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xšnaoθrahe ahurahe mazdā

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Special Issue: Discussions in Assyriology

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The Sumerian Expression a-ra₂ X-kam and the Use of Installments in the Ur III Administration

Magnus Widell
(University of Liverpool)

Abstract

This short communication investigates the Sumerian expression a-ra₂ X-kam, which was used to denote ordinal numbers in the Ur III period, typically to rank in a sequential order deliveries/receipts within the state administration. The literal and the cognitive meanings of a-ra₂ X-kam remain unchallenged, and the article will focus on the practical application of the expression within the Ur III state bureaucracy, and its significance for our overall understanding of the administrative and archival procedures of the period. The use of sequentially ordered installments in the Ur III administration supports the hypothesis that many Ur III texts may have been written *post factum*, and suggests that such texts were produced anywhere from a few days up to several weeks after the economic transactions they document would have occurred.

Introduction

The Ur III period (conventionally dated from 2112-2004 BC according to the so-called Middle Chronology) is commonly referred to as one of antiquity's most well-documented administrative systems.¹ Scholars

¹ I am most grateful to all the participants in the conference, who contributed to a very productive and pleasant event, and offered a range of valuable insights on the topic of my paper, many of which have found their way into this article. I am also indebted to Seth Richardson, for kindly reading and commenting on an earlier version of the study. Responsibility for remaining deficiencies is, of course, my own.

All references to cuneiform texts in this article are according to the abbreviations and CDLI P-numbers used by the *Cuneiform Digital Library Initiative (CDLI)* at <https://cdli.ucla.edu/>, accessed on January 4, 2021.

have estimated the number of Ur III economic and administrative cuneiform tablets kept in various museums and private collections around the world to approximately 120,000, of which some 100,000 are now available to the scholarly community in some form.² Such numbers are certainly impressive, but the fact remains that only a fraction of these texts have been published in translation, and translated texts have not always been subjected to more serious forms of analysis or interpretation. The translation of the texts into a modern language (rather than their understanding) have often remained the focus in the rare (and laudable) cases where Ur III text editions have ventured beyond merely offering Sumerian transliterations and/or line drawings of the tablets.³ The problem is well-known among students and scholars of the period, and Leo Oppenheim's lamentation of the regrettable state of Ur III text editions, published some 70 years ago in the preface to his ground-breaking study on the Ur III administration, remains depressingly befitting to this day:⁴

As a matter of fact, the steadily and rapidly increasing number of published texts did everything but attract new scholars to this important group of documents; the highly valuable information which they contain remained buried in the usual type of impressive looking text-publications with copies and indexes (of personal, divine and geographical names) accompanied by very cautiously styled remarks as to the content of the individual tablets.

One explanation for this ongoing situation is no doubt the very large number of texts that the Ur III period has left behind. Out of sheer necessity, scholars have often (and perhaps correctly) focused on quantity rather than quality, when making new Ur III texts available to the academic community.⁵ Another reason, which is less frequently acknowledged among Ur III scholars themselves is the highly complicated state of text transmission, and the fact that translating and analyzing Ur III administrative and economic texts remains a difficult and time consuming endeavor. The administrative and technical jargon encountered in the Ur III texts often appear overly convoluted, entirely superfluous, or even contradictory. As recently argued by Jacob Dahl, the highly specialized terminology used in the Ur III texts can often (only) be elucidated with the help of a broader understanding of the texts themselves, and the administration to which they belonged.⁶ The prominent assyriologist Ignace Gelb taught us many years ago that an overall understanding of the texts can only be acquired when they are studied within their administrative and archival contexts.⁷ Then again, our reconstructions of those administrative and archival contexts rely almost entirely on our understanding of the texts.⁸ With this obvious dilemma of circularity in mind, it is important to emphasize that every single Ur III tablet, in and of itself, performed an administrative and/

2- The *Database of Neo-Sumerian Texts (BDTNS)* returns a total of 101,012 Ur III texts (<http://bdtns.filol.csic.e>, accessed on January 9, 2021), although as pointed out by Manuel Molina (2016: §2), approximately 1/3 of these texts have only been made available through their cataloguing data, or as scanned images of “unpublished, unassigned” tablets.

3- Some notable exceptions to this rule include Oppenheim 1948; Jones & Snyder 1961; Grégoire 1970; and Dahl 2020.

