

## BRONZE AGE TERRAMARE POTTERY FROM NORTHERN ITALY – EXERCISES IN EXPERIMENTAL REPRODUCTION

<sup>1</sup>Y. Brodà – <sup>2,3</sup>V. Cannavò – <sup>2,3</sup>E. Govi – <sup>2</sup>S. T. Levi – <sup>2</sup>S. Marchetti Dori – <sup>2,3</sup>G. Pellacani

<sup>1</sup>Independent potter

<sup>2</sup>Università degli studi di Modena e Reggio Emilia, Dipartimento di Scienze della Terra

<sup>3</sup>Museo Civico Archeologico di Modena, Parco Archeologico e Museo all'aperto della Terramare di Montale

**Abstract:** Typical Bronze Age pottery of the Terramare villages of the Po Valley was experimentally reproduced in the Montale Archaeological Park (Modena) to investigate the degree of craft specialization required in their production. Raw material properties (grog tempered local clays) and forming techniques (coiling, moulding) were tested in a previous archaeometric study. In the present experiment 20 vessels of various forms (cups, bowls, pithoi, jars) were reproduced by three professional potters using coiling and mould techniques and the pottery was fired in a traditional kiln. The time taken in manufacturing the various forms and the technical/artistic difficulties encountered were recorded in detail. The results assist in defining various stages in the manufacturing process and contribute to understanding social and organizational involvement in prehistoric pottery production. The experiment identified six groups of pots each of which required different levels of craft specialisation to produce.

**Keywords:** Bronze Age, Pottery Craft Specialization, Experimental Archaeology, Northern Italy, Terramare

### INTRODUCTION

During the Middle and Recent Bronze Age (1700-1150 BC) the Po valley was occupied by fortified villages (Terramare) each characterised by the rigorous distribution of space involving defensive structures (wooden palisades, earthen banks) enclosing habitation areas. Enclosed within are quadrangular planned house/domestic/industrial structures (palafitte) arranged in regular parallel rows and occupying areas of dry/humid soils. The Terramare culture, occupying a transitional area between the great innovative cultural zones of the Mediterranean and Central Europe (Bernabò Brea et al. 1997), represents a significant landmark in Italian proto history.

Terramare pottery production appears to be a loosely structured craft undertaken on a part household, part workshop basis, and producing pottery for local consumption (Rice 1981, 1991; van der Leeuw 1984; Levi 2004; Levi et al. 2006). The only evidence of specialised production and long distance ceramic exchange is associated with 20 Aegean sherds which analysis has shown to have been partly produced locally and partly imported from southern Italy and the Aegean (Jenkins et al. 1999; Jones et al. 2002). The long term project into Terramare ceramics has analysed Po valley clays and pottery from six sites near Modena in order to identify local raw materials and establish manufacturing techniques (Levi 1997; Levi & Loschi Ghittoni 1997; Cardarelli et al. 2007). The combined analytical results (petrographic, chemical XRF) indicate that Niviano unit sediments were probably used to produce the pottery with grog introduced as the main type of temper. Grog is the commonest type of temper used in Bronze Age pottery in

the Po valley (Jenkins et al. 1999; Jones et al. 2002; Saracino et al. 2006a, 2006b) and is more generally used in areas of sedimentary deposition in Italy (Levi 2004). Digital image processing (DIP) of the thin sections has been used to establish the dimensions and the quantity of temper used in the pottery (Carpenito et al. in press). Radiographic analysis of some vessels identified internal structures that informed on the techniques used to manufacture the pottery (coiling, moulding).

### EXPERIMENTAL PROCEDURES

The experimental reproduction of Terramare pottery was undertaken in May 2007 in the Montale Archaeological Park as part of the European Livearch Project and follows an earlier experiment conducted by the potter Pino Pullitani in 2001 (Cardarelli & Levi 2004). In a public demonstration three professional potters, utilising grog tempered Niviano clays and employing coil and moulding techniques, reproduced 20 Terramare pottery vessels of different types. The vessels form coherent cultural units with only decoration and handle shapes demarcating chronological variations. The aim of the experiment was to test whether the modern reproductions would instruct on the manner in which the Terramare pottery had been manufactured and to enquire what type of technical difficulties had to be surmounted by the ancient potters.

