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FOOD RATIONS AND PORTIONS IN CRETAN HIEROGLYPHIC DOCUMENTS*

Introduction

In working with Cretan Hieroglyphic, my goal has not been to decipher the language of the script but rather to understand (1) how the scribes organized information on the clay documents, (2) how the administrative process worked, and (3) what role the various types of clay documents and Hieroglyphic sealstones played in that administrative process.

My procedure has been to look at the Hieroglyphic corpus as a whole, to take each document as published in *CHIC*, to try to understand how the numbers worked (do they add up?; are there two lists of totals: totals paid and totals not paid?), to reorganize the texts so they conform to a modern itemized receipt or budget (my "normalization" process), and then to take what progress I make in reading one document to help me understand other documents.

In this paper I will use this method and my three goals to shape my discussion of two sets of Hieroglyphic documents from Knossos that record the assessments, collections and deficits, and redistribution of a quantity of food that includes wine, grain or bread, figs, olives and olive oil, and cattle.

In what follows, I shall usually omit the transnumerations of the texts (these can be found in *CHIC* and on my Hieroglyphic website: <http://people.ku.edu/~jyounger/Hiero>) and my suggested phonetic values. My purpose in omitting this information is simply to make the following discussion more readable.

Knossos Set 1 (Pl. LXIXa)

I start with clay bar #058, which is complete (Pl. LXIXb). It begins with the common header (𐀓 𐀔 𐀕) followed by a very large number, **1640**, undoubtedly an assessment, and then a list of six words followed by small numbers that total 330, probably partial receipts. Of the header, the last sign (𐀕 061) is always a terminal and probably means just that; the first sign (𐀓 042) is always an initial and looks like the predecessor to AB *a*, and the second sign (𐀔 054) may be the predecessor to AB *de*. The header *A-DE* is common in Hieroglyphic and may be related to the common Linear A header *A-DU*. The other words are not at present meaningful, but since most are *hapax legomena*, they are probably names.

With 330, we need 1310 to come up to the assessment **1640**, and we can find it by associating two other documents, bars #057 and #062 (see Pl. LXIXa). I will not discuss these documents here—they are not central to my main theme.

But the 330 commodities that are listed on bar #058 are central. And we can locate these on other documents. Bar #052 (Pl. LXXa) seems to have two lists, one of five small numbers and another of two large numbers, **290** and **710**, which must be assessments since they add up to a round 1000. When we normalize this bar we read sides a and c together (sides that are

* This study adapts texts from J.-P. OLIVIER and L. GODART, *Corpus Hieroglyphicarum Inscriptionum Cretae* (1996), hereafter *CHIC*. I am deeply indebted to J.-P. Olivier for the fonts, Malia-Maigre and Malia-Gros, specially designed for writing Cretan Hieroglyphic in Microsoft Word in Mac OS X. I am also grateful to Brent Davis for reading a version of this paper at the DAIS Conference. Proposed phonetic values for Hieroglyphic signs are given as italicized capitals (e.g., *DE*); doubtful signs are underlined in both text and illustrations; document numbers in bold refer to seal impressions in *CHIC*; numbers in bold are those actually given in the texts, while regular numbers are those restored in the texts. For some of the signs I give whimsical names to describe their appearance (e.g., "lightning-mountain-top" *167 𐀔) and to make them more memorable.

opposite each other—these have the small numbers) and sides b and d together (again, opposite each other—these have the large numbers); in fact, almost all bars make good sense when the opposite sides are read together (is there any influence from hieroglyphic prism seals?).¹ The preserved small numbers add up to 270, but if 20 is restored before the break on side c, then they would add up to the smaller of the two larger numbers, **290**.

