

THE DISTRIBUTION OF WEIGHT STANDARDS TO PORTUGUESE CITIES AND TOWNS IN THE EARLY 16th CENTURY: ADMINISTRATIVE, DEMOGRAPHIC AND ECONOMIC FACTORS

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ABSTRACT – This paper studies how the reform of weights of Manuel I, king of Portugal, unfolded. Some key documents overlooked, until now, by the historians of metrology illuminate the early days of the reform. In a letter of May 1503, the king announced the delivery of the new standards to the municipalities and scheduled the entry into force of the new system for January 1504. Municipal documents tell us that the maneline standards were already being delivered in July 1503 and that the new system did come into force in 1504. In the following decades, as the documentation shows, the maneline rules remained in force and the regional authorities sought to ensure their application. It is also known that many municipalities were given exemptions from adopting the standards, considering their smallness, poverty or lack of trade. Crosschecking the recently elaborated inventory of maneline weight piles with data from the 1527-1532 administrative and demographic survey of the whole kingdom allows for a more substantial analysis of how this process unfolded. More than the global population and size of a municipality, it was the population and importance of its chief urban center that mainly influenced on the decision of acquiring a maneline pile.

Keywords: Maneline reform; weight reform; maneline weight piles; demography; urban centers.

RESUMO – A DISTRIBUIÇÃO DE PADRÕES DE PESOS AOS MUNICÍPIOS PORTUGUESES NO INÍCIO DO SÉCULO XVI. FACTORES ADMINISTRATIVOS, DEMOGRÁFICOS E ECONÓMICOS. Este artigo estuda a implementação da reforma manuelina dos pesos. Alguns documentos essenciais, ignorados até agora pelos historiadores da metrologia, iluminam os primeiros passos da implementação da reforma. Numa carta de Maio de 1503, Dom Manuel I anunciou a entrega dos novos padrões aos municípios e fixou a entrada em vigor do novo sistema em Janeiro de 1504. Alguns documentos municipais mostram que

os novos padrões já estavam a ser entregues em Julho de 1503 e que o novo sistema entrou de facto em vigor em 1504. Nas décadas seguintes, a documentação mostra que as regras estabelecidas continuavam em vigor e que as autoridades regionais procuravam garantir a sua aplicação. É também verdade que muitos municípios foram obtendo dispensas de ter os padrões, considerando a sua pequenez, pobreza ou a inexistência de comércio. O cruzamento da inventariação das pilhas manuelinas, recentemente realizada, com os dados do cadastro de 1527-1532 permite agora uma análise mais substancial sobre a forma como se desenrolou este processo. Mais do que a população global de um município, parecem ter sido a população e importância da sua sede os factores que mais influíram na aquisição de uma pilha manuelina.

Palavras-chave: Reforma manuelina; reforma dos pesos; pilhas de pesos manuelinas; demografia; centros urbanos.

RÉSUMÉ – LA DISTRIBUTION D'ÉTALONS DE POIDS AUX MUNICIPALITÉS PORTUGAISES AU DÉBUT DU XVI^e SIÈCLE: FACTEURS ADMINISTRATIFS, DÉMOGRAPHIQUES ET ÉCONOMIQUES. Cet article étudie la mise en œuvre de la réforme des poids de Manuel I, roi du Portugal. Certains documents clés, ignorés jusqu'à présent par les historiens de la métrologie, éclairent les premières étapes de la mise en œuvre de la réforme. Dans une lettre de mai 1503, le roi annonce la livraison de nouvelles normes aux municipalités et programmait l'entrée en vigueur du nouveau système pour janvier 1504. Quelques documents municipaux montrent que les étalons manuels étaient déjà livrés en juillet 1503 et que le nouveau système est entré en vigueur en 1504. Au cours des décennies suivantes, comme le montre la documentation, les règles manuelles sont restées en vigueur et les autorités régionales ont demandé pour assurer leur application. On sait également que de nombreuses municipalités ont été exemptées de l'application des normes, compte tenu de leur petite taille, de leur pauvreté ou de l'absence de commerce. Le recoupement de l'inventaire récemment élaboré à partir des piles à godets manuelles avec les données de l'enquête administrative et démographique de 1527-1532 sur l'ensemble du royaume permet de procéder à une analyse plus approfondie du déroulement de ce processus. Plus que la population totale et l'extension territoriale d'une municipalité, c'est la population et l'importance de son centre urbain principal qui ont influencé principalement la décision d'acquiescer une pile manuelle.

Mots clés: Réforme manuelle; réforme des poids; piles à godets manuelles; démographie; centres urbains.

RESUMEN – LA DISTRIBUCIÓN DE ESTÁNDARES DE PESO A LOS MUNICIPIOS PORTUGUESES EN LA PRIMERA MITAD DEL SIGLO XVI. FACTORES ADMINISTRATIVOS, DEMOGRÁFICOS Y ECONÓMICOS. Este artículo estudia la implementación de la reforma de los pesos, la "reforma manuelina", de Dom Manuel I, rey de Portugal. Algunos documentos clave, ignorados hasta ahora por los historiadores de la metrología, iluminan los primeros días de la implementación de la reforma. En una carta que data de mayo de 1503, Dom Manuel I, anunció la entrega de los nuevos estándares a los municipios y estableció la entrada en vigor del nuevo sistema en enero de 1504. Documentos municipales indican que los estándares manuelinos ya se entregaron en julio de 1503 y que el nuevo sistema realmente entró en vigor en 1504. En las décadas siguientes, la documentación muestra que las normas establecidas todavía estaban vigentes y que las autoridades regiona-

les buscaron asegurar su aplicación. También es conocido que muchos municipios fueron excusados de tener los estándares, considerando su pequeñez, pobreza o falta de comercio. La verificación cruzada del inventario recientemente elaborado de pilas de pesos manuelinas, con datos de la encuesta administrativa y demográfica de todo el reino de 1527-1532 permite un análisis más sustancial de cómo se desarrolló este proceso. Más que la población global de un municipio, parece que la población y la importancia de su sede fueron los factores que más influyeron en la adquisición de una pila manuelina.

Palabras clave: Reforma manuelina; reforma de los pesos; pilas de pesos manuelinas; demografía; centros urbanos.

I. INTRODUCTION

Throughout Europe, metrology evolved slowly, from a situation of extreme diversity, in the Middle Ages, to the high degree of uniformity observed today (Kula, 1986; Connor, 1987; Connor, Simpson, & Morrison-Low, 2004; Wedell, 2010). Uniformization was promoted by sovereigns, not only to facilitate trade and tax collection, but also having in mind the symbolic importance of subjecting an entire country to the same system of weights and measures.

The developments described and analyzed in this article are a small part of a major development that took place in Portugal in the late 15th and early 16th century: the transition from the highly decentralized model of government, that characterized the middle ages, to the centralized model, that characterizes modern states. On a first stage, king João II managed to set the higher nobility under control. Then, his successor, Manuel I, produced vast amounts of legislation that completely changed the organization of the country, effectively centralizing its government (Freitas do Amaral, 2003). Municipal charters were reformed accordingly. In that context, Manuel I undertook the main metrological reform in Portuguese history prior to the introduction of the Decimal Metric System. The preparatory work began in 1497. The king was particularly careful in which concerns weights, distributing bronze weight standards to a significant number of municipalities throughout the kingdom. Damião de Góis, summarizing the efforts of Manuel I concerning reforms and new legislation, tells us that the king “distributed copper weights throughout the kingdom, because the iron ones were false, as the time had dwindled them, due to the rust they created” (Góis, 1566-1567, IV, 86, fl. 112v). The existence of the manueline standards, which are in the form of nesting weight piles, is well known to Portuguese authors (Trigoso, 1815; Costa Gomes, 1942; Seabra Lopes, 2003).

Around the end of the 15th century, a renewed interest in promoting the uniformity of weights and measures could be observed in different countries. In Portugal, João II attempted to uniformize capacity measures in 1482. He distributed standards to the Lisbon city, to the six *comarcas* (provinces) and to the four military orders (Soares, ~1950, p. 383-384). The Catholic kings, Fernando and Isabel, attempted to simplify and uniformize the system of weights across Castile in 1488. A few years later, in 1496, they

issued a *pragmatica* that repeats most of the content of the reform of Juan II (1435) with the necessary updates related to weights and other recent changes (Castro Redondo, 2018). In 1495-1497, Henry VII undertook a major metrological reform in England, which included the delivery of bronze standards of weights and measures to 42 of the main cities and towns across the kingdom (Skinner, 1967; Connor, 1987). A few of them still exist. Each *avoirdupois* standard was a set of independent weights, not a pile of nesting weights.

