



Research Article

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Rabbits Meat Production in Egypt and its Impact on Food Security, Small Holders Income and Economy

Mostafa A R Ahmed Imam^{1*}, Dorina M, Mohamed S, Ayman A and Monica M

¹Department of Animal Production, Kafrelsheikh University, Egypt

Animal Production Research Institute, Dokki, Giza, Egypt

University of Agriculture and veterinary, Bucharest Romania

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*Corresponding author: Mostafa A R Ahmed Imam, Department of Animal Production, Kafrelsheikh University, Egypt

Abstract

In Egypt, the agricultural sector is of paramount significance to the national economy. Agriculture activities contributed 11.9% to the National Egyptian economy (2017). Poultry sector accounted for 12.5% of the net agricultural production and 25% of the total value of animal production income [1]. With over 100 million inhabitants, Egypt is the largest Arab country in terms of the number of Arabic-speaking people, the third-largest African country, and the fifteenth-most populous nation in the world. Consumers are demanding to guarantee higher quality of protein source with low cost. Rabbit production could be a good source of meat in Egypt since it is a prolific animal, fast growing and of high fecundity [2]. The important goal of Sustainable Agricultural Development Strategy (SADS) [3] (is increasing per capita consumption of poultry products to about 2 g/day in 2030. Rabbits production is one of the fast-growing projects, which is mainly due to rabbits' benefits such as fast reproduction, rapid growth rate, early maturity, efficient feed utilization and high quality nutritious healthy meat [4]. Therefore, rabbit meat has a high demand among different types of meat.

In Egypt, mainly small holders carry out rabbit production. Thus, it's imperative to make any substantial improvement in rabbit production with consideration this sector. It has been reported by [5] that rabbit production needs great attention mainly because this species is a good source of good quality meat. The rural sector contributes 90% to the total rabbit production [6]. It is well known that the Egyptian farmer is very keen to keep poultry and rabbits of good reproductive performance. Local rabbits with their limited economical characteristics could not be raised on a commercial basis. Egyptian governorate and producers used to import several rabbit breeds for their projects. The adaptation of these foreign breeds and lines to calamite under Egyptian environmental conditions is always questionable and should be an area of research.

Keywords: Microbial rumen population; Self-feeding systems; Fertilizing plants; Carbon; Reproductive efficiency

Rabbit Statics in Egypt

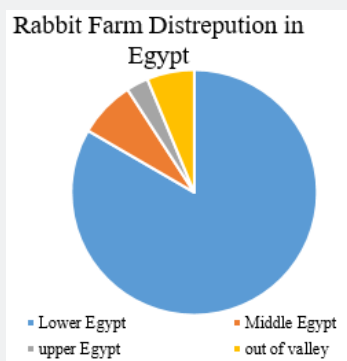


Figure 1: The Distribution of Rabbit Farms in Egypt.

Rabbit Production Eefficiency in Egypt



Figure 2: The Efficiency of Rabbit Production in Egypt.

Egypt is the fourth country in rabbit production by 70 thousand tons of carcass [7] and 7.6 million head of rabbits [8]. According to Economic Affairs Sector, Ministry of agriculture and land reclamation [9], 83.4 % of rabbit production farms are centered in the strip of lower Egypt. In contrast, the lowest strip in rabbit production is Upper Egypt strip by 2.9%, Figure 1). As shown in Figure 2, the rabbit production efficiency (number of litters/ numbers of does) is the highest in Lower Egypt (57.1%) vs. Middle Egypt (44.2%). Family sector and small holders contribute by 90% in total rabbit production in Egypt [10].

Rabbit Breeding

There are two Egyptian local breeds in Egypt (Native and Gabali rabbits). Gabali rabbit breed is raised in desert areas of Sinai Peninsula and Matrouh [6,11]. In 1990's, Ministry of Agriculture started a project to characterize both Gabali populations. In 1994, Egyptian Gabali Sinai (EGS) rabbits were successfully domesticated from a feral habitat to cages productions by a cooperation project between Ministry of Agriculture and Faculty of Agriculture, Moshtohor University [12,13]. Native (Baladi) rabbit breed is an Egyptian domestic rabbit breed found in rural areas of Delta, Middle and Upper Egypt [14,15]. Abdel-Kafy et al., [16] reported that animal production research institute (APRI) established a native rabbit herd nucleus from three governorates in Middle Egypt. The collected rabbits were named Native Middle Egypt Rabbit breed (NMER). On the other hand, Emam et al., [17] recorded high genetic parameters among NMER collected populations from rural areas in Middle Egypt.