4- Oppenheim 1948: vii.

5- See further e.g. the discussion in Englund 2011: 231-232.

6- Dahl 2020:1; see also Dahl 2010.

7- Gelb 1967.

8- Other important sources of data on the Ur III society, such as material culture or ethnography, have only played a minor role in reconstructions of the Ur III administration and bureaucracy (Widell 2013: 56; see also Nissen 1988: 3-4).

or archival function within this very complicated system, and the technical expressions encountered in the individual records can in many cases offer important information on the nature of the state's overall bureaucratic procedures. One such technical expression encountered in the records that may have some implications on our understanding of the administrative and archival procedures of the state is a-ra₂ X-kam, which was used for ordinal numerals in the Ur III period.

Meaning and Occurrences of a-ra₂ X-kam

In the occurrences when Ur III tablets have been translated, and not just presented in Sumerian transliteration, the expression a-ra₂ X-kam is typically (and correctly) translated “the Xth time.” The meaning of a-ra₂ (Akk. *arûm*) as “time” in the Ur III period is well known, and the expression is often used to identify the multiplier in Old Babylonian mathematical texts, similar to how the English “time” would be used in e.g. “3 times 4 equals 12.”⁹ The literal translation of the Ur III expression a-ra₂ X-kam, with -kam being the genitive and the enclitic copula //ak-am//, would be “it/this is of time X.”¹⁰

This translation and understanding of the expression can easily be confirmed in a relatively large number of attestations in the Ur III administrative texts. According to the *Database of Neo-Sumerian Texts* (BDTNS), the expression a-ra₂ X-kam, used to rank in a sequential order some kind of delivery/receipt, is attested throughout the Ur III period on some 650 tablets. These tablets can be attributed to all cities in the state that has produced more significant numbers of texts, with approximately 85% of the attestations coming from Umma, Girsu and Puzriš-Dagan.¹¹

Administrative Significance and Implications of the Use of a-ra₂ X-kam

While the literal and the cognitive meanings of a-ra₂ X-kam are perfectly clear, its precise function (and purpose) within the Ur III administrative system is less obvious. Historical studies of Ur III administrative texts have often focused on either prosopography or economics, and would typically involve the reconstruction of the various officials operating within the state's larger households, and the quantities of the different commodities and/or labor entering/leaving those institutions. For such studies, the expression a-ra₂ X-kam is of little relevance; the sum of the commodities, animals, or work days delivered/received in the different installments in tablets with the expression would conveniently be listed under the “total” (ŠU.NIGIN₂) at the end of the tablet (or as a numerical notation on the left edge of the tablet).¹² Since this “total,” and from whom/where it came and to whom/where it went, would be sufficient for studies trying to reconstruct the economic and administrative activities of the institution/official to which the tablet belonged (and by whom it had been archived), any further consideration of the nature and significance of the expression a-ra₂ X-kam in the text would not serve any tangible purpose. Nevertheless, the very existence of the expression has implications for our understanding of the administrative and archival procedures of the state. A better appreciation of the administrative contexts in which the Ur III tablets were drawn up can help us address the question of the main function of writing in early Mesopotamia, as

9- Friberg 1987-1990: 545-546; see also Robson 2007: 422, with numerous examples in Robson 2004; or, most recently, Gonçalves 2020: 104, with editions of AO 8900, AO 8901, and AO 8902.

10- See e.g. Jagersma 2010: 260.

11- *Database of Neo-Sumerian Texts* (BDTNS) at <http://bdtms.filol.csic.es>, accessed on January 6, 2021.

12- See e.g. the example below *Orient* 55 152 9 (CDLI: P273931), lines 3-7 on the reverse.

an instrument of fiscal control and accountability, or primarily driven by a need for economic planning and forecasting.¹³

The short and laconic text *Orient* 16, 80 114 from Girsu, currently kept in the Liverpool World Museum, may serve as an example of how texts can be interpreted in their administrative contexts, based on our overall interpretation of the historical and cultural contexts of the Ur III state.¹⁴

***Orient* 16 80 114 (CDLI: P124728)**

Obverse

- | | | |
|----|------------------------------|--|
| 1. | 5(diš) sila ₃ kaš | 5 sila ₃ beer (= 5 liters), |
| 2. | a-ra ₂ 1(diš)-kam | the 1 st time, |
| 3. | ur- ^d lamma | (for) Ur-Lamma, |
| 4. | mar-tu | the Amorite, |