Regarding the size of nesting weight piles, it is worth pointing out that, outside Portugal, the large piles of 128 and 256 marcs were very rare, and none is known for the first half of the 16th century¹. The famous (and incorrectly called) *pile de Charlemagne*, weight standard of the Cour des Monnaies of Paris and original standard of France, is a pile of 50 marcs. It probably dates from the last third of the 15th century and is first mentioned in a document of 1486 (Blanchard, 1887; Vangroenweghe, 2015). In Portugal, however, over a hundred piles of 64, 128 and 256 marcs from the manueline reform still exist in town halls, central museums and various collections, and many others are known from different sources.

It seems correct to say that the reform of weights undertaken by Manuel I is unparalleled in 15th-16th century Europe. It is remarkable for the large number of weight piles delivered to municipalities, for the large size of these piles and for the elaborate decoration (fig. 1). Unfortunately, since manueline weight piles only recently were studied, they are completely absent from the main international studies and syntheses on nesting weight piles (Kisch, 1965; Lavagne, 1965; Houben, 1984; Danforth, 1988; Holtman, 1997-1998; Vangroenweghe, 2015).



Fig. 1 – Manueline pile of half quintal (2 arrobas) belonging to the municipality of Monforte, still in the possession of Câmara Municipal de Monforte. Colour figure available online.

Fig. 1 – Pilha manuelina de meio quintal pertencente ao município de Monforte, ainda hoje na posse da Câmara Municipal de Monforte. Figura a cores disponível online.

In this article, we study the implementation of the manueline reform of weights, paying particular attention to the distribution of the new standards to the municipalities. Since the criterion determining the size of the pile to be delivered to a given municipality was based on the population figure of that municipality, this article crosschecks information from the recent inventory of manueline municipal standards (Seabra Lopes, 2018; 2019b) with the demographic information provided by the administrative and demographic survey of 1527-1532 (Galego & Daveau, 1986; Alves Dias, 1996).

II. THE NEW SYSTEM AND THE NEW MUNICIPALITY STANDARDS

1. The new legislation on weights

Two documents of the manuline weight reform are well known. The first is an ordinance dated 1502/05/31, which formalized the imposition of the new system of weights to the whole kingdom. The other is an undated regiment (*Regimento dos Pesos*). Both were printed in annex to the *Regimento dos Ofiçaaes das Çidades, Villas e Lugares destes Regnos* (= regiment of the officers of cities, towns and places of these kingdoms), of which Valentim Fernandes finished printing an edition in Lisbon in 1504/03/29.

In the ordinance of 1502, the king set the *arratel* to 16 ounces, for any product, maintaining the *quintal* (hundredweight) equivalent to 128 *arratels* (*Regimento dos Oficiais*, fl. 80-80v). The reform converged to a purely binary system based on the *marco de Colonha*, the Portuguese variant of the Cologne marc (Gama Barros, [1922] ~1950; Seabra Lopes, 2003). According to the recent evaluation, the manuline *arratel* had a value close to 457.8 g (Seabra Lopes, 2018). In turn, the *Regimento dos Pesos* presents a detailed description of the weight standards to be delivered to the municipalities and specifies the weights that each professional should have, according to the branch of activity, and the penalties in case of poor calibration. The standards distributed to the municipalities present inscriptions according to which their manufacture was ordered by king Manuel I in 1499.

According to the ordinance of 1502/05/31, the new system would come into force six months after the delivery of the new standards. It is known that the preparation of the printed edition of the regiments was in progress at the beginning of 1503. By a permit of 1503/02/22, Manuel I acknowledged “the work that Valentim Fernandes has done in printing the books of the regiments, which we now ordered to be made for the whole kingdom” and granted him the privilege of being the exclusive printer of the regiments (Bragança, 1929-1935, I, p. 162). This suggests that the new regiments, and in particular the *Regimento dos Pesos*, would already have been drafted on that date.

Until recently, only the 1504 editionⁱ of the regiments was known, and it was assumed that the distribution of regiments and weight standards had started in the spring of 1504, when that edition became available. There are, however, documents proving that the implementation of the reform had started almost a year before. A circular letter of Manuel I, dated of 1503/05/28 and addressed to the municipalities of the kingdom, is of great importance for the present study. This letter, which has hitherto remained unknown to the historians of metrology, exists in original form in the municipal archives of Montemor-o-Novo (AMMN, A1C1-19, publ. Sá Nogueira, 1990, doc. 20) and Viana do Castelo (AMVCT, 883, n.º. 41, publ. Domingues, 2014, doc. 2). In addition, the original delivered in Porto is known to us through a contemporary copy that exists in a book of council meetings of this city (AHMP, Liv. 7, fl. 145-145v; Ramos, 1997, p. 120121). In the letter, the king informs: “We order to send to the cities, towns and places of our kingdoms the

regiments of the officers by which they will be governed as well as the regiment of the new weights that we defined and ordered to be made”. Therefore, the edition concluded in March 1504 was not the first, since the distribution of the regiments had begun almost a year earlier (Domingues, 2014).

The circular letter was produced in two steps. In a first step, copies of a template of the letter were made leaving blank spaces for the name of the carrier. Later, for each municipality, the name of the carrier was filled in and the name of the municipality was annotated. The letter delivered in Montemor-o-Novo has the annotation *Para Montemor* (for Montemor) on the footer. The carrier was Estevão de Vilhena. The letter delivered in Viana do Castelo has the annotation *Vyana*, also in the footer. In this case, the name of the carrier, António de Pinharanda, was clearly filled in by a different hand and interlined in two of the three occurrences. The carrier for Porto was also Pinharanda. According to the template, the king said that he had sent the carrier “in that province to give the regiments and weights in its cities and towns according to his regiment signed by us”. We see that Pinharanda was assigned to the *comarca* (province) of Entre-Douro-e-Minho, in the north, and Vilhena was assigned to the province of Entre-Tejo-e-Guadiana, in the south. This proves that in May 1503, not only was there already an edition of the regiments, but there were also concrete instructions to deliver the regiments and the new weights to the different municipalities of the kingdom. In section III.1, we will see that this was already taking place in July 1503. The circular letter further informed that the reform of weights was to come into force in January 1504.

The *Regimento dos Pesos* of 1503 specified that municipalities would pay the cost of manufacturing the new standards and the king would pay the cost of transportation (*Regimento dos Oficiais*, fl. 76v-77). In the circular letter, the king added that the carrier would charge municipalities with the cost of the delivered standards and regiments, “of whatever money there is in this municipality, from its income, and it will be the price which it all costed, the bill of which will be shown to you in the regiment that the said [carrier name filled in here] takes”. If there was no money in a municipality, the king authorized the levying of a tax.

2. Specification of the new municipal weight standards

In the *Regimento dos Pesos*, known to us in the form in which it was printed in March 1504, but with a first edition about a year earlier, Manuel I stated which standards would be sent to the municipalities: a *quintal* pile of 128 arratels, with 16 pieces that were binary subdivisions down to *meia oitava*, i.e. half an octave of ounce (*Regimento dos Oficiais*, fl. 77-77v). The king had commissioned the new municipal standards in Flanders. In the first version of the manueline ordinances, little else changed than the verbal tense: “we send you” became “we have sent you” (*Ordenações Manuelinas*, 1512-1513, Liv. I, tit. XII, 33v-34).

In the regiment of 1503, Manuel I also said: “these standards we order to be taken and placed in the cities, towns and places in our kingdoms, where and how many it seemed to us necessary to each place” (*Regimento dos Oficiais*, fl. 76v-77).

This statement seems to indicate that in May 1503 the king had already decided to distribute piles of different sizes to different municipalities and had already fixed a list with the municipalities (“where”) required to purchase weight standards and “how many” each municipality would have to purchase (i.e. how many pieces in the pile). However, the first version of the manueline ordinances says nothing about this. Only in the final version of the ordinances, everything becomes clear: there were piles of *quintal* (= 4 *arrobas*), *meio quintal* (= 2 *arrobas*, fig. 1) and *arroba*, which would be distributed according to the population figure of each municipality (see more details below sec. III. 2).

