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The exploitation of mountain natural resources during the Iron Age in the Eastern Pyrenees: the case study of production unit G at Tossal de Baltarga (Bellver de Cerdanya, Lleida, Spain)

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The Iron Age site of Tossal de Baltarga (Bellver de Cerdanya) was a large Iberian residential complex occupying a strategic position in the middle of the Eastern Pyrenees. It was destroyed by fire in the second half of the 3rd century BCE, preserving an important volume of archaeological and bioarchaeological material in certain areas. This is the case of Building G, a two-story construction whose violent blaze has offered the possibility of analyzing a precise moment in the history of an Iron Age productive unit. The existence of a stable on the lower floor, where four sheep, a goat, and a horse were documented, and an upper floor, where textile production and storage were evidenced, allows us to analyse the complexity of the economic activities and exploitation of local resources, such as livestock, agriculture, forestry and mining.

KEYWORDS

Iron Age, Eastern Pyrenees, Iberian Peninsula, livestock strategies, forest resources, highlands, textile production, mining

1 Introduction

In recent years, the study of settlement and production patterns of Iron Age communities in northeastern Iberia (4th–3rd century BCE), described as "Iberians" in ancient literary sources, has increased our knowledge of the exploitation of their natural resources and the development of proto-urban societies. Studies of their diversified agricultural production, patterns of grinding and storage (Alonso and Pérez-Jordà, 2019), and livestock strategies (Colominas et al., 2020; Nieto-Espinet et al., 2021; Messana et al., 2023a,b) have identified an intensive exploitation of agro-pastoral

resources. The development of urban communities has also been highlighted, suggesting that their largest sites (*oppida*) acted as the capitals of polities corresponding to some of the ethnic territories mentioned in the ancient written sources (*civitates*; Sanmartí et al., 2019).

However, in mountainous areas, such as the Pyrenees, the lack of research and the difficulties of highland archaeology have limited our knowledge about these processes. Ancient literary sources mention the Cerretani, the Iberian community occupying the Eastern Pyrenees, and their salted ham production (Strabo 3.4.11), but very little was known from an archaeological point of view. In the last 20 years, our research has documented the cultural and archaeological identity of these communities occupying the Eastern Pyrenees during the Iron Age, and in fact, the ethnonym Cerretani has been preserved in the modern name of the region, Ceritània-Cerdanya (Ferrer and Olesti, 2023). This does not mean that we uncritically accept the information from the Graeco-Roman geographers, but a solid epigraphical and archaeological basis exists to support the particular identity of the Cerretani as a *civitas* in relation to other political communities in the northeastern Iberian Peninsula (see Belarte et al., 2019; Sanmartí et al., 2019). Traits specific to the Cerretani include, for instance, their habit of inscribing Iberian graffiti on rock faces (with more than 1,500 signs, including Iberian anthroponyms and theonyms); their material culture, such as their handmade pottery and their low quantity of imported materials; their settlement patterns; or even the predominance of the cattle among their livestock (Colominas et al., 2020; Ferrer and Olesti, 2023). All these features are linked to their mountain territory. Today, the identification of Iron Age *civitates* in northeastern Spain in the 4th–3rd century BCE from their archaeology is considered to be relatively solid and reliable (Sanmartí et al., 2021).

