

## TRADITIONAL RABBITRIES ON THE ISLAND OF CRETE IN GREECE : GENERAL OUTLOOK

CHRISTODOULOPOULOS G.<sup>1</sup>, BURRIEL A.R.<sup>2</sup>, LABRINIDI S.<sup>3</sup>, KRITAS S.K.<sup>1</sup>

<sup>1</sup>Clinic of Medicine, Faculty of Veterinary Medicine, University of THESSALY, Greece.

<sup>2</sup>Laboratory of Microbiology-Parasitology, Faculty of Veterinary Medicine,  
University of THESSALY, Greece.

<sup>3</sup>Field Veterinary Clinic of AGIA BARBARA (IRAKLION, CRETE), Ministry of Agriculture, Greece.

**ABSTRACT:** Greek people consume a limited amount of rabbit meat, with the exception of the island of Crete. In Crete rabbit meat is a traditional dish. A large number of farmer or shepherding families grow rabbits. This study focuses on the traditional rabbitries that serve mainly as a source of meat for the needs of the family, thus become good examples of farming priorities of low-income families. The study focused on rabbitries located at the villages of Krousonas, Sarchos, Korfes and Loutraki in the county of Iraklion, Crete. A total of 70 traditional rabbitries were observed for the duration of four months (July to October 2000). The facilities of the rabbitries were of low cost materials, mostly homemade, with the exception of 15 rabbitries, which used commercial cages. The diet of the rabbits was mainly from garden plants supplemented with grains or other kinds of feed materials, such as leftover dry bread. Some characteristics of the production-system were: Maximum total rabbits number/farm  $22.2 \pm 13.0$  (n=70); Reproductive does number/farm  $3.3 \pm 1.3$  (n=70);

Parturition number/year/doe  $7.7 \pm 0.8$  (n=230); Litter size in birth  $8.0 \pm 2.6$  (n=105); Litter size in weaning  $7.2 \pm 2.4$  (n=97); Litter size in slaughter  $6.5 \pm 2.4$  (n=95); Slaughter age of fattening (months)  $2.8 \pm 0.9$  (n=84); Body weight at slaughter  $1.7 \pm 0.4$  (n=84); In respect to health problems, there were not any serious pathological conditions observed other than some cases with ear mange lesions (18.7% in reproductive does, 28.6% in reproductive bucks, 15.2% in fryer rabbits) and a small percentage (8%) of slaughtered rabbits were observed with liver abnormalities believed to be due to coccidial infection. At the end of the paper, the different medications in use in the observed farms are refereed. The recommendation and the application mode of the used medications were entirely empiric, thus without a prescription from a veterinarian. In 39 farms no medication was used.

### RESUME : L'élevage traditionnel du lapin en Crète (Grèce).

La population grecque consomme peu de viande de lapin sauf sur l'île de Crète. En Crète, de nombreuses familles de fermier et de bergers élèvent des lapins dont la viande est utilisée pour la réalisation d'un plat traditionnel. Ce travail analyse les performances techniques de petits élevages familiaux pratiquant une production vivrière. Il présente ainsi des exemples intéressants concernant les choix de production réalisés par des familles à bas revenu. Les fermes enquêtées étaient localisées dans les villages de Krousonas, Sarchos, Korfes et Loutraki dans le comté d'Iraklion en Crète. Au total 70 ateliers cunicoles traditionnels ont été observés durant quatre mois (entre juillet et octobre 2000). L'équipement des clapiers était constitué de matériel peu coûteux, généralement fait maison, à l'exception de 15 élevages équipés de cages commerciales. L'alimentation des lapins provenait principalement de plantes du jardin supplémentées avec des graines ou d'autres produits comme du pain rassis. Les principales caractéristiques techniques du système de production étaient les suivantes: Nombre maximum d'animaux/élevage:  $22.2 \pm 13.0$  (n=70); Nombre de femelles

