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## Animal exploitation in the Early Neolithic in Central-Southern Italy

### *Explotación de las faunas en el Neolítico antiguo en Italia centro-meridional*

**KEY WORDS:** Early Neolithic, subsistence strategies, hunting, herding, Italy.

**PALABRAS CLAVE:** Neolítico antiguo, estrategias de subsistencia, caza, ganadería, Italia.

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#### ABSTRACT

This paper presents the results of the analysis of the faunal remains from the early Neolithic villages of "La Marmotta" and Favella. Animal husbandry was based upon ovicaprines, pig, and cattle that were usually slaughtered at a young age and probably used for meat. Wild mammals were also exploited. Animal husbandry was however largely prevalent over hunting and fishing. The faunal data from "La Marmotta" and Favella have been compared with other early Neolithic Italian sites.

#### RESUMEN

Este trabajo presenta los resultados de los análisis de los restos de fauna de los poblados del Neolítico antiguo de "La Marmotta" y Favella. La ganadería estaba basada en los ovicaprinos, el cerdo y la vaca sacrificados preferentemente en edad juvenil, probablemente, para consumir su carne. Se constata también la explotación de mamíferos salvajes. La ganadería en cualquier caso predominaba ampliamente sobre la caza y la pesca. Los datos faunísticos procedentes de "La Marmotta" y Favella se han comparado con los de otros yacimientos del Neolítico antiguo italiano.

#### LABURPENA

Lan honetan "La Marmotta" eta Favella-n bizi izan zen Neolito goiztiarreko fauna ikusiko da, eta horren hondakinei egindako azterketaren emaitzak aurkeztuko dira. Fauna hori osatzen zuten ardi, txerri eta behiak sakrifikatu egin bide zituzten, seguraski nahiko gazte, okelatarako. Aztarnategian aurkitutako hondakinek basoko hainbat ugaztun ere ustiatzen zituztela erakusten dute. Abereak nolahi ere gehiago ziren elikaduran ehiza eta arrantza baino. "La Marmotta" eta Favella-ko aztarnategietatik ateratako datuak Italiako Neolito goiztiarreko beste aztarnategi batzuetako datuekin alderatu dira.

#### INTRODUCTION AND AIM OF THE RESEARCH

Starting with a detailed fauna analysis of two important villages in South-Central Italy dated in the Early Neolithic an attempt is made to reconstruct the articulate and complex phenomenon of the diffusion of stockbreeding economy in the peninsula. The analysis is made difficult by the geographic characteristics of the area under study, which contains very diverse areas and environments, and by the complex and unclear relationship between the farming and herding communities and those of the autochthonous hunter-gatherers. Furthermore, the archaeological data is often incomplete; in fact, the archaeological research in the various regions isn't uniform with areas that have been the subject of more and

more intensive investigations (FUGAZZOLA *et al.* 2002). Not all the sites referable to the earliest phases of the Neolithic have yielded sufficient fauna remains to allow for a reconstruction of the activities and in a few cases the data is only preliminary. A further constraint is formed by the fact that the archaeozoological studies have been performed by various scholars that have used different and not always comparable methods. For example, not always information concerning the MNI, the age at death, the distribution of the anatomical elements and the analysis of butchering traces is available. The possibility to make a comparative analysis is also reduced by the diverse nature and typology of the sites; in fact, the role of open-air sites and caves is undoubtedly

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different.

Notwithstanding all these limitations this research represents a synthesis of the archaeological studies of the Italian Early Neolithic and brings to light some useful elements for the reconstruction of the phenomenon of the neolithization in the Italian peninsula (Fig. 1, Appendix).

### FAVELLA DELLA CORTE

The site of Favella is located in the Plain of Sybaris in Calabria not far from the sea. Two phases of frequentation have been recognized: the first is referred to the Early Neolithic I of Southern Italy, characterized by 'archaic' impressed pottery with radiometric datings around 7000 BP (6910±60 and 6940±40 BP) while the second belongs to the recent phase of the Neolithic (TINÉ 1996; NATALI & TINÉ 2002).

The site was first discovered in 1954 and has been the subject of exploratory excavations in 1962 and 1964 by prof. S. TINÉ and of regular excavations from 1990 until the present day under the direction of V. TINÉ.

The structures of the Early Neolithic site are represented by pits, single or grouped, dug into the sandy terrace substratum. These pits were filled up in a short time-span by a fill, strongly anthropic in nature (US 4), on which a layer almost entirely composed of wattle and daub with traces of branches and posts was superimposed (US 3). The intentional nature of the fill is made evident by the repeatedness of this stratigraphic model and by the nature of its content.

Significant amounts of faunal remains have been found in US 4 in all of the pits dug on the site. Structure A (1990-1994 excavations) has been object of study on behalf of dr. CLAUDIO SORRENTINO of the University of Pisa (SORRENTINO 1996). Structures D and E have already been treated in a preliminary study (PINO URIA & TAGLIACCOZZO 2004). In this study the definitive data will be presented for the bone remains referring to the Early Neolithic referable to the US's 4 of the structures D, E and G.