3. The municipalities in the time of Manuel I

In a perfect implementation of the manueline reform, a pile of weights would have been delivered to each municipality. However, as was seen, the king himself indicated that he would not deliver standards to all municipalities. The number of municipalities existing in Portugal in the early sixteenth century varies according to the authors and the criteria used, as does the terminology itself. On the basis of the 1527-1532 administrative and demographic survey, Galego and Daveau (1986, p. 15-17) identified the existence of 637 “administrative units”, corresponding to the entries in that survey. Alves Dias (1996, p. 197-207), noting that several entries of the survey resulted from the aggregation of multiple smaller administrative units, identified each of them, reaching a total of 761 “local administrative units”. For example, the entry for Montemor-o-Velho includes 10 small units (under the names of *lugar* or *couto*) that had their own civil jurisdiction, but were integrated into the criminal jurisdiction of Montemor-o-Velho (Braamcamp Freire, 1908, p. 280-281; Alves Dias 1996, p. 538). Many of these smaller administrative units also had their own charters granted by Manuel I (Garcia, 2009). Since these local administrative units are the roots of contemporary Portuguese municipalities, we will, for simplicity, refer to all of them as municipalities. It is also interesting to note that only 123 municipalities participated in the *Cortes* (i.e. parliament) meetings held between 1385 and 1490, and only 80 of those had a permanent seat in *Cortes* (Sousa, 1990, I, p. 189-194).

Different words were used, not always consistently, to identify the different types of municipalities. A *cidade* (city) was, traditionally, a municipality whose main urban center was also the seat of a bishopric. A *vila* (town) was, according to an indication of the 1527-1532 survey, a municipality with both civil and criminal jurisdiction (Galego & Daveau, 1986, p. 17). The word *vila* applied not only to the municipality but also to its chief urban center or seat. According to the survey of 1527-1532, the vast majority of the municipalities in Estremadura and Entre-Tejo-e-Guadiana were vilas. In Beira and Entre-Douro-e-Minho, many municipalities were not vilas. In these cases, the chief urban center, if it existed, was a *lugar* (place). As a rule, the municipalities that were vilas appear under the title *Vila de ...* (=town of ...) while most of the others appear under the title *Concelho de...* (=council of ...). However, all municipalities were councils. In Entre-Douro-e-Minho, 75% of the municipalities identified as *concelho* had no seat (Galego & Daveau, 1986, p. 23).

III. THE REFORM ON THE GROUND

In the time of Manuel I, as mentioned, hundreds of municipalities existed in Portugal. In spite of all the information collected for the charters reform, the king never had detailed and systematic information on the territorial extension, population and resources of the different municipalities. The information collected for the charters was of a different nature, and even that, was not yet available in 1503, when Manuel I apparently decided which standard to deliver to each municipality, if any. Only in 1527-1532, already in the reign of João III, the first detailed survey of the whole kingdom, simultaneously territorial, administrative and demographic, was carried out (Galego & Daveau, 1986; Alves Dias, 1996). It is almost certain that Manuel I did not have enough information to know precisely in which municipalities the standards were really necessary and which municipalities would have the financial capacity to acquire them. Thus, the established rules were not strictly followed. In any case, we have plenty of evidence that the reform has been implemented throughout the kingdom.

1. Early reports on the distribution of weight standards to municipalities

Most municipalities did not preserve their early 16th century books and documents. Fortunately, in the few municipal archives preserving documentation from that time, it is still possible to find important evidence about the implementation of the manueline reform of weights. The documents here mentioned, hitherto unknown to the historians of metrology, show that the new weights and regiments were already being distributed in July 1503. The minutes of the Montemor-o-Novo council meeting of 1503/07/16, which appear under the title *Entrega dos pesos e livros* (delivery of weights and books [of regiments]), tell us that the officers, noblemen and people of this town were called “to see the letter of our lord the king about the regiment of weights and the book of the regiment of towns” delivered to them by Estevão de Vilhena. In the same moment, Vilhena also delivered a “castedⁱⁱⁱ pile of 15 pieces, and the pile is full with them” (*Vereações de Montemor-o-Novo*, 1503-1504). Given the number of pieces inside, this was a quintal pile.

Similar news can be found in the council meetings of the city of Porto (Ramos, 1997, p. 120-121). In particular, the minutes of the meeting held in 1503/07/27 tell us that Antonio de Pinharanda, royal knight, had appeared in the *câmara* (chamber or city hall) of Porto where he delivered a “quintal weight, according to the regiment which he delivered with it” (AHMP, Liv. 7, fl. 144v). In annex to the minutes, a letter similar to the originals preserved in Viana de Castelo and Montemor-o-Novo was transcribed under the title *Trelado da carta dos pesos e regimento novos* (Transcription of the letter of the new weights and regiment, in AHMP, Liv. 7, fl. 145-145v).

We also know that the new *Regimento dos Pesos* was available for consultation for a month at the *Porta da Relação* in Porto, and it was also proclaimed throughout the city, as the *porteiro* (doorman) declared in 1503/08/17. In this record, it is explicitly stated that the new weight standard was in fact a “pile”. It is again stated that the new *arratel* was of

16 ounces and the new system would come into force in January of the following year (AHMP, Liv. 7, fl. 221v; Ramos, 1997, p. 121).

Viana do Castelo lost the books of council meetings of that time, so there is no written record about the delivery of weights and regiments. However, Viana do Castelo still keeps the circular letter of May 1503. And, unlike Porto^{iv} and Montemor-o-Novo^v, Viana also keeps its maneline quintal pile (Seabra Lopes, 2018, p. 235), which must have been delivered by António de Pinharanda in July or August 1503.

The letter of May 1503 announced that the new system of weights was to come into force in January 1504. The municipality officers or councilmen were to ensure that all those who “should have weights in that town, should calibrate and repair them by this new [standard] that we now send”. In 1504/05/04, the new system was already being used in Porto and it was found that the new arratel was causing confusion regarding the equivalence that should be given to a weight named *pedra* (stone) based on the new arratel (AHMP, Liv., 7, fl. 181v; Ramos, 1997, p. 128). A few days earlier, in 1504/04/20, Montemor-o-Novo’s councilmen had decided to recycle the old iron weights to make prison window grids (*Vereações de Montemor-o-Novo*, 1503-1504). Around the same time, the new system had also reached the island of Madeira (see below section II.2).

With the distribution of the new weight piles to the municipalities, the new system was connoted with the piles. For example, in 1507, on the African island of São Tomé, the “weight of the island, the one of the pile” was mentioned (*PMA*, V, doc. 89). And in 1509 Manuel I recalled that “in the House of Guinea, we have ordered the weight to be made by the piles of the new weights” (*Regimento das Casas das Índias e Mina*, 1509-1697, p. 128).

In the first edition of the long-prepared maneline ordinances, Manuel I stated that the weights and linear measures would be the same throughout the kingdom and that he had ordered the respective standards to be made (*Ordenações Manuelinas*, 1512-1513, Liv. I, tit. XII, fl. 33). At another point, the king recalls that he had already sent the weight standards to municipalities (*idem*, *ib.*, fl. 33v).

It is hard to know at what pace the new standards reached the municipalities in the different domains of the king of Portugal. In 1515, the municipality of Santa Cruz, in the island of Madeira, recognized that its standards “are not the standards that our lord the king ordered to be in the chamber”, since the standards should be made of “metal”, i.e. bronze or brass (Costa, 1995-2002, II, p. 507). In fact, the regiments of Manuel I (1503 and 1512-1513) say that the piles sent to the municipalities were made of “metal”. As such, Santa Cruz ordered a new standard from the king. Therefore, Santa Cruz most probably received a maneline weight pile, which is now unknown.

Documents in municipal archives across the country are likely to contain references to nesting weight piles. In Coimbra, a 16th century inventory of the standards of weights and measures that were kept at the city hall informs us about the existence of “a perfect quintal with all weights of moorish brass in a closed pile” (*Livro I da Correia*, p. 155). The maneline quintal pile of Coimbra still exists, albeit incomplete. A similar inventory from the city of Lisbon, dated of 1614, mentions “a weight standard of quintal that the chamber imported from Flanders”, most likely a maneline pile (AML-AH, *Livro Carmesim*, fl. 100; see *Livros de Reis*, VI, p. 129; Seabra Lopes, 2019b).