reproductrices/élevage:  $3.3 \pm 1.3$  (n=70); Nombre de mises bas/femelle/an:  $7.7 \pm 0.8$  (n=230); Taille des portées à la naissance:  $8.0 \pm 2.6$  (n=105); Taille des portées au sevrage:  $7.2 \pm 2.4$  (n=97); Taille des portées à l'abattage:  $6.5 \pm 2.4$  (n=95); Age à l'abattage (en mois):  $2.8 \pm 0.9$  (n=84); Poids vif à l'abattage:  $1.7 \pm 0.4$  (n=84). Concernant les aspects sanitaires, aucune pathologie grave n'a été observée à l'exception de quelques cas de gale des oreilles (18.7% chez les femelles reproductrices, 28.6% chez les mâles reproducteurs et 15.2% chez les lapins à l'engraissement). A l'abattage, un faible pourcentage d'animaux (8%) présentaient des anomalies au niveau du foie, probablement dues à une infection coccidienne. Les différents traitements médicamenteux utilisés dans les élevages enquêtés sont référencés à la fin de cet article. Généralement, les recommandations et le mode d'utilisation des médicaments étaient totalement empiriques et donc réalisés sans prescription vétérinaire. 39 élevages n'utilisaient aucun traitement médicamenteux.

## INTRODUCTION

Rabbit meat, either in regional traditional dishes or as food for the poor farmers of the Developing World, has always been a kind of meat offering valuable protein in the diet of people. Today the increased need of healthier food in the West and more protein in the Developing World is increasing the use of rabbit meat in the human diet all across the world (OWEN 1981, HOFFMANN *et al.* 1992, LUKEFAHR 1998, LUKEFAHR 1999, FINZI 2000, LUKEFAHR 2000).

The only area of Greece where rabbit meat is considered as a traditional dish is the island of Crete. In Crete, rabbit meat is used at least weekly as a source of protein. It is not known when this regional tradition started, but the evidence suggests ancient sources. The

ancient Greeks were eating the hare and rabbit meat (ATHINEOS, 2<sup>nd</sup> century A.D.). Today in the "Museum of Cycladic Art - Nicholas P. Goulandris Foundation" (Athens, Greece) someone can see a small marble statue of 320-310 BC showing a little boy holding a young rabbit (Photo 1). Today in Crete a large number of farming families or shepherds are growing rabbits for mainly personal consumption.

Lack of systematic information on rabbit farming in Greece and the expected increase in the consumption of this kind of meat due to the recent fear of eating other kinds of animal protein encouraged the undertaking of the present study. The study focuses on the traditional rabbitries that serve mainly as a source of meat for the needs of the family, thus become good examples of poor families' farming priorities.



Photo 1 : Statue of a boy with rabbit. Marble, probably made in Attica. ca 320-310 B.C. (Nicholas P. Goulandris Foundation, Museum of Cycladic Art., ATHENS, Greece).

## MATERIALS AND METHODS

The area of study is the county of Iraklion, Crete, more specifically the villages of Krousonas, Sarchos Korfes and Loutraki. In these villages, 70 traditional rabbitries were observed for the duration of four months (July to October 2000). The objective was to collect information clarifying the following subjects. (1) The reason rabbits were kept, (for personal consumption or profit?) (2) The infrastructure of the rabbitries (the number of animals raised, the various production variables or the system of reproduction) and (3) the various diseases either recognized or suspected and their treatments. To meet the objectives 41 specific questions were asked of each owner of the observed rabbitries and at least one member of research team visited and observing every one of these rabbitries each week.

## RESULTS AND DISCUSSION

Questioning of rabbitries' owners revealed that the initial source of the local breeds was not known. However, they all believed that for many decades there were no rabbits introduced for breeding from other parts of Greece or abroad. This has perhaps resulted into the development of a local breed, which is still unclassified and untypified.

From the 70 rabbitries researched, 38 (54.3%) were under the responsibility of the family's head, 21 (30%) were the responsibility of the mother and the remaining 11 (15.7%) were the responsibility of both.