#### *Analysis of the bone remains*

The analyzed bone remains (Tables 1-4) are 5573, of which 1504 (or 27,0%) have been identified, are mainly made up of mammals (87,8%), followed by fishes (9,4%) and more rarely by turtles (2,3%) and birds (0,5%). The information for the mammals documents an

economy that is mostly based on herding with 97,1% of the remains referable to domestic animals. Hunting played a marginal role and was directed mostly towards wild boar and aurochs, red deer and roe deer. Of the carnivores only the fox is represented.

In the ratios of the number of remains, of the domestic animals the ovicaprines (68,5%) result prevailing over the bovines (21,0%) and pigs (10,4%) (Table 3). In the estimation of the minimum number of individuals the ovicaprines continue to prevail with values of 55,4%, while the bovines and pigs are more equivalent with values of 21/23%.

The distinction between sheep (NR 37, MNI 6) and goat (NR 9, MNI 3) shows that the former are prevailing (MNI 2:1 and NR 4:1). The bovines are mostly of large stature. The remains of dog are few and are referable to specimen of small/medium size.

The estimation of the age at death of the domestic animals, with the prevalence of the killing of juvenile animals, indicates exploitation aimed at meat consumption (Table 4). Of the ovicaprines, in fact, 50% of the individuals (MNI 18) belong to the juvenile class of less than two years, with the presence of lambs and kids. This seems identical to the model of bovine exploitation characterized by a preferred slaughtering of animals in juvenile age (MNI 8) over adult ones (MNI 6). Juvenile pigs are more abundant in comparison to adult ones.

Structure D has yielded the largest number of finds (2.719), while from structures E and G a similar quantity of finds was recuperated, around 1.400. Apart from some differences (in structure G the fox is absent and in E no bird bones were found) the same animals were found in the three structures. The determined remains vary between the various structures: in D these constitute only 15,7% while in E and G these reach 33,7% and 42,2% respectively. This difference is caused by the more intense fragmentation found in structure D, where very small fragments of 1-2 cm prevail.

Differences between the three structures are also shown clearly in the relation between the economically more important domestic animals (pig, cattle and ovicaprines). In the count of the number of remains the ovicaprines exceed the 50% in all the structures, particularly in structures G and D where they account for 81,9% and 66,9% respectively. The estimation of the MNI confirms this data, but with lower values ranging from 51,7 to 69,7%. Cattle is always the second species in the NR-count with values that in structure



Figure 1. Localization of the early Neolithic Italian sites:

- 1 Arene Candide
- 2 San Marco
- 3 Maddalena di Muccia
- 4 Grotta Sant'Angelo
- 5 Villaggio Leopardi
- 6 La Marmotta
- 7 Santo Stefano
- 8 Grotta Continenza
- 9 Grotta dei Piccioni
- 10 Ripa Tetta
- 11 Rendina Lake site 3
- 12 Rendina
- 13 Scamuso
- 14 Torre Sabea
- 15 Favella della Corte
- 16 Grotta dell'Uzzo.

## APPENDIX

1	Arene Candide, Finale Ligure (Savona, Liguria).	Early Neolithic with Impressed Ware, levels 28-25.	ROWLEY-CONWY 1997
1a	Arene Candide, Finale Ligure (Savona, Liguria).	Early Neolithic with Impressed Ware, levels 15-14.	SORRENTINO 1999
2	S. Marco, Gubbio (Perugia, Umbria).	Early Neolithic with "Adriatic Impressed Ware" and "Sasso facies Ware".	CLARK 1992
3	Maddalena di Muccia, (Macerata, Marche).	Early Neolithic with "Adriatic Impressed Ware".	WILKENS 1987
4	Grotta S. Angelo, Civitella del Tronto (Teramo, Abruzzi).	Early Neolithic with "Adriatic Impressed Ware", cuts 16-13.	WILKENS 1987
5	Villaggio Leopardi, Penne (Pescara, Abruzzi).	Early Neolithic with "Adriatic Impressed Ware".	WILKENS 1987
6	La Marmotta, Anguillara Sabazia (Roma, Latium).	Early Neolithic with "Impressed Ware" and "Sasso facies Ware".	CASSOLI & TAGLIACCOZZO 1993, 1995a
7	Santo Stefano, Ortucchio (L'Aquila, Abruzzi).	Early Neolithic with "Adriatic Impressed Ware".	RADI & WILKENS 1989
8	Grotta Continenza, Trasacco (L'Aquila, Abruzzi).	Early Neolithic with "Adriatic Impressed Ware", cuts 24-1	WILKENS 1987, 1989-90
9	Grotta dei Piccioni, Bolognano (Pescara, Abruzzi).	Early Neolithic with "Adriatic Impressed Ware".	WILKENS 1987
10	Ripa Tetta, Lucera (Foggia, Apulia).	Neolithic with "Impressed Ware".	WILKENS 1988
11	Rendina Lake site 3, Melfi (Potenza, Basilicata).	Early Neolithic, Phase I with only "Impressed Ware", lower strata of the Southern moat.	WILKENS 1996
12	Rendina, Melfi (Potenza, Basilicata).	Early Neolithic with "Impressed Ware".	BÖKÖNYI 1977-1982
13	Scamuso, Torre a Mare (Bari, Apulia).	Neolithic, levels with "Impressed Ware" and "Painted Ware", Area III/IV, Trench A III.	CASSOLI & TAGLIACCOZZO 1986, 1997
14	Torre Sabea, Gallipoli (Lecce, Apulia).	Early Neolithic with "archaic Impressed Ware".	WILKENS 1987
15	Favella della Corte, Piana di Sibari (Cosenza, Calabria).	Early Neolithic with "archaic Impressed Ware", Strata 4-5.	SORRENTINO 1996; PINO URIA & TAGLIACCOZZO 2004
16	Grotta dell'Uzzo, San Vito lo Capo (Trapani, Sicily).	Early Neolithic, Trench F, cuts 10-6	CASSOLI & TAGLIACCOZZO 1995b; TAGLIACCOZZO 1993, 1996

