Birds in Archaeology
Proceedings of the 6th Meeting of the ICAZ
Bird Working Group in Groningen (23.8 - 27.8.2008)
The proceedings are dedicated to the memory of Anneke (A.T.) Clason, one of the founding fathers of ICAZ and former professor of Archaeozoology at the Groningen Institute of Archaeology.

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Editors: Wietske Prummel, Jørn T. Zeiler and Dick C. Brinkhuizen
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Back cover: Participants during the bird watching trip to the Lauwersmeer, the Netherlands (photograph Erika Gál)

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These proceedings present the results of the 6th Meeting of the ICAZ Bird Working Group in Groningen.

The wide scope of the contributions makes clear that this subfield in archaeozoology is thriving. In itself this is a valuable conclusion and enough validation for the importance of archaeological bird research per sé. In this preface I would like to address two issues: the contribution of archaeological bird research to the field of archaeology at large and the relevance of archaeological bird research for present-day society.

To start with the first issue. In my opinion it would be sad if this volume would reach an in-crowd audience only. Like the other archaeozoological groups, bird remains are often an important find category, not only in numbers, but also in importance for societies in the past. Many of the contributions in this volume focus on their importance in terms of nutritional value, but it remains difficult to quantify and compare to other sources of protein as mammals, snails, and fish. It is my opinion that in archaeology the importance of mammal bones as indicators of past behaviour is often overestimated and that more often fish and birds were used as a daily basis as source of protein. Other contributions focus on the non-functional meaning of birds. This is a topic that is often left out of consideration, but should receive more attention because it is sparse opportunity to gain insight in the way past societies perceived, categorised and enculturated their surroundings. These topics should attract readers from across archaeology to see how archaeological bird research might contribute to understanding past subsistence and society.

To turn to the second point, I am impressed by the large popularity of birding in the Netherlands. Many are frequent watchers, making fieldtrips abroad in search of specific birds. As such they are part of an international community of birding, not unlike scientific research groups. In my opinion the scientific relations between the ICAZ Bird Working Group and this community might be of great importance: this community is a knowledge base for interpreting archaeological remains and at the same time a first-class audience for archaeological bird research. In present-day society the societal relevance of research is increasingly important and this potential great relation between the archaeological bird scientists and society lies waiting to be exploited....It would be worthwhile to see if a next ICAZ Bird Working Group Meeting could encompass specialists from both archaeozoology and birding to compare past and present-day patterns of bird behaviour.

I hope you find great inspiration in the contributions presented in this volume.

Prof. dr. D.C.M. Raemaekers
Director Groningen Institute of Archaeology
Introduction by the editors

Forty ornitho-archaeozoologists – archaeozoologists working with bird remains – came together between the 23rd and 27th of August, 2008 for the 6th Meeting of the Bird Working Group (BWG) of the International Council for Archaeozoology (ICAZ) in Groningen, the Netherlands. Twenty-four oral presentations and thirteen poster presentations were given during the three days of the conference. Lively discussions were held after the oral presentations, during the poster presentation, during the visit to the archaeozoological reference collection of the Groningen Institute of Archaeology (GIA) and during coffee and lunch breaks (see photo's on p. 8).

On the 26th of August, a very successful excursion was made to the former salt marsh and mud flat area to the north of the city of Groningen, where people lived since the Iron Age on artificial dwelling mounds (terpen), and to the Lauwersmeer, a Mecca for bird watchers (see photo on p. 10). Many of the birds discussed during the sessions were observed there alive.

We are happy that 26 of the 37 original oral and poster presentations were transformed into manuscripts, that are published in this book, *Birds in Archaeology*, the Proceedings of the 6th BWG Meeting.

The Meeting and the publication of the Proceedings would not have been possible without the financial and other aid given by many people and organizations. We are very grateful to Mr. Luuk Tol, the administrator of GIA, who showed the participants the skeletons they wanted to see in the reference collection, to Lazar Brinkhuizen who showed the participants many interesting birds in the Lauwersmeer and to Nynke Tiekstra, who did the layout of this book.

