



PROBLEMS AND PROSPECTS OF RABBIT PRODUCTION IN NIGERIA – A REVIEW

*Mailafia, S.¹, Onakpa, M.M.² and Owoleke O.E.³

¹Department of Veterinary Microbiology, Fac. of Vet. Medicine, University of Abuja, PMB 117, Abuja. Nigeria.

²Department of Veterinary Physiology and Biochemistry, Faculty of Veterinary Medicine, University of Abuja, PMB 117, Abuja. Nigeria

³Department of Animal Health and Production, Faculty of Veterinary Medicine, University of Abuja, PMB 117, Abuja. Nigeria.

*Correspondence author: smailafia@yahoo.com

ABSTRACT

Population growth in the developed countries is stabilizing while that of developing countries including Nigeria is still increasing rapidly. This calls for increasing the production of livestock to meet the protein demand of the populace. Rabbits are characterized by small body size, short gestation period, high reproductive potential, rapid growth rate, genetic diversity, and their ability to utilize forages. Their by-products serve as major diet components and are devoid of fat thus making them suitable important source of protein. Rabbit meat is of high quality, being high in protein and low in fat content. Rabbit production can be integrated into small farming systems, with the rabbits being fed on crop residues, weeds, waste fruits, vegetables and poultry droppings. The manure can be used as fertilizer for crops and gardens. The housing systems and equipment examined were cages, feeders and other equipment for rabbits can be made using readily available materials such as split bamboo and raffia palm. Limitations to rabbit production in developing countries include the susceptibility of the animals to heat stress, and the degree of management skill necessary to raise rabbits successfully. This study further suggests areas of research needed on the nutritional value of tropical forages and by-products for rabbits. It is apparent that in many areas in developing countries, rabbit production could be an effective means of converting forages and by-products into high quality animal protein for human consumption. The study provides a benchmark for the understanding of prospects of rabbit production in Nigeria.

Keywords: Rabbit, Production, Problems, Prospects, Animal protein.

INTRODUCTION

The human population growth in developed countries is stabilizing while that of developing countries including Nigeria is still increasing rapidly. Thus, the search for alternative sources of protein to meet up the population challenge is imperative. Economic indices indicate that as this population trend continues, more people are to be fed. Agricultural outputs needs to be increased rather than through food importation into such countries (Allen, 1993). In order to maximize food production and meet protein requirements in Nigeria, viable options need to be explored and evaluated (Owen *et al.*, 2008). Among such alternatives is the use of livestock species that are yet to play a major role in animal production within these countries. Fast-growing livestock such as rabbits possess a number of features that might be of advantage in the small holder subsistence – type integrated farming in developing countries.

Rabbit farming in Nigeria is faced with myriad of problems, which have resulted to a gross shortage of meat to meet up the population challenge in our country (Nworgu, 2007). The growth rate of the Nigerian agricultural sector is below the potentials of natural and human resources due to high cost of

agricultural inputs, poor funding of agriculture, inadequate functional infrastructural facilities, inconsistencies of government agricultural policies, inadequate private sector participation, poor mechanized farming and little or no adoption of some simple agricultural technologies developed by scientists (Nworgu, 2007). In Nigeria, consumption of animal protein remains low at about 6.0-8.4 g/head/day which are far below the 13.5g per day prescribed by the WHO (Egbunike, 1997).

Rabbit production is a veritable way of alleviating animal protein deficiency in Nigeria (Ajala and Balogun, 2004). The rabbit has immense potentials and good attributes which include high growth rate, high efficiency in converting forage to meat, short gestation period, and high prolificacy, relatively low cost of production, high nutritional quality of rabbit meat which includes low fat, sodium, and cholesterol levels. It also has a high protein level of about 20.8% and its consumption is bereft of cultural and religious biases (Biobaku and Oguntona, 1997). The presence of caecal microbes enables the rabbit to digest large amounts of fibrous feed as most non ruminant species cannot (Taiwo *et al.*, 1999).

To our understanding, information on the problems and prospects of rabbit farming in Nigeria is scanty. Few of the information available are unable to elucidate the major intricacies involved in rabbit farming. This paper therefore presents firsthand information on the review of management procedures in rabbit production; examines the potentials and problems that may be envisaged in rabbit production in Nigeria. Suggestions were made to improve rabbit farming and useful recommendations were made in order to meet the ever-rising protein needs in Nigeria in order to meet the WHO prescriptions.