E reach 29,0%, while in the MNI-estimation it has the same number of individuals as the pig for structures E and G, and in structure D is under-represented in respect to the pigs. The presence of pig remains in structures D and E is constant with values between 13-17% while in G it only constitutes 3,4%. On the other hand, the MNI remains constant in all of the structures.

The birds and tortoises are present in all of the structures with low values while the fish are particularly abundant in structure D with 34,3%.

It's possible, therefore, that at least one of the contexts would have had a different function.

The high fragmentation of the bones and alterations of the bone surfaces, caused mainly by post-depositional agents, has limited the possibility of finding butchering traces. Striae relating to the various phases of butchering have been found on some finds of pig, ovicaprine and cow. Gnawing marks by carnivores are scarce and a few finds show traces of burning.

The frequency of the skeletal elements of the principal taxa doesn't permit to shed light on eventual selection of anatomical parts.

Apart from the animal bone remains linked to the food supply several instruments made from the diaphyses of mostly medium-sized animals have been found, pointed objects and biseau. These same typologies have been identified amongst the worked bone objects from structure A (Giomi 1996).

The composition of the mammals in structure A (Sorrentino 1996) is similar to that of the other structures, apart from the presence of the wild cat, not found in structures D-G. In structure A also the complete absence of fish remains is noted. Regarding the relationship between the economically most important species structure A relates well to structure G with many ovicaprine remains (70,6%) and few pig remains (7,7%).

## LA MARMOTTA

The Early Neolithic village of "La Marmotta" (Anguillara Sabazia, Rome), is located at about 8m below the average water level of the Bracciano Lake and about 350 m from the shore (FUGAZZOLA DELPINO 1995, 1998). The C<sup>14</sup> calibrated dates obtained allow the identification three different occupation phases ranging from 6855±65 B.P. and 6189±43 B.P. (FUGAZZOLA DELPINO 2002). Various rectangular wooden structures have been identified and the dendrochronological sequences were used for a more precise identification of the different phases of edification, enlargement or

repairing of the structures of the village.

The village has yielded a large quantity of pottery, wooden objects and tools, objects made of vegetal fibres, lithic tools made of flint and obsidian, and bone artifacts. The excavation allowed the recovery of four pirogues made out of a single trunk.

In the village a rich agricultural economy, based on cereal cultivation, was developed. Among the cereals emmer wheat was the most important, followed by barley and einkorn.

The absolute dates obtained so far confirm the hypothesis of a confluence in the *facies* of La Marmotta of elements characteristic of Tyrrhenian Cardial Ware and of Painted Ware complexes. On the basis of these dates and of the characteristics of the material culture, the village can be considered the oldest lake-shore settlement in Western Europe during the Neolithic.

## Analysis of the bone remains

This paper presents the preliminary results of the analysis of the faunal remains collected during the 1989-1996 excavations.

The faunal sample analyzed includes about 3300 bone remains, 37,8% of them being identifiable to the level of species or genus. Among the vertebrates, mammal remains are prevalent over birds, reptiles, and fish (Tables 1-4). A fragment of long bone diaphysis probably of an elephant, maybe collected when it was already a fossil, and a shark tooth were also found. Considering only the mammals, domestic animals represent the majority of the remains (Table 2). In the calculation of the Minimum Number of Individuals, where usually rare species are overestimated, the incidence of wild animals seems greater (CASSOLI & TAGLIACCOZZO 1993, 1995a).

The most abundant remains belong to ovicaprines followed by pig, cattle and dog. A varied range of wild mammals is present (wild boar, red and roe deer, aurochs, various carnivores, hare, and hedgehog), but they are represented only by scarce remains (Table 1).

The relationships among the main economically important species show the prevalence of ovicaprines (Table 3). The minimum number of individuals also confirms the dominance of ovicaprines over pig and cattle.

For the swine, morphometric data indicate a prevalence of skeletal elements referable to the domestic form, while specimens falling within the variability range of wild boar are more rare. Regarding the age at death of the pig, there is a

strong prevalence of the juvenile age classes. Remains of sucking pigs and piglets less than 7 months old are present and almost half of the individuals are juvenile and sub-adults under two years of age. Just a few individuals were killed over three years and there is only one occurrence of a senile individual. Two elements of a foetus are present. Male canines are prevalent and only one lower canine can be attributed to a female.

