

THE IRON AGE BREAD OVENS FROM TELL DEIR 'ALLA

by

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Introduction

At Tell Deir 'Alla in the Jordan Valley, excavations have taken place from 1960 onward, with a gap between 1967 - 1976. During this period, part of the Late Bronze and Iron Age settlements have been examined.¹

The 51 ovens that are described here are the ones found in the seasons between 1976 and 1987. They cover phases IX to II. The phase IX fire is dated ca. 800 BC, phase VI is dated between ca. 750 - 650 BC, and the last phases are dated within the period of the Babylonian and the Persian empires.²

Ovens in Literature, Description of Types

The oldest known words for ovens stem from the Semitic root *tnr*, one of the most ancient words being the old Babylonian *tinuru*. In Sumeric the word is *DILI-NA*, *IM-SU-NIGIN₂-NA*, but also *TI-NU-RU* is used.³ One undated text⁴ runs: '1 *gis ig.dib.ba ká IM-SU-NĪGIN₂-NA*' '1 door, of planks, the entrance to the oven'. This seems to have been a special oven-house, or oven-room. Other words, found in connection with *ti.nu.ru* are *pi.kal.lu.lu* 'oven-hole' and *nap.pa.su* 'air-hole'. *Seru* in connection with ovens means 'greasing', probably referring to the moistening of the inside wall.

Several types of traditional ovens are still in use in the Middle East, although they are becoming less and less common. The main types are the *ṭabun*, the *tannur*, the *wajdiah* and the *saj*.

The *saj* is the traditional bedouin oven, a convex metal disc, placed on three stones.

The *wajdiah*, a relatively common type in Jordanian villages⁵ is a vault-like structure,

open at the front, and divided horizontally by a metal plate. Below is the fire-chamber, while the dough is put on top of the metal plate.

The *ṭabun* is the most common type of traditional ovens in Jordan. It consists of a low, vaulted structure (diam. about 80 cm, height about 30 cm) made of clay, with an opening at the top. The floor inside is made of smoothed clay, pebbles or sherds. When it is used, the oven is pre-heated from the inside, then the fire is cleared out, the dough put in, and the outside of the oven covered with glowing dung-cakes, leaving only the opening at the top free, which is covered with a lid. Through this opening the bread is taken out, and new dough put in the *ṭabun*.

The *tannur* is hardly in use any more in Jordan, but it is still very common in Syria and also in India, where it is known as a *tandoori*. It is a conical or beehive-shaped installation made of clay, open at the top, and with very smooth inner walls. A *tannur* is used by making a glowing fire at the bottom, and sticking pancakes of dough to the inner sides. These will be ready in a few minutes, and must come off almost by themselves. A *tannur* has a venthole near the bottom, mainly for regulating the fire.

Ovens found in excavations are usually identified with the *tannur*, although in publications they are more often than not referred to as *ṭabun*.

Description of the Ovens from Tell Deir 'Alla

General shape: Table 1 gives the features of the Deir 'Alla ovens as they have been recorded in the excavation. The original

1. An extensive description of the geographical layout and history of the Tell can be found in van der Kooij and Ibrahim 1989. For the Early Iron Age pottery, see Franken 1969.

2. Van der Kooij and Ibrahim 1989: 82 ff. Phase IX equals phase M in Franken 1969.

3. See von Soden 1959, ref. *tinuru*, for textual

references. Most of these come from lexicographical lists.

4. In Bisot, 1969, text 37, a list of doors from a building, part of a legacy, l.16.

5. For a description of the main types, see McQuitty 1984.

Table 1: Deir 'Alla ovens features.

phase	locnr	temper	constr	c h	w th	fin in	fin out	dian surf	found	position	dista	space	rebu	area	height	
9	b/b8.80	or,du,st	coils	8	20	smooth	clay	level		south	1	courty	1	1		
9	b/d6.a						smooth	70 level		center				1	3	
9	b/d6.b		coils	3			smooth	43 level	stones	center				1	3	
9	b/d6.c						smooth	52 level		north	6			1	3	
9	b/d7.54		plaques	10			clay	35 platform		south	1	courty	1	1	25	
9	b/d7.66							50 platform								
7.8	b/a9.34		coils	7			clay,sh	60 workpit	sherds					1	1	25
7.8	b/b10.42		cubes	2	25	pol		50 dug in						1	3	
7.8	b/b10.50	or,du,st			25	smooth	clay	75 workpit	clay					1	3	
7.8	b/b10.53						clay,sh	52 workpit						1	3	25
7.8	b/b8.59		plaques	9				60 level						1	1	30
7.8	b/c10.46							45 level						1	1	20
7.8	b/d8.70	or,du,st	coils	2	20	slip	slip	level						1	1	
7.8	b/e8.41	or,sd	coils	10			smooth	34 level						1	1	15
6	b/b8.51						clay	45 level		northw	50			1	3	30
6	b/b8.26						clay	30 dug in		west	30			1	3	40
6	b/e8.43	or			40	selfslip	crust	37 platform		north	1	room	2	1	5	
6	b/e8.42		coils	8	20	smooth	smooth	40 platform		north	1	room	2	1	15	
6	b/b10.26						smooth	35 level		north	90	room	1	1	31	
6	b/a6.141							level		north	10			1	1	
6	b/a7.65		coils	8			clay	60 workpit		north	1			1	3	70
6	b/a8.32		plaques	13			smooth	30 level		south	1	room		1	2	
6	b/b4.32	or,du,st	coils	8	25	selfslip	clay	75 dug in	sh,st			open	7	2	42	
6	b/b4.32a	or,du	coils	9	35	smooth	clay	56 workpit				open	7	2	30	
6	b/b4.41		cubes		28		clay	60 dug in	sh,st			open	7	2	54	
6	b/b4.59	or,sd	plaques	10	23	smooth	clay	67 dug in	straw			open	7	2	40	
6	b/b4.60							level				open	7	2	1	
6	b/b4.62	or,du,st	plaques	15	30	selfslip	clay,sh	57 workpit				open	7	2	30	
6	b/b4.63	or,du			65	smooth	clay	70 workpit	straw			open	7	2	15	
6	b/b5.45		cubes				clay	level				open	4	2	30	
6	b/b5.54							40				open	4	2		
6	b/b5.55											open	4	2		
6	b/b5.57											open	4	2		
5.6	b/d9.33	or,sd	coils	10	24	selfslip	clay,sh	40 dug in		south	1			1	1	
5.6	b/b8.21													1	1	
5.6	b/b10.6													1	1	
5.6	b/a6.37							40 dug in			20			1	1	
5.6	b/a10.14							dug in						1	1	
5.6	b/b5.65						stones	level				uncov	1	1	15	
5	b/d10.20	or,du	coils	11	25	smooth	clay	70 dug in		north	35			1	3	
5	b/d10.2	or,du,st	coils	7	25	selfslip	smooth	62 level		north	1	uncov	1	3		
5	b/d10.29							64 level		north	1	uncov	1	3	1	
5	b/b6.23		cubes		40			40 level		north			2	3	25	
5	b/b6.21				40		clay,sh	62 level		east	25		1	3	25	
5	b/b6.27						clay,sh	55 level		east	50		1	3		
5	b/a5.37							63 level		east	10	room	1	2		
5	b/a5.14						clay	65 level	stones	southea	1	room	1	2		
5	b/b6.16							50 workpit						1	1	40
2.3	b/a6.54							52 platform		north	50	uncov	2	1	25	
2.3	b/a6.42							level		north	50	uncov	2	1		
2.3	b/a5.27		coils	15				60 workpit				uncov	1	1	55	

locnr = locus number; temper: or = organic, du = dung, st = salt, sd = sand; constr = construction method; c h = coil height (cm); w th = wall thickness (mm); fin in = finish inside wall, pol = polished; fin out = finish outside wall, sh = sherds; dian = inner diameter at bottom (cm); surf = relation to the surface; found = foundation; position = position with regard to nearest wall, only if distance is less than one meter; dista = distance to this wall, dista = distance to wall (cm); space = nature of the space in which the oven stood, courty = courtyard, open = open area, uncov = open space, but nature of the space is unclear; rebu = number of rebuilds; area = number of contemporaneous ovens in the area; heigh = preserved height (cm).

heights of the ovens of Tell Deir 'Alla are unknown, except for one case. One oven, B/A7.65, is preserved to a height of 70 cm, B/A5.27 is preserved to 55cm, and B/B4.41 to 54cm, but the preserved heights of most of the ovens are between 20-40cm. Therefore only the general shapes of the lower parts are known, and our descriptions are based on these lower parts.

B/B10.26 is preserved complete, but this oven differs from the others in more than one respect. First of all, it is the only oven that has a venthole at the bottom. This is a rectangular opening of 6×9 cm, that has been silted up by the floor accumulations. Apart from that, it has an extra opening in the body at the top, possibly for a swing door, because there are two hinges (Fig. 1).

In Middle Bronze Age Jericho one oven was also found with a venthole (Kenyon and Holland 1981).

Egyptian paintings from the same period show that this type of oven was in fact rather common in Egypt. It is seen on Egyptian paintings of the Middle and New Kingdom.⁶ Most of these ovens are rather high, and the people who operate them (usually men) are always standing.

Other important features are: they have no wall-insulation, and sometimes they are also used for cooking or baking in a wok-like dish.

The examples from Jericho and, for the later period, from Deir 'Alla show that the venthole was at least known in the Levant, although it did not become common here until much later. The Jericho oven measures 60 cm in diameter. The Deir 'Alla one has an outer diameter of about 40 cm, and a height of 31 cm, and looks rather like some of the Egyptian examples apart from the extra opening at the top. However, a considerable period of time lies between them.

The ancient oven seems to have been used in the same way as the modern *tannur*: ash, traces of burning and hollowing out of the bottom show that the oven was heated from the inside, while the smoothness of the inside of the wall, and sometimes very heavy insulation of the wall suggest that the bread

was baked on the inside wall, just as is the case today. Apart from that, the ovens may have been used for cooking in a cooking pot put on top of the oven, and for roasting meat.

Covers: Modern *tannurs* can have covers. These may be made of metal, as is the case with most modern Syrian ovens, or with the Zagros dug-in *tannurs* that have been described by Christensen (1967). According to Dalman, dug-in bread ovens in South Arabia and Yemen had covers of either stone or palm-leaves (Dalman 1935: D1 IV, blz 91ff).

At Tell Deir 'Alla, two objects that look like covers made of unbaked clay were found. Oven B/B10.50, in phase VIII-VII appears to have been cleaned thoroughly. Inside was found an 'Assyrian bottle', a dish, loom-weights and fragments of what appeared to be a clay cover. These are fragments made from the same material as the oven, but flat, some with rims suggesting a disc shape.

At Tell Masos a possible clay cover with handle was found, on top of a thick layer of ashes (Fritz and Kempinsky 1983: 106, oven 10). At Tell Abu Šarbut, a late Medieval Islamic site near Deir 'Alla, two clay covers were found, consisting of a flat disc with a knob-handle roughly in the center. The fragments of ovens between which they were found had smooth, in places polished, inner walls, proving that they were *tananir*.

The fact that the covers are seldom found in excavations may be partly due to the fact that they are made from the same material as the oven itself. In general, very little attention is paid to oven fragments in excavations.