Breeds of Rabbits

The United States Department for Agriculture (USDA) has classified rabbits according to size, weight and type of pelt. Small rabbits weigh about 1.4 – 2kg at maturity, medium breeds 4 – 5.4kg, and large breeds 6.4 – 7.3kg (USDA, 1972). Based on this classification, two most popular breeds for meat production include the New Zealand white and the Californian. These breeds are most popular because they combine white fur and good growth characteristics. The New Zealand rabbits are slightly larger than the Californian, 4 – 5.9kg and 3.6 – 4.5kg respectively. The New Zealand rabbit has a completely white, red or black body, whereas the Californian is white with colored nose, ears and feet. The two most popular rabbits for fur production are the Rex and the American Chinchilla. The Rex is slightly smaller than the American Chinchilla, 3.2kg versus 4.5kg (USDA, 1972).

At present there are many breeds of rabbit being used for both meat and skin production in developing countries. For example in Brazil there are the New Zealand White, Californian, Chinchilla, Palomino, Hollander, Rex, Dalmation, Flemish Giant, New Zealand Red, Barboleta, Champaigne, d'Argent; in Ecuador there are the New Zealand White, Blue Viennese, Silver German and Angora. In Malawi there are the New Zealand White, Californian, Angora, Rex; in Nepal there are the Californian Hybrids while in Ghana there are the Thuringa, Blue Viennese, Flemish Giant, Checkered Giant, Lop, Californian, Alaska, and the Yellow Silver (USDA, 1972). In Nigeria, the commonest breeds include the New Zealand white, Californian, Angora, Rex amongst others (Aduku and Olukosi, 1990).

All of these breeds of domestic rabbits are descendants of the European wild rabbit, *Oryctolagus cuniculus* (Aduku and Olukosi, 1990). Although many of these are breeding successfully in various countries, the most popular breeds are the New Zealand White and the Californians. These two breeds are also the most popular in commercial rabbit industries in the developed countries. The various production traits such as fertility, growth and feed conversion rates when considered, under commercial conditions, New Zealand Whites and Californians are amongst the better breeds available for meat production (Bombeke, *et al.*, 1975).

Housing Rabbits

Housing constitutes an important factor for a successful rabbit production. Housing types include the cages, pens, paddocks, underground and insulated housing, housing made from locally sourced raw materials such as bamboo, and rabbits kept on free range make for themselves houses in holes. In many rural areas of developing countries, the materials for building cages and insulated housing, and electricity to power fans and ventilators which are used in commercial rabbitries in the developed countries are often not available. When available the cost may be too high to justify their use in anything but highly developed commercial rabbit industries. It is possible, however, to construct rabbit housing from locally available materials such as old packing cases, intermeshed branches or bamboo strips (Action for Food Production, 1974), or local hard wood or bamboo-like material (Owen, *et al.*, 2008).

Housing made of wood would have to be renewed more frequently due to gnawing than that constructed from wire for example. Rabbit housing in tropical countries should be designed and situated to keep the rabbits as cool and quiet as possible, to keep out predators such as python and cats, and to keep out dogs and children which may disturb the rabbit leading to general unthriftiness. The housing should be made of bamboo or bamboo-like materials and nailed or, especially in the case of bamboo, tied to upright supports with local cords or vines; wire could perhaps be used for exposed ties to minimize gnawing damage (Owen, *et al.*, 2008). Rabbit housing should be built under trees or such natural shelter as exists and, if possible, sited to take advantage of breezes (Bewg, 1974).

Flooring can be made of hard bamboo-like material slatted together. Bamboo flooring of this type is recommended for adult rabbits only, as young rabbits tend to slip on the smooth slates and can develop deformed legs. Splitting and weaving bamboo strips into a mat provides much better footing for all rabbits. The outer surface of the bamboo should face upwards in order to minimize damage from gnawing and to facilitate cleaning (Owen, *et al.*, 2008). Nesting boxes can be constructed from thinner material or even from clay. Wire has many advantages when used for rabbit housing, especially for floors and the fronts of cages. It should be noted, however, that this material can rust rapidly in warm humid climates if not galvanized or if the galvanized coating is damaged. Possibly it's most important use would be in making ties (Ministry of Agriculture Fisheries and Food, 1973).