Vessels were identified with the following prefixes followed by a sequence number–

A = bowls and cups (carinated and rounded); B = jars (biconical and with rounded profile); D = pithoi

**Table 1** The main phases of the experimental reproduction with the recorded parameters

phase	time	difficulty	other parameters	plots
1. Ceramic paste	minutes	technical	clay, tempers, water, tools	
2. Forming	minutes	technical	technique (coils and mould), tools, dimension, profile	figs. 1, 2
3. Handles	minutes	technical+artistic	shape, tools	fig. 3
4. Decoration	minutes	technical+artistic	technique, tools, pattern	fig. 4
5. Surface treatment	minutes	technical	technique, tools	
6. Drying	minutes	technical	weather	
7. Firing	minutes	technical	location in the kiln, fuel, firing curve	
total	minutes	technical+artistic	chronology and model's provenance, potter's skill, sequence of the manufacturing process, similarity to the model	fig. 5

**Table 2** Time and Technical – Artistic Difficulty for each pot

POT		B7	B4	B8	B6	B9	B2	B1	B5	B10	A2	A9	A8	A7	A5	A1	B3	A3	D2	A4	D1
time (minutes)	Forming	30	70	65	50	65	65	70	90	70	85	145	65	100	155	145	200	170	320	165	500
	Handles	15	10	20	10	10	15	20	30	10	70	5	70	100	25	65	10	135	20	90	55
	Decoration	15	10		45	30	40	20	30	70	15	25	80	30	5	30	35		155	196	45
	Surface treat.			25	30	30	25	35			70	70	35	55	145	120	155	155	55	125	105
	total	60	90	110	135	135	145	145	150	150	240	245	250	285	330	360	400	460	550	576	705
technical difficulty	Forming	1	1	1	1	1	2	2	1	1	2	3	3	1	5	3	4	5	4	4	4
	Handles	1	1	1	1	1	3	3	2	1	3	1	2	1	3	2	1	5	3	3	3
	Decoration	1	2		1	1	1	1	1	2	1	2	3	1	2	3	4		3	5	3
	Surface treat.			1	1	1	1	1			1	1	3	2	4	3	4	4	1	4	1
	total	3	4	3	4	4	7	7	4	4	7	7	11	5	14	11	13	14	11	16	11
artistic difficulty	Handles	1	1	3	1	1	3	3	1	1	3	1	2	1	1	2	4	1	3	3	3
	Decoration	1	2		1	1	1	1	1	2	1	2	3	1	2	3	4		2	5	2
	total	2	3	3	2	2	4	4	2	3	4	3	5	2	3	5	8	1	5	8	5
tech- arts. difficulty	total	5	7	6	6	6	11	11	6	7	11	10	16	7	17	16	21	15	16	24	16

The production process has been divided into the following phases (**Table 1**):

- Preparation of the ceramic paste
- Forming techniques
- Modelling of the handles
- Decoration and surface treatment

For each phase the working time and the technical/artistic difficulties encountered were recorded (**Table 2**). Degree of difficulty was estimated in an ascending order: 0 = very simple; 1 = simple; 2 = simple/moderate; 3 moderate; 4 = moderate/complex; 5 = complex; 6 = very complex. Certain vessels were reproduced by different

potters and the recorded data was compared and standardised to formulate consistent parameters.

The finished replicas were dried for approximately one week and fired in a reconstructed kiln, modelled on a Bronze Age type discovered at Basilicanova, near Parma (*Cattani 1997*). The kiln has a circular firing chamber with a mantelpiece entrance and is surmounted by a clay dome and a chimney at the back (**Fig. 1**). Two separate firings were undertaken, the first, for cups and bowls, in a reducing atmosphere for 5½ hours with a maximum temperature of 765°C: the second, for jars and pithoi, in an oxidizing atmosphere for 8½ hours with a maximum temperature of 800°C.



**Fig. 1a** Reconstructed Bronze Age kiln in the Archaeological Park, Montale



**Fig. 1b** The pots stacked inside the firing chamber

## ANALYSIS OF EXPERIMENTAL DATA

In this article the results are discussed under the headings of formative processes, handle modelling and decorative embellishments.

### *Formative processes*

In general cups and bowls were formed either by coiling or in moulds. The time for forming took between 30 minutes and three hours. Pithoi were formed by coiling only and took between 5 and 9 hours to complete.

Coiled vessels fall into two categories depending on the severity of the formative process (**Fig. 2**):

Category A - simple (1-2), short time scale (less than 2 hours), mainly jars and a small bowl (Form A2).

Category B - complex (4-5), medium-long time scale, large open carinated vessels (Forms A3 and A5) and pithoi.