It is probable that oven B/B10.50 was used for storage, in this case of kitchen utensils (see below). Carol Kramer, in her study of Aliabad (1982: 100,105) mentions the use of clay covers on storage bins, and the practice of using old ovens for storage purposes.

Material, temper, construction, finish: The Deir 'Alla ovens are made of so-called banded clay, a Pleistocene clay. It consists of thin layers of fine material, alternating with layers of coarser material, containing sand.

6. See for example Wreszinsky 1923, nos. 125, 221, 255, 301, 326.

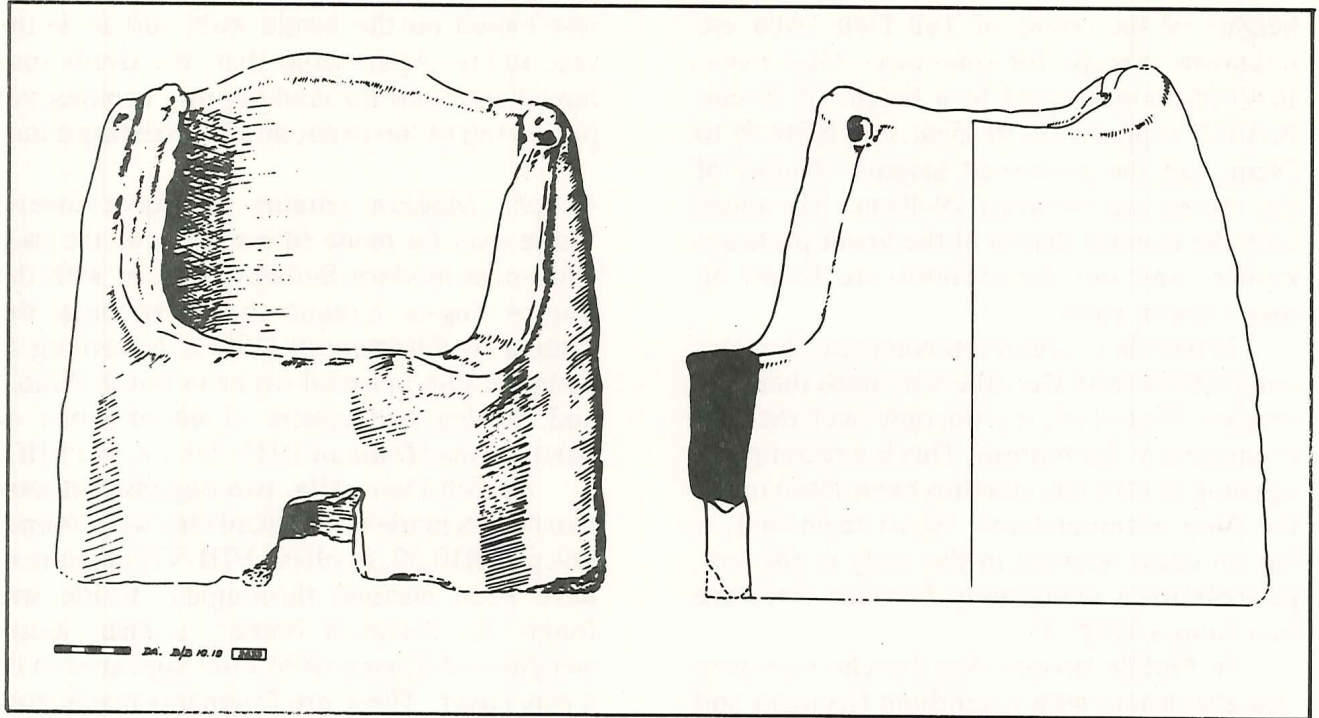


Fig. 1. Oven B/B10.26 from Tell Deir 'Alla.

Banded clay is found at the foot of the tell.

According to Franken the woman who made the *ṭawabeen* in Abu Gourdan, the village next to Deir 'Alla, refused to use anything other than the banded clay from the foot of the tell.⁷

The temper used nowadays is dung, which improves the cohesion of the clay, mainly because it contains small organic fibres; sand, to prevent shrinkage, and goat-hair, that has the same function as the organic fibres in the dung, and according to Kramer, is 'reputed to minimize cracking' (1982:99).

The samples taken from the Deir 'Alla ovens had very fine holes, indicating the use of dung as temper. They also contained sand, but this may have been an original component of the clay. The height of the coils, with which the ovens were built, varies between 2 and 15 cm. Two different ways of construction can be discerned. One is the method of building up in small coils, which is how modern *tananiir*

are usually constructed. The other method involves the use of bands, 7 - 15 cm high, put on top of each other. Each band was left to dry before the next was added, and the edge was bevelled for better attachment. The bands themselves were segmented, lumps of clay were shaped into plaques, and stuck together to form the band. This method is somewhat similar to the way large handmade vessels were made. Potters in Yemen, for example, still use this method to make small portable *tananiir* (Daum 1987: 434).

The difference between 'coils' and 'plaques' is a difference in interpretation, rather than in construction.

In four cases, small cubes have been used to build the wall of the oven, like a miniature mudbrick wall.

The construction of a modern *ṭabun* or *tannur* is in coils.⁸ This way of construction can be observed in a number of ancient ovens, like the Late Bronze and Early Iron

7. In 1960-64, H. Franken observed the making of ovens in Abu Gourdan: The clay was thrown in a pit, together with water and dung, and left to stand. This gave the water the chance to penetrate and soften the clay. After a couple of days the mixture was kneaded thoroughly, and left again for some days, to make the superfluous water evaporate. When the right consistency had been reached, the clay was formed into coils, which were rolled out

again and again in one direction, to make the organic fibres lie lengthwise in the coil. The coils were then spiraled upwards, to shape the oven. (Pers. comm).

8. This is what Dalman states, what Franken has seen in modern Deir 'Alla and Abu Gourdan, and it is also the method described by Sweet for the ovens of Tell Toqaan in northwestern Syria.

Age ones from Deir 'Alla excavated by Franken and at least some of the ovens from Tell Masos.

The coils of the early ovens of Deir 'Alla had a maximum height of 4 cm, since their height never exceeded their width (Franken 1969: 29). The inner faces of all the Deir 'Alla ovens were used in the same way as the modern *tananir*.

Outer finish and insulation: The Middle Bronze Age oven from Jericho described above had a 'sandwich-wall', which means that it had two concentric walls of clay, with sherds and mud in between.

One of the Masos ovens described by Gunneweg, no. 9 (Fritz and Kempinsky 1983: 106-113), also had a 'sandwich-wall' and, in addition, its dimensions were much larger than those of most of the Masos ovens. The ovens from Tell Masos all come from four strata in the 13th to 11th centuries. Oven 9 was found in Str. II.

In Ta'anek a 12th century sandwich-wall oven was found (Lapp 1961: 14), and at Tell Zeror a Late Bronze Age example (Ohata 1970: 46, Pl. 42).

In Keisan it was a general feature. The ovens described by Humbert consist of two walls of clay, 3-4 cm thick, and a layer of 6-7 cm thick in between, consisting of lighter material and sherds. The Keisan ovens cover the period from 1075 - 580 BC according to the excavators.

The most probable reason for this type of construction seems to be heat insulation. Potsherds have good heat preserving qualities. In fact this is the principle of the hollow wall: two walls with insulating material in between.

On most sites the sandwich-wall disappears after the Early Iron age, maybe because its construction was rather complicated. On the other hand, many ovens were provided with a thick layer of clay, often mixed with sherds. It is a standard feature for the Iron Age I and II ovens from Tell el-Far'ah (Chambon 1984). According to Franken, at Tell Deir 'Alla in the Early Iron Age, ovens were found "lined with sherds, over which a thick coat of clay was packed" (Franken 1969: 30). One has been recorded at

Tell es-Sa'idiyeh (Pritchard 1985, in House 35, Stratum VI), and another at Masos. This was the second oven that was larger than its fellows, and Gunneweg also considers it an archaism from the Late Bronze Age.

Of the Deir 'Alla Iron Age II ovens, six were found with a clay-and-sherds layer (Pl. I, 1). Fifteen of the Deir 'Alla ovens had an insulation layer of clay alone. The clay-and-sherds insulation and the clay-insulation existed side by side in all phases.

Modern *tananir* in Syria and western Iran are insulated, but most of the time this insulation is made of mudbricks. Sometimes, like at Tell Toqaan and the ovens described by Nissen (Nissen 1968: 109), it has been extended to form a platform, on which procedures involving bread-making are performed.

Nine of the Tell Deir 'Alla ovens had no insulation layer of any kind. Their outer face had been smoothed, and sometimes there was a slip layer.

Foundation, floor: Some ovens at Tell Deir 'Alla have a kind of foundation. This may be of stones, sherds, a combination of stones and sherds, straw or clay.

The use of clay to level off the surface where an oven was to be placed is more or less the rule here, and has not been interpreted as a 'foundation'. In the case of B/B10.50, a special ridge had been made in this levelled off area in which the oven was put. Straw may have been used in smoothing the surface.

Stone foundations are the rule in Masos for example, where only the ovens in the rooms were not placed on stone foundation, and at Keisan. On the other hand, at Tell el-Far'ah no foundations were found. Some ovens at Tell es-Sa'idiyeh Str. VI had foundations of stone or lime.

At Tell Deir 'Alla, four different ways of placing an oven on the surface were found. In Table 1 these four 'settings' are named (Figs. 2-5):

level: which means that an oven is put directly on the surface, sometimes on a foundation of stones;

platform: means that a small mudbrick plateau had been constructed, on top of

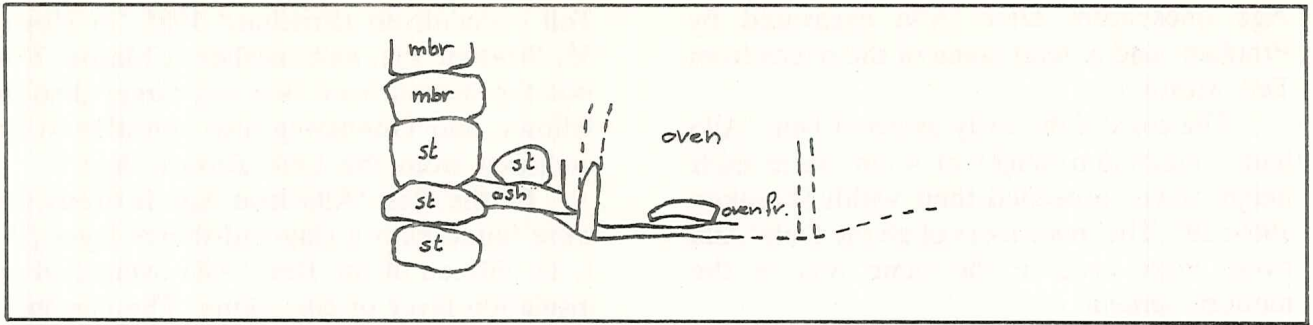


Fig. 2. Section of DA B/B 8.51, an oven that is 'level' (scale 1:25).

