigeria are either marketed live or processed. The processing involves removal of the skin and the head before refrigeration. Otherwise, the slaughtered animal is singed and roasted on fire without cutting the head or tarsals. For such processing the chest and abdominal compartments are longitudinally incised while short sticks are used to expand the chest. The roasting is effectively completed within 24 hours of continuous exposure to fire. Retail outlets are springing up in meat shops and supermarkets for which supply fryer rabbits, but smoked rabbits are sold best when disguised as game meat. Smoked rabbits are sold along roadsides of major highways especially in South-western Nigeria. In Northern Nigeria where the rabbit population is the highest, they are seldom consumed because of the availability of other meats types. Consumer preference for the smoked rabbit was manifest, not revealed in our results, probably because it reflects the traditional preparation of game animals. Rabbit meat is not sold in restaurants unlike other delicacies like goat head, fresh fish, cow leg or bush meat.

However, it was found during the survey that rabbits are now sold alongside chicken and turkey during Christmas and other festivals. Respondents indicated that they would shift their consumption to rabbit meat if the price becomes cheaper, though most have not consumed rabbit meat for a long time.

A negligible number regarded rabbits as pets and indicated their unwillingness to consume it as a meat

**Table 3 : Production traits of rabbits in Nigeria**

| Traits | Range |
|---|---|
| **Reprodcutive traits** | |
| Age at maturity | 5-6 months |
| Weight at maturity | 1.8- 2.4 kg |
| Number of kits per litter | 5-8 |
| Kit birth weight | 35-45g |
| Number of kits weaned per litter | 3-5 |
| Percentage mortality[1] | 30-40% |
| Weaning age | 6-8 weeks |
| Body weight at weaning | 450-500g |
| **Performance traits** | |
| Daily feed intake (concentrate only) | 62-74g |
| Daily feed intake (greens only) | 87-100g |
| Daily feed intake (concentrate + greens) | 80-90g |
| Daily weight gain | 12.5-18g |
| Feed conversion (feed intake: weight gain) | 4.96-4.11 |
| Age at market weight | 15-17 weeks |
| Market weight | 1.8-2.2kg |

Source: Field survey

[1]Mortality for all groups and ages of rabbits starting from birth to marketing.

animal. There were, however, no religious or social taboos against consumption of rabbit meat as it exists for pork. Thus, if its consumption is popularised, the predominant Moslems in the North will avail themselves of the superior nutritional qualities of rabbit meat.

From our current survey, we are unable to propose a more pertinent evaluation of rabbit meat production than the 50, 000 tonnes of carcasses estimated by Colin and Lebas (1996). Nevertheless, and based on our local experience, there appear to be lower or no import of rabbit carcasses and the number of breeding does appears to be smaller considering the rearing practices in the Northern Nigeria, where actual enumeration is difficult. Also, per capital consumption seems too high compared to our local survey because many respondents indicated they have not taken rabbit meat for a long time. It is also difficult to differentiate rabbit consumption and the local «bush-meat» considering the marketer's strategy mentioned earlier.

**Strategies for promoting rabbit production in Nigeria**

Despite culinary preferences for other meat types, and the somewhat non-competitive production and market price of rabbit meat; rearing of rabbits offers a great potential towards attainment of family or household food security in terms of animal protein intake. Therefore, every effort at promoting rabbit production is well deserved. Revitalisation of promotional efforts by government agencies like such as the Department of Rural Development, Family Support Programme and World Bank Assisted Agricultural Development Projects would greatly encourage rabbit keeping amongst the populace. This should be backed up with an effective extension and accessible veterinary services.

Formation of rabbit keeping and breeder association in the community; and rabbit keeping clubs at pre-tertiary institutions would profoundly sustain interest in rabbit keeping. Provision and accessibility of the co-operative rabbit keepers to soft loans represent an ideal incentive strategy.