2. Rules, exceptions, and new rules

Given the lack of detailed information on the actual needs and resources of different municipalities, Manuel I and his successors used common sense, opening exceptions to previously established rules when this seemed appropriate.

One of the first exceptions was requested by the island of Madeira, which wanted to continue using the old weight. In a first moment, in June 1504, Manuel I refused to allow the exception (Sousa Melo, 1972-1974, doc. 280). However, the people of Madeira probably insisted and the king eventually accepted the exception. In fact, in January 1505, considering “the loss and damage which the inhabitants of the said island were receiving by using the new weight”, the king determined that, “from now on, the new weight should not be used and nothing should be weighted by the new weight, as we instead want and order that you use and weigh by the old weight” (Sousa Melo, 1972-1974, doc. 283).

The amplitude of this somewhat unexpected concession was soon limited. In 1515, one of the municipalities of the island of Madeira, Santa Cruz, asked the king to send them a weight standard made of “metal”, i.e. made of bronze or brass (Costa, 1995-2002, II, p. 507). This was most probably one of the piles of the new weights. Other municipalities of the island did acquire manuline piles, as is known in the cases of Machico, Calheta and Ponta do Sol (Seabra Lopes, 2018, p. 229, 234).

In contrast, in 1546, the only city of Madeira, Funchal, still didn't have a quintal pile as it was supposed to have. The chamber of Funchal had three sets of weights, one for goldsmiths and apothecaries, another for general *haver-de-peso* (avoir-du-pois) and a third one for sugar. It was stressed that in this last system, the “arratel has fourteen ounces, and by these [old weights] only the sugar is weighed” (Costa, 1995-2002, II, p. 325). We see that the old weight was no longer the general weight in Funchal. In 1550, the chamber of Funchal had acquired a pile of arroba “of the general weight of 16 ounces” (Costa, 1995-2002, II, p. 491). The absence of a manuline pile in Funchal probably resulted from the aforementioned indecision between the old and the new weight. It was not until 1580 that the chamber of Funchal acquired a quintal pile from a manufacturer based in Nuremberg (Seabra Lopes, 2018, p. 228).

Other exceptions were created for less important municipalities. In 1516, Manuel I exempted the municipality of Sesimbra from having a quintal (see confirmation dated 1529 in ANTT, Chanc. D. João III – *Doações, Ofícios e Mercês*, Liv. 52, fl. 130). While exempting Sesimbra from having a quintal pile, the king could have compelled this town to having a pile of half quintal. However, the word *pilha* (pile) is absent in the permit and it is not clear that the town had it or that it was forced to acquire one. The town of Águas Belas was in 1518 exempted by Manuel I from having “weights and measures of copper and metal”, being expressly authorized to continue with iron weights of arroba and its subdivisions (see confirmation of 1530 in ANTT, Chanc. D. João III. *Ofícios, Padrões e Doações*, Liv. 52, fl. 206).

In 1519, the small municipality of Infias, near Fornos de Algodres, was in the custom of having only some linear and capacity measures and no weights. This custom had been validated by the Beira authorities. In the meantime, “the tenants of our chancel-

lery of that province compelled them to have all the standards that we ordered in our regiment”. Infias noted that “in the said municipality there are no more than thirteen neighbors” and asked the king to authorize their old custom. Finally, in a permit addressed to the *corregedor* (provincial authority) of Beira, Manuel I informed that Infias “should not be compelled to have other measures or weights” (confirmation of 1529 in ANTT, Chanc. D. João III – Doações, Ofícios e Mercês, Liv. 52, fl. 119v)^{vi}.

In uncertain date, Manuel I delivered a “pile of metal that all assembled and closed weighted one arroba” to the municipality of Algodres (ANTT, Chanc. D. João III, Privilégios, Liv. 2, fol. 199). This explicit reference to an arroba pile is important. In the regiment of 1503, in addition to the detailed description of the quintal (= 4 arrobas) pile, we only find a vague hint that some municipalities would receive smaller piles. The case of Algodres provides a proof that, in fact, Manuel I distributed piles of arroba.

The final version of the manuline ordinances, printed in 1521, not only clarifies the existence of piles of three sizes, but also specifies a rule for determining the size of the pile based on the population figure of each municipality (*Ordenações Manuelinas*, 1521, Liv. I, tit. XV, fl. 35v-36):

- *idades e vilas* (cities and towns) with 400 households or more would have a quintal pile;
- *concelhos* (councils) with more than 200 and less than 400 households would have a half quintal pile (see example in fig. 1);
- *concelhos* with 200 households or less would have an arroba pile.

For municipalities with less than 400 households, the word *concelho* was used, suggesting that many of these municipalities would be small and / or would not have criminal jurisdiction, thus not having the status of *vila* (town). It should also be noted that we do not know when the rules of 1521 were first established. It is known today that the ordinances had another printed version in 1518-1519 (Alves Dias, 2012). The rules summarized above may have been already included in that version.

It is important to note that the Algodres case mentioned above does not follow these rules. In fact, Algodres had 357 neighbors or households in 1527-1532. Following the demographic criterion, Algodres should have acquired a half quintal pile. It would be interesting to know whether the delivery of the arroba pile to Algodres happened before the rules were established, or whether we are already facing a first exception to these rules. Unfortunately, we do not have information allowing us to clear the doubt.

3. The rule and the exception in the reign of João III (1521-1557)

In the following decades, exemptions were granted at the request of several municipalities. Isabel Drumond Braga collected dozens of references from the chancelleries of João III and Sebastião I in which these kings authorized certain municipalities or professional groups to have fewer weights or measures than they should have according to the ordinances (Braga, 1998). In the rest of this section, we focus our attention on the exemptions from having weights granted to different municipalities by João III, the son and

successor of Manuel I. Table I presents some data on the known exemptions. Next to the name of the municipality, there is an acronym identifying the respective “*comarca*” or province (*EDM* = Entre-Douro-e-Minho, *TM* = Trás-os-Montes, *E* = Estremadura, *B* = Beira, *ETG* = Entre-Tejo-e-Guadiana). When stated in the exemption letter, the population (number of households) is also included in the table. In the last two columns, the book and folio of the chancellery (ANTT, Chanc. D. João III – Doações, Ofícios e Mercês), where the exemption can be found, are given. The case of Aregos is known through a mention in the exemption granted to Mondim-e-Sever. The exemption granted to Algodres is in ANTT, Chanc. D. João III, Privilégios, Liv. 2, fl. 199. In the case of Pias, a municipality created in 1534 (Alves Dias, 1996, p 177), instead of an exemption, it was granted a term extension of four years for Pias to comply with the ordinances.

Table I – Municipalities exempted from having weights in the reigns of Manuel I and João III, respective population figures and the weights they were exempted from.

Quadro I – Municípios que foram dispensados de ter pesos nos reinados de Dom Manuel I e Dom João III, respectivos quantitativos populacionais e pesos que foram dispensados de ter.