Composite vessels, the lower part made in moulds and the upper part coiled, occupy an intermediate position (Category C) - simple/medium to medium/complex (3-4), moderate time scale (1 to 3 hours), bowl and cup (Forms A9, A8) and carinated cups (Forms A1, A4); biconical jar (Form B3). Only the shallow carinated bowl (Form A7) is less complex.

The technical difficulty involved in making open forms (bowls and cups) depends on the two variables of technique and size (**Fig. 3**). Large vessels formed exclusively by coiling (forms A5 and A3, respective rim diameters 25.5cm and 28cm) are classified as the most difficult. Cups and bowls of approximately the same size (Forms A4, A7, A9 - rim diameters 25-29cm) formed in

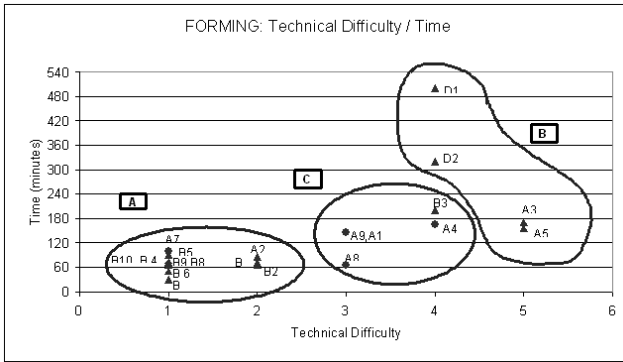
moulds are easier to construct. All the carinated forms (A1, A3, A4, A5), with the exception of the shallow carinated bowl (Form A7), are more difficult to construct than rounded vessels (Forms A2, A8, A9) if size is the only variable under consideration. For example, the same degree of difficulty is assigned to forms A1, A8 and A9, but only the smallest of these vessels (Form A1) is carinated.

In closed forms, which are all built by coiling (**Fig. 4**) two groups can be distinguished with 20 cm in height forming the cut off point between the two groups. The first group consists of small jars (Forms B4, B5, B6, B7, B8, B9 and B10); the second group contains vessels with the degree of difficulty compounded by the shape of the profile. For example, Form B3 (biconical) is more angular than Forms B1 and B2 (rounded profile).

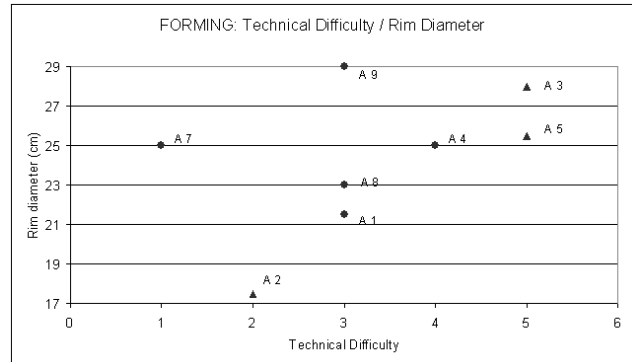
If all coiled pots are taken into consideration the cut off point in the scale of difficulty appears to be 20 cm in height for closed forms, but for the open forms the cut off point is 25 cm in considering rim diameter. This conclusion, based on a small number of experimental vessels, can be compared with the findings of Roux (1990, 150) who, by testing the degree of difficulty in fabricating wheel made pottery both experimentally and ethnographically, established that 'ceramic expertise' could be defined when the potter could throw a closed vessel of 30 cm in height or form an open type vessel with a rim diameter of 40 cm.

### *Handle Modelling*

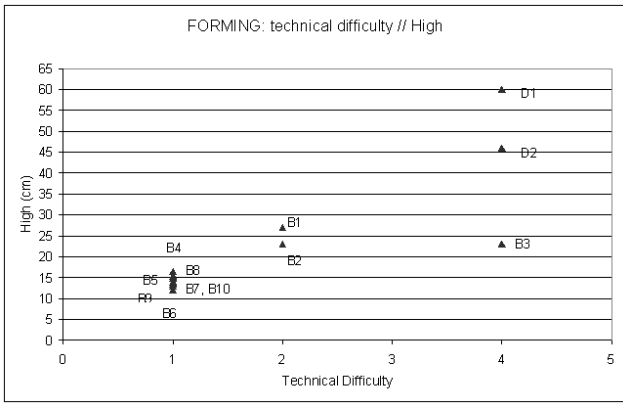
Terramare handles form an important decorative element and are often characterised by elaborate shapes and rich impressed ornamentation. In the experiment a variety of handle forms were reproduced but only the 'horned' types are discussed here (**Fig. 5**).