Cerdanya is a large valley located at an altitude of 1,100–1,200 meters, surrounded by mountain ranges to the north (Axial Pyrenees) and south (Pre-Pyrenees) of more than 2,500 m in height. Despite its altitude and location between the Atlantic and the Mediterranean, the Cerdanya valley is oriented east–west and receives more than 3,000 h of sunshine a year, which determines its climate. Since 2007, the first extensive archaeological excavations at some of the Iron Age sites in the Cerdanya region (Castellot de Bolvir, Tossal de Baltarga, Serrat del Castellar) have increased our information about these societies (Rendu, 2003; Morera, 2017; Oller et al., 2018a). We have been able to identify their settlement patterns based on defensive hillforts, which are small in size (0.5 ha). Two of them (Castellot de Bolvir and Serrat del Castellar) were protected by walls, and the other four (Puig del Castell de Llívia, Llo, Coma Peronella, and Tossal de Baltarga) occupied high strategic positions, but no walls have been identified for now (Figure 1). The central position of Castellot de Bolvir, its defensive system, its relatively large size, and the identification of agro-pastoralism and metallurgy points to a capital role among the Cerretani, and for this reason, we have defined it as an *oppidum*, the terminology used by the ancient writers and modern scholars (Belarte et al., 2019; Sanmartí et al., 2021) to define the territorial and political centers of these Iron Age *civitates*. The identification of a group of 20 silos at El Castellot de Bolvir and the archaeobotanical analyses carried out provide information about their agricultural practices, combining cereals (barley and wheat) and legumes (Berrocal-Barberà, 2021). The archaeozoological analyses provide information about their livestock strategies, showing a preponderance of cattle over caprines and suids (Colominas, 2017). But the recent excavation of Building G at the site of Tossal de Baltarga, and the outstanding preservation of its bioarchaeological remains *in situ*, has allowed our team to conduct an in-depth analysis of the relation of between its inhabitants and the area's natural resources, following an innovative interdisciplinary micro-contextual approach. The site's destruction by fire preserved a group of animals and botanical remains kept at the time in Building G, allowing the analysis of an active productive space as it was in the second half of the 3rd century BCE.

Building G at Tossal de Baltarga, a two-story structure measuring 8 × 2 m, was excavated between 2016 and 2019, and the violent end of the site allowed the *in situ* conservation of organic and non-organic remains, offering an exceptional view of Cerretanian productive patterns. A first examination of these data, focused on those from the lower floor of the building, has recently been published (Colominas et al., 2023; Portillo et al., 2023) and has identified a stable where six animals were kept alive. Our continued research and studies combined with the remains of the upper floor can now complete the overview of the productive patterns of this specific Iron Age household. In this article, we present the results of the study of the organic and non-organic remains of the upper floor, and we integrate these data with those of the lower floor to obtain a more comprehensive and complete view of the range of the productive patterns of the inhabitants of Building G to, therefore, investigate this productive unit as a whole and shed light to its relationship with the available mountain natural resources.

1.1 The site of Tossal de Baltarga

Located in the municipality of Bellver de Cerdanya (Eastern Pyrenees), Tossal de Baltarga is situated on the top of a hill and strategically overlooks the valley. From this point, there is visual control of the main terrestrial route crossing the region and the river Segre, one of the main communication axes of this area in ancient times (Figures 1A, B). The site overlooks a narrow pass, where the river and the road converge.

After several seasons of excavations since 2011, we can determine the existence of a small settlement with three chronological phases. The first, the Late Bronze to the Early Iron Age, is little known and only identifiable from a small number of materials found, with characteristics of the so-called *décor cerdan*, a pottery decoration based on geometric incisions characteristic of the region (Campmajó et al., 2014). The second dates to the Iron Age period (4th–3rd century BCE), during which several buildings were constructed oriented toward the valley. Finally, a Roman Republican phase exists, dating to the 2nd– 1st century BCE. In this later phase, some fortification structures were built, in particular an impressive watchtower.

A set of structures (scattered and partly unconnected, given the poor state of conservation of the remains) from the Iron Age period (4th–3rd century BCE) have several defined grouped buildings, which follow the terraced layout, occupy an area of 0.2 ha, and are adapted to the slope of the hill (Portillo and Albert, 2014). The walls