What kind of number is this? The word that precedes it is “sistrum-icetong” $\Psi \text{ ☉}$ (057-092), which is obviously equivalent to AB *ki-ru*, and which I have demonstrated was the Hieroglyphic equivalent of Linear A KI-RO,² meaning “not paid” or “deficit.” We then have a neat reading: an assumed target of 1000, of which **290** is owed and therefore **710** has been paid (*KU-RO?*).³

What is the commodity? I would guess it is the logogram at the end of the heading, the “frond” sign Ψ *174, which also functions as a phoneme, the predecessor to AB *re*, which also functions, albeit infrequently, as a logogram in Linear A.⁴

If we place bar #052 next to #058 (Pl. LXIXa) we see immediately how they match: a similar heading, the same logogram *RE*, and most of the same numbers or totals.

Similarly, we can adduce another document, a fragmentary crescent sealing #020 (Pl. LXXb) that appears at first glance to offer little information. But its two fragmentary statements contain signs found in our major document (#058).

The crescent was also impressed by a sealstone. Although *CHIC* does not consider the impression relevant, it does give another logogram, *GRA*, as well as the sealstone term for “total” (“mallet-eye”). “Mallet-eye” ($\text{☉} \text{ ☉}$, 044-005) occurs almost exclusively on sealstones (some 75 times), but the word is also written on two or three clay documents that are also impressed by seals⁵ having this term and/or its companion term, “mallet-arrow” ($\text{☉} \text{ ☉}$, 044-049), the other transaction term that appears almost exclusively on sealstones. It has long been thought⁶ that these two sealstone terms are either complementary or contradictory – the latter as it turns out.⁷ “Mallet-eye” on seals ($\text{☉} \text{ ☉}$, 044-005) probably means the same as *KI-RU* (“owed”) on documents, while “mallet-arrow” on seals ($\text{☉} \text{ ☉}$, 044-049) probably means the same as *KU-RO* (“paid”) on documents.

When we add this crescent to the others (Pl. LXIXa), we can see how such a sealing gives an individual piece of information, while a bar (like #052) can either give a summary of such individual pieces of information, or (like bar #058) be part of a series that places all this information into context. From this, I gather that crescents probably record the arrival (or not) of commodities into the palatial administrative system; since they are sealings on cord, they probably accompanied the commodity they refer to.

To summarize: This set of documents (Knossos Set 1; Pl. LXIXa) records the assessment of 1640 unspecified items, and the collection as well as deficits of some of these.

bar #058 baldly records the grand assessment totaling 1640 unspecified items

bar #062 lists four large assessments [$\text{☉} \text{ ☉}$] totaling 1210 of these items

crescent #020 records some individual collections

bar #052 lists 290 collections not paid [$\Psi \text{ ☉}$] (leaving 710 paid [$\text{☉} \text{ ☉}$]) out of a total of 1000

bars #057 and #058 summarize 430 collections, which, when added to the 1210 assessments on bar #062, balance the grand assessment of 1640

1 J.G. YOUNGER, “New Observations on Hieroglyphic Seals,” *SMEA* 28 (1990) 85-93.

2 J.G. YOUNGER, “Cretan Hieroglyphic Transaction Terms: ‘Total Paid’ and ‘Total Owed’,” *Cretan Studies* 9 (2003) 301-316.

3 The *RO* ($\text{☉} \text{ ☉}$ 070) is certain; the sign that precedes it is one of the two branch-signs (☉ 028 or ☉ 029).

4 Cf. HT 27a.2 and 41a.3, KH 8.1, and PH 31a.3 (SUS+SI+RE); these are published in L. GODART and J.-P. OLIVIER, *Recueils des inscriptions en Linéaire A* (1976-1985), and online at <http://people.ku.edu/~jyounger/LinearA/>.

5 *CHIC* #018 (mirroring its seal impressions #140 & #158), #059aA, and probably on #066c.

6 See the discussion in YOUNGER (*supra* n. 1).

7 See their use on clay document *CHIC* #059aA.

Knossos Set 2

Another bar #053 (Pl. LXXc) takes up 330 of the 430 collections and itemizes them in two lists. First, the commodities: **170** pot-items 𐤃^* 150, and **160** arrow-items \uparrow^* 176;⁸ it then reallocates these (list 2): **110** pot-items 𐤃^* 150, and **170** arrow-items \uparrow^* 176. The intervening side c (between the two lists) presents 50 cattle 𐤃^* 152 (inscribed as two encircled [corralled?] sub-herds of 20 and 30 each).⁹ Since the 50 cattle plus **110** pot-items totals 160, I assume that List 2+cattle is some kind of restatement and reorganization of List 1.