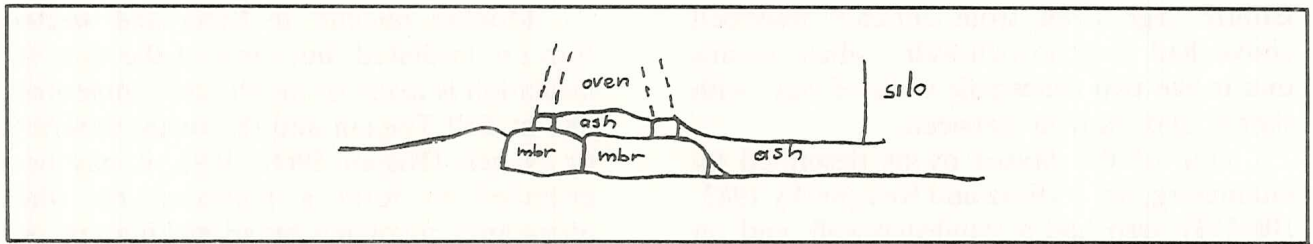


Fig. 3. Section of DA B/E 8.42, an oven that is built on a platform (scale 1:25).

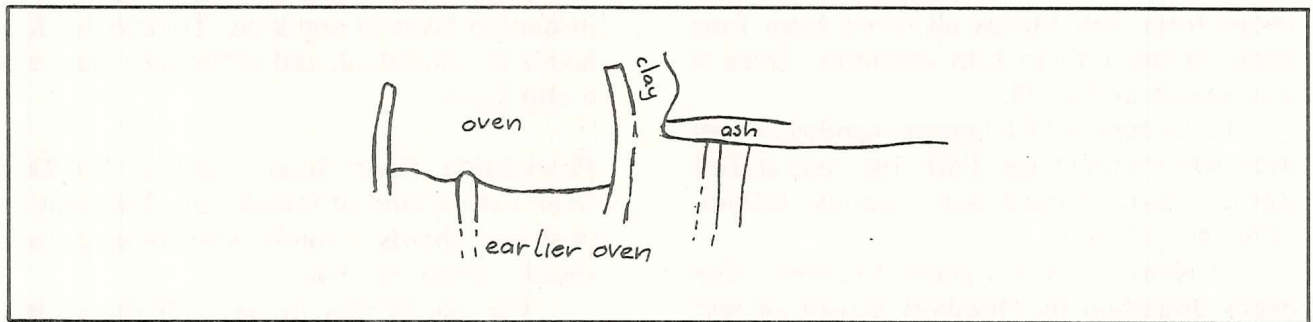


Fig. 4. Section of DA B/B 4.32, an oven that is dug in (scale 1:25).

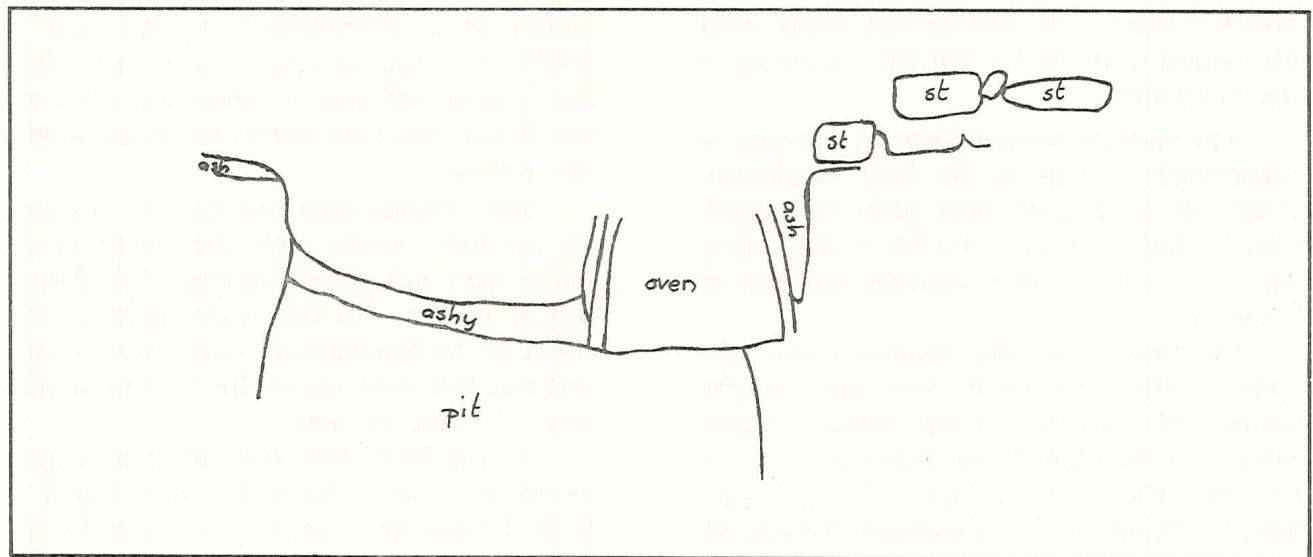


Fig. 5. Section of DA B/A 7.65, an oven that is put in a 'workpit' (scale 1:25).

which the oven was built;

dug in: a hole had been dug to fit the oven in, and filled up again, so that the bottom of the oven is lower than the sur-

rounding surface.

workpit: a large pit had been dug against the wall of which the oven was placed. That means that on the other side of the oven

about 50 cm of empty space was left in the pit. At Deir 'Alla these pits had a maximum depth of about 40 cm (B/A9.34, B/A7.65, B/B4.32a and B/B4.62). In three cases (B/B10.50 and 53 and B/B4.63) the depth of the pit was less, about 20 cm, but in all these cases the surface to which the oven belonged had been eroded.

In his description of the dug-in *tannur*, Dalman mentions the use of the *jura* (pit), the outlet for the venthole in the bottom part of the *tannur* in which the woman who bakes the bread puts her feet to sit more comfortably. In fact he saw a *tannur* in Qadas where the *jura* was not connected with a venthole, but only served for the woman to put her feet in (Dalman 1935: 89).

This indicates a probable function of the workpit. One could sit on the edge, feet in the pit, which was a relatively comfortable position if the oven itself was not too high. Deir 'Alla oven B/A7.65 stood in a workpit, and still stood 70 cm high. If the workpit was indeed used in the way described above, then this must have been pretty near its original height, since otherwise it would become impractical. On the other hand, the top edge of the oven could have hardly been much below the walking surface (which, of course, is the case with the dug-in *tananir* that have been described by Dalman). This makes it probable that the height of these ovens generally lies somewhere between 40 and 70 cm.

In the workpit of B/A5.27 a layer of reed was found, that had been put there after the oven had been in use for some time. In Deir 'Alla, Franken found layers of reed in the streets, that had apparently been put there in the rainy season to make the surface less slippery, and to prevent large lumps of clay sticking to one's feet (Franken 1969: 28). It is possible that the B/A5.27 reed layer had the same function, since once water has collected in a pit in the clay ground of Deir 'Alla it is very slow to seep away, even after the weather has been dry for some time. For ovens not standing in a workpit, it is probable that the baker sat squatted beside the oven, or they used some kind of stool.

Rebuilds: Humbert gives a lifetime of about 20 years for an oven. This seems rather long, if we compare it to the 3 - 15 years McQuitty gives for a *ṭabun* protected by a *ṭabun*-house. In Raqa'i, in northern Syria, one of the neighbours of the archaeological expedition baked the bread for the expedition in her own *tannur*, and this was replaced every two or three years. Therefore it seems improbable that the Deir 'Alla ovens survived much longer than five years. An oven usually was rebuilt at the same place for obvious reasons.

Oven B/E8.42 was set on a platform of mudbricks. When it was rebuilt, another mudbrick was put on top of the first one, and the new oven, B/E8.43 was placed partly on top of this second mudbrick and partly on top of the first oven. This practice indicates considerable use-accumulation, even inside a room.

Space: As Table 1 shows, the Deir 'Alla ovens stand inside a room, in a courtyard or in open areas outside structures. Modern *ṭawabeen* in Jordan are usually placed in bakehouses, small rooms in courtyards or at the edge of the village. Sometimes old rooms or houses are used as an ovenhouse (McQuitty 1984; Dalman 1935: 77, 89ff).

In Tell Toqaan ovens can be inside the house, or outside in the courtyard. In the wet season these are protected with some kind of copper pan.

In western Iran and southern Iraq, dug-in *tananir* (which are in fact clay-lined holes in the ground) used to be in the kitchen, the most important and sometimes the only room of the house. Most families also have an oven in the courtyard (Kramer 1983: 99ff; Christensen 1967, the house of Mirza Kadir; Nissen 1968). Ancient bakehouses occur in Hazor and other places. The valuation list mentioned above⁹ also refers to a bakehouse, part of a larger house. Possibly ovens B/A5.14 and 37 did stand in a bakehouse, but bakehouses were not the usual place for an oven at Tell Deir 'Alla.

Communal use of ovens: The practice that

9. See note 4.

one oven was shared by several families seems to have been normal until recently, according to McQuitty and Dalman. This we call 'communal use', although it is not known how the proprietary rights were divided over the families that used the oven. The *tannur* at Raqa'i, although belonging to Helwa, the housekeeper of the archaeological expedition, was 'borrowed' from time to time by neighbours. Some Biblical texts may refer to the use of communal ovens.¹⁰

Ovens are also found in streets, with no connection to one house or another, for example at Masos, at Tell es-Sa'idiyeh and at Tell el-Far'ah. They can be 'walled-off' with a row of stones. Sometimes communal ovens were placed together, often at the edge of the village. This situation occurs at Tell Keisan, where six ovens were placed outside structures. Stratum IV at Tell es-Sa'idiyeh consists only of a large group of storage pits, bins and three ovens. The existence of 'oven-areas' on several sites may point to a communal use of ovens.

Since excavations nowadays are usually on a small scale and the existence of ovens is not always reported, it is hard to find reliable statistics on the number of ovens in relation to the number of households in an archaeological context. If the oven areas found in archaeological contexts originate from a communal use of ovens, then these could have been only used in the dry season. All the ovens stood in the open air.

Humbert offers another explanation for the Tell Keisan oven area (Briend and Humbert 1980: 34). According to him, the ovens belonged to seasonal workers, who camped in the 'zone non-construite' of the village. The presence of kitchen waste and a posthole should also point in that direction.

A comparable explanation is offered by Pritchard for Tell es-Sa'idiyeh Stratum IV. In this phase, the tell was used to store grain in

pits. The farmers, who looked after the stored grain, lived on the tell until the grain was moved.

The large group of ovens in B/B4 and 5, in Deir 'Alla phase VI bears some resemblance to those of Keisan and Tell es-Sa'idiyeh. There are two contemporaneous groups of ovens, each group itself a number of rebuilds, one of four and one of seven ovens. So probably two, or maybe three ovens were in use at the same time. The nearest architectural feature is a wall at 5 m distance. Near the area, a number of postholes was found, made at different times, separated by only short periods (Ibrahim and van der Kooij 1979: 48). At least in the B/B4 area, seasonal erosion had taken place before each rebuild.

All these facts seem to point to use by seasonal workers which, of course, does not exclude communal use.

Position: If an oven stands in the open air, its relation to the nearest wall may, for several reasons, be important. Fig. 6 and Table 1 give the positions of the open air Deir 'Alla ovens, and the ones of which it is unknown whether they stood in the open air or in a roofed space. A position north of a wall seems to have been preferred.