Financial aid for the Meeting and the publication of the Proceedings was given by the Groningen Institute of Archaeology (GIA) of the University of Groningen, the Koninklijke Nederlandse Academie van Wetenschappen (KNAW), the Groninger Universiteitsfonds (GUF), the Stichting Nederlands Museum voor Anthropologie en Praehistorie (SNMAP), the University of Groningen, the Province of Groningen and the Municipality of Groningen. We are very grateful to all these people and organisations that enabled the Meeting and the publication of these Proceedings.

Wietske Prummel, Jørn T. Zeiler and Dick C. Brinkhuizen
Field trip to the Lauwersmeer (photograph Erika Gál).
5 The dietary role of hens, chickens and eggs among a 17th-century monastic order: the Clarisse of Santa Clara-a-Velha, Coimbra (Portugal)

Marta Moreno-García and Cleia Detry
1 Instituto de Historia. Centro de Ciencias Humanas y Sociales (CCHS). Consejo Superior de Investigaciones Científicas (CSIC). C/ Albasanz 26-28, 28037 Madrid, Spain; e-mail: marta.moreno@cchs.csic.es
2 UNIARQ, Centro de Arqueologia da Faculdade de Letras da Universidade de Lisboa, Portugal

Abstract
Bird remains recovered from two rubbish dumps dated to the 17th-century AD at the convent of Santa Clara-a-Velha in Coimbra (Portugal) are studied. Although a variety of avian taxa are present domestic fowl dominate the assemblage. The age at death and the sex profile data suggest that chicken and hens were frequently consumed. Body parts show that the best cuts of meat from wings and legs were discarded here. In addition, the large amount of eggshell remains recovered indicates eggs played also an important role in the diet of this female monastic community. Documentary evidence and the results of the pathological analyses carried out on the nuns skeletons provide an interesting background against which our data can be interpreted.

Key words
Domestic fowl, monastic diet, historical sources, oral pathology, post-medieval Portugal

Introduction
The standard of living of monastic houses in Portugal during the medieval and post-medieval periods is a research topic that, as in many other European countries, has hardly been approached through the study of archaeological faunal remains (O’Connor, 1993). Documentary sources such as accounts books and the rules set by religious orders constitute the main data analysed. These records show the complexity of elements - of diverse social and economic nature variable over time - that played a part in the daily routine of these establishments. Whereas accounts record both livestock held on monastic properties and slaughtered for the meat larder, rules usually describe fasting and abstinence as essential components of their living behaviour.

This paper deals with the bird remains recovered from the Convent of Santa Clara-a-Velha in Coimbra, Portugal (fig. 1). Construction of the original church and cloister was sponsored by Dona Mor Dias in 1286. The site fell out of use in 1311 because of legal battles with the Santa Cruz order but it was reopened in 1314 by Saint Queen Isabel. Although the church was not completed until 1330, the first nuns moved into the convent earlier, in 1317. The history of this establishment was marked by its location on the bank of the river Mondego and the successive floods it suffered. When living conditions became impossible in the 17th-century, King D. João IV ordered the construction of a new convent and the nuns moved there in 1677 (Côrte-Real et al., 2000).

The material under study comes from two rubbish dumps (Area 41 and Area 46) located in the west side of the cloister (fig. 2). Nearly fifteen thousand faunal remains were recovered among ceramics, metal, glass and other objects that represent household wares dating to the first half of the 17th-century (Detry & Moreno-García, 2008). The high density of organic remains in the black-coloured sediments excavated show how the inner perimeter of the cloister was used for rubbish disposal at that time. We are aware that the bird sample recovered may not be representative of the full range of avian species present at the convent over the three and a half centuries it was occupied. However, these remains provide an opportunity to gain insight into the dietary habits of the nuns living there just before its abandonment. At present the results of our analysis can only be compared with the documentary evidence available. Hopefully as more faunal remains from other periods and deposits are studied, our understanding of the subsistence practices in the daily life of this Portuguese monastic site will improve and consumption patterns over time will be properly assessed.
The faunal assemblage: the bird remains

The mammal and bird samples recovered from Area 41 and Area 46 are summarised in table 1 (Detry & Moreno-García, 2008). The number of remains is larger in Area 41 than in Area 46 and so is the range of species recorded (table 2). Altogether, the bird bones total 4363. Additionally, a large amount of small and very fragile eggshell fragments were recovered from Area 46. Since these avian assemblages were accumulated over the same period of time and have the same origin they will be analysed as a single sample.