Only one fragment of juvenile distal ulna of a large-sized individual was dubiously identified as an aurochs; this specimen was worked into an awl. All other bovine remains were considered, for their small-medium size, as belonging to the domestic form. Remains of calves and other young individuals are present, but 3-4 years old sub-adults and adults over 5-8 years are prevailing.

Among the ovicaprines only a limited number of specimens allowed for a distinction between the genera *Ovis* and *Capra* (Table 1). On the whole, sheep remains are prevailing over those of goat (with a variable ratio of 3-5 sheep for each goat). Dimensional evaluations indicate a reduced size for both genera. The age at death of ovicaprines shows a clear majority of young individuals; among these, there are numerous lambs and kids less than 6 months old. For the adults, 3-4 years old individuals are prevalent and only a few reached 6-8 years of age (Table 4). Senile individuals are completely absent. This age-composition seems to reflect the exploitation of ovicaprines for their meat, while the culling of lambs suggests that they were probably also exploited for their milk (Table 4).

Pigs, cattle, and ovicaprines are represented by all anatomical elements, suggesting that butchering was carried out at the site. Butchering traces, mostly striae made by lithic instruments, have been found on the remains of the principal domestic animals and are related to filleting and disarticulation (CASSOLI & TAGLIACCOZZO 1995a).

Among the domestic animals, the dog is quite common, it is present with individual of small dimensions, a short muzzle and medium-large size.

Among the wild animals with economic importance, the most frequently hunted species was roe deer, followed by wild boar and red deer. The remains of these animals are often worked (awls made of roe deer bones and handles made of red deer antler). One wild boar lower canine was sectioned lengthwise and presents a hole on one of the extremities.

Besides hare and hedgehog, many small carnivores, such as fox, the most common, polecat, otter, badger, and wild cat, are also

present. However, they are represented only by few specimens.

Among the hunted birds, all of aquatic environment, there are the little grebe and the great crested grebe, the coot, the cormorant, and various Anatides: mallard, ferruginous duck, shoveler and pochard. A harrier and a hooded crow are also present, but it is not sure if they were the result of human hunting.

Remains of some fishes (two dentaries of pike, pharyngeal bones of tench, and vertebrae of other *Cyprinidae*) document occasional fishing activity. The collecting of European pond tortoises is suggested by the remains of their carapace and plastron.

Stratigraphically the occupation of the village of La Marmotta can be divided into three levels: level II, the oldest, level I, and the "Chiocciolaio". The latter represents the abandonment of the village.

It's possible to point out some variations in faunal composition among the different levels. However, such variations are strongly influenced by the different number of bones analyzed in the different phases, as for example the presence of some species of small mammals, birds and fish only in level I. Other variations appear to be more significant, such as the constant decrease of wild mammals between the oldest and the most recent phases.

The ratios among domestic mammals provide contrasting results according to the adopted method of calculation. If the count of specimens is used, in the most recent phase there is an increase in ovicaprines, but with other methods this result is not confirmed. As regards the age at death it's not possible to make significant comparisons for pigs and cattle, while the data for the ovicaprines show uniformity in the three occupation phases, with a clear prevalence of juvenile individuals.

In conclusion there are no clear changes in the subsistence economy during the different periods of occupation of the village. From the beginning there was an advanced herding economy based on the exploitation of four main species: cattle, sheep, goat, and pig. There was also a constant hunting activity with the exploitation of both mammals and aquatic birds. Fishing and gathering tortoises and fresh-water mollusks were occasional, on the other hand. Besides the meat, mammal hunting was aimed at the acquisition of hides, raw materials for the production of tools and ornaments, and trophies.