Reverse

- | | | |
|----|--------------------------------|--|
| 1. | nibru ^{ki} -ta gen-na | who went from the city of Nippur (to the city of Girsu). |
| 2. | iti amar-a-<a>-si | (In) the month of the amar-a-a-si festival. (= Girsu month 10) |
| 3. | (blank line) | _____ |

The Amorite Ur-Lamma was in all likelihood a royal messenger within the Ur III state (lu₂-kin-gi₄-a lugal),¹⁵ and it seems plausible that the five liters of beer listed in the text would have been offered to Ur-Lamma at his arrival in Girsu from the city of Nippur, as a one-time allocation for consumption “in the town” (ša₃ iri), as opposed to a provision “for the journey” (kaskal-še), which would be calculated based on the number of days that Ur-Lamma travelled.¹⁶ The tablet would have been kept by the central administration of Girsu (who also wrote it), where it would have served as a simple (and temporary) record of the expenditure. At the end of the administrative year, all beer expenditures would be added together, and the sum would be subtracted from the expected amount of beer kept in the city’s main storage facility (e₂-kišib₃-ba), which in turn would be the sum of any surplus stock from previous years, and all incoming beer deliveries from the city’s various brewing establishments. A simple inventory of the large beer vats (^{dug}kur.KU.DU₃ and ^{dug}lahtan_x) in the storage would then neatly reveal if any officials or administrators were helping themselves

13- Mark Van De Mieroop (1997 and 1999-2000) has argued that the main purpose of writing in the Ur III period was administrative control and accountability, while Piotr Steinkeller (2004; also Woods 2015) remains the main proponent of the view that the Ur III texts were primarily written for economic prognostication and planning. For an excellent and balanced overview of the discussion, see now Garfinkle 2015.

14- The text belongs to the category of so-called messenger texts. For a thorough analysis of this group of texts in Girsu, and a reconstruction of the administrative procedures behind them, see now Notizia 2006 and 2009: 25-26.

15- See NG 2 33 (CDLI: P200594) or ITT 2 3810 (CDLI: P110981).

16- See Notizia 2006: 323-327; and 2009: 24-25. Sedentarized Amorites could hold a variety of professions in the Ur III period, but they are (perhaps not surprisingly) particularly well attested in the army and the messenger corps (see Buccellati 1966: 340-344; Wilcke 1969: 16; Limet 1972: 132; Lafont 2009: §4.25; Michalowski 2011: 107-110; Silver 2017: 285-286). The tradition of offering very respectable amounts of beer to arriving messengers and couriers is well known in early Babylonia (see e.g. Dalley 1984: 89, referring to the Old Babylonian document OBTR 18 [CDLI: P223854]; or Selz 2014: 270-271, referring to various beer [and bread] expenditures in connection to arriving/departing travelers in Old Akkadian texts from Umma; for beer provisions more generally, in the Ur III documentation, see Neumann 1994: 328-329).

to free beer at the expense of the city.¹⁷

The main problem with our understanding of *Orient* 16 80 114 – within the administrative apparatus of the Ur III state – is the fact that the text specifically points out that this was the “first time” (a-ra₂ 1(diš)-kam) Ur-Lamma received the provision of beer. Only two scenarios could reasonably prompt the scribe of the tablet to sequentially order Ur-Lamma’s beer provisioning in this way:

1. The scribe knew, or anticipated, that Ur-Lamma would receive at least one additional beer provision in Girsu later in the month, and he therefore preemptively avoided any future confusion, specifying that this one was the first.
2. Ur-Lamma had already received (at least) one *additional* provision of beer in month 10, when *Orient* 16 80 114 was written, and the scribe therefore specified that the one in our text was the first, to distinguish it from the later one(s).

We can, with some confidence, dismiss the first scenario as rather far-fetched, and we have no reason to assume that the scribe of *Orient* 16 80 114 should possess the intimate knowledge of Ur-Lamma’s different assignments and whereabouts required to predict his future return to the city. Certainly, simply adding a more precise date to the text would be a safer and more effective way of distinguishing this first beer provision from any possible provisions in the future.