The most common species at the convent is undoubtedly the domestic fowl (Gallus gallus domesticus), followed by far by another galliform, the red-legged partridge (Alectoris rufa), a wild species. Turkey (Melleagris gallopavo) is recorded for the first time in an Iberian stratified context (Pino et al., 1996). We also identified the remains of Anatidae, especially ducks, mostly with the size of A. platyrhynchos, and Anser sp. (goose); it was not possible to decide whether they come from wild or domestic species (see below). Rock dove (Columba livia) and a small falcon (F. tinnunculus/naumanni) were identified only in Area 41. Few bones of small Passeriformes and waders such as the woodcock and the golden plover are also present (table 2).

1 Fish remains are currently under study by A. Morales and E. Roselló from the Laboratorio de Arqueozoología, Universidad Autónoma de Madrid, Spain.

---

**Table 1.** Number and percentage of mammal and bird remains recovered from Area 41 and Area 46

<table>
<thead>
<tr>
<th></th>
<th>Area 41</th>
<th></th>
<th>Area 46</th>
<th></th>
<th>Total</th>
<th></th>
<th>% %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>7906</td>
<td>73</td>
<td>2336</td>
<td>63</td>
<td>10242</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>2997</td>
<td>27</td>
<td>1366</td>
<td>37</td>
<td>4363</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10903</td>
<td>100</td>
<td>3702</td>
<td>100</td>
<td>14605</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.** Avian species recovered from Area 41 and Area 46. The last column shows the percentage of identified species

<table>
<thead>
<tr>
<th>Species</th>
<th>A-41</th>
<th>A-46</th>
<th>TOTAL</th>
<th>% id</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greylag goose (Anser cf. anser)</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Goose (Anser sp.)</td>
<td>15</td>
<td>4</td>
<td>19</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Mallard (Anas cf. platyrhynchos)</td>
<td>41</td>
<td>10</td>
<td>51</td>
<td>2</td>
</tr>
<tr>
<td>Marbled duck (Marmaronetta angustirostris)</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Common teal (Anas crecca)</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Common pheasant (Alectoris rufa)</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Domestic fowl (Gallus gallus domesticus)</td>
<td>1264</td>
<td>198</td>
<td>1462</td>
<td>63</td>
</tr>
<tr>
<td>Red-legged partridge (Alectoris rufa)</td>
<td>198</td>
<td>377</td>
<td>575</td>
<td>27</td>
</tr>
<tr>
<td>Rock dove (Columba livia)</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Swift (Apus apus)</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Woodcock (Scolopax rusticola)</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Golden plover (Pluvialis apricaria)</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Total identified birds</td>
<td>1983</td>
<td>347</td>
<td>2330</td>
<td>100</td>
</tr>
<tr>
<td>Large-sized birds</td>
<td>47</td>
<td>21</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Medium-sized birds</td>
<td>1355</td>
<td>619</td>
<td>1974</td>
<td></td>
</tr>
<tr>
<td>Undetermined</td>
<td>114</td>
<td>119</td>
<td>233</td>
<td></td>
</tr>
<tr>
<td>Total unidentifiable birds</td>
<td>1244</td>
<td>1379</td>
<td>2623</td>
<td></td>
</tr>
<tr>
<td>Total bird assemblage</td>
<td>2997</td>
<td>1366</td>
<td>4363</td>
<td></td>
</tr>
</tbody>
</table>
Methodology

Recovery

Excavations at the Convent of Santa Clara-a-Velha started in 1995 (Côrte-Real et al., 2000; Côrte Real, 2005). Since then different teams of excavators have been on the field. No uniform methodology for recovering organic materials was followed. Most faunal remains, including birds, were recovered by hand during excavation. In Area 41 earth samples were dry sieved on site using a 3 mm mesh and material was sorted by workers there. On the contrary, earth samples from Area 46 were water sieved at the Paleobotany Lab of the ex-IPA (Portuguese Institute of Archaeology, now IGESPAR) with 8mm and 4mm meshes and later they were carefully sorted by technicians into bone, eggshell, seeds, charcoal and molluscs. Evidently, the larger number of undetermined bird remains, Passeriformes and the presence of eggshell in this rubbish dump is related on the one hand, to the skills of the staff that undertook the task and on the other, to the thorough methodology that was followed (table 2).
Figure 3. Tibiotarsi of domestic fowl with cut marks on their distal articulation.