Municipality, province	Date	Stated population	Popul. 1527-32	Exemption from having	Book	Fl.
Sesimbra, <i>ETG</i> (conf. 1529)	1516	-	564	Quintal	52	130
Águas Belas, <i>E</i> (conf. 1530)	1518	45	68	Arrob. metal	52	206
Infias, <i>B</i> (conf. 1529)	1519	13	30	Pesos	52	119v
Algodres, <i>B</i> (see below)	≤1521	-	-	-	-	-
Monforte do Rio Livre, <i>TM</i>	1533	600	862	Quintal	20	110v
Silvã, <i>B</i>	1535	14	25	Pesos	50	45
Fonte Arcada, <i>B</i>	1535	-	379	Quintal	10	10v
Gouveia R. Tãmega, <i>EDM</i>	1535	-	415	½ quintal	10	174v
Caria, <i>B</i>	1535	-	656	Quintal	10	170v
Bouro, <i>EDM</i>	1535	-	719	Quintal	10	81
Azurara, <i>B</i>	1535	-	936	Quintal	10	123
Águias, <i>ETG</i>	1536	50	29	Pesos	22	102
Aveloso, <i>B</i>	1536	40	47	Arroba	22	91
Sanceriz, <i>TM</i>	1537	22	70	Arroba	23	20v
Moimenta [da Beira], <i>B</i>	1537	-	205	Pesos	23	19
Melgaço, <i>EDM</i>	1538	-	301	½ qtl. metal	44	93v
Mondim e Sever, <i>B</i>	1540	200 .. 250	247	½ qtl. metal	50	219v
Aregos, <i>B</i>	≤1540	-	359	½ qtl. metal	-	-
Felgueiras, <i>EDM</i>	1541	-	1053	Qtl. metal	34	54v
Pias, <i>E</i>	1543	-	-	(postponed)	28	33
Miranda [do Corvo], <i>E</i>	1543	-	268	½ quintal	28	37
Almeida, <i>B</i>	1544	450	412	Quintal	41	47v
Algodres, <i>B</i>	1548	>200	357	½ quintal	-	-

A first aspect to be emphasized is that several municipalities asked to be exempt from having weights because the tenants of the chancelleries of the respective provinces had moved them demands. This was the case of Infias, in the province of Beira, in 1519, as mentioned above. Still in Beira, we have a similar case in Moimenta in 1537, and another

in Algodres in 1548. Those of Algodres said that “the tenants of the chancellery of the said province, and other persons who demand sanctions, moved them demands”. In Entre-Douro-e-Minho, there are similar cases in Gouveia de Riba-Tâmega (1535) and Felgueiras (1541). A similar case is known in Sanceriz, province of Trás-os-Montes (1537).

Several of the exemptions granted by João III allude to the main characteristics of the weight standards that municipalities should have. The exemptions granted to Fonte Arcada and Miranda do Corvo state that the standards were piles. The exemptions granted to Águas Belas, Melgaço and Felgueiras state that the standards were made of “metal”, that is, made of a copper alloy. Some exemptions mention both characteristics: the town of Caria was exempted from having “a pile of metal of a quintal”; the municipality of Mondim-e-Sever was exempt from having a “pile of metal”; Algodres was authorized to continue with its “pile of metal, which all assembled and closed, weighted an arroba”.

The exemptions granted to Monforte do Rio Livre, Almeida and Algodres refer to the demographic criterion stated in the ordinances of 1521. Several exemptions also mention the population figure of the municipality. Although the figures indicated in the royal letters of exemption do not always coincide with those indicated in the survey of 1527-1532, there is at least a coincidence in terms of order of magnitude. And, when we crosscheck population data with the weights from which the municipalities were exempted, we can see that the demographic criterion for which exceptions were being created, was still that of 1521 (table II). It can be seen that the rules laid down by Manuel I were still in force and that, in general, the authorities sought to ensure their application.

Table II – Exemptions for each type of standard and respective population intervals (in number of households) in the beneficiary municipalities.

Quadro II – Dispensas para cada tipo de padrão e respectivos intervalos de população (em número de vizinhos ou fogos) nos municípios beneficiários.

Exemption from having	#exemptions	Population 1527-1532
Any weights	4	30 a 205
Arroba	3	47 a 70
Meio quintal	6	247 a 415
Quintal	8	412 a 1053

Arroba = 14.650kg; Meio quintal = 29.299kg; Quintal = 58.598kg (Seabra Lopes, 2018, II e IV.4)

Some letters of exemption of João III provide indications on the weight standards then in use in municipalities. Usually, they were sets of loose weights, and in some cases we know they are made of iron. Melgaço had “half quintal in iron weights”. Moimenta da Beira used the “iron quintal” of Leomil. Fonte Arcada had iron weights of arroba and subdivisions. Silvã had iron weights up to 8 arratels. In 1548, the “metal” pile of arroba delivered by Manuel I to Algodres was still in use there. Caria had loose iron weights and a “metal” pile of half arroba. Monforte do Rio Livre had an “arroba in its box for adjusting the weights”, which probably was a pile of weights, since in a pile the larger piece served as box for the set. There was also “another iron arroba for weighing meat”.

In most cases, the royal exemption from having a standard did not specify the obligation of having a metal pile of the immediately lower size. On the contrary, several of the granted exemptions expressly authorize the continuation of the use of loose iron weight standards.

Several letters of exemption indicate the neighboring municipalities to which the beneficiary municipalities should resort when necessary. So Moimenta da Beira had weights smaller than quintal, and when needing to check a quintal, they would use the Leomil quintal standard. The letter informs that “all [the inhabitants of Moimenta] have paid for this quintal located in Liomil”. A similar case occurred with Azurara, a municipality that only had an arroba and would use the quintal of the city of Viseu when necessary. In turn, Silvã had weights up to 8 arratels and resorted to Gulfar for checking larger weights. And Águias, exempt from having any weights and measures, would use the standards of Pavia. Finally, the town of Pias, which enjoyed a term extension for acquiring the standards, resorted to Tomar’s standards in the meantime. Among the manueline piles that have reached us, there is an arroba pile that was shared by Tentúgal and Ferreira de Aves, municipalities integrated in the domain of the dukes of Cadaval (Seabra Lopes, 2018, p. 230, n. 21).

The type of municipality indicated in the exemption letters coincides with the one indicated in the survey of 1527-1532 in most cases (17 out of 22). The generally most common types, *vila* and *concelho*, are also the most common among the municipalities with exemptions (table III). Between these two main types, the number of exemptions is distributed approximately in equal parts. From table IV, it can be seen that most of the exemptions were granted to the municipalities of Beira and Entre-Douro-e-Minho, precisely the provinces where municipalities of the *concelho* type predominated.

Table III – Types of municipalities exempted from having weights.

Quadro III – Tipos dos municípios dispensados de ter pesos.

Municipality type	In exemption letters	In the 1527-1532 survey
<i>Cidade</i> (city)	0	0
<i>Vila</i> (town)	9	12
<i>Concelho</i> (council)	12	9
Others	1	1
Total	22	22

Many other exemptions may have been granted, either by the kings or by the regional authorities, of which no record exists or its existence is not yet known. In the island of São Jorge (Azores), the town of Velas highlighted its “great poverty” in 1570 and recorded the weight standards they had in chamber, which were loose iron weights. They had no money to buy “metal” standards (*Vereações de Velas*, 1559-1571, p. 169, 262-263). They didn’t have a “metal” pile. The quintal standard of the city of Évora is a manueline pile, but it has inscriptions with the year 1554 and lacks the characteristic diamond-shaped marks. It may therefore be a late acquisition, indicating that here too some kind of exception may have been allowed for some time (Seabra Lopes, 2018, p. 228-229 and 234).

Table IV – Number of exemptions granted in each province.
Quadro IV – Número de dispensas concedidas em cada província.

Province	#exemptions	%
Entre-Douro-e-Minho	4	18.2
Trás-os-Montes	2	9.1
Estremadura	3	13.6
Beira	11	50.0
Entre-Tejo-e-Guadiana	2	9.1
Algarve	0	0.0
Total	22	

4. Justifications for the exemptions

Among the reasons alleged by municipalities in their requests for exemptions, the poverty of the residents and their small number stand out. For example, Silvã had “no more than thirteen or fourteen neighbors [=residents or households], and so poor that almost all live in small farms”. In Aveloso, the 40 residents were “very poor”. In Sanceriz, the 22 residents “were poor farmers”. Águas Belas, with 50 residents, claimed that it would be “too much oppression” to be forced to acquire metal weights. Infias and Águias also point out population figures in the same order of magnitude. Melgaço, who had 301 neighbors in 1527-1532, also alleged that the council was “very small and the land very poor”. The larger municipality of Felgueiras, with 1053 households in 1527-1532, similarly claimed to be “very poor”. Monforte do Rio Livre, Bouro, Azurara, Moimenta da Beira and Almeida, municipalities with population figures between 205 and 719 neighbors, also highlighted their poverty. Naturally, in these larger municipalities, the exemption was partial.

Another common argument was the lack of need for the weights from which the municipalities wanted to be exempted. Thus in Monforte do Rio Livre “there were no waxes or linens”, Bouro had no “gross merchandises” and Fonte Arcada and Caria also had no merchandises. In Sanceriz, they “had nothing to measure or weigh, only some bread and wine from their harvest, and some meat they sold by arratels among themselves”. Other municipalities explicitly argued based on the absence of commerce: Algôdres “was not a place of trade” and Gouveia de Riba-Tâmega “had no retailers”. Finally, other characteristics were mentioned which also implied the lack of trade and the little need for the weights: Bouro was a “land in the mountains”, Mondim-e-Sever was located “in the backwoods”, Caria had no “sea port” and Azurara and Gouveia de Riba Tâmega claimed to be unimportant places.