I will return to the inscription on the end of the bar (side e).

On bar #065 (Pl. LXXd), 340 of the original 430 commodities¹⁰ are broken down in detail; this bar comprises a complete and careful summary of two fragmentary bars #066 and #067 – these all make up what I call Knossos Set 2 (Pl. LXXIa).

All three documents list specific commodities: some kind of pot-item (by itself [𐤃^* 161] or accompanied by the double-ax [𐤃^* 175+*161]), some kind of cattle (by itself [𐤃^* 152] or accompanied by an adjunct [𐤃^* 089+*152, #065b.4] that may also appear by itself [𐤃^* 171, #067a.2]), some wine (𐤃^* 156), some kind of grain (𐤃^* 180 or 𐤃^* 182),¹¹ some unknown commodity (𐤃^* 178), some oil (𐤃^* 158), another unknown item (“lightning-mountain-top” 𐤃^* 167), and some figs (𐤃^* 155).

Now that we have some idea of what these 340 commodities are, in detail, we return to bar #053 (Pl. LXXc) that concerns 330 of these commodities in two groups of **170** and **160**. This time, we look at the inscription on the end of the bar (side e). End-inscriptions occur rarely;¹² presumably when stored on a shelf, the end would convey identifying information, like the label on a file folder. This inscription simply says “harp-man” **22** (𐤃^* 058-002). The man sign (looking like a bald doll’s bust) occurs frequently enough that I designate it *VIR*₂. It always occurs at the end of a signgroup, probably as one of the *VIR* logograms (person, personnel). What harp-man means, I do not know, but it may have something to do with the appearance of “crowned-man” (𐤃^* 003) that terminates the heading at the top of this document #053, announcing (I imagine) the subject of the inscription: people and commodities (including cattle).

It is therefore not coincidental, I think, that the **22** harp-men (𐤃^* 058-002) divide into the number of the commodities (330) a neat 15 times, suggesting a distribution among these **22** harp-men of 15 sets of commodities per harp-man. These harp-men may be workers, each getting 15 sets of commodities (a half-month’s worth), or each might be an overseer of 15 workers, each of whom would be getting a single set of rations. If our harp-men are supervisors, special people, then perhaps that is the meaning of the crowned-man (𐤃^* 003) in the heading.¹³

Rations/Portions

This distribution of commodities among people allows us to think in terms of provisions and/or rations. Typical clusters of comestibles, for example, occur on several Hieroglyphic and Linear A documents. For example, Linear A tablet 114 from Ayia Triada (Pl. LXXIb) lists four

8 Logogram \uparrow^* 176 appears only on this document.

9 These two signs 𐤃^* , which *CHIC* numbers 074 and 075, appear only on this document. I take it not coincidental that the two circles contain two and three dots (10s, not dashes or strokes, 100s), respectively, signifying groups of 20 and 30.

10 330 on #053 and another 100 restorable on either crescent #036 or #046.

11 For the possible identification of these commodities, see J.G. YOUNGER, “The Cretan Hieroglyphic Script: A Review Article,” *Minos* 31-32 (1996-1997) 379-400, esp. the discussion concerning the conventional order of commodities in Hieroglyphic and Linear A (pp. 390, 397-398).

12 Only four other bars have an inscription on their end: #054 (Knossos; recording the difference between assessment and contribution), #056 (Knossos; the same?), #061 (Knossos; recording the total), and #117 (Malia; trace of a sign).