The main occupation of the father in 49 (70.2%) from the 70 rabbitries was farming, although in 12 (17.1%) the owners were pensioners, in seven (10%) shepherds, in one the owner was a teacher (1.4%) and in another a priest (1.4%). The main occupation of the mother of all the owner family rabbitries was a housewife. All the families had both parents, 12 also had the grandfather and 25 a grandmother with them. As for the number of children per family, seven did not have any children, 14 families had one child, 20 families had two children, 21 families had three and four had four children.

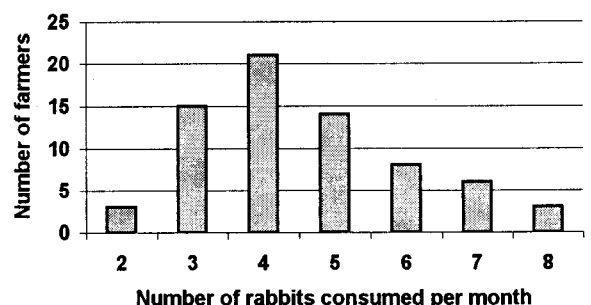
The rabbitries were located at the ground floor of the house in 17 cases, while in the remaining 53 the housing of the rabbits was located in adjacent buildings together with other kinds of animals.

In 23 of the 70 rabbitries rabbits were free within the building they were housed. These rabbits had access to an outdoor-protected yard. Females of this kind of housing were digging their nests in the earthy ground of the house. In a second group of 18 rabbitries all animals lived in hand constructed hutches made of wooden planks and chicken wire. In a group of 15 rabbitries all rabbits lived in cages commercially bought for them, and in the remaining 14 only breeding stock was housed in hand constructed cages while fattened rabbits were housed in an outdoor protected yard. A top covering protected all the caged animals irrespective of the origin of the cage or its quality.

The feeding and drinking troughs were in their majority old household pots (earthen or plastic). In only nine of the fifteen commercially bought cages feeding troughs were of similar commercial quality.

The diet of the rabbits consisted mainly of grass, tree branches or vegetables unsuitable for human consumption. The materials were collected from the family yards or neighboring similar properties. However, in 41 rabbitries the diet was supplemented with grains, other kinds of foods, such as leftover dry

Figure 1 : Rabbits consumed per month and farmer family



bread and in 16 rabbitries the diet was supplemented with commercially prepared foods suitable for rabbits.

The fattened rabbits of 40 rabbitries were used only for home consumption, in 18 for home consumption and presents to relatives and friends and in 12 of them many fattened rabbits were also sold to third parties. The only parts of the carcass used were the body, head and liver, while the rest of the rabbit was disposed. As it is evident from the above information, the main purpose of these rabbitries was the supply of meat for the owner family or its friends. Rabbit breeding ensures for these families a high quality meal with the minimum of cost for breeding and keeping rabbits. The low cost of producing this kind of protein makes rabbit keeping extremely suitable for low-income farmer families. In this way, particularly within poorer families, rabbit breeding has an important role to play.

Figure 1 presents the number of rabbits consumed per month by owner families. Each family consumes an average of 4.6 (mean  $4.6 \pm 1.5$ ) rabbits per month,

**Table 1: Some production variables**

Variable	Number of observations	Mean $\pm$ SD
Maximum total rabbits number / farm	70	22.2 $\pm$ 13.0
Reproductive does number / farm	70	3.3 $\pm$ 1.3
Reproductive bucks number / farm	70	1.1 $\pm$ 0.3
Parturition number / year / doe*	70	7.7 $\pm$ 0.8
Births interval / doe (days)*	70	48.3 $\pm$ 11.3
Age of reproductive doe (years)*	230	2.3 $\pm$ 1.5
Age of reproductive bucks (years)*	77	3.6 $\pm$ 1.9
Litter size in birth	105	8.0 $\pm$ 2.6
Litter size in weaning	97	7.2 $\pm$ 2.4
Litter size in slaughter	95	6.5 $\pm$ 2.4
Days of lactation*	70	28.7 $\pm$ 4.3
Slaughter age of fattening (months)*	70	2.8 $\pm$ 0.9
Body weight at slaughter	84	1.7 $\pm$ 0.4