In the middle of last century, Ministry of Agriculture researchers tried to improve native Egyptian rabbits by crossbreeding for several generations of Baladi with the Flemish Giant [18]. The breeding plan carried out in five stages. First, the inbreeding inside each breed. Second, the cross between native rabbits does and Flemish Giant (FG) bucks. Third, Giant Baladi (GB) offspring was separated according to fur color to three groups (red, black and white). Fourth, the back cross between GB and heavy FG bucks for several generations and separation according to the three colors. Finally, does of each strain were mated with bucks of the same color for several generations. Each color gave independent strain until characterizations were established by Khalil [18], Galal and Khalil [19], Khalil [20]. The strains are Egyptian Red Baladi (ERB), Egyptian Black Baladi (EBB) and Egyptian White Baladi (EWB) with 1/8 Baladi and 7/8 FG. According to Ministry of Agriculture and Land Reclamation in Egypt and FAO report [6] the EWB has become extinct. In addition, previous report indicated that ERB and EBB are endangered [21]. The Egyptian and international literatures reviewed that the total number of Egyptian local rabbit breeds, lines and strains are eight [10]. Galal and Khalil [19] reported that the establishment of rabbit farms has become a popular target among small holders, which led to easy spread of foreign breeds (New Zealand White, California, Buscat, Chinchilla, Filmish Giant, Papillon and Rex) and lines (V-Line and Hy plus) for economic reasons (fast productive and reproductive

performance); and in contrast, neglecting native Egyptian rabbits in the large-scale production [17].

Nowadays, synthetic lines are being developed by selection for defined objectives [22,23]. These lines, depending on their specialization, perform better than the standard of the original breeds and the current production tends to rely on them. Four synthesized lines to be convenient for Egyptian conditions (Table 1). Till now, multi- synthetic lines were not formed to be used on small and large scales. Three-way crossing will be beneficial in this concept. This scheme has the advantage of exploiting entirely the effect of heterosis at each generation (direct and maternal), but it requires a complex design for maintaining and selecting the pure stocks and the multiplication and diffusion of the crossbred bucks and does.

Table 1: The Synthetic Lines in Egypt.

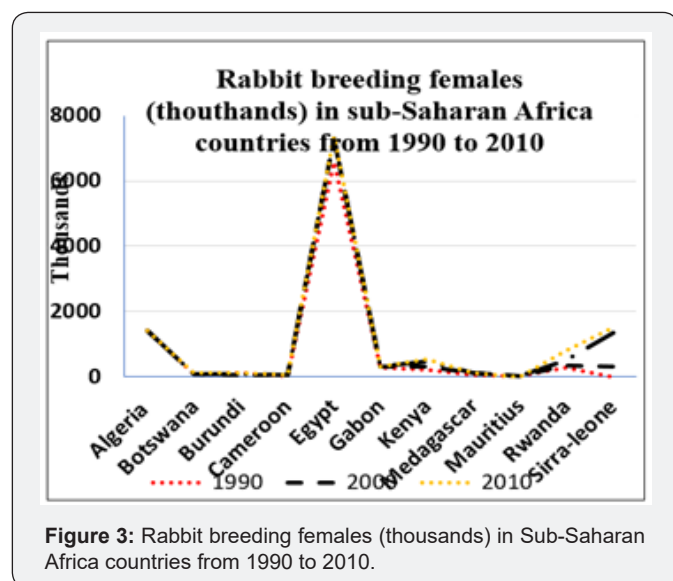
Purpose	Line	Founder Breeds	Selection Criteria	Author
Maternal line	APRI	Vline X Red Baladi	Weaning litter weight	[46]
Maternal line	New Giza	Native Baladi X NewZeland	Weaning litter weight	[42]
Paternal line	Alexandria	Vline X Black Baladi	Daily body gain (28-63) day	[43]
Multi-Purpose	Moshtohor	Sainai Gabli X Vline	Weaning litter weight and weight at 56 day	[44]

Smallholders Production System

According to World bank (2018), Egypt with a large population residing in the rural areas (57%) and engaged in agricultural production as a major means of livelihood [24]. The agricultural production system is mainly rain fed and traditional characterized by low inputs and other technologies. The definition of rabbit smallholder is the model of production with small rabbit capacity units (less than 50 does) with floor housing or simple batteries. The small units are set up in both of villages and small towns where feed is more expensive, but meat marketing is easier than centers towns. The famous symbol of small rabbit units in the most rural areas is one buck and 8-10 does that based on renewable resources constitute in 58% of North Africa [25]. It is the most frequent size where their offspring are mainly for home and neighbor consumption [19]. Kamel and Lukefahr [26] reported that village rabbit projects that directly involved young people reportedly decreased the rate of youth migration to urban areas. Small-scale rabbit projects have also targeted the more vulnerable households [27]. In addition, Lukefahr [28] reported that small-scale rabbit production provides opportunities as humanitarian projects that assist people who live in poor rural communities.