IV. THE GEOGRAPHY OF THE REFERENCED MANUELINE PILES

The inventory recently elaborated identifies 128 manueline weight piles (Seabra Lopes, 2018)^{vii}. This inventory is based on reports from the weights and measures inspection services dated 1857-1860, on other literary sources of the nineteenth and twentieth centuries, and on direct search in museums. Of the piles referenced, 71 have the region

and / or the specific municipality of origin identified: 15 of quintal, 40 of half quintal and 16 of arroba. Currently missing are 21 out of those 71. Additionally, there are 49 piles (7 of quintal, 25 of half quintal and 17 of arroba) that were delivered for evaluations in Coimbra or Lisbon in 1817-1819 and never returned to the municipalities of origin, being currently preserved without indication of origin in several central museums. Eight other piles remain in several museums, without any indication of their origin. Included in this last group may be some of the piles that disappeared from municipalities after 1857-1860.

The starting point for this analysis are the mentioned 71 manueline piles with identified region and / or municipality of origin (Seabra Lopes, 2018, table IV). From these 71, a few will be excluded because they belong to regions not covered by the 1527-1532 survey, namely three from the island of Madeira (Machico, Calheta and Ponta do Sol) and one from the Azores (Ponta Delgada, currently disappeared). To the remaining 67 manueline piles, we can add three more which are now lost or not located, namely the quintal pile delivered to the city of Porto by Antonio de Pinharanda in 1503, the quintal pile delivered to Montemor-o-Novo by Estevão de Vilhena in the same year and the Algodres arroba pile, mentioned in a letter of João III, already cited above^{viii}. Table V presents a summary of the distribution of manueline piles per province.

Table VI presents some relative size indicators for each province, taking into account the existing households and municipalities. It is found that the distribution of manueline piles does not have a proportional relation to the population distribution. In the two provinces with intermediate population figures, Entre-Tejo-e-Guadiana (17.2%) and Entre-Douro-e-Minho (20.0%), the presences of manueline piles are quite different: 37.1% in Entre-Tejo-e-Guadiana against 7.1% in Entre-Douro-e-Minho. Considering the small number of manueline piles referenced in the whole region north of the Douro, and considering also that the chamber of Porto itself reached the nineteenth century with a weight pile dating from 1758, one could speculate that the manueline reform of weights had little success in this region (Seabra Lopes, 2018, p. 235). However, we know now that the city of Porto received a manueline pile in 1503. It also remained unclear which factors might have determined the high number of these piles in Entre-Tejo-e-Guadiana.

Table V – Distribution of referenced manueline weight piles, with identified origin, per province.

Quadro V – Distribuição das pilhas de pesos manuelinas referenciadas, com origem identificada, pelas antigas comarcas.

Province	No. of copies	%
Entre-Douro-e-Minho	5	7.1
Trás-os-Montes	2	2.9
Estremadura	17	24.3
Beira	17	24.3
Estremadura e Beira	1	1.4
Entre-Tejo-e-Guadiana	26	37.1
Algarve	2	2.9
Total	70	

The first three percentual distributions in table VI, namely households, municipalities and municipalities with more than 100 households, are relatively similar (data taken from Alves Dias, 1996, p. 199, 207 and 503-546). In the three distributions, Beira emerges as the largest province.

Table VI – Relative importance of the early 16th century Portuguese provinces according to several percentual indicators computed with respect to the total of the kingdom: households; municipalities; municipalities with more than 100 households; and municipal seats with more than 100 households.

Quadro VI – Dimensão relativa das comarcas portuguesas no início do século XVI segundo vários indicadores percentuais calculados em relação ao total do país: moradores; municípios; municípios com mais de 100 moradores; e sedes municipais com mais de 100 moradores.

Province	Households (%)	Municipalities (%)	Mun. >= 100 (%)	Seats>=100 (%)
Entre-Douro-e-Minho	20.0	14.7	15.3	5.5
Trás-os-Montes	12.5	12.7	11.8	6.6
Estremadura	23.1	21.4	18.1	23.1
Beira	23.8	34.3	32.9	21.4
Entre-Tejo-e-Guadiana	17.2	15.2	19.7	39.6
Algarve	3.5	1.7	2.6	3.8

As for the percentual distribution of municipal seats (chief urban centers of municipalities) with more than 100 households (according to Galego & Daveau, 1986, Annex II), Entre-Tejo-e-Guadiana emerges as the most relevant province, while the provinces of Entre-Douro-e-Minho and Trás-os-Montes appear with little relevance, almost at the level of the Algarve. It is very interesting to see that the percentual distribution of manue-line piles (table V) comes very close to the percentual distribution of the seats with more than 100 households (last column of table VI). It seems, therefore, that the municipalities that acquired manue-line piles were mainly those municipalities with chief urban centers of some importance, at least in terms of population.

For three of the 70 piles with identified province of origin, the specific municipality of origin is not known. In fact, some arroba or half quintal piles exist or existed in municipalities which also had quintal piles: a pile of half quintal that existed in the chamber of Lisbon, now disappeared; another half quintal pile still existing in the chamber of Elvas; and an arroba pile that existed in Vila do Conde, now also missing. Therefore, in the continuation, we will work with the remaining 67 municipalities^{ix}. A slightly different case occurs in Évora. In the chamber of this city, besides its quintal pile, there is also an arroba pile. In 1858, this chamber only had the quintal pile, but there was a pile of unspecified size in the chamber of the neighboring town of Alcáçovas (Mourão & Mourão, 1858). As the old municipality of Alcáçovas was integrated in Évora for a short period in 1867 and again in 1895-1898, we will assume here that the arroba pile currently in Évora originates in Alcáçovas.

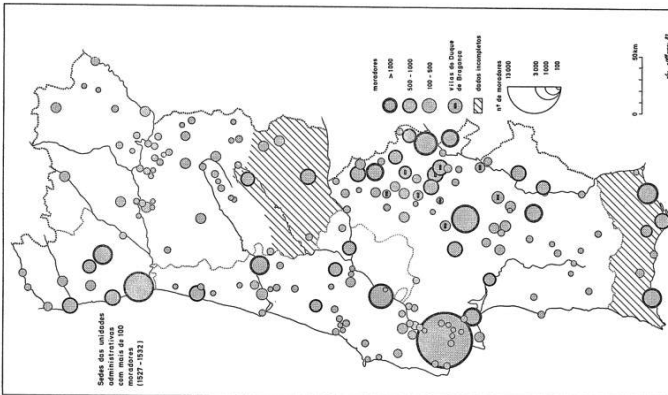


Fig. 2 – Municipal seats with more than 100 households in 1527-1532.

Fig. 2 – *Sedes municipais com mais de 100 moradores em 1527-1532.*

Source: Galego and Daveau (1986)

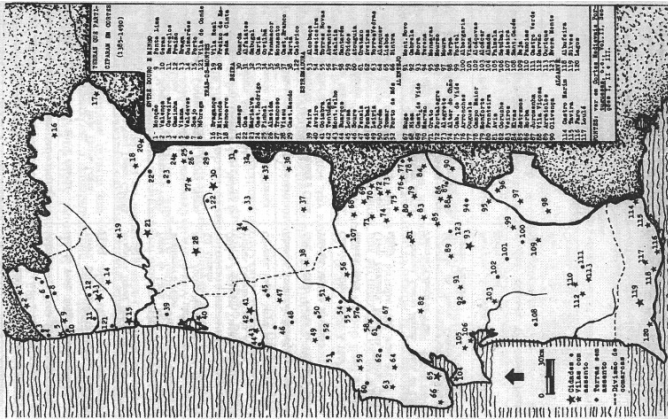


Fig. 3 – Municipalities represented in Cortes between 1385 and 1490.