\* According the owner notice

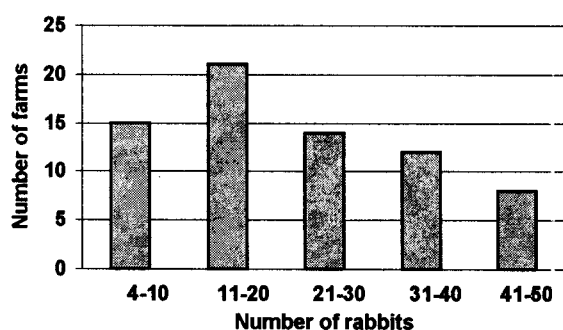
approximately one rabbit per week. Although an average of approximately 14 rabbits are killed for consumption per month, those not consumed by the owner family are either sold or donated to relatives and friends. The number of consumed rabbits by producer families in Crete is higher than that consumed in the rest of Greece or areas where rabbit meat is recommended and farmed as source of low cost animal protein (GENKAHA 1997, LUKEFAHR *et al.* 2000). The higher number of rabbits consumed in Crete is perhaps due to the long tradition of keeping rabbits by traditional farmers. There are a large number of Cretan recipes for cooking rabbit meat. People consider rabbit meat a healthier kind of meat, cheaper, and better controlled for its quality than other kinds of meat.

Some characteristics of the production-systems are described in Table 1. The variable "Maximum total rabbits number per farm" was

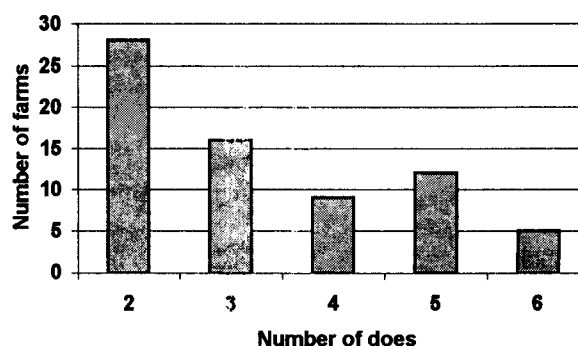
**Table 2: Pathological conditions**

Signs	Number of examined animals	Number of animals with signs	Percentage animals with signs
Nose discharge	230 reproductive does	3	1.3
	77 reproductive bucks	0	0
	310 fryer rabbits	0	0
Subcutaneous abscesses	230 reproductive does	2	0.9
	77 reproductive bucks	0	0
	310 fryer rabbits	0	0
Ear mange signs	230 reproductive does	43	18.7
	77 reproductive bucks	22	28.6
	310 fryer rabbits	47	15.2
Liver lesions	225 fryer rabbits	18	8

**Figure 2: Number of rabbits per farm**



**Figure 3: Number of does per farm**



**Table 3: Used medications in examined farms**

Medication	Application mode	Farms number	%
Nothing		39	55,8
<b>Oxytetracycline hydrochloride</b> (powder for oral solution)	Only in the event of "mucoïd enteropathie" appearance: continuously in the water until the treatment.	6	8,6
<b>Sulfachlorpyridazine sodium + Trimethoprim</b> (powder 5:1, for oral solution)	Only in the event of diarrhea appearance: for 5 days in the water.	5	7,1
<b>Oxytetracycline hydrochloride</b> (powder for oral solution)	Every 2 months for 5 days in the water.	3	4,3
<b>Phoxim</b> 500 mg/ml (solution for external use)	In the case of ear mange: local application, 2-3 drops once.	5	7,1
<b>Sulfur powder with olive oil</b> (hand made ointment)	In the case of ear mange: local application	15	21,4