Domestic mammals	FAVELLA				LA MARMOTTA			
	Total		Total		Total		Total	
	NISP	%	MNI	%	NISP	%	MNI	%
Dog ( <i>Canis familiaris</i> )	7	0,5	3	3,6	66	5,7	8	3,2
Pig ( <i>Sus scrofa dom.</i> )	133	10,1	15	18,1	238	20,5	49	19,7
Cattle ( <i>Bos taurus</i> )	268	20,3	14	16,9	118	10,1	31	12,5
Sheep ( <i>Ovis aries</i> )	37	2,8	6	7,2	53	4,6	7	2,8
Goat ( <i>Capra hircus</i> )	9	0,7	3	3,6	10	0,9	3	1,2
Ovicaprine ( <i>Ovis vel Capra</i> )	828	62,7	27	32,5	578	49,7	84	33,7
<b>Total</b>	<b>1.282</b>	<b>97,1</b>	<b>68</b>	<b>81,9</b>	<b>1.063</b>	<b>91,4</b>	<b>182</b>	<b>83,1</b>
<b>Wild mammals</b>								
Wild boar ( <i>Sus scrofa</i> )	14	1,1	3	3,6	18	1,5	7	2,8
Red deer ( <i>Cervus elaphus</i> )	3	0,2	3	3,6	6	0,5	2	0,8
Roe deer ( <i>Capreolus capreolus</i> )	6	0,5	3	3,6	19	1,6	6	2,4
Deer (Cervidae unid.)					4	0,3		
Aurochs ( <i>Bos primigenius</i> )	9	0,7	3	3,6	1	0,1	1	0,4
Fox ( <i>Vulpes vulpes</i> )	6	0,5	3	3,6	13	1,1	3	1,2
Canid (Canidae ind.)					6	0,5	2	0,8
Polecat ( <i>Mustela putorius</i> )					1	0,1	1	0,4
Otter ( <i>Lutra lutra</i> )					1	0,1	1	0,4
Badger ( <i>Meles meles</i> )					5	0,4	3	1,2
Wild cat ( <i>Felis silvestris</i> )					9	0,8	2	0,8
Hare ( <i>Lepus europaeus</i> )					6	0,5	5	2,0
Hedghog ( <i>Erinaceus europaeus</i> )					11	0,9	4	1,6
<b>Total</b>	<b>38</b>	<b>2,9</b>	<b>15</b>	<b>18,1</b>	<b>100</b>	<b>8,6</b>	<b>37</b>	<b>16,9</b>
<b>TOTAL MAMMALS</b>	<b>1.320</b>	<b>87,8</b>	<b>83</b>	<b>100,0</b>	<b>1.163</b>	<b>93,3</b>	<b>219</b>	<b>88,0</b>
<b>Birds</b>	7	0,5			51	4,1	19	7,6
<b>Reptiles</b>	35	2,3			9	0,7	2	0,8
<b>Fish</b>	142	9,4			23	1,8	9	3,6
<b>TOTAL OTHERS</b>	<b>184</b>	<b>12,2</b>			<b>83</b>	<b>6,7</b>	<b>30</b>	<b>12,0</b>
<b>TOTAL NISP</b>	<b>1.504</b>	<b>(100)</b>			<b>1.246</b>	<b>(100)</b>	<b>249</b>	<b>(100)</b>
<b>TOTAL NISP</b>	<b>1.504</b>	27,0			<b>1.246</b>	37,8		
<b>UNIDENTIFIABLE</b>	<b>4.069</b>	73,0			<b>2.053</b>	62,2		
<b>TOTAL</b>	<b>5.573</b>	<b>100,0</b>			<b>3.299</b>	<b>100</b>		

Table 1. "La Marmotta" and Favella villages: NISP and MNI of the animal remains.

FAUNAL REMAINS	FAVELLA				LA MARMOTTA			
	NISP	%	MNI	%	NISP	%	MNI	%
Domestic mammals	1.282	85,2	68	81,9	1.063	85,3	182	73,1
Wild mammals	38	2,5	15	18,1	100	8,0	37	14,9
<b>Total mammals</b>	<b>1.320</b>	<b>(87,8)</b>	<b>83</b>	<b>100,0</b>	<b>1.163</b>	<b>93,3</b>	<b>219</b>	<b>(88,0)</b>
Birds	7	0,5			51	4,1	19	7,6
Reptiles	35	2,3			9	0,7	2	0,8
Fish	142	9,4			23	1,8	9	3,6
<b>Total others</b>	<b>184</b>	<b>(12,2)</b>			<b>83</b>	<b>6,7</b>	<b>30</b>	<b>(12,0)</b>
<b>Total</b>	<b>1.504</b>		<b>83</b>		<b>1.246</b>		<b>249</b>	

Table 2. "La Marmotta" and Favella villages: NISP and MNI of the animal remains divided by classes.

Domestic mammals	FAVELLA				LA MARMOTTA			
	NISP	%	MNI	%	NISP	%	MNI	%
Pig ( <i>Sus scrofa dom.</i> )	133	10,4	15	23,1	238	23,9	49	28,2
Cattle ( <i>Bos taurus</i> )	268	21,0	14	21,5	118	11,8	31	17,8
Ovicaprine ( <i>Ovis vel Capra</i> )	874	68,5	36	55,4	641	64,3	94	54,0
<b>TOTAL</b>	<b>1.275</b>	<b>100,0</b>	<b>65</b>	<b>100,0</b>	<b>997</b>	<b>100,0</b>	<b>174</b>	<b>100,0</b>

Table 3. "La Marmotta" and Favella villages: NISP and MNI of economically important species.

FAVELLA								
Domestic mammals	Foetus	Very Young	Young	Subadult	Adult	Senile	Undet.	Total
Pig ( <i>Sus scrofa dom.</i> )		2	3	4	6			15
Cattle ( <i>Bos taurus</i> )		3	3	2	6			14
Ovicaprine ( <i>Ovis vel Capra</i> )		4	5	9	18			36
<b>TOTAL MNI</b>		<b>9</b>	<b>11</b>	<b>15</b>	<b>30</b>			<b>65</b>
LA MARMOTTA								
Domestic mammals	Foetus	Very Young	Young	Subadult	Adult	Senile	Undet.	Total
Pig ( <i>Sus scrofa dom.</i> )	1	6	11	13	8	1	9	49
Cattle ( <i>Bos taurus</i> )		3	5	6	8		9	31
Ovicaprine ( <i>Ovis vel Capra</i> )		14	18	17	22		23	94
<b>TOTAL MNI</b>	1	23	34	36	38	1	41	174

Table 4. "La Marmotta" and Favella villages: Age classes of the main domestic animals.