13 Sign 𐤃^* 003 looks like the bust of a human figure with a branch over its head; I have designated it *VIR*₂ (𐤃^* 001 *VIR*₁, 𐤃^* 002 *VIR*₂). The sign appears only four other times (#049.d, #060.a, #068.r.A, and #109.a). Bars #060 and #109 are not helpful, but tablet #068 (Pl. LXXId) cites sign 𐤃^* 003 among a list of commodities, as if also listing personnel.

commodities and two types of wine (VINa and SA VINa). If we combine the two types of wine to make 10 units, and combine the oil and BOS to make another 10 units, then these are in a 1:1 ratio with GRA — plus a small amount of figs.

Of course I would expect the units of liquids to be different than the units of solids like figs; I have no idea how GRA would be measured, but if in loaves that might help explain the simple ratios between it and the other comestibles.

If we imagine that these comestibles were destined for 10 people at SA-RA₂ (and it would be difficult to imagine any other animal eating such comestibles), each person would get 1 portion of wine, 1 portion of OLE+BOS,¹⁴ and 1 portion of GRA — plus a small amount of figs.

Compare another Linear A tablet, HT 121 (Pl. LXXIc), which sets out a similar set of ratios. I concentrate on the comestibles cited for SA-RA₂: if we divide the figs (FIC) in half to produce a base unit (1), and make the other commodities proportional to it, then we get FIC=1, VIN = 1 ½, BOS = 1 ½, OLE = 2, and GRA = 2 ½. Again, if we imagine these food items destined for people, we could imagine that a single person at SA-RA₂ would be getting 1 portion of figs, a portion and a half of wine and of BOS, 2 portions of oil, and 2 portions and a half of GRA.

If BOS were a portion of meat and GRA a loaf of bread (this is just a suggestion for narrative purposes), then we could imagine one person getting a cup of wine or two, a loaf of bread, some olive oil for dipping, and a cut of meat — plus a small amount of figs.

Let us return to the Hieroglyphic documents.

Like bar #053 that lists commodities associated with harp-men, tablet #068 (Pl. LXXId) sets out amounts of commodities, including personnel (crowned men 𐎗 , VIR₂).

The ratio of wine (𐎗) to person (𐎗 : 𐎗 ; VIN : VIR₂) is 2:1. And if the double-ax commodity 𐎗 is added to GRA 𐎗 (plus 𐎗 , a fraction?, perhaps 1/8),¹⁵ then that combined commodity 𐎗 is also approximately in a 2:1 ratio with olives 𐎗 .

If we think of these staples (wine, GRA, olives, and “double ax” 𐎗) as being distributed among the 5 VIR₂ 𐎗 , we obtain some slightly complex ratios.¹⁶ We can make these ratios simpler, however, if we combine the double ax and OLIV, producing: VIN 2 per person, 𐎗 +OLIV 1.95 per person, and GRA 3 per person.

In other words, each person is getting 2 portions of wine, a little under 2 portions of double ax plus olives, and 3 portions of GRA.

If double ax 𐎗 is a portion of meat (like BOS in the Linear A examples) and GRA were a loaf of bread, then we could imagine one person getting a large cup of wine, a large loaf of bread, and some olives to accompany a small cut of meat — perhaps not a feast, but certainly a satisfying lunch.

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14 The juxtaposition of OLIV+double ax 𐎗 on the previous Hieroglyphic document #068 and of OLE+BOS on HT 114 suggests that double ax 𐎗 may be a portion of meat.

15 This sign appears only on this document. If it is a fraction, as CHIC seems to think, the fact that it occurs twice in this document, each time in threes, 𐎗𐎗𐎗 , implies that a fourth occurrence of the sign would equal a whole number or a fraction that already has a sign. Unless 𐎗 is another and idiosyncratic way of writing 1/4, it could designate 1/8. 𐎗𐎗𐎗 would then mean 3/8, while four of these signs (𐎗𐎗𐎗𐎗), totaling 1/2, would be conventionally written as 𐎗 (see the caption to Pl. LXXIa).

16 𐎗 1 3/8? = 0.275/person; 8 3/8? OLIV = 1.675/person; 10 VIN = 2/person (assuming 𐎗 is a person).