This leaves us with the second scenario, with its obvious implication that a not insignificant amount of time must have elapsed between Ur-Lamma receiving his beer, and the drafting of *Orient* 16 80 114 recording the expenditure. This understanding of how a-ra₂ X-kam was used in the administration might find some support in the relatively frequent occurrences of deliveries/receipts broken up into ordinals within single administrative texts. In some cases, the different deliveries in such documents were intended for different purposes/destinations (e.g. *Orient* 16 99 149 [CDLI: P124751]), or the different batches of products or labor in the texts were received from different sources (e.g. *Nisaba* 33 546 [CDLI: P517721]). In such cases, it is certainly possible that the transactions should have occurred more or less simultaneously, and therefore entered together in the same documents. However, in other texts the enumerated deliveries/receipts appear to be identical (in terms of the transaction’s contributor, recipient and ultimate purpose), and in those texts we have to assume that the ordinal numbers breaking up the transactions reflected a successive order of installments.¹⁸ The reverse of the Umma text *AAICAB* 1/3 Bod S 234 (CDLI: P249141) offers an excellent example of how single transactions could be broken up into successive installments.

17- For the central storage facility (e₂-kišib-ba) in the Ur III period, see Widell 2018; for various Sumerian jars and storage vessels, see Waetzoldt 1971: 13-25.

18- Transactions broken up in installments are not unknown in early Mesopotamia; for advanced and partial payments in the Old Babylonian period, see e.g. De Graef 2016.

Curiously, texts such as *Orient* 16 85 127 (CDLI: P124736), reverse, lines 7-9 and 11-14, indicate that chronologically separate installments in the Ur III period were retained as separate entries in the so-called balanced accounts produced at the end of the administrative years. Ur III administrative documents are not known for their verbosity or inclusion of redundant expressions, and I have no explanation for this seemingly meaningless waste of precious space in these accounts.

AAICAB 1/3 Bod S 234 (CDLI: P249141)**Obverse**

- | | | |
|----|--|--|
| 1. | 1(barig) še u ₄ 1(diš)-še ₃ | 1 barig barley, for 1 day (= 60 liters), |
| 2. | 1(barig) 1(ban ₂)-ta u ₄ 3(diš)-še ₃ | 1 barig (and) 1 ban ₂ (barley) each, for 3 days (= 210 liters), |
| 3. | 4(ban ₂) u ₄ 1(diš)-še ₃ | 4 ban ₂ (barley), for 1 day (= 40 liters), |
| 4. | ur- ^d ma-mi | (for) Ur-Mami. |
| 5. | 1(barig) še u ₄ 1(diš)-še ₃ | 1 barig barley, for 1 day (= 60 liters), |
| 6. | 1(barig) 2(ban ₂)-ta u ₄ 3(diš)-še ₃ | 1 barig (and) 2 ban ₂ (barley) each, for 3 days (= 240 liters), |
| 7. | 4(ban ₂) u ₄ 1(diš)-še ₃ | 4 ban ₂ (barley), for 1 day (= 40 liters), |
| 8. | a-lu ₅ -lu ₅ | (for) Alulu. |

Reverse

- | | | |
|----|---|--|
| 1. | 3(barig) še a-ra ₂ 1(diš)-kam | 3 barig barley, the 1 st time (= 180 liters), |
| 2. | 3(barig) a-ra ₂ 2(diš)-kam | 3 barig (barley), the 2 nd time (= 180 liters), |
| 3. | a-lu ₅ -lu ₅ | (for) Alulu. |
| 4. | 3(barig) a-ra ₂ 1(diš)-kam | 3 barig (barley), the 1 st time (= 180 liters), |
| 5. | 2(barig) a-ra ₂ 2(diš)-kam | 2 barig (barley), the 2 nd time (= 120 liters), |
| 6. | ur- ^d ma-mi | (for) Ur-Mami. |
| 7. | e ₂ šu- ^d nisaba-ta | From the house of Šu-Nisaba. |
| 8. | (blank line) | _____ |
| 9. | iti ezem- ^d šul-gi | (In) the month of the divine Šulgi festival. (= Umma month 10) |

Again, the precise nature of the text, and its administrative *Sitz im Leben* within the city of Umma, can be reconstructed based on our overall understanding of the organization and prosopography of the city. The two brothers Alulu and Ur-Mami were employed as animal fatteners in the important Šara temple, and are attested working together in this office from the later part of Šu-Suen 1 until (at least) the end of Ibbi-Suen 3.¹⁹ In the text, they appear as the recipients of barley from the house of Šu-Nisaba, intended for the fattening of animals before their slaughtering and consumption, which typically would occur in different cult-related contexts.²⁰ We can only speculate as to why the house of Šu-Nisaba saw it necessary to provide these relatively modest amounts of barley in separate installments. However, we do know that the barley