### COMPARISONS WITH OTHER NEOLITHIC SITES AND CONCLUSIONS

The data from Favella and La Marmotta have been compared with those of other important early Neolithic sites in Italy (Tables 5-6; Figure 1, Appendix with references). The examined sites have faunal samples that differ quantitatively from our sites and were studied with different methodologies. Therefore only general considerations based on the number of specimens were possible (Tables 5-6).

The first datum analyzed regards the incidence of birds, tortoises, and fish in human diet (Tables 5-6; Figures 2-3). In Italy during the Early Neolithic, excluding Grotta Continenza and Grotta dei Piccioni in Abruzzo (WILKENS 1987, 1989-90; Figure 2), bird remains have only a very marginal role. However, also in these two Fucino-caves it's not sure that all bird remains are the result of hunting; it is instead possible that the accumulation was produced by pellets of raptors or by other natural causes. Also fishing (Figure 3) seems to have played a secondary role with the exception of two sites: Grotta Continenza in Abruzzo (WILKENS 1987) and Grotta dell'Uzzo in Sicily (CASSOLI & TAGLIACOZZO 1995b, 1989-90; TAGLIACOZZO 1993, 1996). Although situated in different environments, one near a lake-shore and the other near the sea, fishing and mollusk gathering, of Mesolithic tradition, continue to play an important role in human diet in these two sites. Another marine coastal site where fishing is important is Scamuso and also at Favella fishing is modestly attested (CASSOLI & TAGLIACOZZO 1986, 1997; PINO URIA & TAGLIACOZZO 2002).

The domestic/wild mammals ratio shows different subsistence strategies (Table 6), with hunting still playing an important role only in some cave sites. At Grotta dell'Uzzo, red deer hunting,

which was the main activity in the Mesolithic, persists during the whole Early Neolithic and is very gradually replaced by ovicaprine herding. At Arene Candide in Liguria (ROWLEY-CONWY 1997), together with a developed ovicaprine herding activity, the presumed high incidence of hunting is determined by swine that are all considered to be wild boar. These data result contradicting with the archaeozoological study of the layers excavated in the period 1972-1977, where the pigs all appear to be domestic (SORRENTINO 1999) and the amount of wild animals is similar to that of other caves, such as Grotta S. Angelo or Grotta Continenza, with values ranging from 28-36%. At Arene Candide, as at Grotta Continenza, the wild animals are represented mainly by red deer and hare. At Grotta S. Angelo, in Abruzzo, the high number of wild animals is anomalous and raises some doubts, because it consists mainly of remains of wild cat.

In general the faunal spectrum reflects the area where the site is located, with red deer and wild boar almost always present with the addition, sometimes, of roe deer or chamois or ibex or different carnivores. With the exception of the site of Maddalena di Muccia in the Marche, in all open-air villages the frequency of wild mammals is never above 10% of the total.

Another datum examined is the ratio among the three groups of domestic animals: ovicaprines, cattle, and pig (Figure 4). In the vast majority of cases, ovicaprines are the most frequent animals, with percentages over 50% that only in the case of the Arene Candide (1940-50 excavations) reach 90%. This datum is misrepresented by the complete absence of domestic swine; in fact, the pigs are all considered to have been wild. Regarding the study carried out on the remains of the layers excavated in 1972-1977, the herding is

Neolithic Site	Mammals		Birds		Reptiles		Fish		Total NISP
	NISP	%	NISP	%	NISP	%	NISP	%	
Arene Candide (Excav. 1940-1950)	1.424	100							<b>1.424</b>
Arene Candide (Excav. 1972-1977)	3.333	85.8	425	10.9	2	0,1	124	3.2	<b>3.884</b>
S. Marco	504	99.4	3	0.6					<b>507</b>
Maddalena di Muccia	157	100							<b>157</b>
Grotta S. Angelo	-	94.5							<b>-</b>
Villaggio Leopardi	154	96.9	5	3.1					<b>159</b>
La Marmotta	1.163	93.4	51	4.1	9	0.7	23	1.8	<b>1.246</b>
S. Stefano di Ortucchio	227	83.8	38	14.0			6	2.2	<b>271</b>
Grotta Continenza	509	30.4	329	19.6			839	50.0	<b>1.677</b>
Grotta dei Piccioni	186	48.3	69	51.7					<b>255</b>
Ripa Tetta	136	100							<b>136</b>
Rendina Lake 3 phase I	101	84.2			19	15.8			<b>120</b>
Rendina	4.548	99.9	4	0.1	2	0.04			<b>4.554</b>
Scamuso	243	74,8	4	1,2			78	24,0	<b>325</b>
Torre Sabea	826	92.2			58	6.5	12	1.3	<b>896</b>
Favella della Corte	1.320	85.2	7	0.5	35	2.3	142	9.4	<b>1.504</b>
Grotta dell'Uzzo Tr. F	1.353	46.0	44	1.4	1	0.3	1.539	52.3	<b>2.937</b>