Figure 4. Left femur of domestic fowl in four views. Note the little tooth puncture marks at several points on the proximal diaphysis and the distal articulation, probably caused by a cat.
The bird assemblage was identified using the comparative collection housed at the Archaeozoology Lab (IGESPAR) in Lisbon. Unidentifiable remains were assigned to three general categories, of which two were based on approximate size. Taking into account the identified species it can be assumed that fragments included in the large-sized group correspond to goose and maybe turkey bones whereas the medium-sized group comprises mostly remains of domestic fowl and mallard that could not be determined specifically. Skull fragments, quadrate, ribs, vertebrae, fragmentary bits of sternum and pelvis, carpals and upper and lower phalanges are the main skeletal elements recorded in these general categories, together with the shafts of long bones (table 3). Finally, the undetermined fraction includes bone splinters that could not be identified with any anatomical element.

None of the diagnostic characters of pheasant or guinea fowl (Erbersdobler, 1968; MacDonald, 1992) were observed in the galliforms remains of the size of domestic fowl. Thus, they were assigned to this species. Equally, the large number of immature bones of galliforms compatible with domestic fowl is recorded in table 2 as cf. Gallus gallus domesticus. In the case of the Anatidae, mallard outnumbers any other ducks and greylag goose appears to be the only goose species present. However, since most of these fragments are partially damaged at the articulation ends...
it was not possible to take measurements to identify their wild or domestic nature. Neither were juvenile specimens recovered.

**Recording**

In addition to the anatomical and taxonomical identification, butchery marks and carnivore damage were also recorded. Due to the good state of preservation of most of the identifiable fraction and as the bones were nearly complete these marks were clearly evident with the naked eye (figs 3 and 4). Immature bones of domestic fowl were noted (fig. 5) and their contribution to the total sample was quantified to gain some knowledge on the mortality pattern of this species (table 4). The presence of medullary bone was recorded for coracoid, ulna, femur and tibiotarsus of galliforms and medium-sized birds that presented broken shafts (fig. 6 and table 5). Also the presence or absence of a spur or evidence of a spur scar on the tarsometatarsus of domestic fowl was noted.

**Results**

The abundant avian remains recovered from two rubbish dumps in Santa Clara-a-Velha suggest that birds play an important role in the diet of this religious community and in particular, domestic
fowl. Poultry represent 90% of the sample if both certain and probable identifications of immature specimens (cf. *Gallus gallus domesticus*) are counted together (table 2). These data agree with the information recorded in the account books of the convent which exclusively mention hens and capons (Lígia Gambini, personal communication). In comparison, the contribution of the other species appears to be occasional. The low number of fragments assigned to large-sized birds agrees with the scarce occurrence of large-sized species, namely geese and turkey. With the exception of the small falcon, the swift and maybe the unidentified Sylviidae, all avian remains derive probably from table refuse. The diversity recorded attests to some variety of meat consumed by the nuns during the 17th-century, despite the Order regulations (see below). The distribution of skeletal elements, which includes all species but is dominated by galliforms and medium-size birds, indicates that the best cuts of meat from wings and legs were discarded here (table 3; fig. 7). Body parts are shown in six groups: head (skull, mandible, quadratum and maxilla), body (vertebrae, furcula, sternum and ribs), meaty wing (coracoid, scapula, humerus, radius and ulna), distal wing (carpometacarpal, carpals and upper digits), meaty leg (synsacrum, femur, tibiotarsal and fibula) and finally, distal leg (tarsometatarsal and phalanges). Nearly 70% of the remains are from the meaty wing and leg, whereas their extremities, axial and cranial bones are the less represented for all species (fig. 7). Even if these results could be slightly biased due to damage of the most fragile skeletal elements and failure to recover the smallest bones, it appears that extremities of most birds were removed before consumption and they were discarded somewhere. The portions served were certainly the most rich in meat. Butchery traces were recorded in less than 3% of the galliforms sample and on one mallard tarsometatarsus. No chop marks were recognised,
only knife cuts. In particular, they were located on the distal tibiotarsi, probably as a result of the removal of the lower leg (fig. 3). This suggests that further processing of the bird carcasses occurred once the meat was cooked. Then, breast, wings and legs could be easily disarticulated by hand or cutting through the meat without touching the bones.