calculated during the time of observation (July to October 2000). The "litter size at birth" refers to the total number of rabbits born (live or dead). The variables "Number of parturitions per year and doe", "Birth interval per doe", "Age of reproductive does", "Age of reproductive bucks", "Days in lactation" and "Age of fattened rabbits at Slaughter" were based on the information given by the owner. The other variables, «Litter size»-variables including, were based on direct observations contacted by a member of the research team. Figures 2 and 3 show the number of rabbits per rabbitry and breeding does respectively.

As it appears from the first three variables in Table 1, particularly the number of reproductive does ( $3.3 \pm 1.3$ ), the research was carried out on small family farms that serve the family rabbit meat needs. The mean litter size at birth was 8.0 newborns and it is similar to the mean litter-size reported by others (BERCHICHE *et al.* 2000, CAPRA *et al.* 2000, DAS *et al.* 2000), although some report a slightly smaller number (AGUIRRE *et al.* 2000), but still within the litter range referred as normal of this species (OKERMAN 1994). It must be noted, that the calculation of the "Litter size" variables was carry out on farms that did not have any programs for preventing infectious or other disorders.

The death rate from birth to weaning was about 10%. It is estimated from the difference between the mean litter size at birth and the mean litter size at weaning. The death rate among post weaning, fattened, rabbits is similar at about 9.7%. These findings are similar or better to those reported by others for

traditional rabbitries (AGUIRRE *et al.* 2000, BERCHICHE *et al.* 2000). The particular weather conditions on the Island of Crete are perhaps contributing favorably to these results.

In the research, the owner was asked his opinion about the most important pathological disorders or their result he had faced and if he had asked for professional help from a Veterinarian. To these questions six owners answered that the small litter-size at birth, only 4 young or less, was their problem. Eleven owners answered that ear mange was their most disturbing problem, and eight owners answered that "mucoïd enteropathy" was their biggest problem. To the question if professional help had being asked, 47 owners answered they did not seek veterinary help and 23 looked for such help only when they thought the problems were out of control. None of the owner families admitted asking systematically professional help for rabbits' health problems.

Table 2 is reporting those pathological conditions found during this investigation by direct observation from a team member. It is evident that there are not any serious pathological conditions with the exception of the cases with ear mange lesions and a small percentage of slaughtered rabbits with liver abnormalities. These abnormalities were moderate enlargement of the liver and abscesses thought to be characteristic of coccidiosis (OKERMAN 1994) needing further systematic investigation. The few cases of mild nose discharge did not disturb the owners, thus they were not reported it as a problem.

Diarrhea or "mucoïd enteropathy" was not observed during the investigation in any of the rabbitries including those where the owner had reported such occurrence. This could have been attributed to the season of the present investigation (July to October). During this time weather conditions are usually dry and warm. Diarrhea and "mucoïd enteropathy" were problems reported by owners as occurring during the colder times of the winter. The reported death rates at the time of highest losses were up to 20% among fatteners. Winter months on the island are relatively cold with high humidity, weather conditions predisposing perhaps to diarrhea and "mucoïd enteropathy" from an increased survival of coccidia oocysts and a decreased intestinal tract motility (HILLYER 1994, JENKINS 1997, FINZI 2000).

Table 3 presents the various drugs or other medications used in the 70 farms, the application programs and the number of farms using such treatments. Farms using water-soluble systematic antibiotic treatment from a variety of antimicrobials (oxytetracycline hydrochloride, sulfachlorpyridazine sodium plus trimethoprim) were using these

medications entirely empiric, thus without a prescription from a veterinarian. The farms reported by the owner as having problems of diarrhea or "mucoïd enteropathy" belonged to the group of farms using antibiotics without veterinary help.