The prevailing direction of the summer wind in Deir 'Alla is from the north, which means that the Deir 'Alla ovens would catch the wind most of the time. This may be important since they had no venthole at the bottom, and needed the wind at the top to draw the fire.

Relations between Features; Winter Ovens

For the Tell Deir 'Alla ovens, the inner diameters have been given in Table 1. They range from 30 - 75 cm, with an average of 52.5cm. As can be seen in Fig. 7, there is no clear tendency to a larger or smaller diameter through time.

10. Lev. 26:26, 'And when I have broken the staff of your bread, ten women shall bake your bread in one oven, and they shall deliver you your bread again by weight...'; and according to Dalman

(Arbeit u. Sitte p.97), the 'tower of furnaces' mentioned in Neh. 3:11 and 12:38 could have been the place where communal bake-ovens stood outside the walls of Jerusalem.

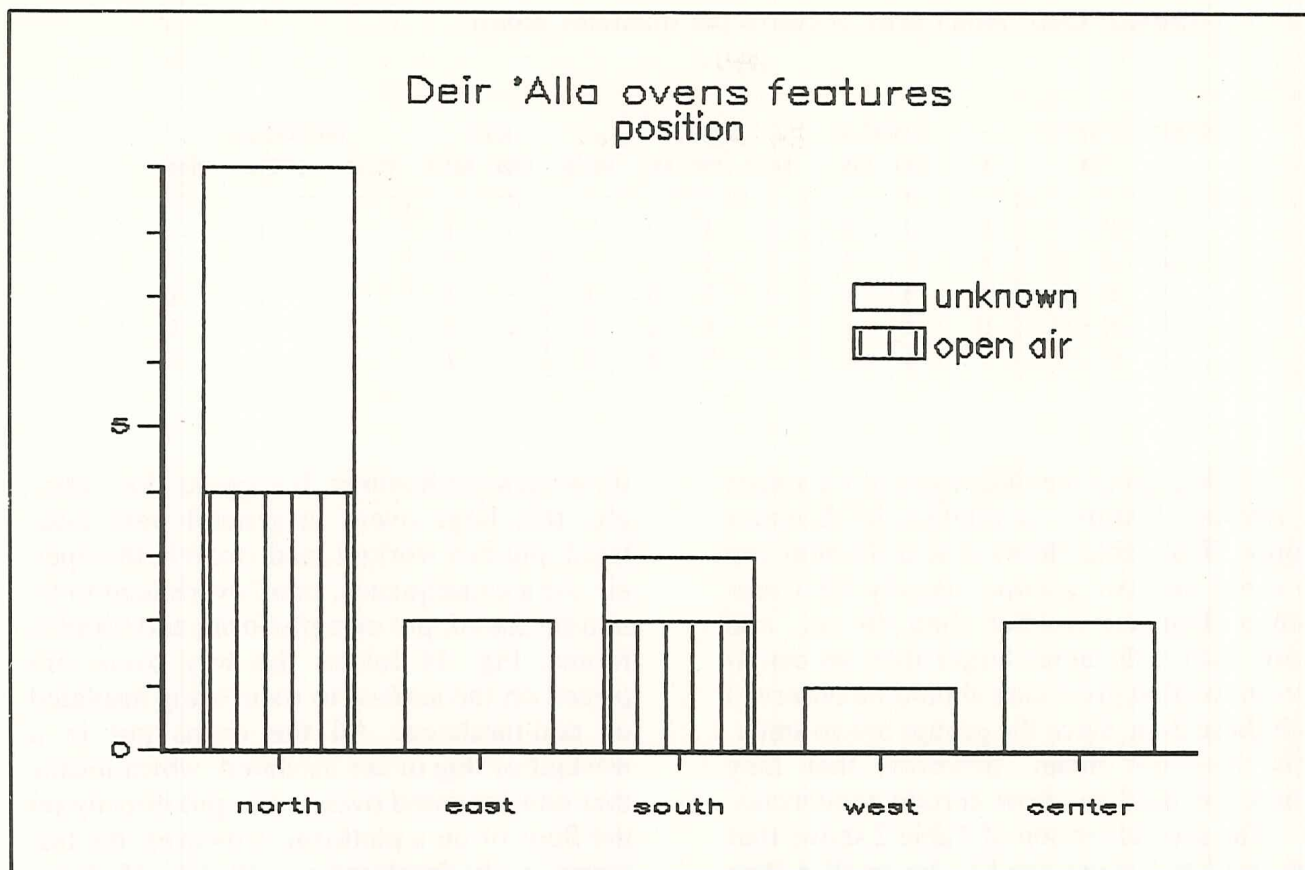


Fig. 6. Positions of the Deir 'Alla ovens as related to the nearest wall.

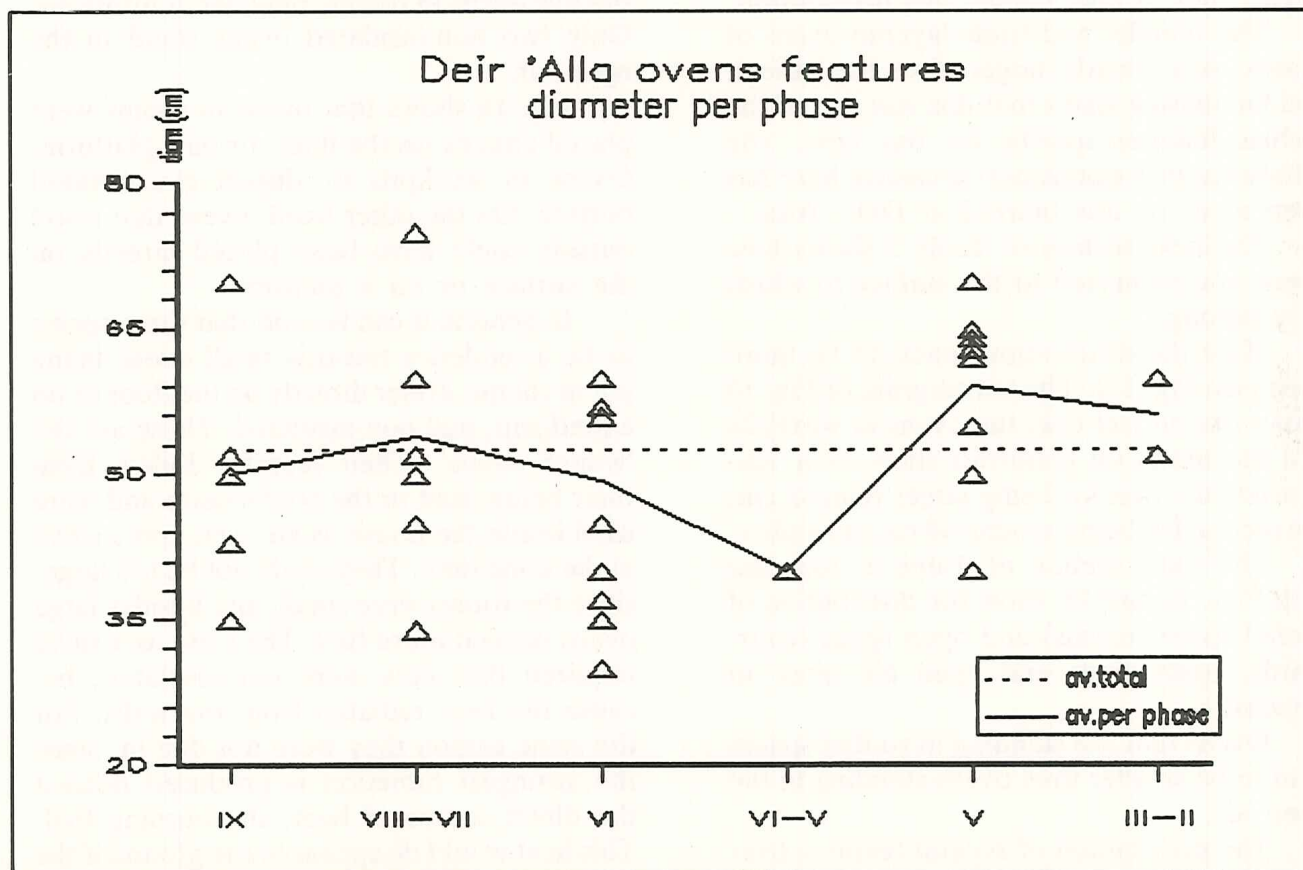


Fig. 7. Mean diameters of the Deir 'Alla ovens per phase.

Table 2: Deir 'Alla ovens, features per diameter group.

groups	diameter (cm)	N	isolation		floor			space		construction			
			isol	non	platf	level	dug	workp	room	uncov	coils	plaques	cubes
1	28 - 37	6	2	4	2	3	1	-	3	1	1	2	-
2	38 - 47	8	1	2	1	4	2	-	1	1	3	-	1
3	48 - 57	9	4	1	2	2	1	4	-	3	1	1	1
4	58 - 67	11	6	1	-	6	2	3	2	5	4	2	1
5	68 - 77	5	4	1	-	1	2	2	-	2	2	-	-

Table 2 gives the dispersion of a number of relevant features in relation to diameter groups. This table shows that a division can be made into two groups, namely the ovens with a diameter smaller than 48 cm, and ovens with a diameter larger than 48 cm. It also shows that great care should be observed with these data, since the groups are so small. This does not mean, however, that they cannot be used to show certain tendencies.

The second section of Table 2 shows that non-insulated ovens tend to be smaller than 48 cm, while most of the insulated ones are larger. Figs. 8 and 9 show this distribution.

The double- and triple-layered ovens of Masos were clearly larger than the others, and Gunneweg states that this was one of the archaic features specific for this type. The difference that stands out so clearly here has been more or less blurred at Deir 'Alla.

The next section of Table 2 shows how ovens are connected to the surface to which they belong.

Here the distribution seems to be more even (see Fig. 11). The scattergram of Fig. 10 shows that in fact only the ovens in workpits and the ovens on platforms show clear tendencies, the first for being larger than 48 cm, the second for being around 48 cm or smaller.

The third section of Table 2, together with Figs. 12 and 13, show the distribution of roofed space (rooms) and open space (courtyards, open areas and open air space in general).

Ovens that are standing in roofed spaces tend to be smaller than ovens standing in the open air.

The distribution of several features over the diameter groups suggests certain correla-

tions between features. It suggests, for example, that large ovens in general were insulated, put in a workpit, and stood in the open air. As a consequence, small ovens tend to be non-insulated, put on a platform, and stand in rooms. Fig. 14 relates the way ovens are placed on the surface to their being insulated or non-insulated. All the ovens put in a workpit or dug in are insulated, which means that non-insulated ovens were put directly on the floor or on a platform. However, the last group can be insulated as well. Fig. 15 shows the relation between insulation and siting. Of the five ovens in rooms, only one is insulated. Only two non-insulated ovens stand in the open air.

Fig. 16 shows that ovens in rooms were placed directly on the floor, or on a platform. Ovens in workpits or dug-in ovens stood outside. On the other hand, ovens that stood outside could have been placed directly on the surface or on a platform.