19- See Stępień 1996: 108-112 and 179; Widell 2009: §§3.3.1-3.3.5. Note also the aforementioned text *Nisaba* 33 546 (CDLI: P517721) from Ibbi-Suen 3 (month 3), in which the pair received two separate installments of barley fodder for various sheep from the threshing floors (ki-su₇) of two different and well-known Umma fields (a-ša₃ ^dnin-ur₄-ra and a-ša₃ la₂-tur; see Pettinato 1967: 53-57 and 137-139).

20- The scribe's cavalier attitude as to the accuracy of his calculations in the text is noteworthy, with the house of Šu-Nisaba providing Ur-Mami with 10 liters less than he would need for his animals, and Alulu with 20 liters in excess of the requirements of his animals. As interesting as such scribal "errors" may be, this topic lies beyond the scope of the present study, and will not be treated here.

was intended to be used (as supplemental fodder) over a period of five days (obverse, lines 1-3 and 5-7). It is clear that breaking up the delivery from the house of Šu-Nisaba into two (more or less) equal consignments separated by 2-3 days, would not have had an adverse impact on the animal fatteners' overall work, and may have brought about some logistical advantages in respect to both local transportation and storage within the organization of Alulu and Ur-Mami.²¹

One thing is certain: texts with deliveries or receipts made in installments could only have been drawn up *after* the fulfillment of their final installments, supporting the hypothesis put forward by Piotr Steinkeller, that many Ur III primary documents were written *post factum*, and in locations different from where their transactions would have occurred.²² In a short article published in 2004, I argued that Ur III officials operating away from the administrative centers of the state (in this case the capital Ur), occasionally can be attested in the archives of those centers using different seals (and with alternative writings of their names) in otherwise identical and contemporary receipts.²³ A reasonable explanation for this peculiar phenomenon is that these officials sealed and authorized their receipts *in absentia*, by means of dedicated proxy administrator(s). An established system of remote accounting, with multiple seals distributed among representatives or subordinates acting on behalf of a stationary official, should not be confused with the occasional and more ad hoc arrangements involving substitute sealing, whereby a subordinate (or colleague/family member) would seal a receipt of his superior (or colleague/family member), using his own seal.²⁴ Rather, such a system of remote administration would resonate well with Steinkeller's understanding of the state's administrative procedures (also published in 2004), although the *post factum* drafting of the tablets in his model could – at least in these particular cases – equally well be *pre factum*.

The question is not if these transactions occurred together with the drafting of the tablets documenting them (they clearly did not),²⁵ but rather by what means, and for how long a time, would the ancient administrators be expected to keep track of the details of these transactions (real or not), before they were finally written down? How much time would (typically) elapse between the first and the last installment in texts such as *AAICAB 1/3 Bod S 234 (CDLI: P249141)*? The above examples certainly indicate that the various installments documented in these texts would have occurred within the timeframe of a single month.²⁶ In

21- Other texts, in which the animal fatteners of the Šara temple are recorded to have received barley fodder in separate installments, include *Nisaba 33 546 (CDLI: P517721)* and *STU 17 (CDLI: P130443)*.

22- Steinkeller 2004; see also Widell 2021.

23- Widell 2004.

24- E.g. Garfinkle 2020: 75-76; see further Widell 2021, with additional references.

25- In fact, we may with some confidence contend that in many cases there would not have been any physical transaction at all accompanying these records. For example, in my 2004 article I discuss a small group of texts in which the scribe *Idi-Suen* is receiving – from the granary in Ur – relatively modest amounts of barley, for the maintenance of various workers in the land of Subu (ma-da su-bu). However, we have no reason to expect that barley would ever be transferred from the central granary in Ur to the countryside, where it was originally cultivated. *Idi-Suen* was himself responsible for very substantial amounts of barley stored in Subu (Widell 2004: 289), and these “transfers” from the central granary in the capital should in all likelihood simply be understood as the official records of barley withdrawals made by *Idi-Suen* from the local granary in Subu, which ultimately operated under the authority of the central granary in the capital (see already Jones & Snyder 1961: 318; and, more recently, Johnson 2017: 182).