For water supply, sprays and the installation of sprinklers in the rabbitary is very useful. In arid areas where the water supply is restricted, the construction of underground compartments with inspection hatches could be important (Templeton, 1968). This would assist in keeping rabbits cool in hot climates though, would be relatively difficult to clean and may lead to increased parasites or disease spread. Therefore this type of housing has been discouraged in Nigeria.

Feeds and Feeding

Rabbit production in developing countries is based on low cost feeding, using locally available feedstuffs. Rabbit husbandry in these countries emphasizes on simple feeding methods. In developed countries where commercial rabbitary is on the lead, feeds are compounded to increase growth rate and to minimize labor requirements (Walsingham, 1972). However, in developing countries more important considerations would be to formulate cheap diets based on feedstuffs that are of little direct value as human food. If the rabbits are kept on a small scale, diets such as green succulent fodders can be fed with little costs. Current feeding practices vary widely in the tropics, depending on the types of feed material that are available locally (Aduku and Olukosi, 1990). In tropical Africa, feeds commonly given to rabbits include grasses such as Guinea grass (*Panicum maximum*) and stargrass (*Cynodon dactylon*); legumes such as Kudzu (*Pueraria phaseoloides*), groundnut haulms and cowpea haulms; root crops such as sweet potato leaves and cassava chips; and various herbs such as *Tridax procumbens*, *Euphorbia* and *Aspilla* (Aduku and Olukosi, 1990).

Rabbits may be maintained solely on green feeds together with household vegetable waste. However, careful management and balancing of diets is necessary (Aduku and Olukosi, 1990). The two most common deficiencies encountered in such diets are of energy and protein rather than minerals or vitamins. Although the rabbit is by nature herbivorous, growth rates on forage based diets containing high fiber levels will be increasingly curtailed with increasing fiber level. This is due to the animal's inability to obtain sufficient digestible material to satisfy its energy demands. The nature of the fibrous components is also important; the greater the degree of lignifications, the greater the reduction in the digestibility. In general, tropical species of grasses are less digestible than temperate species at the same stage of maturity and are often of low protein content. The feeding of forage legumes, cut at an early stage, could help to increase protein supply. Alternatively, a protein supplement may be provided, such as vegetable oil seeds or oil seed residues (Blattachary and Taylor, 1975).

Rabbit Slaughter and Processing

One of the important aspects of any rabbit meat production enterprise is the efficient and hygienic slaughter and handling of the animals and also the hygienic handling of the carcasses. This applies to both the large-scale commercial enterprises and small-scale enterprises alike. Problems concerning these aspects are common to meat production from all types of livestock in developing countries, particularly in rural areas. The relatively small size of the rabbit presents advantages of easy transportation and consumption is easier by a few people (Aduku and Olukosi, 1990). Rabbits should be starved for about six to ten hours before slaughter, to empty the gut as far as possible. They should be well watered during this period to prevent dehydration and weight loss

especially in warm weather. It is better to slaughter rabbits in an area fenced or walled off from other people and domestic animals such as dogs. It is also preferable to have a roof of some kind over the area and a water supply for cleaning purposes (Aduku and Olukosi, 1990).

Rabbits are best slaughtered by stunning or dislocating the neck before severing the head at the atlas joint using a sharp knife. The hind legs should be held firmly in the left hand, with the right hand holding the rabbit's head directly behind the ears. Pulling sharply on the head with a downward and backward twist of the hand will effectively break the neck. This operation should be followed immediately by bleeding, which is best carried out by severing the head with a knife in one smooth cut (Aduku and Olukosi, 1990).

Skinning and dressing the carcass is most conveniently carried out while the rabbit is suspended from a horizontal rail or a bar. The rabbit can be attached to this bar by the hind feet using simple shackles, which can be made from a thick gauge wire. A simple rail system can be constructed from tubular steel (Aduku and Olukosi, 1990). Evisceration is carried out by making a longitudinal cut through the body wall from the vent through the belly to the breast bone. The gut, lungs and heart are removed through this cavity while the liver and kidneys are usually left in the carcass. Care should be taken, however, to remove the gall bladder without bursting as the contents could taint the carcass (Ministry of Agriculture Fisheries and Food, 1973).

Rabbit carcasses are mostly consumed fresh; where this is not the case, processing and preservation becomes necessary. Facilities such as refrigeration are not always available in rural areas of developing countries or where available, power supply may be inefficient, so in these areas more traditional methods of processing have to be considered. The oldest and most widely used methods of processing and preservation of meat in rural communities include drying, smoking and sometimes salting (Pellett and Miller, 1963).