In general it can be said that there seems to be a tendency towards small ovens being put in rooms, either directly on the floor or on a platform, and non-insulated. These are the 'winter ovens'. Their features follow from their being used in the cold season and were used inside the house as an oven and a stove at the same time. They could not be too large, since the rooms were small, and besides large ovens needed more fuel. Their use as a stove required that they were not insulated, because the heat radiated from the walls. For the same reason they were not dug in, since the strongest radiation is produced nearest the direct source of heat, the burning fuel. This heat would disappear in the ground if the oven was dug in.

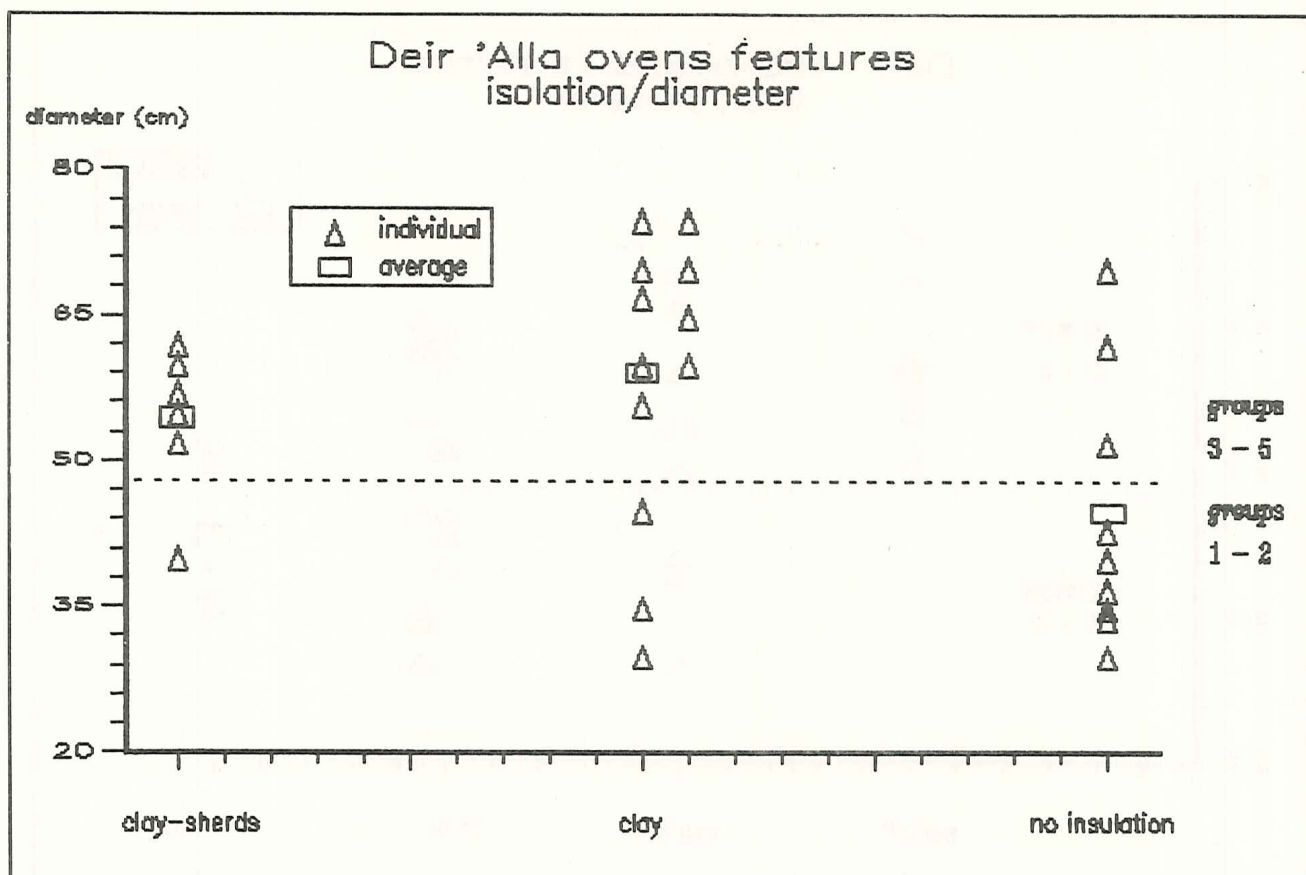


Fig. 8. Relation between diameter and insulation type for the Deir 'Alla ovens.

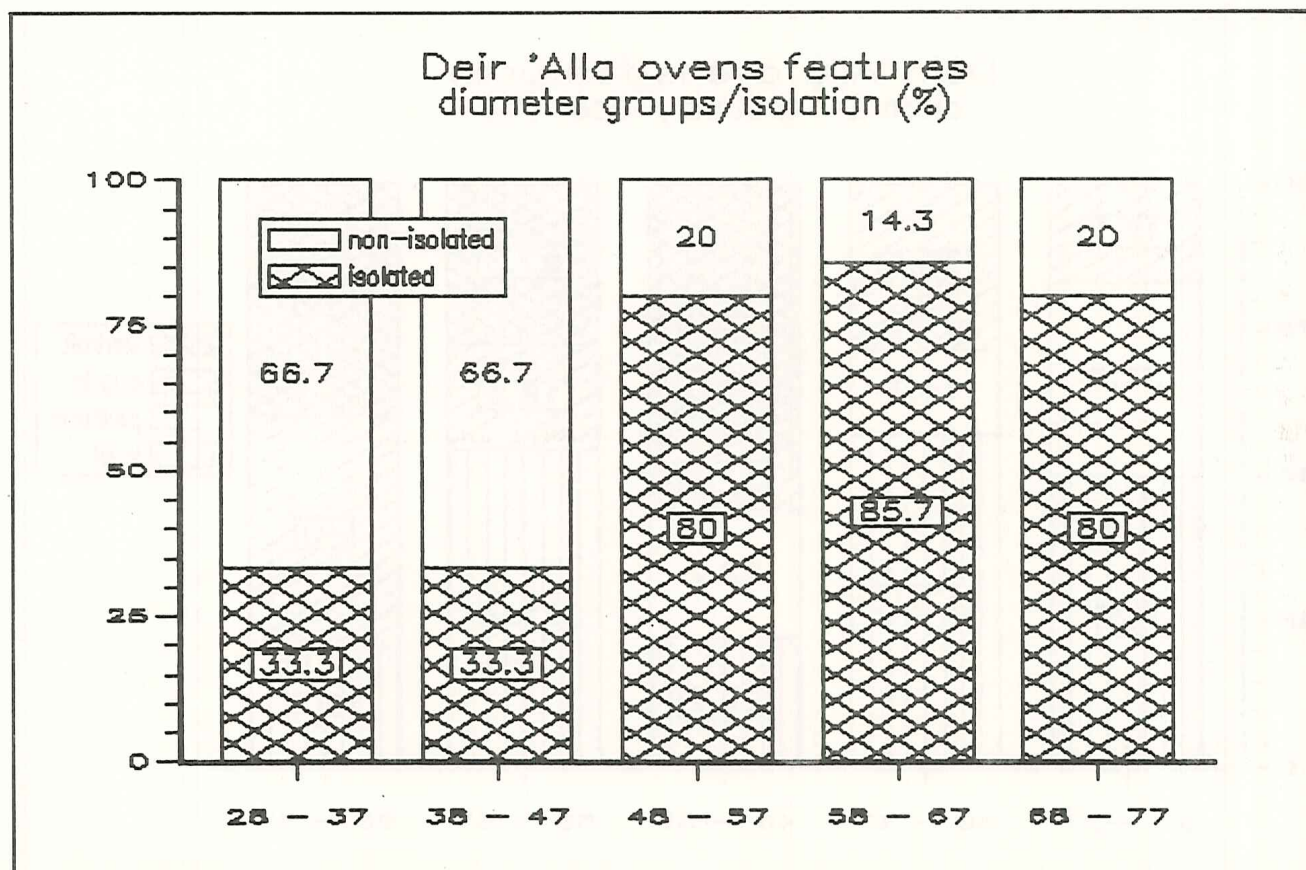


Fig. 9. Insulation type per diameter group (percentages) for the Deir 'Alla ovens.

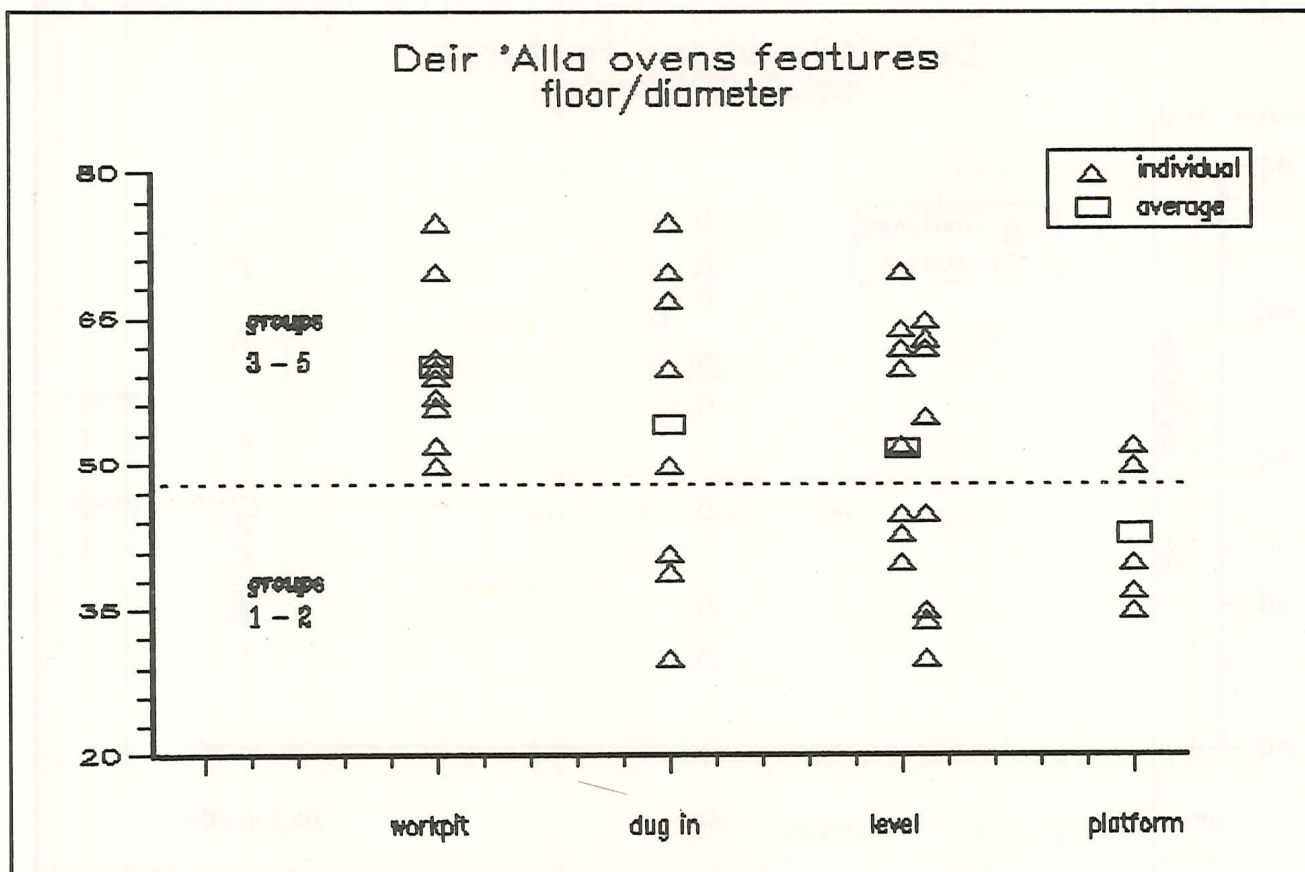


Fig. 10. Relation between diameter and type of setting for the Deir 'Alla ovens.