More numerous were the signs of carnivore gnawing, in particular tiny teeth puncture marks that were visible on nearly 5% of the sample. They were identified as produced by cats (Moran & O’Connor, 1992). Overall, this suggests that domestic cats were kept in the convent premises to control other pests (i.e., rodents) and that they had access to the avian remains discarded by the nuns, after or during their meals. Thus, it is possible that this commensal species was responsible also for the partial destruction of the smallest elements less abundant in the sample. Based on the tibiotarsus, the minimum number of domestic fowl is estimated in 155 individuals (fig. 8). The estimated MNI of ovicaprines recovered from Area 41 is 87 and 20 for Area 46 (Detry & Moreno-García, 2008). Such comparison suggests that consumption of fowl was high although the quantity of meat from mammals was obviously dominant.

As shown in table 4 more than a quarter of the wing and leg bones of fowl are from immature birds. Amongst these the humeri show the highest percentage of all – over 40% (fig. 5). Church and Johnson (1964) in their study on growth of long bones in the chicken describe how the bony epiphyses in the proximal end of the tarsometatarsal bone and on the proximal and distal ends of the tibiotarsal bones fuse with the diaphysis between the age of 14 and 18 weeks. In the sample analysed, nearly 30% of those leg bones present unfused epiphyses (table 4). It can be concluded that the consumption of chicken younger than 4 months at the convent of Santa Clara was of some significance.

None of the tarsometatarsals recovered in both rubbish dumps presented a spur, suggesting that the meat of adult cocks and maybe also of old hens (West, 1982) was not on the nuns’ table. That does not appear to have been the case of hens inlay as shown by the presence of medullary bone in broken shafts of coracoid, ulna, femur and tibiotarsus (fig. 6). Its frequency differs slightly from one to another bone but the average value accounts for its occurrence in 27% of these remains (table 5). At this stage, it is worth mentioning that the abundance of eggshell fragments recovered from Area 46 demonstrates the important role that eggs must have had as a source of protein in the diet of this religious community. It cannot be forgotten that eggs are also the main ingredient of the well-known home-made sweets by the Clarisse nuns of the city of Coimbra nowadays, a tradition that perhaps extends far back in time (Algranti, 2005; Tavares, 1999).

On the whole, over half of the domestic fowl remains belong to juvenile individuals and laying hens (26% and 27%, respectively). This suggests a mixed husbandry strategy, with part of the chickens bred for meat and part used when adults for egg-production, although the common destiny was to end up in the boiling pots.

**An integrated approach**

As mentioned above the documentary sources can provide an insight into the daily life of the nuns living in this convent. As far as dietary aspects are concerned the Second Rule of the Order of the Clarisses was particularly strict (Constituiçoens geraes, 1693). In fact, there is a whole chapter dedicated to fast and abstinence in which the consumption of flesh meat is restrained to special circumstances. Neither eggs nor cheese or dairy products were allowed at anytime of the year. For the sake of clarity an excerpt of this chapter is reproduced here (own translation):

> Fast and abstinence for the sisters
> With the exception of the sick and the externals, all sisters must fast from Our Lady’s Nativity (8th of December) until Easter, except on Sundays and Christmas Day. The rest of the year they should fast only on Fridays. Further, they must refrain from eating flesh-meat, except in the case
of sickness. The abbess can dispense the weakest, according to their weaknesses. Eggs, cheese and dairy products can be consumed except from Advent to Christmas, (…), on Fridays and during the fasting ordered by the Holy Church. The abbess can dispense the youngest, sick and oldest sisters from fasting, except during Advent and on Fridays.

It has to be emphasised that this convent was known for its strict compliance with the law. Therefore, the regular consumption of flesh-meat reflected in the results from the archaeozoological analyses carried out on material dated to the 17th-century (Detry & Moreno-García, 2008) appears to be in profound disagreement with the Order rules. However, according to available historical documents from the 16th-century there is an explanation for such results.