Fig. 3 – *Municipalios representados nas cortes realizadas entre 1385 e 1490.*

Source: Sousa (1990)

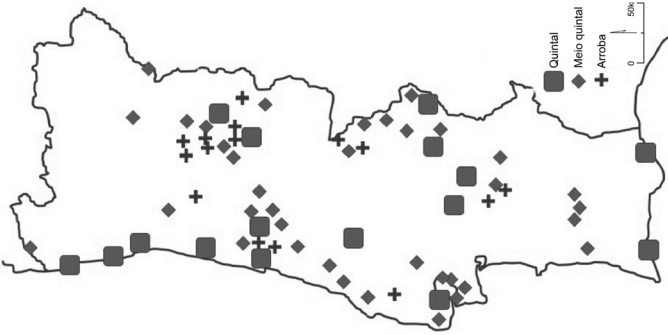


Fig. 4 – Geographical distribution of referenced maneline piles with identified municipality of origin.

Fig. 4 – *Distribuição geográfica das pilhas manuelinas referenciadas com município de origem identificado.*

Figure 4 shows the geographic distribution of referenced manueline piles with identified municipality of origin. The similarity with the distribution of the municipal seats with more than 100 households (fig. 2) and with the distribution of the municipalities that participated in Cortes in the preceding century (fig. 3) is quite evident. It should also be noted that 74.6% of the municipalities with manueline piles (50 out of 67) had defensive structures (castles, forts, walls) at the time of the manueline reform, and that 62.7% of the same municipalities (42 out of 67) participated in the Cortes meetings that took place between 1385 and 1490 (Sousa, 1990, I, p. 189-194).

V. ANALYSIS BY MUNICIPALITY

In the continuation, for the 67 municipalities with known manueline piles, we will crosscheck the information on the locations and sizes of the piles with the information on population figures, types of the municipalities and types of the respective landlords.

1. Analysis by type of landlord

Municipalities throughout the kingdom were given to different *senhorios* (landlords), which could be members of the royal family, nobles, clergy, military orders, etc. These landlords had different levels of jurisdiction in their lands. It is known that landlords sometimes refused to use the weights and measures established by kings (Gama Barros, [1922], ~1950, p. 20). Even Manuel I, in 1514, in the charter granted to Setúbal, a town that belonged to a military order (*Ordem de Santiago*), stated that the weights to be used in the commerce in that town should be those of the order (Carvalho Dias, 1961-1969, *E.T.O.*, p. 128). The king did not say if those weights were the same as his own weights. One fact is that no manueline pile is referenced for Setúbal.

We analyze here the types of landlords in the 67 municipalities with known manueline pile. Table VII presents the distribution of manueline pile per type of landlord. This information was mainly gathered from the manueline charters (Carvalho Dias, 1961-1969), from the 1527/1532 survey (Alves Dias, 1996, p. 503-546), from the notes of Carvalho Dias (1961-1969, at the end of each volume) and from other sources when necessary. The time frame is 1503-1537.

Approximately one third (32.8%) of the piles were found in municipalities belonging to nobles, including the duques of Bragança and Coimbra, the marquesses of Ferreira and Vila Real, the earls of Odemira, Penela and Portalegre, the baron of Alvito, etc. This is the largest group. The second and third largest groups involve the crown: in one group (16.4%), the crown seems to have been the single landlord of the municipality in the studied period; in another group (25.4%), the crown was the landlord for some time, and some other entity (including the queen and the princes) was the landlord after and/or before the crown. Another well represented group (14.9%) are the military orders (*Ordem de Santiago*, *Ordem de Avis*). We also find manueline piles in the

domains of religious institutions (the bishop of Coimbra and the monasteries of Alcobça, Arouca and Vila do Conde). The main conclusion is that manueline piles did have significant penetration in the domains of landlords, including those of higher rank. In a time of transition to the modern state model of government, it seems that the landlord was no longer a major factor influencing the acquisition of a manueline pile by a municipality.

Table VII – Manueline piles per type of landlord (%).

Quadro VII – Pilhas de pesos manuelinas por tipo de senhorio (%).

Crown	16.4
Crown and other	25.4
Nobility	32.8
Clergy	7.5
Military orders	14.9
Unclear cases	3.0

2. Analysis by type of municipality

Table VIII presents some statistics on the distribution of municipalities and manueline piles per type of municipality. It is clear there was a high probability of cities having manueline piles, since 53.8% of the cities retained their manueline pile until the 19th century, or even until today. There is also a significant presence of manueline piles in towns (15.0%). In the so-called *concelhos*, that is to say, municipalities without seat or where the seat was typically not a city or town, the presence of manueline piles is residual (0.9%). In other types of municipalities, there is no reference to the existence of manueline piles. Thus, out of a total of 761 municipalities, it is mainly in the 400 cities and towns that there is some reasonable probability that manueline piles existed.

Table VIII – Municipalities and manueline piles per type of municipality.

Quadro VIII – Municípios e padrões manuelinos por tipo de município.

Municipality type	All municipalities		With pile (%)		With pile / All (%)
"cidade" (city)	13	(1,7%)	7	(10,6%)	53,8
"vila" (town)	387	(50,9%)	57	(86,4%)	14,7
"concelho" (council)	205	(26,9%)	2	(3,0%)	1,0
Other	156	(20,4%)			
Total types	761		66		8,7
Unidentified			58		
Total	761		124		16,3

3. Referenced manueline piles and the demographic criterion

The demographic criterion used to decide the size of the pile for each municipality appears in the final version of the manueline ordinances (1521, see above

sec. III.2) without a justification. From the granted exemptions (see secs. III.2-III.4), we gather that the smaller municipalities did not have the necessary financial resources to acquire a manueine weight pile and medium size municipalities often requested permission to acquire a pile smaller than prescribed in the ordinances. Therefore, it is clear that the demographic criterion was intended to offer a compromise between cost and function. To better understand how the rules were applied in practice, it is important to crosscheck the inventory of manueine piles with the available demographic information.

Table IX allows to verify to what extent the rules established by Manuel I, to determine the size of the pile according to the population of the municipality, have been followed. Here we consider the 748 municipalities with a population figure indicated in the survey of 1527-1532. The municipality of Grândola cannot be considered, since it was only created in 1544 (Alves Dias, 1996, p. 179). Only 28 municipalities are known to have had a pile with the size they should have, according to the demographic criterion of 1521: 4 of arroba, 8 of half quintal, 16 of quintal. On the other hand, it is known that 33 municipalities had a smaller pile than they were supposed to have: 21 municipalities should have quintal but had half quintal; 7 municipalities should have half quintal but had arroba; 5 municipalities should have quintal but had arroba. In contrast, 5 other municipalities had piles larger than necessary: arroba was sufficient, but they had half quintal. These are the cases of Coina (131 households), Batalha (145), Lousã (163), Aldeia Galega do Ribatejo (= Montijo, 173 households) and Garvão (174).

Table IX – Standards that municipalities had *versus* standards that they should have had.

Quadro IX – Padrões que os municípios tiveram versus padrões que deviam ter tido.

Should have this standard	Had this standard			Total
	None	Arroba	Meio quintal	
Arroba	453	4	5	462
Meio quintal	102	7	8	117
Quintal	127	5	21	169
Total	683	16	34	16

It is likely that the demographic criterion was defined in a late stage, with the size of the pile being determined in the initial years of the reform on the basis of less objective criteria. It is certain that the criterion is only documented in 1521, in the final edition of the ordinances. At the time of applying the criterion, it may have prevailed the practice of determining the size of the pile based on the population of the municipality's seat. In addition to the 66 piles recorded in table IX, 58 more are referenced for which the municipality of origin is not known, so it is not possible to feature them in the table. Table X presents indicators of municipality population for each of the pile sizes. The first row counts, not only municipalities that did not have a manueine pile, but also those that had a pile, but this did not come to our knowledge.

Table X – Municipality population indicators (in number of households) for each type of weight standard.

Quadro X – Indicadores de população (em número de vizinhos ou fogos) nos municípios com diferentes tipos de padrões.

Standard	Minimum population	Average population	Maximum population
None or unidentified	0	301	5307
Arroba	101	454	1300
Meio quintal	131	582	2042
Quintal	920	3248	1 7034

Finally, figure 5 shows the percentage of municipalities with manuline piles per population interval. The piles with identified municipality of origin and known population of that municipality were directly considered in the respective intervals. The remaining referenced piles were included taking into account the ranges of variation identified in table X and making a proportional distribution to the intervals used in the figure.