LIST OF ILLUSTRATIONS

- Pl. LXIXa Knossos Set 1: crescent #020; bars #052, #057, #058, #062.
Pl. LXIXb *CHIC* #058, bar from Knossos.
Pl. LXXa *CHIC* #052, bar from Knossos.
Pl. LXXb *CHIC* #020, crescent sealing from Knossos, plus its seal impression #145 (*CMS* II 8, no. 78).
Pl. LXXc *CHIC* #053, bar from Knossos.
Pl. LXXd *CHIC* #065, bar from Knossos.
Pl. LXXIa Knossos Set 2: bars #067, #066, #065.
Pl. LXXIb HT 114, tablet from Haghia Triada.
Pl. LXXIc HT 121, tablet from Haghia Triada.
Pl. LXXId *CHIC* #068, tablet from Knossos.

contribution summary on crescent #020	contribution summary on bar #052	contribution summary on bars #057, #058, #062
		#057a 10
		#057b 20
		#057c 20
		#057d 50
		total 100
#020d Ψ	#052a2 Ψ 40	#058b1 Ψ 80
#020b	#052c1]50	#058b2 50
	#052a1]2 60	#058c1 60
	#052c0 <20>	#058c2 20
	#052c3 70	#058d1 90
	#052c2 50	#058d2 30
	#052b]X 290	
#020γ (#145) {0}	#052d] 710	
	total 1000	total 330
		#062a1 500[
		#062bB-A] 140
		#062cB-A] 30
		#062dB-A] 540
		#062a2 X 1210
		total 1210
		total #058a X 1640

Knossos Set 1

a

CHIC #058

As on the bar

- | | | | |
|----|---|------|-------|
| a. | X | 1640 | |
| b. | | 80 | 50 |
| c. | | 60 | X 20 |
| d. | | 90 | 30 |

CHIC normalizes

- | | | |
|-----|---|------|
| a. | X | 1640 |
| b1. | | 80 |
| b2. | | 50 |
| c1. | | 60 |
| c2. | X | 20 |
| d1. | | 90 |
| d2. | | 30 |

b

commodity summary on bar #067	commodity summary on bar #066	commodity summary on bar #065
	c]⊕† 1	a1 X △↑ ⊘↑⊕† 1
d X •[a2 X ⊙⊘ 1
c2 X ⊙Ψ 1		b1 X ⊙Ψ 1
	d2 t	b2 ⊘ t
		b3 300
a2 } 100 or 1		b4 ⊕ 1
a4 ⊘ 1		c1 ⊘ 2 t
b]t 1	d1]t 12	c2 t 32
c1]⊕ 1		c3 ⊕ 1
	b]⊗	c4 X ⊘⊙ ⊕ t
total 5?	total 13 1/6	total 340
		d1 △↑ 1
a1]t	a1]t	d2 ⊘ t
	a2 Δ t	d3 Δ t
a3 t	a3 t	d4 t
total 5/6	total 2	total 2

Knossos Set 2

If these fractions have the following values: t=1/2, l=1/3, ⊕=1/6, then #066a totals 2 (t+l = 5/6; lt = 2/3; ⊕ = 1/2), and #065a-c totals "340" and d totals 2. On #067a3 and #065d4, lt would be another way of writing 1/2.

HT 114

line	statement	logogram	numbers
a1	KI-RI-TA ₂		
a1-2	SA-RA ₂	GRA	10
a2		OLE	7
a3		FIC	1
a3		VINa	1
a3-4		BOSm	3
	<i>vacat</i>		
b1		SA VINa	9
b2-4	<i>vacant</i>		

CHIC #068

rA	⊘	10
	⊕	5
	⊘	1 llll
rB	⊕	15
	⊘	8 llll
v	<i>vacat</i>	

b

HT 121

line	statement	logogram	numbers
1	KI-RI-TA ₂	OLE+QE+DI	10
2	SA-RA ₂	GRA	5
2		OLE	4
3		FIC	2
3		VINa	3
3-4		BOSm	3

c

d