Problems of Rabbit Production in Nigeria Climate

Heat is one of the most important climatic factors which may affect rabbit production in the tropics. The rabbit is very largely dependent on respiratory evaporation for the regulation of its body temperature and this confers only a limited power of adaption to hot climates. Heat is also dissipated by radiation and convection, but these are somewhat restricted by the rabbit's furry covering. Johnson *et al.*, (1957) reported that short hair and larger ears helped the cooling process in New Zealand White rabbits. According to these workers, growth and development were impaired at ambient temperatures of 28.3°C and above. Generally the higher the ambient temperature the greater was the disturbance of the rabbit's functions.

The temperature of a rabbit's body is best measured by recording rectal temperature. A rectal temperature of 38°C is considered to be within the normal range. Lee *et al.*, 1944 reported that at ambient temperatures above 29.4°C the rectal temperature begins to increase in the rabbit. When the rectal temperature of Angora rabbits reached 39.8°C the animals became disinclined to move; at a temperature of 40°C they lay down on their sides; and at 41.7°C the rabbits suffered obvious distress but were able to carry out ordinary movements. These rabbits were found to be unable to tolerate ambient temperatures of 37.8°C to 43.3°C for more than 7 hours, within which time the critical rectal temperature of 41.7°C was reached.

Reproduction

There is evidence that high ambient temperatures can impair the reproductive performance of rabbits. In New Zealand Whites a temperature of 32.8°C reduced fertility in the male rabbits, a continuous high temperature being more detrimental than intermittent heat (Oloufa *et al.*, 1951). In the female, smaller blastocysts and embryos, and an increase in embryo mortality rates were also observed. El Sheikh and Casida (1955) concluded that the maximum temperature to which rabbits could be exposed (for 1 hour) without impairing health or sperm motility was 43.3°C at a relative humidity of 30 to 40%. Chou *et al.*, (1974) heated the testes of live rabbits to 43°C for 20 min on three successive days. No spermatozoa were present in the seminiferous tubules up to 30 days after the treatment. However, recovery was complete at about 10-14 weeks following the treatment. Hiroe and Tomitzuka, (1965) observed a marked fall in semen quality in male rabbits subjected to ambient temperature of 30°C for 14 days. These changes in quality were associated with an increase in the pH of the semen, a fall in sperm motility, a decrease in sperm concentration, an increase in the percentage of abnormal spermatozoa and a decline in libido. These workers found that, with the exception of sperm concentration, the changes could be reversed by reducing the ambient temperature.

Embryo survival was depressed by heat stress and this was more severe under constant heat stress than under fluctuating heat stress, and was due largely to post implantation losses. Embryo survival at 12 days post insemination was lower at 32.2°C than 21.1°C. Shah (1955) reported that severe prenatal losses occur in pregnant does exposed continuously in the first 6 days of pregnancy to environmental temperatures sufficiently high to cause a rise in body temperature of 1.2°C to 1.7°C. Such losses occurred through resorption of embryos following implantation. When laboratory rabbits were exposed to a Sahelo-Sudanean dry climate, breeding was only successful for 5 months out of 12 (Tacher, 1970).

Diseases

Viral Diseases

Infectious myxomatosis is a fatal disease transmitted by mosquitoes, biting flies and by direct contact.

(Aduku and Olukosi,1990). The disease is characterized by conjunctivitis and the animal appears listless, anorexic with high temperature. In severe outbreaks animals die within 48 hours after manifesting signs. The disease can be prevented by vaccination. Other viral diseases include rabbit pox and papillomatosis both of which affect the skin and integuments (Aduku and Olukosi, 1990).

Bacterial Diseases

Pasteurellosis – This highly contagious disease is caused by *Pasteurella multocida*. The disease is manifested as inflammation of the mucus membranes of the air passages and lungs. *Pasteurella* spp can also cause abscesses which may be found on any part of the body (Mercks, 1998). Mastitis also known as “blue breast disease” is caused by *Streptococcus* or *Staphylococcus* in lactating does. The mammary glands become hot, reddened and swollen and the doe may have fever as high as 40°C or more (Aduku and Olukosi, 1990). Other bacterial diseases are pneumonia, conjunctivitis (weepy eye), spirochetosis (vent disease) and enteritis.