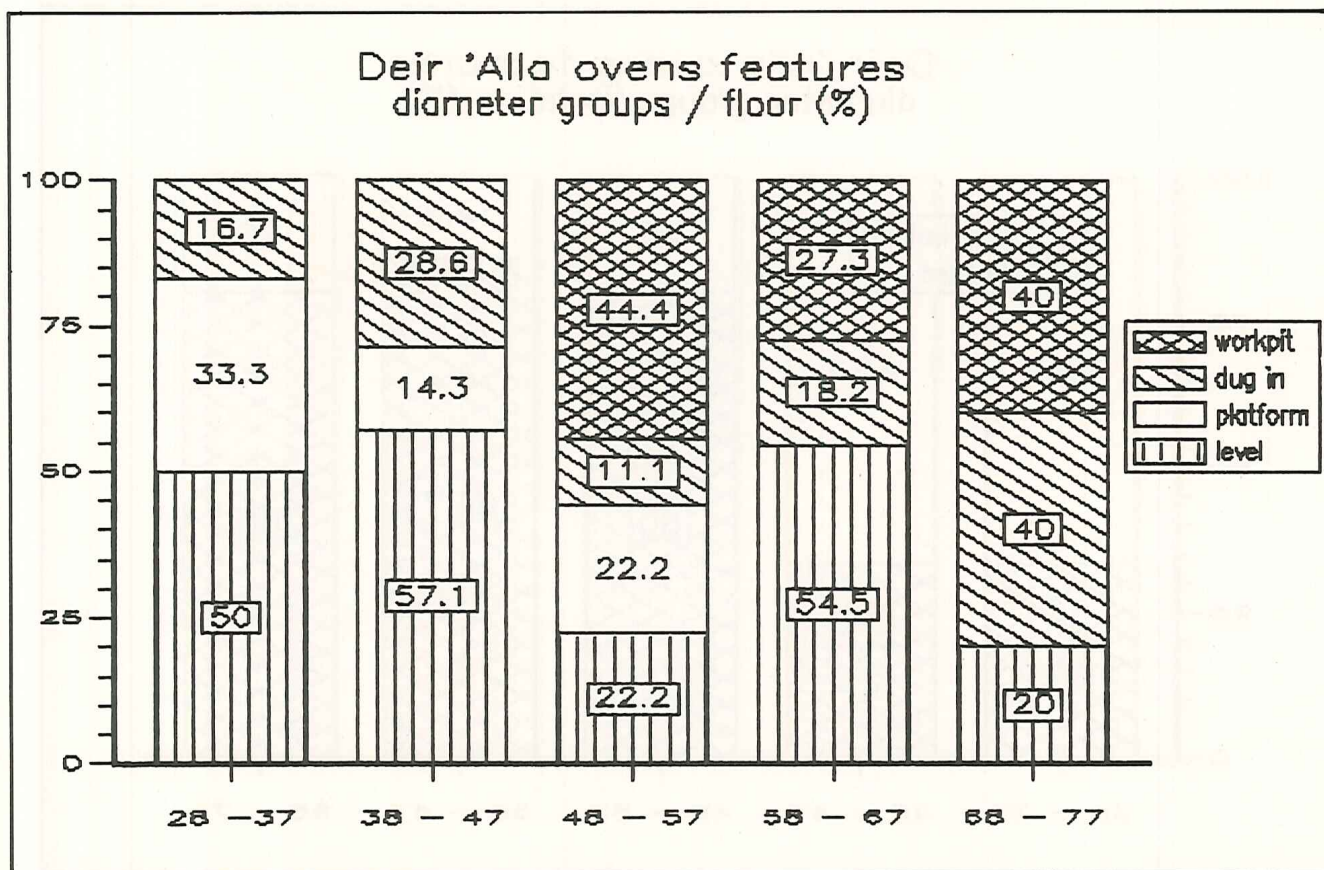


Fig. 11. Type of setting per diameter group (percentages) for the Deir 'Alla ovens.

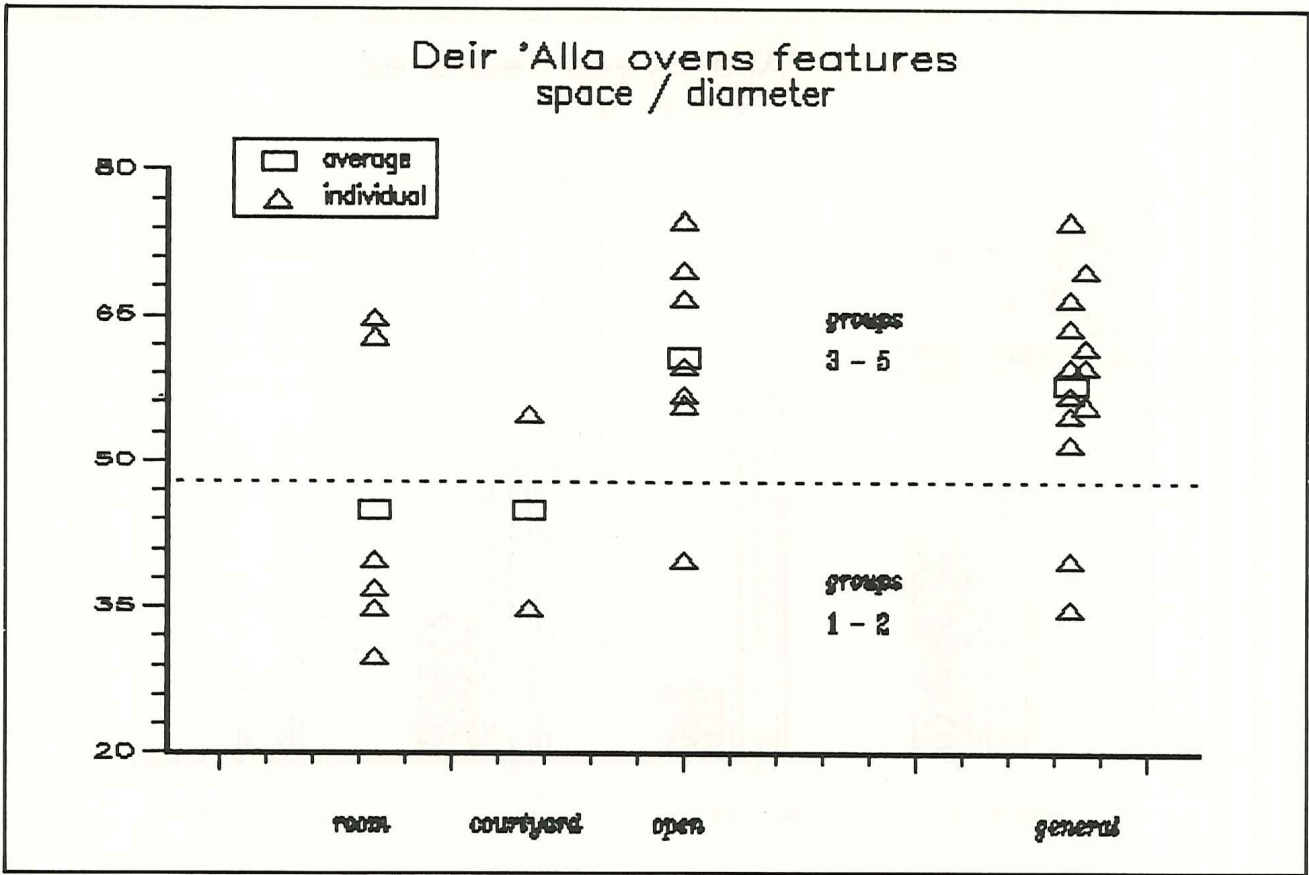


Fig. 12. Relation between diameter and nature of space for the Deir 'Alla ovens.

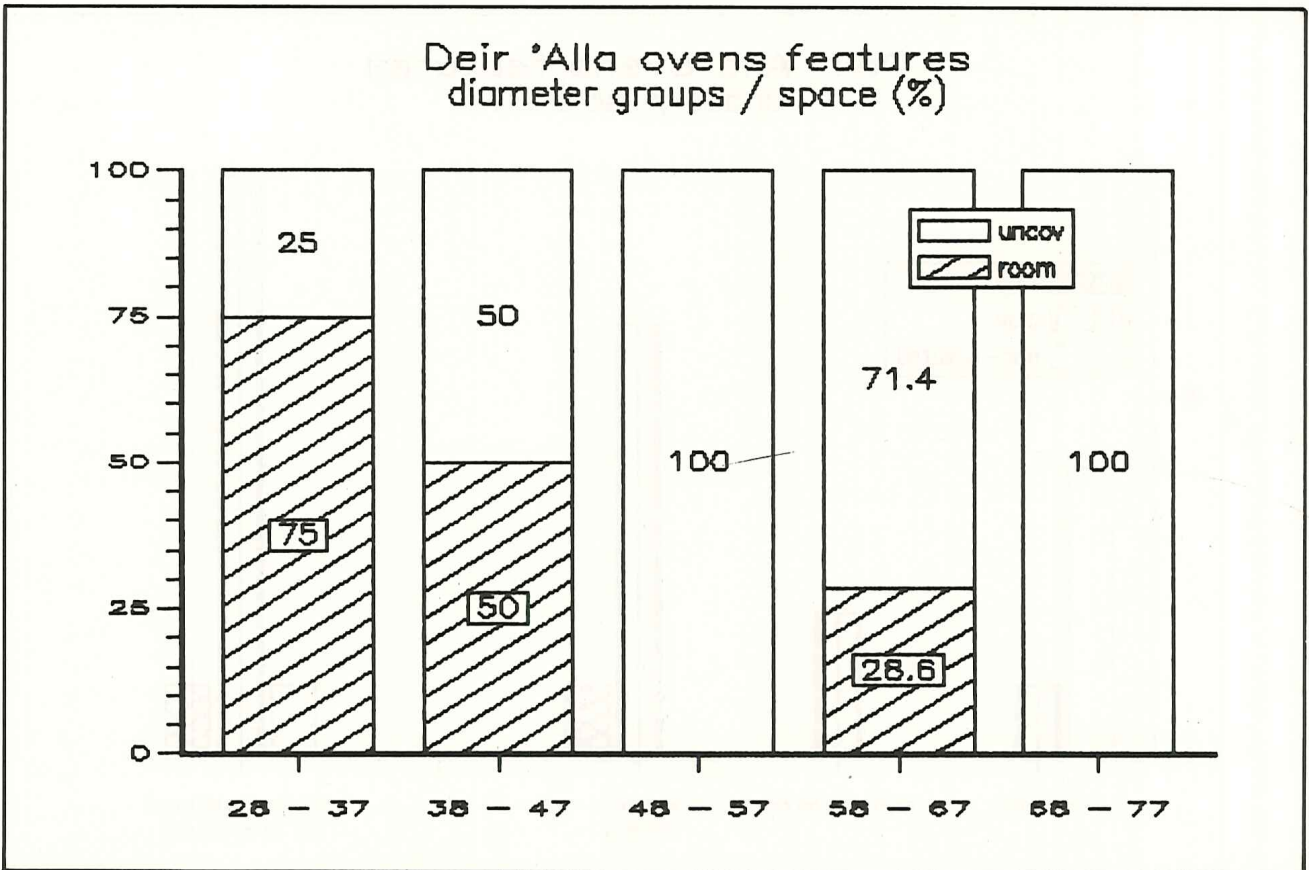


Fig. 13. Nature of space per diameter group (percentages) for the Deir 'Alla ovens.