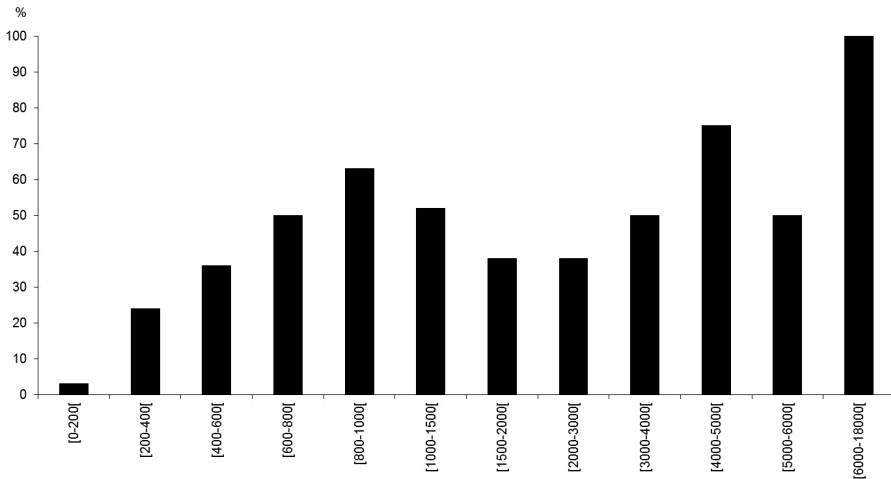


Fig. 5 – Percentage of municipalities with manuline piles per population interval.

Fig. 5 – Percentagem de municípios com padrão manuelino por intervalos de população.

VI. CONCLUSION

The piles of weights manufactured in northern Europe, by order of Manuel I, with the aim of serving as local standards in Portuguese municipalities, are well-known monuments. The delivery of the new standards began in the late spring of 1503 and the new system came into force in January 1504. The regiment of 1503 vaguely indicated that standards would be of different sizes and would not be delivered to all municipalities. However, only in the ordinances of 1521 we find an objective criterion for deciding the size of the pile to be delivered to each municipality according to its population. If this criterion was followed, a pile would have been delivered to each of the more than 750 municipalities then in existence.

However, a number of exceptions were permitted, both by Manuel I and his successors, given the smallness and poverty of the municipalities and/or the lack of trade activities. In any case, the documentation shows that the regional authorities actively promoted the application of the defined rules. Only recently was an inventory and detailed study of the maneline piles elaborated (Seabra Lopes, 2018). The existence of 128 piles has been identified, many of which are still preserved today, and others at least referenced in the reports of weights and measures inspections (1857-1860) and in other relevant literature. Four additional piles (Porto, Montemor-o-Novo, Algodres and Santa Cruz) are documented above based on 16th century sources. Crosschecking the inventory of maneline piles with the administrative and demographic survey of 1527-1532, it was possible to draw several important conclusions. First, more than the population figure of a municipality, it was the population and importance of its seat that determined the acquisition of a maneline pile. The geographical distribution of maneline piles also presents a significant similarity to the geographical distribution of municipal seats with more than 100 households. Of all maneline piles with identified origin, 97% come from cities or towns, 92% come from municipalities with more than 150 households, 80% come from municipalities whose chief urban centers had more than 100 households and 75% come from municipalities with defensive buildings. The province of Entre-Douro-e-Minho, the most densely populated, but where dispersed settlement prevailed, stands out due to the low density of referenced maneline piles. Municipalities that were not cities or towns, or not fortified, or with low population, typically did not have a maneline pile. In 1527-1532, there were only 238 municipalities with more than 150 households and with the category of city or town. In the other municipalities, the probability of having maneline piles seems to be very low.

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AHMP = Arquivo Histórico Municipal do Porto.

AML-AH = Arquivo Municipal de Lisboa – Arquivo Histórico.

AMMN = Arquivo Municipal de Montemor-o-Novo

AMVCT = Arquivo Municipal de Viana do Castelo.

ANTT = Arquivo Nacional da Torre do Tombo.

ⁱ In a survey of nesting weight piles in French museums, their sizes vary between 0.5 and 64 marcs and the typical sizes are 16 and 32 marcs (Vangroenweghe, 2015, p. 38-42). In the 16th century, different cities had piles of different sizes: Brussels, 64 marcs, dated 1516; Bruges, 128 marcs, dated 1568; Dresden, 256 marcs, dated 1583; Maastricht, 64 marcs, late 16th century; Amsterdam, 32 marcs, dated 1614 or earlier (Vangroenweghe, 2015, p. 16-19). Perth keeps its pile of 32 marcs, dated 1572 (Connor *et al.*, 2004, p. 460-461). Kisch summarizes as follows: “Nested weights were made in vastly different sizes. Some were so big that the weight of the entire set was 64 pounds [i.e. 128 marcs] or even more.” (Kisch, 1965, p. 126).

ⁱⁱ See the preface of Marcelo Caetano in the facsimile edition of the regimint (Caetano, 1955). It should be pointed out that the two copies of this edition known today are reprints probably produced between 1506 and 1511 without updating the print date (Alves Dias, 2012, p. 25; Domingues, 2014, p. 4-5).

ⁱⁱⁱ In the source, it is written “*pilha de fugaleyra*”. Modern Portuguese dictionaries record the word “*fogaleira*” with the meaning of ‘shovel used to remove embers from a wood fire oven’. The semantic connection to ‘fire’ leads to hypothesize that “*fugaleyra*” in our source refers to the pile production process, which was based on melting brass and casting it in a mold.

^{iv} In 1857-1860, the city of Porto had a standard dated of 1758 (Fradesso da Silveira, 1859, map at p. 59), still preserved today.

^v In 1857-1860, the town of Montemor-o-Novo had a 2 arratel brass pile and separate iron weights (Mourão & Mourão, 1858). It is possible that the original manuline quintal pile delivered to Montemor-o-Novo in 1503 is among those sent to Lisbon in 1819 (Seabra Lopes, 2018, p. 230-236).

^{vi} Confirmation letter published by Alves (1911, doc. 63, p. 230-231), who read “*Ansyães*” where it is written “*Emfyães*”. For the same word, Braga (1998, page 204, n. 74) read “*Cinfães*”. This municipality appears as “*Emfiaens*”, with 30 neighbors and in the province of Beira, in the survey of 1527-1532 (Magalhães Colaço, 1929, p. 162).

^{vii} In the published inventory, the Montemor-o-Velho pile is said to be of half quintal (2 arrobas), but it is a quintal pile. The figures presented here already take into account the correction of this mistake.

^{viii} The municipality of Lisbon is represented in the published inventory of manuline piles by the quintal pile of the brotherhood of St. Eloy of the silversmiths of Lisbon, responsible for the weight calibrations in the city of Lisbon (Seabra Lopes, 2018, p. 227-228, 229, 234, 240). This pile, produced to replace another one that was lost in the earthquake of 1755, mimics the decoration of manuline quintal piles, but is clearly not from the manuline period. However, the quintal pile of Lisbon is mentioned in a document of 1614 (see sec. III.1).

^{ix} These are de following: Aguiar da Beira, Alcáçovas, Alcobaça, Alcochete, Aldeia Galega do Ribatejo, Alegrete, Algodres, Almada, Alpalhão, Ansiães, Arganil, Arouca, Aveiro, Batalha, Benavente, Campo Maior, Cantanhede, Castro Verde, Celorico da Beira, Coimbra, Coima, Covilhã, Elvas, Estremoz, Évora, Ferreira d’Aves (com Tentúgal), Freixo de Espada Cinta, Garvão, Gouveia, Grândola, Guarda, Lagos, Lisboa, Lousã, Manteigas, Marvão, Monforte, Montalvão, Montemor-o-Novo, Montemor-o-Velho, Nisa, Óbidos, Odemira, Ourique, Penacova, Penamacor, Penela, Pombal, Porto, Sabugal, Seia, Sintra, Tavares, Tavira, Torres Novas, Trancoso, Valença do Minho, Valhelhas, Viana do Alentejo, Viana do Castelo, Vila do Conde, Vila Nova da Baronia, Vila Nova de Anços, Vila Verde dos Francos, Vila Viçosa, Vouzela. See the existing inventory (Seabra Lopes, 2018, p. 230-236) and the additions in the present paper.