

Economy and Ecology in the Kellis Agricultural Account Book

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The largest contribution to our knowledge of the economy of Dakhleh Oasis during Late Roman times to come from the written material found to date in the excavations of Ismant el-Kharab is certainly that of the Kellis Agricultural Account Book (KAB). This codex of eight boards of acacia wood was found in 1988 and published in 1997 (Bagnall 1997). In its more than seventeen hundred lines of accounts, it provides an unmatched look at agricultural production and estate management in the second half of the fourth century CE, covering a three-year period which is probably 361–364, but could be 376–379. As the KAB has now been published, this paper will give only a brief description of the contents as a basis for a short discussion of some of the major issues which the KAB raises for the larger interests of the Dakhleh Oasis Project, such as those concerning human relationships to the environment over time.

1. The Object

The KAB was found in a room which originally served as a kitchen for House 2 in Area A (see Hope 1997, 5–16 for the find context). The book's eight boards were still tied together with the cord which bound them in antiquity. The writing extends to both faces of all eight boards, but the writing on the two outside covers of the codex as assembled is not part of the series of accounts that occupy all fourteen inside faces. On most faces there is more than one column of writing, but not all columns run the full length of the boards. As many of the entries contain only the name of a payer and the amount paid, lines tend to be short, except in those portions containing the wheat and barley dues. The handwriting is a straightforward cursive characteristic of the period, but with a few palaeographical peculiarities shared with one hand of the *Kellis Isocrates Codex* (Worp and Rijksbaron 1997). In some places the writing has disappeared, leaving only a ghost impression on the wood.

2. The Accounts

The largest part of the KAB is devoted to income accounts arranged by the item received. The entries typically give the name of a tenant, the amount due in a particular year

from him (the tenants are all male), then the actual amounts received, with individual payments enumerated rather than totalled. Deficiencies are sometimes noted in the margin. There are also expenditure accounts organized by type of produce disbursed, which are essentially registers of what went out of individual storehouses. Only a few totals are given, as well as a few brief balancing accounts for individual tenants and individual storehouses.

For the most part, the accounts of the KAB are raw journals, with limited information recorded. Most entries have no date, and hardly any contain all the information a modern accounting system would require for recording a transaction: date, person, purpose, storehouse ('account'), produce and amount. The interconnections of individual entries can be used to help fill in some of these gaps, but it would not be possible to reconstruct a general ledger on the basis of the information preserved. The writer also has attempted no abstraction, unification or quantification of his information. It is possible, of course, that the KAB served the writer (or someone else, but efficient use of it would require much remembered information) as the raw material for more sophisticated accounts in which income and expenditure for particular properties or purposes would be analyzed; but the KAB itself shows no signs of the accounting sophistication present in the third-century CE archive of Heroninos (Rathbone 1991).

3. The Crops

The major account for each year (years are indicated using the indiction, a system reckoning in fifteen-year cycles) is that for wheat and barley. Other 'income crops' include grape-juice (must) from which the estate produced wine, chaff, hay, figs, dates and date-stones, jujubes, olives/olive oil, chickens, cotton, turnips, and the mysterious *tiphagion* (see Bagnall *et al.* 1998). Additional crops appear in the income accounts by virtue of being paid in substitution for the produce due, a practice seemingly permitted to a large extent, or in the expenditure accounts. These additional crops are: sesame, fenugreek, cumin, safflower, honey, onions, cheese, butter (?), porridge, vetch, a leguminous meal called *oregmos*, and a vetch or other legume called *arakia*. These last three appear in very

small quantities, and it is noteworthy that lentils and beans do not appear at all.

Because the writer often indicates the cash value of produce offered in substitution for that due, we have a large number of directly-stated or imputable prices or values for commodities, including chaff, *arakia*, safflower, sesame, cotton, *tiphagion*, figs, dates, date-stones, honey, oil, must, wine, chickens and butter. The absence of explicit prices for wheat and barley is not surprising given the reasons for which prices are stated, but it complicates the task of assigning an exact date to the fifth-through-seventh indiction-years mentioned in the KAB; wheat is otherwise our single best-known commodity for prices throughout the fourth century.

4. The Estate Economy

These accounts are kept by an unnamed person who refers to himself simply as 'I'. Because he uses the term *adelphos*, 'brother', to mean 'colleague' in reference to persons who have the title *pronoetes* or 'steward', he may be supposed to hold the same position himself. He is evidently in charge of one unit of the properties of a large land-owner, with other stewards being in charge of other units. The KAB concerns a modest collection of properties around Kellis and nearby places, most of which cannot be identified so far with either modern settlements or archaeological sites. The landlord for whom the author of these accounts worked was named Faustianus son of Aquila; he and his wife lived in Hibis, modern Kharga, in the Great Oasis.

The tenants who pay rent throughout the three-year period recorded remain fairly consistent in identity, in the crops grown, and in the amount of rent due. There is one case of a succession to a tenant by two of his sons who divide the property equally; as one of them is a monk, however, it seems that one son manages the property for them both. No one tenant pays rent in all of the crops grown; the most important tenants pay in most crops. The complete absence of leases of land from the papyri found to date at Kellis might suggest that the consistency of tenancy found here is the reflection of a pattern of tenancy in which customary tenure, rather than contractual relations, dominates. Given the tendency in the oases for water rather than land to be the critical factor in arable agriculture, however, it is not clear of precisely what being a landlord consists. The dominance of tree crops noted below may suggest that we are dealing with the planting of arable crops in the space between trees or vines.