The owners had reported ear mange as a serious problem, something which was confirmed by the investigator, especially among bucks. In five of these rabbitries sick rabbits were treated with Phoxim solution (500 mg/ml) for external use in its undiluted form. Specialists do not recommend the undiluted use of Sebacil, but it appears to give good results. Some farmers treated ear mange by a traditional method using sulfur powder mixed with olive oil. This treatment appeared to be effective especially when repeated no more than four days latter. The control of ear mange with the use of oil is known as a traditional effective treatment. Oil impairs parasite respiration when they are completely covered, thus causing their death (FINZI 2000). The sulfur powder is perhaps an effective disinfectant currying the concurrent otitis.

**Acknowledgements:** We would like to express our thanks to the friend, philologist, Mr. Theodoros Kostopoulos for his help in reading the ancient Greek text of Athineos for information in relation to rabbit meat use.

Received : Mars 2<sup>nd</sup>, 2001

Accepted : November 9<sup>th</sup>, 2001

## REFERENCES

- AGUIRRE J., FERNANDEZ J.I., DE BLAS C., FILLAT F., 2000. Traditional management of the rustic rabbit in mountain areas: The case of the Gistain Valley of the Central Pyrenees of Huesca. In *7<sup>th</sup> World Rabbit Congress (Valencia)*, Vol. B: 395-400.
- ATHINEOS, 2<sup>nd</sup> century A.D.: Dipnosophistes.
- BERCHICHE M., ZERROUKI N., LEBAS F., 2000. Reproduction performances of local Algerian does raised in rational conditions. In: *Proc. 7<sup>th</sup> World Rabbit Congress (Valencia)*, Vol. B: 43-49.
- CAPRA G., BLUMETTO O., ELIZALDE E., 2000. Meat rabbit production in Uruguay. In: *Proc. 7<sup>th</sup> World Rabbit Congress (Valencia)*, Vol. B: 51-58.
- DAS A., BUJARBARUAH K., DEKA T., VERMA N., 2000. Rabbit a potential micro livestock for Eastern Himalayan region of India. In: *Proc. 7<sup>th</sup> World Rabbit Congress (Valencia)*, Vol. B: 59-61.
- FINZI A. 2000. Raising rabbits for food security. In: *Proc. 7<sup>th</sup> World Rabbit Congress (Valencia)*, Vol. B: 13-38.
- GENKAHA F.F., 1997. The socio-economic impact of Heifer Project International (HPI) supported small holder rabbit projects in Mankon village. *Thesis, University of Dschang, Cameroon*.
- HILLYER E.V., 1994. Pet rabbits. *Vet. Clin. North Am. Small Anim. Pract.*, 24,1, 25-64.
- HOFFMANN I.M., KOBLING S., STIER C.H., GALL C.F., 1992. The potential of rabbit meat marketing in Bobo-Dioulasso, Burkina Faso. *Livest. Res. Rural Devel.* 4 (1), 1-8.
- JENKINS J.R., 1997. Gastrointestinal diseases. In: *Ferrets, Rabbits, and Rodents: Clinical Medicine and Surgery*. Hillyer-Quesenberry, W.b. Saunders Company, Chap. 17, 176-188.
- LUKEFAHR S.D., 1998. Rabbit production in Uganda: Potential versus opportunity. *World Rabbit Sci.*, 6, 331-340.
- LUKEFAHR S.D., 1999. Teaching international animal agriculture. *J. Anim. Sci.*, 77 (11), 3106-3113.
- LUKEFAHR S.D., NKWOCHA H.I., NJAKOI H., TAWAH E., AKOB J.M., KONGYU F.A., NIWE R.M., GUDAHL D., 2000. Present status of the Heifer Project International-Cameroon rabbit program: Back to the future. *World Rabbit Sci.*, 8, 75-83.
- OKERMAN L., 1994. *Diseases of Domestic Rabbits. Second Edition, Blackwell Science*.
- OWEN J.E., 1981. Rabbit meat for the developing countries. *Wld. Anim. Rev.*, 91, 43-48.