26- For a discussion on how detailed information on past matters might have been stored/remembered within the administration, awaiting the drafting of the final records of the transactions/events, see Steinkeller 2004; Widell 2009 and, most recently, Widell 2021. For administrative aids and “Instrumente der Gedächtniserweiterung” from the fourth- and early third millennium BC, see now Sauer & Sürenhagen 2016.

fact, no Ur III texts with this type of sequential installments clearly demonstrate that these transactions would extend over multiple months. Even transactions consisting of larger numbers of installments appear to have been completed within a single month, suggesting that individual installments could be very frequent occurrences, perhaps even daily.²⁷ On the other hand, the time period between the different beer provisions in *Orient* 16 80 114 could hardly have been less than 5-6 days, to allow sufficient time for Ur-Lamma's rest and departure from Girsu, and his subsequent return to the city with a new message (and a new beer allocation).²⁸

Atu's bala Contribution of Ghee in Installments

The recently published text *Orient* 55 152 9 (CDLI: P273931) might shed some further light on the administrative nature of the installments in the Ur III period.

Orient 55 152 9 (CDLI: P273931)

Obverse

- | | | |
|----|---|--|
| 1. | 1(ban ₂) 3(diš) sila ₃ i ₃ -nun | 1 ban ₂ (and) 3 sila ₃ ghee (= 13 liters), |
| 2. | kišib ₃ didli | (from) various sealed documents. |
| 3. | 1(ban ₂) 2(diš) 1/2 sila ₃ i ₃ -nun | 1 ban ₂ (and) 2 1/2 sila ₃ ghee (= 12 1/2 liters), |
| 4. | ša ₃ -bi 1(diš)-kam | within (the bala obligation), it is the 1 st (installment). |
| 5. | 1(ban ₂) 4(diš) sila ₃ i ₃ -nun | 1 ban ₂ (and) 4 sila ₃ ghee (= 14 liters), |
| 6. | ša ₃ -bi 2(diš)-kam | within (the bala obligation), it is the 2 nd (installment). |
| 7. | 1(ban ₂) 8(diš) 1/2 sila ₃ i ₃ -<nun> | 1 ban ₂ (and) 8 1/2 sila ₃ ghee (= 18 1/2 liters), |
| 8. | ʾša ₃ -bi 3(diš)-kam ¹ | within (the bala obligation), it is the 3 rd (installment). |

Reverse

- | | | |
|----|---|--|
| 1. | BI-A bala-a | ??? of the bala obligation. |
| 2. | (blank line) | ————— |
| 3. | ʾŠU+NIGIN ₂ 5(ban ₂) 8 sila ₃ i ₃ -nun | Total: 5 ban ₂ (and) 8 sila ₃ ghee (= 58 liters). |
| 4. | ʾki ¹ a-ʾtu ¹ -ta | From Atu, |
| 5. | lu ₂ -ʾnin-šubur ¹ | Lu-Ninšubur |
| 6. | šu ba-ti ¹ | received, |
| 7. | ʾša ₃ ʾbala-a | within the bala obligation. |
| 8. | mu en eridu ^{ki} / ʾba ¹ -hun | The year (when) the en-priestess (of the god Enki) in the city of Eridu was installed. (= Amar-Suen 8) |

27- E.g. the Puzriš-Dagan text *JCS* 14 112 16 (CDLI: P111928), in which 12 oxen and 7 cows were transferred to the (royal) kitchen, or "commissariat" (e₂-muḫaldim), using eleven separate installments in the 12th month of year (iti še-sag₁₁-ku₅), or the Umma text *SAT* 3 1725 (CDLI: P144925), in which 23,185 liters of barley was disbursed as rations from the great threshing floor of the field Lamaḫ (ki-su gu-la a-ša₃ la₂-maḫ), using ten separate installments in the city's 7th month (iti min-eš₃).

28- Note *SAT* 1 106 (CDLI: P131215), showing that messengers could also be provided with provisions on a daily basis.