Rabbit production under smallholder farms has several benefits [29,30]. The benefits could be that it is good source for food and income supplementation. Farmers can benefit from a good supply of meat and their income will be increase through

extra fryers sale [31]. In addition, rabbit manure could be used to improve crop production and reduce fertilizing inputs cost for small crop farms [32]. Rabbit projects open several smallholders' income for the family by opening near small projects and secondary activities improve the family income and grantee cheap protein cost with high nutrient value. Rabbits are particularly favored for poverty reduction programs on account of their low investment and early benefits, and subsistence on renewable resources for feeding, housing and general management. It could be used as a vehicle for the poor to help themselves [28,29]. In the smallholder production system encouraging family (especially women) for contributions in improving income levels. According to FAOSTAT [33]. Egypt is the largest sub-Saharan Africa in women rabbit producers (Figure 3).



Rabbit by Products and Income Increase

Fur, pelt and shorn hair are three by-product are recovered from rabbit skins. Both of skins and pelts in rabbits have been used for many years as fur, in the manufacture of felt, and for a variety of miscellaneous toys and other items. With the development of many synthetic fibers and imitation furs, the demand for pelts by furriers has decreased. Rabbit skins and pelts vary widely in quality and value. The different types of fur characteristics vary depending on the breed type. Skins from young of any breed are normally of poor quality and of less value than those from adult animals. Those with dense fur, that is not easily removed from the skin, are most desirable. Rabbit skins in Egypt are not suitable for manufacturing propose due to tearing the skin into two pieces by un recommended methods, limited numbers of tanneries and limitation of rabbit fur manufacturing [34]. In addition, it will be increasing the attention of rabbit skinning preserving and tanning to maximize the benefits of those product. The most important factor to stop investigation in this area for absence of rabbit producer's association role to improve this manufacturing methods. The other problem is that small rabbit holders depending on colored rabbit in meat production.

There is a significant move within many countries in agricultural development to increase the implementation of zero-grazing systems [35]. Orskov et al. [36] reported that the timely incentive for biogas development in order to fully utilize the increased animal excreta captured at household level. Several research studied the incorporation of different animal manures into various animal diets [37,38] but few studies have used rabbit feces [39,40] although they are higher in nutritional value than other animal wastes [39] Manure can be successfully included in the feeds of both ruminants and non-ruminants, but animal waste is most efficiently used by ruminants such as cattle and sheep. Ruminants can digest fiber and to use non-protein nitrogen due to its microbial rumen population [39]. Moreover, in all these cases, the nutritional value of the manure was mainly a reflection of feed spillage, which is almost inevitable when intensive self-feeding systems are practiced [35].

Rabbit manure isn't only useful as fertilizer in a garden. It is feeding and bedding material for worms to indirectly benefit plants. However, it is using storage and fresh manure for fertilizing plants. It has a high percentage of nitrogen and, when combined with the rabbit urine that get mixed with the pellets, it can be poisonous to the worms. Therefore, you will need prep the manure well before using it for this purpose. Since rabbit manure has a greater proportion of nitrogen than carbon, it is also vital that you balance out this ratio by mixing it with materials high in carbon content, such as wood chips and straw, as it sits. Additionally, you will need to remove excess salts in the manure by passing water through it before you can use it. In Egypt, rabbit feces were used widely to product compost. Rabbit compost is easily using for organic vegetables production [41]. Generally, rabbit by products in Egypt need more efforts to put new strategies for their industry (especially in fur and composts industries). Rabbit producer's associations can be involved in this type of productions by creating focal points in rural areas for women and family's production.

Several Entities Activities to Support Rabbit Smallholders in Egypt

Several reports of rabbit projects were reported that there are several actions carried out to encourage smallholders attribute in production. TeleFood Project (belonging to FAO) carried out to increase small farmers income by adding new activities. involved smallholders of rabbit farms as well as key stakeholders, including micro- finance and input suppliers and services. Telefood goal was to sensitive the populace about the contribution of smallholders to increase farms income generation and family nutrition. The national rabbit project of Egypt, which involved collaboration between University of Zagazig and the Egyptian Academy of Scientific Research and Technology [42-46]. The objective of this project to involve rabbit pure breeds (Californian and New Zealand White rabbits) distribution, along with an extension package to facilitate project uptake and adoption by small-scale rabbit farmers. The United States Agency for International Development (USAID) and the National Development Agricultural Bank of

Egypt was established to promote rabbit production in rural areas through soft loans. Both projects documented good successes. Kamel and Lukefahr [28] reported that the Near East Foundation supported success project for rural development in Ezbet Badir) El Beheira Governorate. (The approach was a participatory and community-based development project managed at grass root level. The project also recorded some remarkable successes, which according to the authors included stemming the tide of rural-urban migration among the youth and literacy improvement.

Most of rabbit farms depend of semi closed housing system. Egyptian rabbit production is affected directly by climatic changes, especially in summer. The challenges of extreme environment stress (heat and cold) is considered as most important hazard facing rabbit investment expansion in Egypt. Most of important characteristics in rabbit production are vibrate for heat exposure (e.g. reproductive efficiency, locational and maternal abilities, growth rate, feed conversion ratio, carcass traits and meat composition, hair and fur quality, etc.) and adaptability to heat stress [18].

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