How labour was provided is not entirely clear either. There are a few payments for wages, but the recipients are not well known, and the amounts are mostly not large. It seems probable that individual tenants supplied most of the labour inputs. The steward also records larger amounts for 'services' or 'expenses' mainly in the first half of the Egyptian year (i.e., from end of summer through midwinter), the period of harvest for tree crops like grapes,

olives and dates. The recipient of these payments is not stated, and it is possible that it is the steward himself.

Overall, it appears that the wheat, barley and wine produced by the estate were all disbursed against local expenses, with only minor surpluses left at the end of the year to be carried forward. We may presume that crops like green fodder, chaff and hay were also consumed locally, mainly in the maintenance of animals. No doubt other perishable goods like turnips and chickens were consumed locally as well. What remains are the crops for which there is no account of expenditures, all of which happen to be high-value, low-bulk products, mainly olives, olive oil, figs and dates, although the small amounts of cotton and jujubes may also belong to this category. These crops represent more than 40 percent of the total value of the estate's production, with olives and olive oil alone representing something like 30 percent or more. These goods seem to be the estate's surplus for this unit, and except for cotton, all grow on permanent stock, rather than being sown annually.

5. The Olive Economy

The development of the Dakhleh and Kharga Oases in the Roman period is very striking, with a rapid increase in the number and extent of inhabited sites, and with the peak extent of occupation reached for historical periods. This development must be supposed to require the generation of an economic surplus capable of being exchanged for cash in the larger context of the imperial economy. That surplus was provided, to a large extent, by wheat in the case of the Nile valley, where inexpensive water transport of bulk commodities was available. But with the oases there can be no possibility of such an economy, for the distances to the Nile and the expense of land transport were prohibitive. Wheat from the oases cannot have been competitive in an outside market.

The important role of olives in the KAB – a third of the cash value of production and four-fifths of the net surplus – suggests that this crop may have been the single most important motor behind the development of the oases. The opportunity will certainly have been available, because Egypt as a whole was a limited and poor-quality producer of olive oil. At the beginning of the Roman period, Strabo noted that only the Fayum and the garden district around Alexandria produced high-quality olive oil. The oases, by contrast with the inundated plains of the Nile Valley, offered the possibility of limited, but perennial, watering from wells as a substitute for the limited rainfall on which the olive relies in most of the Mediterranean basin. Thus, a nearby and relatively under-supplied market for olive oil would have been found.

We know that the period of the Roman Empire saw, in fact, a vast extension of olive cultivation around the Mediterranean. Most immediately relevant for our purposes is the increase of olive cultivation in North Africa, where the olive was pushed into desert-fringe zones such as those in Libya, usually relying on rainfall by virtue

of being planted less densely than was traditional (see Mattingly 1988, 1996). In Libya, it has been argued, these olive groves were largely owned by an absentee urban aristocracy and cultivated by tenants. Oil pressing required substantial capital investment in presses by the landlords and involved some centralization of control. Olive oil for export was thus probably a major factor in the creation of urban fortunes and in the rise of North Africa to prosperity in the second and third centuries CE.

The hint furnished by the KAB is that much the same sort of thing happened in the oases during the same period. A growing urban aristocracy was supported by the extension of cultivation of olives and other high-value crops. The cost of land was here not a significant factor; rather, the availability of non-inundation-controlled irrigation was crucial. In the third century it seems that Mothis, the metropolis of Dakhleh Oasis, rose to achieve rank as capital of an independent nome, something unlikely to have happened without the availability of a means of support for the expenses of an urban elite.

In the case of Libya, Mattingly, noting that intensive oleoculture in marginal zones is demanding and can result in declining yields after a period of high initial yields, has speculated that the ultimate decline of the cities may have been a product, in part, of ecological stress. Such ecological pressure may have been a contributor to the decline of fourth-century Dakhleh and Kharga, perhaps with the olive both the chief benefactor and ultimate source of decline for the Roman efflorescence in the oases. More study of other types of evidence will be required to investigate this hypothesis.

6. Diet

Other papers in this volume (Aufderheide *et al.*, Dupras *et al.*, Fairgrieve and Molto) study the skeletal material from Kellis cemeteries for its information about the eating habits and nutritional characteristics of the local population in the Roman period. The KAB makes an important contribution to this study, showing above all that the foods produced at Kellis in this period were characteristic of the Mediterranean diet, with wheat, wine and oil prominent. The virtual absence of legumes, however, is equally striking. It is possible, of course, that this absence could be just a product of management choices made by the estate of Faustianus, but the lack of beans and lentils among the substitute crops offered by tenants in rent payments suggests that these crops simply were not grown in any quantity in the Kellis area. If the expanding information from other Kellis documents bears out this suggestion (it is worth noting that the main vocabulary for legumes does not appear in the first volume of published documents), the consequences could be substantial, for these plants were important sources of protein and iron in the ancient Mediterranean diet. The combination of beans and wheat produces higher-quality protein than either offers separately; the absence of legumes may be a factor in explaining the widespread

anaemia observed in the skeletal remains. Since the other obvious source of iron in the oasis diet is dates, one may wonder if the growth of an economy based on exporting high-value fruit crops and their derivatives to the valley led to a reduction in local consumption of the valuable dates.

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