The official Atu (reverse, line 4) was the chief livestock administrator in Umma (šuš₃), and one of his many responsibilities in this capacity involved overseeing the production of the dairy cows in the important Šara temple. In Amar-Suen 8, when the text was written, the temple would have kept some 250-350 cows, herded by 10-15 individual dairy farmers.²⁹

Lines 3-7 on the reverse neatly summarizes the text: Atu is delivering 58 liters of ghee, or clarified butter oil, to the official Lu-Ninšubur, as a part of Umma's rotational commitment to the crown, referred to as the bala obligation.³⁰ The consignment of ghee in the text is broken up into four separate installments. The first two lines of the text, registering 13 liters of ghee assembled from various individual deliveries (kišib₃ didli) from Atu's dairy farmers, is likely listing the fourth and final installment, after which the tablet could have been produced. The earlier three installments are listed on the obverse in lines 3-4 (1st installment of 12.5 liters), lines 5-6 (2nd installment of 14 liters), and lines 7-8 (3rd installment of 18.5 liters).³¹

Why did Atu – one of Umma's most powerful and influential officials at the time – need to break up this relatively modest transfer of ghee into four installments, ranging from 12.5 to 18.5 liters? In my original edition of the text, I suggested that the answer might be found in the perishable nature of raw milk in the hot climate of southern Mesopotamia, and the rather limited production capacity of the dairy cows under Atu's supervision:³²

The dairy farmers [under Atu's supervision] would be responsible for the churning of cultured butter from the fermented cream, and for making dry cheese from the fermented butter milk. In order to avoid the development of rancidity the accumulated butter, the farmers would have to turn it into ghee every 3-5 days. They would immediately transfer the finished ghee – together with the dry cheese – to their foreman Atu.

Atu would consolidate all incoming deliveries from his dairy farmers, and without further delay authorize the required transfers of the received dairy products to the different offices within the state administration.

The reality is that it would take Atu's 10-15 dairy farmers and their combined 250-350 cows some 2-3 weeks to produce the milk (or sour cream) required for the 58 liters of ghee appropriated for Umma's bala obligation. Atu was the chief livestock administrator in Umma, and in this capacity he would manage a number of complicated supply chains within the city, some of which would involve perishable commodities. He would have to collect a variety of milk products from his dairy farmers on a regular basis, before any

29- For a more thorough analysis of this text, see Widell 2020: 132-137; for the Umma dairy accounts in general, see Englund 1995 and 2003: §§9-10.

30- For the liquid form of i₃-nun as a type of clarified butter oil, see McCormick 2012: 100-101; for a comprehensive overview of the bala obligation in the Ur III period, see Sharlach 2004. Umma's bala obligation in Amar-Suen 8 occurred in the 8th month of the year (Sharlach 2004: 325).

31- I have previously suggested that single tablets, recording multiple transactions that must have occurred at separate times, in some cases may have been kept wet (and thus inscribable) over extended periods of time, by keeping them wrapped in a moist linen or woolen cloth (see Widell 2021). However, such an explanation appears less plausible for *Orient* 55 152 9 (CDLI: P273931), considering the sequence of the four installments (4th > 1st > 2nd > 3rd), by which the last installment appears as the first entry on the tablet.

32- Widell 2020: 136-137.

microbial spoilage would occur. Ghee would have been produced by the dairy farmers in batches every couple days throughout the year, and delivered to Atū on a rolling basis. Rather than waiting 2-3 weeks to collect the 58 liters of ghee, the text suggests that Atū would simply authorize a transfer of his stock to Lu-Ninšubur every 3-5 days. Each installment would count towards the total of 58 liters, and when the full amount finally had been transferred, the receipt would be produced, with all the individual installments duly noted. The administrative decision to break up the delivery into a series of installments would not have had any impact on Umma's bala contribution of ghee, but would in all likelihood have brought about some logistical benefits to Atū's own organization in the city.

Conclusions

This paper has demonstrated that the Ur III administrators were capable of storing – in some format – detailed information for several days, or even weeks, before it was permanently documented in the archival records of the state. The practice is evident from the widespread use of sequentially ranked installments, expressed in the administrative texts with the formula a-ra₂ X-kam. Transactions broken up in installments are attested from all Ur III sites that have produced more significant numbers of tablets, and the practice can be observed throughout the period.

The evidence suggests that the period of time between the installments typically would have been rather short, ranging from a few days up to perhaps a week. However, as the transactions described in single tablets often would involve as many as 3-4 separate installments (sometimes more), the complete process documented in the tablets, from first to last installment, would in some cases have continued for much longer periods, extending up to several weeks in time.

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