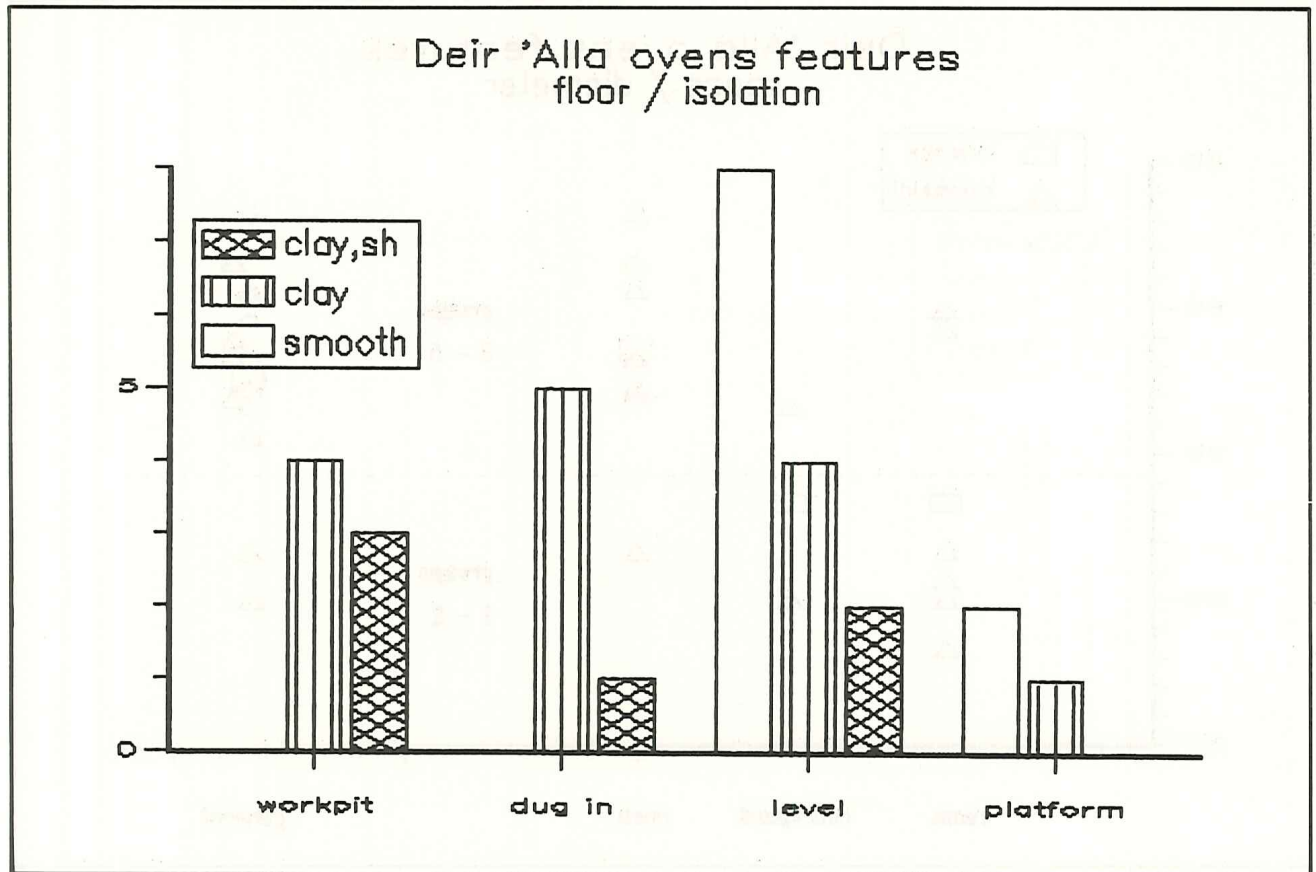


Fig. 14. Relation between type of setting and type of insulation for the Deir 'Alla ovens.

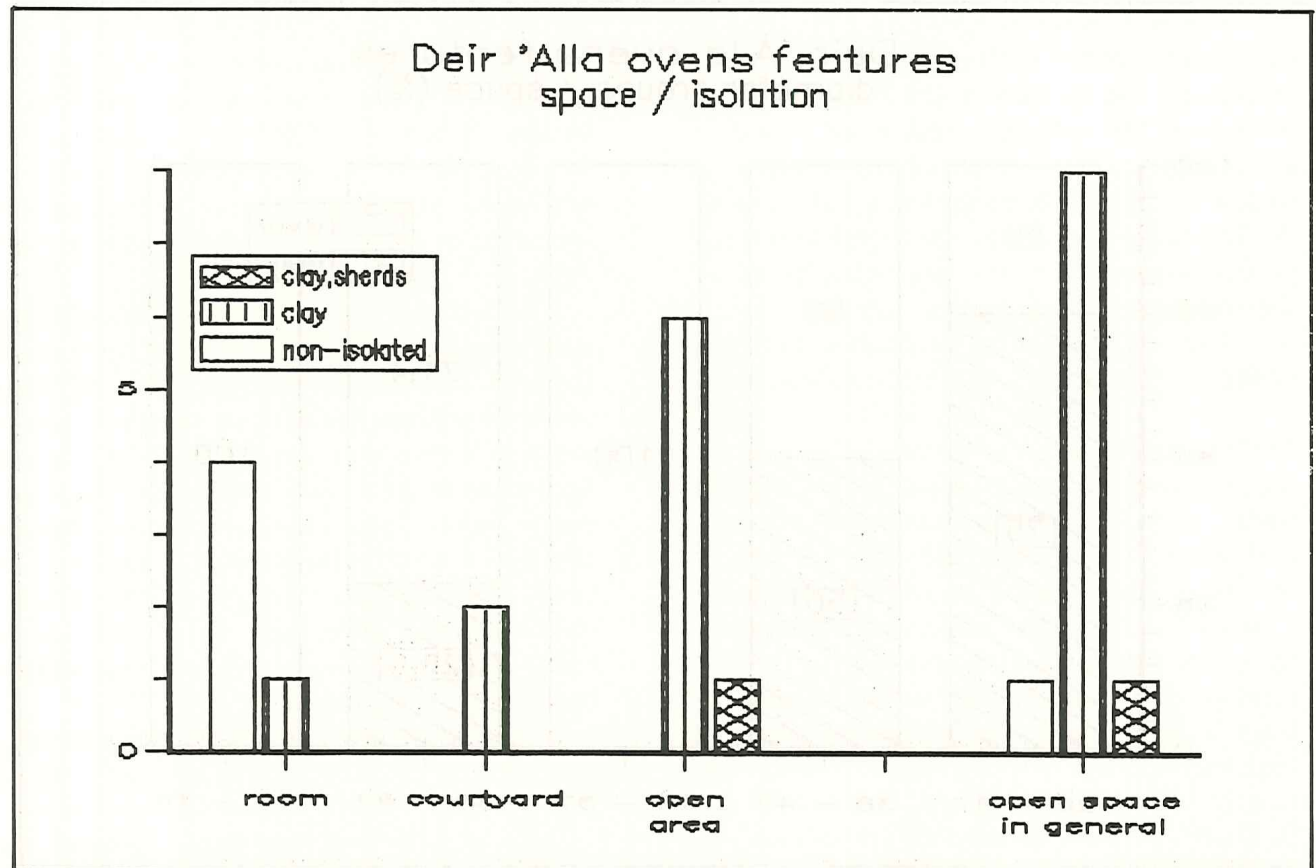


Fig. 15. Relation between nature of space and type of insulation for the Deir 'Alla ovens.

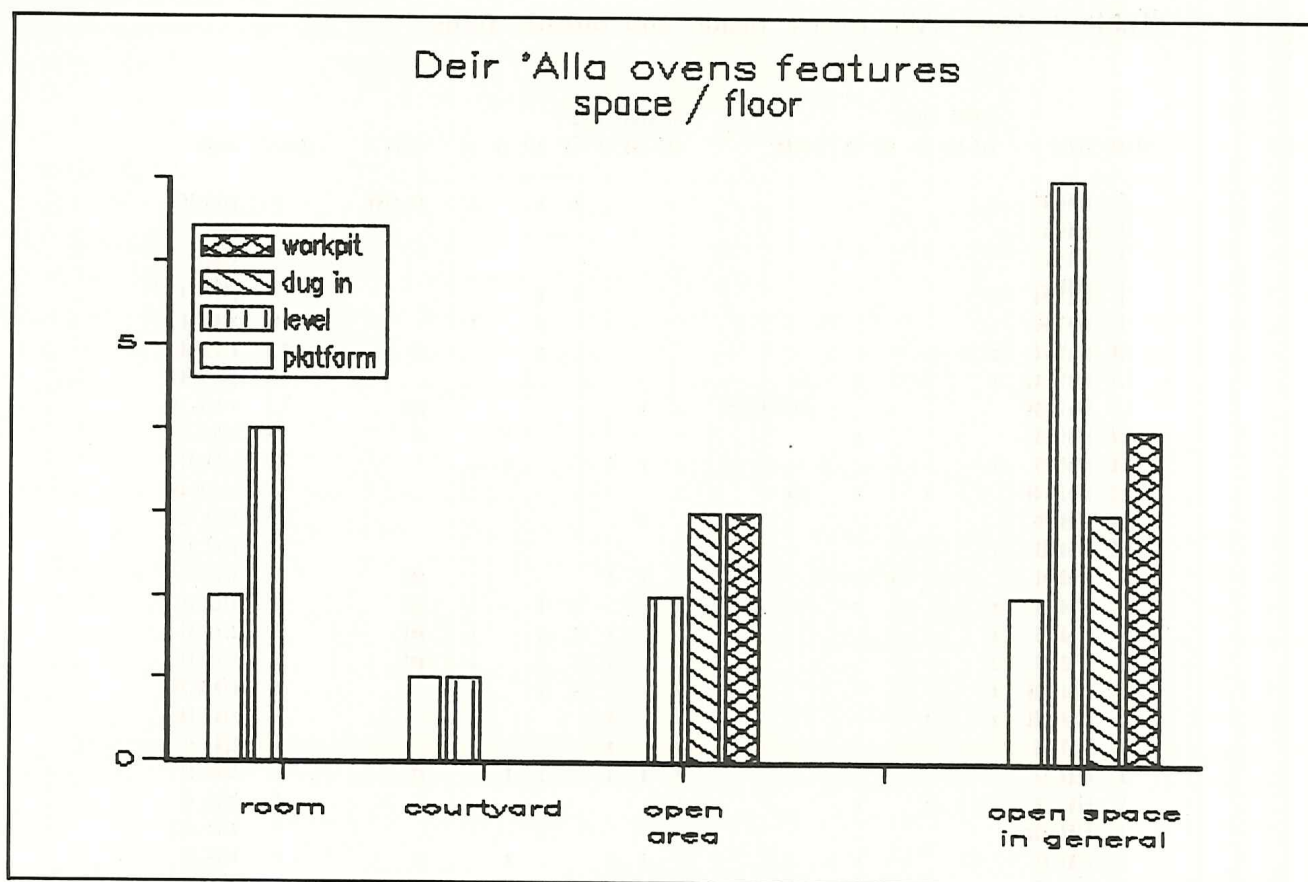


Fig. 16. Relation between nature of space and type of setting for the Deir 'Alla ovens.