Realising that feeding of rabbits especially during the dry season remains critical and the most costly aspect of their management; simple feed formulations based on local feedstuffs (Table 2) and appropriate combination of kitchen wastes need be taught to the rabbit keepers. Further awareness on the nutritional complementarity of local feedstuffs, grass and leguminous forages, kitchen wastes, foliar biomass of harvested crops as cowpea, groundnut, cassava, potato, edible vegetable stems, and agro-industrial by-products should be created. Supplementary feeding of permissible growth promoters, especially the non-antibiotic types and the inclusion of low-cost animal protein sources like blood meal, could significantly increase performance of rabbits.

Marketing of rabbit meat and their products need to be promoted to sustain the economic initiatives of the producers. Pragmatic steps involve documenting highlights of the comparative meat types in print and in electronic media; organising rabbit (agricultural) shows, serving rabbit meat at public banquets or dinners, hotels and restaurants as variety meat, and recommending rabbit meat because of its low-cholestrol properties for dietetic management of patients suffering from coronary (arteriosclerosis) disease, hypertension and other related ailments in the hospital.

The use of the hides and skins of the rabbits in leather and ornament industries can create an additional source of income to the producers. Governmental support for research on rabbit production in tertiary institutions especially the key aspects of sustainable and economic feeding, disease prevention and control, and improved breeding programmes would provide immense promotion for rabbit keeping in Nigeria.

## CONCLUSION

This paper appraised Nigerian rabbit production revealing the largely traditional management systems, under-utilisation of the reproductive capacities of the buck and doe, peri- and post-natal high mortalities and low survival rates of kits, poor and lack of organised marketing of rabbit meat and products. Results of this study revealed that there is low awareness of rabbit productive potentials, and the uninformed culinary preferences for the other meat types. The abundant local feed resources can be harnessed for sustainable and cost-effective production of rabbit. Promotional strategies for expanding rabbit production were suggested to stimulate the latent market that exists for rabbit as an alternative animal protein source.

Received : December 17th, 1997
Accepted : April 25th, 1999

## REFERENCES

ABU O. A., ONIFADE A. A. (1996). Effects of cassava waste substitution for maize in weaner rabbit diets. *Bull. Anim. Hlth. Prod. Afr. 44, 167-172*

COLIN M. (1993). Rabbit production in East European countries. *World. Rabbit Sci., 1, 37-52.*

COLIN M., LEBAS F. (1996). Rabbit meat production in the world: A proposal for every country. In : *Proc. 6th World Congress, Toulouse, France. Vol. 3, 323-330*

LONGE O. G., FAGBENRO-BYRON J. O., (1990). Composition and physical characteristics of some fibrous wastes and by-products for pig feeding in Nigeria. *Bietr. Trop. Lanwirtsch. Vet. Med.*, ***28, 199-205.***

OLOREDE B. R., ONIFADE A. A., OKPARA A. O., BABTUNDE G. M., (1996). Growth, nutrient retention, haematology and serum chemistry of broiler chickens fed shaebutter cake or palm kerenel cake in the tropics. *J. Appl. Anim. Res.*, ***10,173-180.***

ONWUDIKE O. C., (1995). Use of legume tree crops Gliricidia sepium and Leucaena leucocephala as green feeds for growing rabbits. *Anim. Feed. Sci. Technol.*, ***51, 153-163.***

ONIFADE A. A., NASIRU F. A., (1997). The impacts of structural adjustment programme on livestock production in Nigeria. *A report prepared for National Planning Commission, Lagos Nigeria.*

ONIFADE A. A., BABATUNDE G. M., (1997). Comparative utilization of three by-products feed resources supplemented with or without molasses by broiler chicks. *Arch. Zootec.*, ***46, 137-144.***

ONIFADE A. A., ABU O. A., (1998). Productive response of rabbits to supplemental copper in a diet based on tropical feedstuffs. *J. Appl. Anim. Res.*, ***13, 129-135***

ONIFADE A. A., OBIYAN R. I., ONIPEDE E., ADEJUMO D. O., ABU O. A., BABATUNDE G. M., (1999a). Assessment of the effects of supplementing rabbit diets with a culture of *Saccharomyces cerevisiae* using growth performance, blood composition and clinical enzyme activities. *Anim. Feed. Sci. Technol.*, ***77, 25-32.***

VIETMEYER N. D., (1985). Potentials for micro livestock in developing countries. *J. Appl. Rabbit. Res.*, **8**, 10.