Table 5. Early Neolithic Italian sites: NISP of the different classes.

mainly aimed at the ovicaprines with over 66,3% and at the pigs (31,3%), while the scarce presence of bovines is confirmed (2,4%). Rare sites show more balanced ratios with pig and cattle alternatively reaching a number of specimens similar to the ovicaprines. An exception is formed by the Adriatic site of Maddalena di Muccia and by Grotta dell'Uzzo, where pigs are most common. In this latter site, where hypotheses of local domestication of wild boar have been suggested, the introduction of ovicaprines is very gradual, and they become prevalent only in the most recent occupational phase (TAGLIACCOZZO 1993).

In conclusion, the subsistence economy of the settlement of Favella and La Marmotta falls perfectly within the economy of the Early Neolithic in Italy. This is, in most of the cases, characterized by a well-developed herding activity and reflects the arrival of populations already with a technical knowledge. These people introduced animals domesticated a long time before as suggested by the reduced size of all domestic species and the prevalence of hornless female sheep. In some rare cave sites, in particular environments, an economy with hunting, fishing, and gathering still persists in the initial phases of the Neolithic. These cases could be used to support the hypothesis of a gradual "Neolithization" of autochthonous population induced, for sure, by contacts and exchanges with communities of farmers and herders.

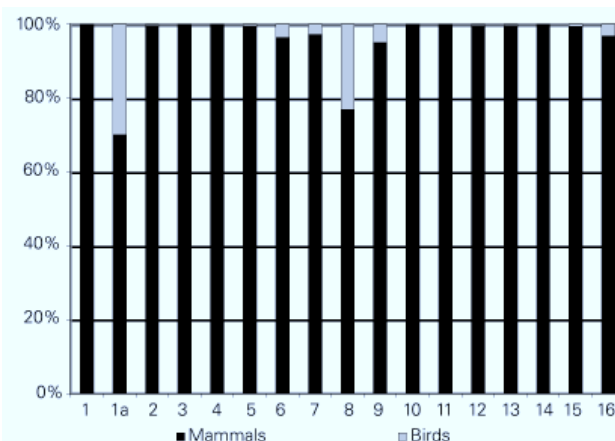


Figure 2. Early Neolithic Italian sites: mammal vs. bird NISP ratio.

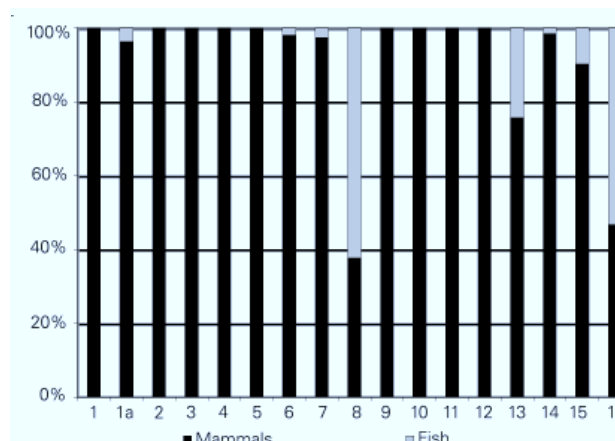


Figure 3. Early Neolithic Italian sites: mammal vs. fish NISP ratio.