The two ovens B/A5.37 and 14 stood in one room directly on the floor, but they are large, and one of them at least was insulated with clay. The fact that both were placed in the same room and apparently used together, makes it probable that this was a 'bakehouse'. At Tell el-Far'ah a room was found with three contemporaneous ovens, and interpreted by the excavators as a 'palace kitchen'.

There is no positive correlation between diameter groups and construction methods.

Finds in and outside the ovens: Table 3 shows the categories 'inside finds' and 'outside finds', representing the finds inside an oven and those in the immediate surroundings of the oven. Finds inside an oven are limited. Usually one finds ash (included in the description 23 times), and sometimes charcoal. The remains of charcoal points to use of wood to start a fire, while the nature of the ash indicates the use of dung cakes to keep the

fire glowing.¹¹ From time to time ovens were emptied of ash. For ovens that had been in use for a long time, this resulted in a hollowing out of the bottom, which is clear, for example, in the case of oven B/B10.50, and which was also the case with the Early Iron Age ovens of Deir 'Alla (Franken 1969: 29).

Sometimes it is stated that this emptying was done every time an oven had been used. If that is so, one would not expect so many ovens to contain thick layers of ash. It seems more probable that the fire in the oven was kept glowing after use, unless the oven was not to be used again for several days. Maybe Hosea 7:6 is to be interpreted in this way. It reads: 'For they have made ready their heart like an oven, while they lie in wait: their baker sleepeth all the night; in the morning it burneth as a flaming fire'.

This tending of the fire in the oven may also give an explanation for the amounts of

11. Dr. R. Neef kindly provided me with the results of his analysis of the botanical samples of Deir 'Alla. The ashes from inside the ovens contained remains

of wood from local trees (poplar, tamarisk and Syrian ash), and different kinds of seeds, that may be found in animal fodder.

Table 3: Deir 'Alla ovens, inside and outside finds.

phase	locnr	inside finds					outside finds							phase	locnr		
		ash	bns	cc	pot	sh	other	ash	bns	cc	lw	pot	sh			sl	other
9	b/b8.80	x									x	x		x	st,clay	9	b/b8.80
9	b/d6.a															9	b/d6.a
9	b/d6.b															9	b/d6.b
9	b/d6.54	x									x	x				9	b/d6.54
9	b/d7.66											x		x		9	b/d7.66
7.8	b/a9.34	x										x			st	7.8	b/a9.34
7.8	b/b10.42	x				x	st									7.8	b/b10.42
7.8	b/b10.50				x		lw,lid,pott	x	x						pln	7.8	b/b10.50
7.8	b/b10.53		x			x								x	st	7.8	b/b10.53
7.8	b/b8.59	x						x	x	x				x		7.8	b/b8.59
7.8	b/c10.46			x		x	pln	x								7.8	b/c10.46
7.8	b/d8.70								x							7.8	b/d8.70
7.8	b/e8.41	x		x												7.8	b/e8.41
6	b/b8.51				x	x			x	x					net	6	b/b8.51
6	b/b8.26	x				x			x		x				net	6	b/b8.26
6	b/e8.43	x							x	x	x			x	net	6	b/e8.43
6	b/e8.42	x							x	x	x			x	net	6	b/e8.42
6	b/b10.26	x						x	x	x	x					6	b/b10.26
6	b/a6.141	x		x						x						6	b/a6.141
6	b/a7.65								x	x						6	b/a7.65
6	b/a8.32							x	x	x		x	x		st	6	b/a8.32
6	b/b4.32	x	x	x		x										6	b/b4.32
6	b/b4.32a											x				6	b/b4.32a
6	b/b4.41					x		x	x			x			st	6	b/b4.41
6	b/b4.59	x					st	x		x						6	b/b4.59
6	b/b4.60					x										6	b/b4.60
6	b/b4.62	x				x			x							6	b/b4.62
6	b/b4.63					x										6	b/b4.63
6	b/b5.45	x	x	x		x		x	x	x						6	b/b5.45
6	b/b5.54							x							st	6	b/b5.54
6	b/b5.55															6	b/b5.55
6	b/b5.57															6	b/b5.57
5.6	b/d9.33	x				x			x			x				5.6	b/d9.33
5.6	b/b8.21					x				x		x			plaster	5.6	b/b8.21
5.6	b/b10.6															5.6	b/b10.6
5.6	b/a6.37									x						5.6	b/a6.37
5.6	b/a10.14			x		x										5.6	b/a10.14
5.6	b/b5.65									x						5.6	b/b5.65
5	b/d10.20								x							5	b/d10.20
5	b/d10.2	x					nlst		x							5	b/d10.2
5	b/d10.29	x				x										5	b/d10.29
5	b/b6.23								x	x						5	b/b6.23
5	b/b6.21	x				x										5	b/b6.21
5	b/b6.27	x														5	b/b6.27
5	b/a5.37											x				5	b/a5.37
5	b/a5.14	x		x		x			x	x						5	b/a5.14
5	b/b6.16					x	st		x				x		st	5	b/b6.16
2.3	b/a6.54								x							2.3	b/a6.54
2.3	b/a6.42															2.3	b/a6.42
2.3	b/a5.27	x	x						x						reed	2.3	b/a5.27

locnr = locus number; findsin = finds inside the oven, bns = bones, cc = charcoal, pot = complete pottery, sh = sherds, st = stone(s), lw = loonweight, lid = ovenlid, pot = complete pottery, pln = plantmaterial, nlst = grinding stone; findsout = finds outside the oven, in the same space or area, sl = silo, net = metal objects.

sherds found inside. Sherds have good heat-preserving qualities. If a glowing fire is covered with sherds, and air is kept away from it, it may go on glowing for days, practically without consuming any fuel. Oven B/D10.29 had a thick ashy layer, covered with the upside-down base of a large vessel.

The finding of complete pottery in an oven is rare, but it does occur at Deir 'Alla in two cases. Oven B/B10.50 is interpreted as having been turned into a storage bin, but B/B8.51 seems to have been in use as an oven. A complete cooking pot was found inside that originally may have stood on top (Pl. I, 2). This indicates the use of the oven as a cooking installation, while the occasional presence of bones makes it possible that it was also used to roast meat. The grinding stone found in B/D10.2 may have fallen in later.

The group 'outside finds' includes everything that has been found in the same room or courtyard (if present) or in the immediate surroundings of the oven.

Kramer describes a modern traditional kitchen in western Iran as containing an oven, one or more storage bins made of clay and very often also a loom (1982: 99-100). This 'kitchen' may well be outside the house

during summer, in the courtyard or maybe even in open areas.

At least five times ovens in combination with complete pots, silos and looms (indicated by the presence of a number of loom-weights) are found at Deir 'Alla, twice with pottery and loom, and once with pottery and silos. In itself this does not seem particularly significant, but it does indicate the presence of 'kitchens' similar to those described by Kramer and Christensen.

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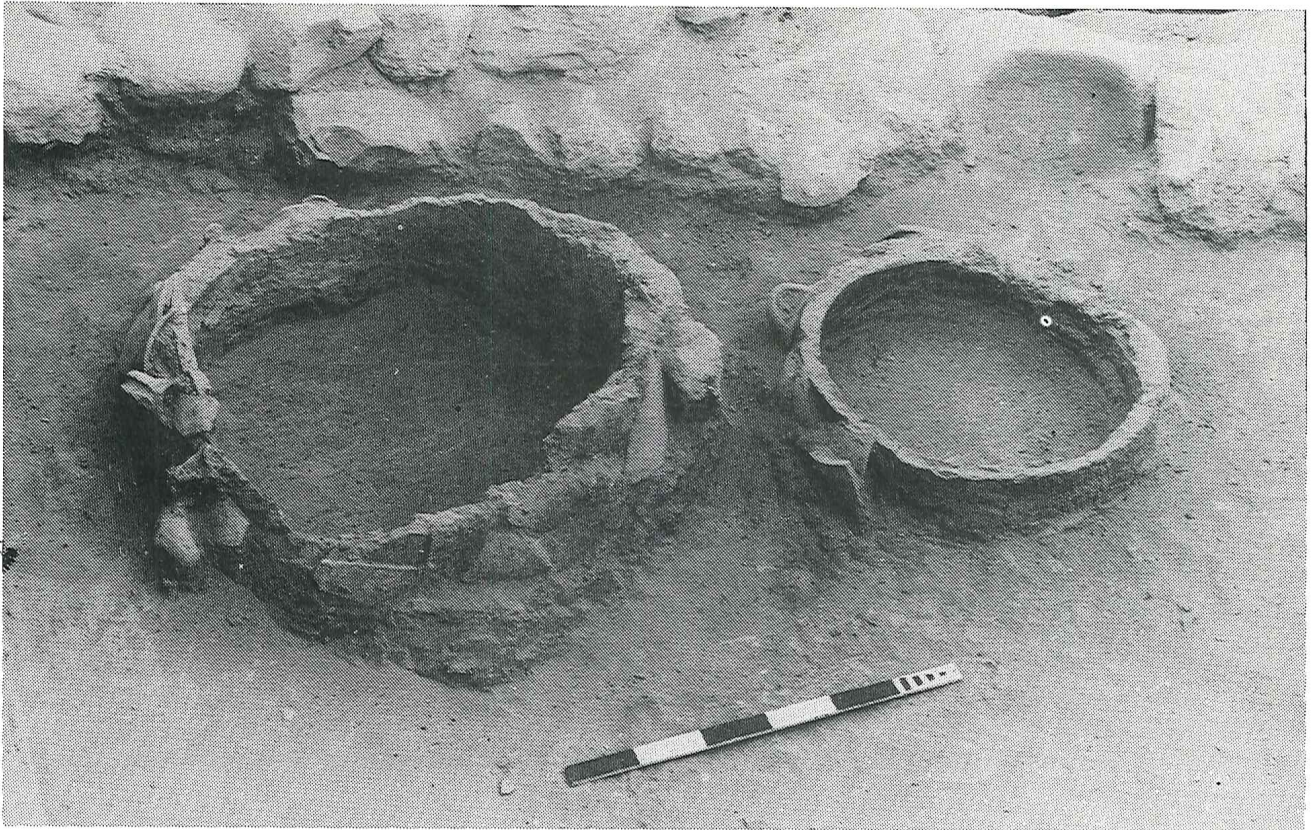
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1. Tell Deir 'Alla ovens with a clay-and-sherds layer.



2. Tell Deir 'Alla oven B/B 8.51, containing a complete cooking pot.