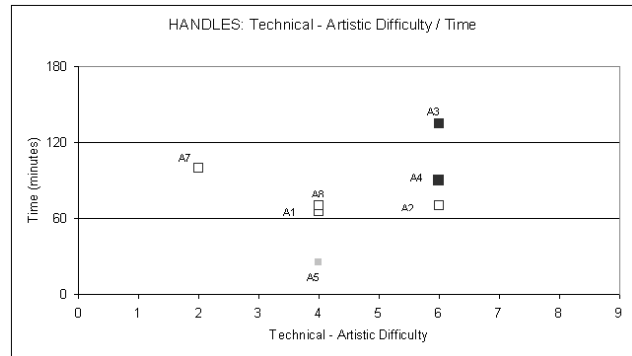
**Fig. 2** Forming process – technical difficulty/time. Key to manufacturing technique: Δ = coil; o = mould.



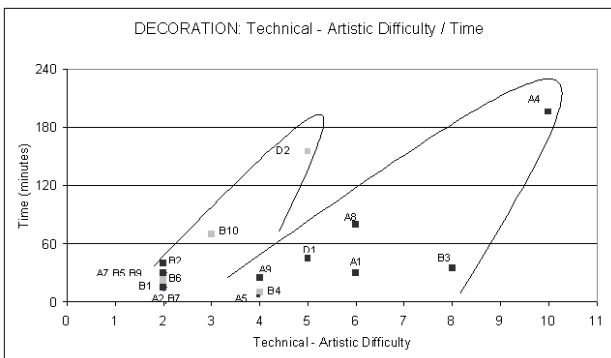
**Fig. 3** Forming of open forms – technical difficulty/rim diameter. Key to manufacturing technique: Δ = coil; o = mould.



**Fig. 4** Forming of closed forms - technical difficulty/high



**Fig. 5** Handle formation – technical-artistic difficulty/time. Chronological scale MBA 2a = □; MBA 3a = ▨; MBA3a/b = ■.



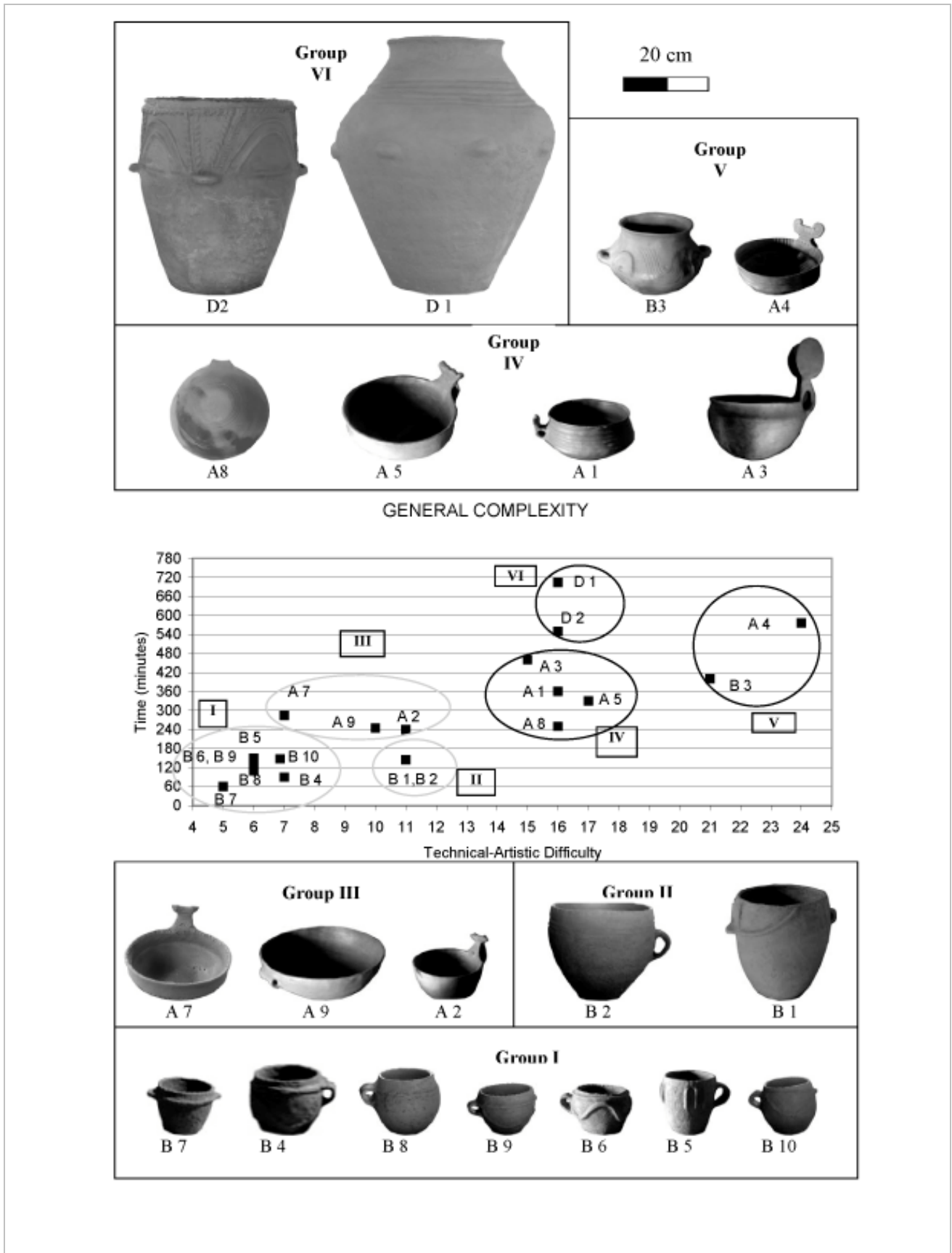
**Fig. 6** Decoration – technical-artistic difficulty/time. Key to technique: ■ = impressed or incised; ▨ = appliqué ribs.