Fungal Diseases

Ringworm is caused by *Trichophyton mentagrophytes* and is characterized by lesions which may occur in any area of the rabbit's skin with loss or thinning of fur. The affected area may be inflamed or capped with white bran-like flaky material (Mercks, 1998).

Parasitic Diseases

Coccidiosis is a major disease problem in rabbit production. This disease is caused by a protozoan parasite *Eimeria stiedae*, *E. magna*, *E. irresidua*, *E. media*, or *E. perforans*. Affected rabbits exhibit diarrhea, anorexia, rough hair coat and unthriftiness (Aduku and Olukosi, 1990). Mange is also a major cause of poor production in the rabbit industry. The disorder may be caused by *Sarcoptes scabiei* or *Notoedres cati*. Pruritis and alopecia are major clinical signs. Rabbits are intermediate hosts to some intestinal tapeworms such as *Taenia pisiformis* and *Multiceps serasilis*. Also pinworm and ear mite infections are common to the rabbit (Rai, 1988). Problems can be also be caused by such external parasites as ear mites and chicken fleas.

Non Infectious Conditions

The common non infectious conditions in rabbits include cannibalism, sore hocks, dental malocclusion, bloat and fur eating. However, cleanliness and good management, which does not necessarily have to be sophisticated or involve the use of expensive drugs, can be extremely effective in the prevention of disease (Stewart, 1974).

Prospects

Rabbit skin

In some cases, the rabbit skin is of more value than the rest of the carcass but it should always provide a useful income to the breeder to offset some of his costs.

Rabbit skins, when properly processed and made into garments, are very attractive and command a high price. While it is not suggested that the production of fully processed skins is within the capacity of small-scale breeders, dried or salted skins can easily be produced and, if due care is taken in their preparation, can give a good return (Aduku and Olukosi, 1990).

The first essential with all fur skin, whether from a rabbit or any other animal, is to prevent putrefaction taking place. Unless checked, decay will set in within a few hours of flaying and one of the first results, loss of hair, makes the skin totally unsuitable for use in fur garments. Therefore, all skins should be properly cured or preserved very soon after flaying. Methods of preservation include salting or sun-drying (or both) and simple rules will ensure that a top-quality cured skin is produced. Cure as soon as possible after flaying and if sun-drying, do so in the shade with the skins hanging flesh-out. If salting, use a fairly small grain salt and apply carefully over all parts of the skin. Small-scale breeders may keep their preserved skins for several weeks, to build up the larger loads required by skin dressers. Processing of rabbit skins involves a long and complicated series of chemical reactions and physical treatments, including pickling (in acid/salt mixtures), tanning, dyeing, oiling and numerous finishing operations. A great deal of work is expended on improving the appearance of the fur, using brushing, combing, shearing and ironing techniques (Aduku and Olukosi, 1990). The production and processing of rabbit skins and the manufacture of various marketable products from them could ideally be carried out by labor intensive industries, as in Malta for example (Joseph, 1975).

Rabbit Manure

Rabbit manure is very useful, its dry matter content being about twice that of horse manure and over

three times that of dairy cow manure under conventional UK farming systems (Sandford, 1979). Moreover, rabbit manure is relatively rich in phosphorous and nitrogen when compared to the manure of other livestock on a dry matter basis (Casady, 1975).

Marketing

The single most important step before building a rabbitry or beginning commercial rabbit production is to develop a market for the rabbits. In most cases producers must develop their own markets. Rabbits produced for their meat must have good loins, shoulders, hips and pelts. The rabbit meat industry will not buy unhealthy rabbits; therefore, rabbit producers must furnish healthy, high-quality, disease-free rabbits to the processors. It is therefore advisable to engage the services of a veterinarian at every stage of the production process.

Conclusions and Recommendations

The rapid growth rate, high reproduction potential, and ability to utilize forage make rabbits an important livestock contributing to meat and protein production in Nigeria. They often have abundant resources of forage, local building materials and labor, all of which can be effectively utilized in rabbit production. Limited data indicate that a number of tropical legume forages are well digested by rabbits, whereas tropical grasses are of low feeding value. Further data on commercial and local feeds for rabbits is needed to develop effective feeding systems. In a number of respects, the major potential for rabbit production seems to be in developing countries, where the needs for maximizing food production are required. Investigations into methods of converting such offal into proteinaceous concentrates suitable for animal feeds are recommended.

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