Species	Arene Candide 1	Arene Candide 1a	S. Marco	Maddalena di Muccia	Grotta S. Angelo	Villaggio Leopardi	La Marmotta	S. Stefano di Ortucchio	Grotta Continenza	Grotta dei Piccioni	Ripa Tetta	Rendina Lake 3 phase I	Rendina	Scamuso	Torre Sabea	Favella	Grotta dell'Uzzo Tr. F
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
<b>Domestic mammals</b>																	
Dog ( <i>Canis familiaris</i> )	0,1	0,1	6,5	1,3	1,1	0,6	5,7	0,9	15,3		2,2	1,0	0,8			0,5	0,4
Pig ( <i>Sus scrofa dom.</i> )		22,9	18,8	49,0	19,4	42,9	20,5	15,9	18,5	19,9	9,6	17,8	17,8	16,0	5,9	10,1	26,1
Cattle ( <i>Bos taurus</i> )	2,7	1,8	30,8	6,4	7,5	11,7	10,1	8,8	2,8	11,3	26,5	20,8	17,4	14,4	26,0	20,3	3,5
Sheep ( <i>Ovis aries</i> )		4,1		1,3	9,7	6,5	4,6	14,5	9,4	16,7	8,1	13,9			0,1	2,8	
Goat ( <i>Capra hircus</i> )		0,5			7,5	5,2	0,9	3,1	1,2	4,3	1,5	3,0				0,7	
Ovicaprines ( <i>Ovis vel Capra</i> )	55,4	43,9	38,3	14,0	21,5	32,5	49,7	43,2	16,5	31,7	50,7	31,7	60,9	68,3	58,7	62,7	12,0
<b>Total %</b>	<b>58,1</b>	<b>73,2</b>	<b>94,4</b>	<b>72,0</b>	<b>66,6</b>	<b>99,4</b>	<b>91,4</b>	<b>86,3</b>	<b>63,7</b>	<b>83,9</b>	<b>98,5</b>	<b>88,1</b>	<b>96,9</b>	<b>98,8</b>	<b>90,8</b>	<b>97,1</b>	<b>41,9</b>
<b>Wild mammals</b>																	
Wild boar ( <i>Sus scrofa</i> )	19,3				6,5		1,5	3,5	3,3				0,5			1,1	
Wild ass ( <i>Equus hydruntinus</i> )													0,04				
Fallow deer ( <i>Dama dama</i> )													0,04				
Red deer ( <i>Cervus elaphus</i> )	12,9	8,5	0,4	10,2			0,5	2,6	12,0	4,8		5,9	0,1		5,6	0,2	39,9
Roe deer ( <i>Capreolus capreolus</i> )	0,5	0,9	4,0	2,5			1,6	0,9	3,7	4,3			0,1		1,0	0,5	
Deer ( <i>Cervidae ind.</i> )			1,0				0,3										
Aurochs ( <i>Bos primigenius</i> )		0,6			1,1		0,1					5,0	2,2			0,7	
Ibex ( <i>Capra ibex</i> )																	
Chamois ( <i>Rupicapra rupicapra</i> )								1,8	0,6	1,1							
Seal ( <i>Monachus monachus</i> )																	0,1
Wolf ( <i>Canis lupus</i> )	0,1	0,1							2,4	0,5			0,02				
Fox ( <i>Vulpes vulpes</i> )	0,6	0,2					1,1		2,6		1,5			0,4	1,9	0,5	10,7
Canid							0,5										
Brown bear ( <i>Ursus arctos</i> )	0,6	0,0		0,6					0,2				0,02				
Marten ( <i>Martes sp.</i> )	0,3				4,3				1,2	1,1							
Otter ( <i>Lutra lutra</i> )	0,3	0,1					0,1								0,1		0,1
Pine marten ( <i>Martes martes</i> )		0,8															
Stone marten ( <i>Martes foina</i> )		0,0															
Least weasel ( <i>Mustela nivalis</i> )		0,0															
Polecat ( <i>Mustela putorius</i> )		0,2		3,2			0,1										
Badger ( <i>Meles meles</i> )	2,1	2,8		0,6			0,4	0,9	2,2	1,6					0,6		
Lynx ( <i>Lynx sp.</i> )	0,2	0,0															
Wild cat ( <i>Felis silvestris</i> )	0,6	0,7		9,6	11,8	0,6	0,8		2,2	0,5							6,6
Hare ( <i>Lepus europaeus</i> )	4,4	11,6	0,2	1,3	4,3		0,5	3,1	5,7	2,2			0,1	0,4			
Hedgehog ( <i>Erinaceus europaeus</i> )		0,2					0,9	0,9	0,4			1,0		0,4			0,7
<b>Total %</b>	<b>41,9</b>	<b>26,8</b>	<b>5,6</b>	<b>28,0</b>	<b>28,0</b>	<b>0,6</b>	<b>8,6</b>	<b>13,7</b>	<b>36,3</b>	<b>16,1</b>	<b>1,5</b>	<b>11,9</b>	<b>3,1</b>	<b>1,2</b>	<b>9,2</b>	<b>2,9</b>	<b>58,1</b>
<b>TOTAL NISP</b>	<b>1.424</b>	<b>3.333</b>	<b>504</b>	<b>157</b>	<b>95-</b>	<b>154</b>	<b>1.163</b>	<b>227</b>	<b>509</b>	<b>186</b>	<b>136</b>	<b>101</b>	<b>4.548</b>	<b>243</b>	<b>826</b>	<b>1.320</b>	<b>1.353</b>

Table 6. Early Neolithic Italian sites: NISP % of the mammals.

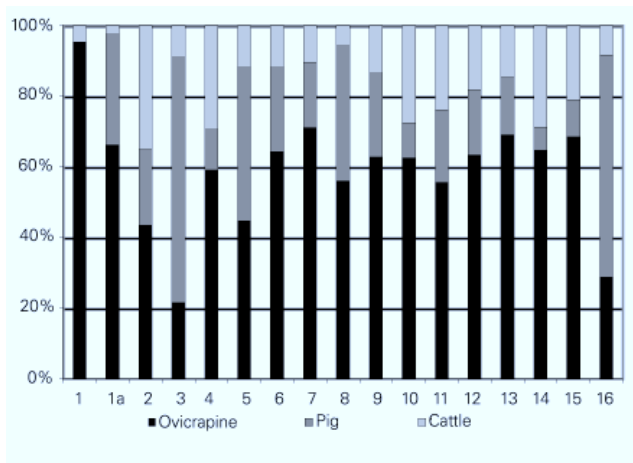


Figure 4. Early Neolithic Italian sites: NISP relationships among economically important animals.

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