The location of the convent on the bank of the river Mondego (fig. 1), successive flooding and gradual silting-up of this space, meant that living conditions became very unhealthy. The nuns were frequently ill so that a request was made to the religious authorities to be exempted from fasting. Consequently, this compulsory regulation was officially discontinued in 1507 when Pope Julius II issued a Papal Bull decreeing that the Clarisses of Santa Clara from Coimbra were authorized to eat meat all year round except during Advent and each Wednesday (Lígia Gambini, personal communication).

In effect, examination of more than seventy skeletons exhumed from the cloister and the choir of the church (Cunha et al., 2000) revealed different osteopathologies affecting the joints of the body and also respiratory problems related to the insalubrious local environmental conditions. Yet, above all health problems oral pathologies stand out. Lopes (2001) found that the overall frequency of teeth with caries was 85.7%, antemortem dental loss was 91.4% and 40% of the individuals suffered abscesses. These data, taking into account the average age of the deceased, around 50 years old, suggests that there was a lack of oral hygiene and odontological care among the religious community (Leal & Ferreira, 2006-7). Since dental wear was not particularly strong, Lopes (2001) concludes that the diet of the nuns of Santa Clara-a-Velha was not based on abrasive food. The way it was cooked must have also played a part. For instance, immature fowls were presumably roasted while mature hens were cooked in stews and soups served to the sick sisters. In addition, the high incidence of caries, the fact that loss of teeth affected also young individuals and that periodontal disease was common can probably be explained as effects of a diet rich in carbohydrates and sugars.

This hypothesis agrees with the results from the analyses of the excavated environmental material dated to the 17th-century. They not only reveal regular consumption of tender meat from lambs, kids, piglets, calves, immature domestic fowl and eggs (Detry & Moreno-García, 2008) but also evidence consumption of a wide variety of fruits (i.e., walnuts, hazelnuts, figs, peaches, apricots, plums, cherries, grapes, …). Among them coconuts (Cocos nucifera) and squash (Cucurbita ficifolia) seeds, exotic tropical fruits probably imported from Africa or South America, are recorded for the first time (Queiroz et al., 2007). Some of these fruits were probably consumed as fruit preserves or used in confectionery. Based on documentary sources Algranti (2005) notes how the art of confectionery was developed and mastered by Portuguese nunneries during the 17th-century. Santa Clara-a-Velha would not have been an exception.

The abundance of domestic fowl and the variety of bird taxa represented, including rare species such as turkey, resemble other European urban monastic assemblages from the medieval and post-medieval periods (O’Connor, 1993; Powell et al., 2001; Ayres et al., 2003), although the contribution of bird remains, particularly domestic fowl, in the two garbage dumps studied appears to be quite high (30%, table 1). This leads to the conclusion that hens, chicken and eggs must have played an important role in the diet of this religious establishment at least during the 17th-century.

Finally, we would like to put forward a working hypothesis that may be worth considering as more data on monastic living standards are investigated. Could the abundant remains of poultry be related to this post-medieval convent being a female house? Gilchrist (1994) in her study on medieval and late medieval women’s monastic communities in Britain noted different standards of living between nunneries and male monasteries. Such interesting approach is lacking from Portuguese archaeology. Equally, there are no archaeozoological analyses from other religious establishments or even secular sites from this chronological period to which our results can be compared and this hypothesis be assessed.
Final remark
The Clarisses from Coimbra were religious women but also aristocrats. All along its history the convent of Santa Clara-a-Velha was a wealthy institution. It owned extensive tracts of agricultural lands which were rented out in exchange for goods and it profited from donations, some of them contributed by the well-off families of the nuns or the nuns themselves, wealthy widows who donated property to the order when they entered the nunnery. According to Oliveira (1972) they were allowed to keep in their properties up to 900 rams per year which in some cases were gifts made in kind. Thus, it may be assumed that most of the flesh-meat consumed at this monastic house came from animals reared at their own lands. From this perspective, it appears of great interest to further research the documentary sources available in order to understand how this urban Portuguese nunnery participated in economic aspects such as production and trade other than that of consumer.

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References


Constituiçoens geraes para todas as freiras e religiosas sogeitas à obediência da Ordem de N.P.S. Francisco nesta família cismontana. Officina de Miguel Deslandes, impressor de Sua Magestade, Lisboa 1693.