They are considered for their technical/artistic complexity but they also form significant markers in Terramare chronology.

Fabrication of the type took between 1 and 2 hours to complete and it is significant that the most elaborate (difficult) forms belong to later chronological stages (Middle Bronze Age 3a/b).

*Decoration*

Surface treatment and decoration are properties that often overlap in ceramics. Two decorative techniques, appliqué ribs and impressions (incision in Form A8) are employed. Appliqué ribs decorate the external surfaces, particularly on the upper body, and are mainly applied to single piece jars and pithoi. Impressed decoration consisting of deep grooves, often forming a lattice pattern, which may cover both the internal and external surfaces of vessels. In the experiment cobblestones, shell and antler points were used to form the impressions. Difficulty of application and the time factor involved are the operative forces that are related to the complexity of the pattern (Fig. 6).



**Fig. 7** Six vessel groups corresponding to different degrees of 'specialisation' according to technical-artistic difficulty and time (scale approximately 1:10).

Two trends are apparent whereby the difficulties imposed by a complex pattern increase more quickly if applied by impression than by appliqué ribbing, as illustrated by the impressed forms A4, B3, A1 and D1 as opposed to the ribbed forms D2, B10 and B6.

## CONCLUSION

The effective total working time taken to complete each pot varied between 1 and 12 hours. It was established that the 'difficulty score' for completing the most elaborate vessels was five times greater than for finishing the simplest pots. Using a scale of 5 to 24 based on the parameters of time and difficulty the vessels can be classified into 6 groups each of which correspond to a higher degree of specialisation (**Fig. 7**).

Group I - includes 7 jars; Time <2½ hours; Degree of technical/artistic difficulty 5-7.

Group II – includes 2 large jars; Time 2½ hours; Degree of technical /artistic difficulty 11.

Group III - includes 1 carinated, 2 rounded bowls; Time 2½-3hours; Degree of technical/artistic difficulty 7-11.

Group IV – includes 1 carinated cup, 2 carinated bowls, 1 bowl; Time 4-8 hours; Degree of technical/artistic difficulty 15-17.

Group V – includes 1 biconical jar, 1 carinated bowl; Time 6-10 hours; Degree of technical/artistic difficulty 21-24.

Group VI – includes 2 pithoi; Time 9-12 hours; Degree of technical/artistic difficulty 16.

All the vessels were made from the same raw materials but a clear gap exists between Groups I-III (maximum time is 5 hours; degree of technical/artistic difficulty is <11) and Groups IV-VI (time is 4-12 hours; degree of technical/artistic difficulty is >15). The parameters of the latter group, consisting of pithoi and pots of complex shape and/or decoration, would suggest that they are the products of a 'workshop' organised industry: in contrast, the former group consists of simple bowls, which suggest that they are the products of a 'domestic' organised industry. In conclusion, the experiments have indicated that pottery production in the Terramara culture was well organised and possibly arranged on a two tier basis with skilled potters undertaking the production of the most specialised and complex vessel forms.

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