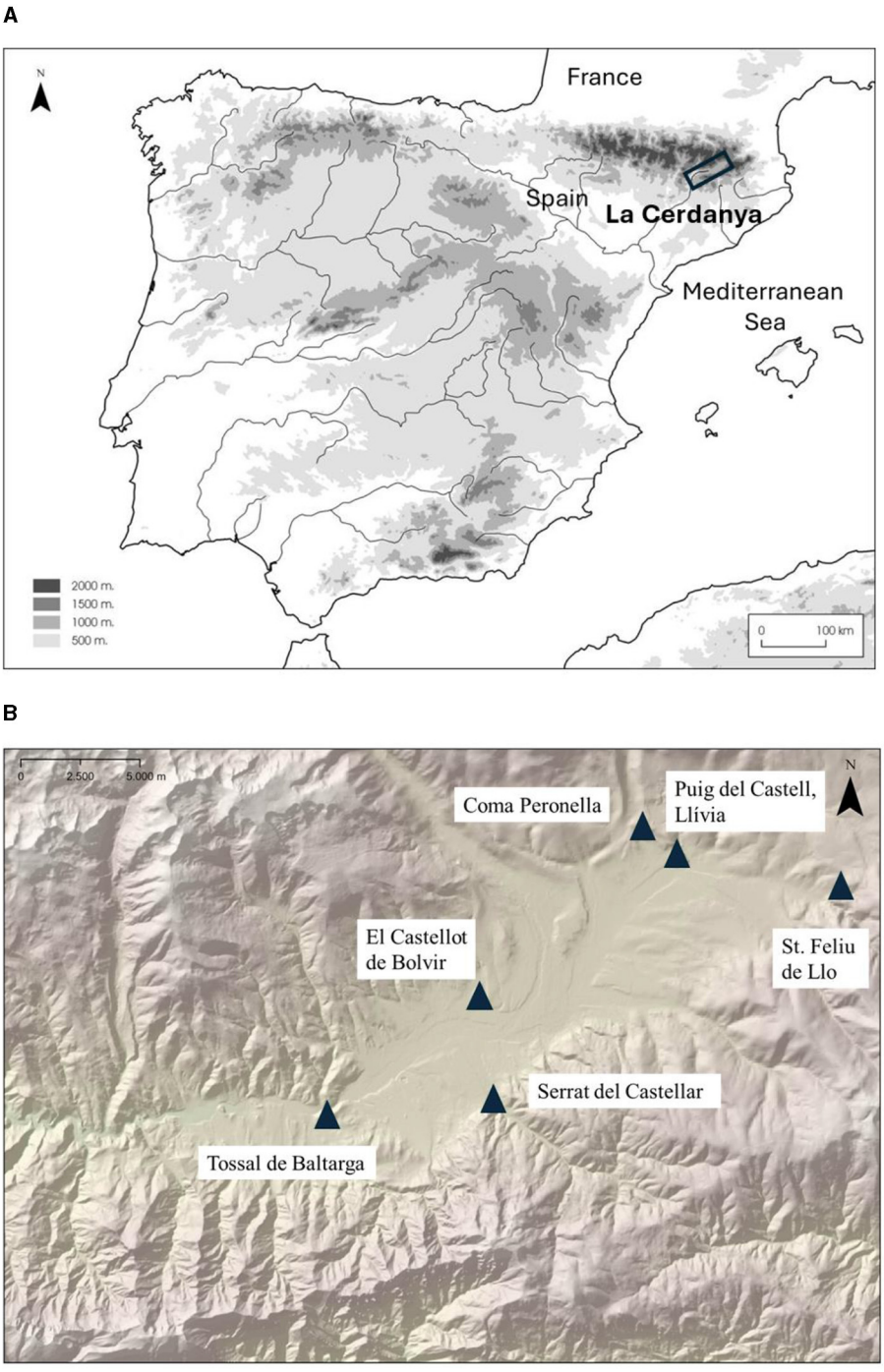

FIGURE 1
(A) Location of the Cerdanya Region. **(B)** Location of Tossal de Baltarga and other contemporary sites mentioned in the text.

are composed of local stone plinths with rammed earth architecture above. From these structures, we can identify Buildings A, D, F, and G with relative precision (Figure 2).

Building A is composed of two attached rooms, just partially preserved. Each room has a surface area of around 20 m². On the inside, the location of a small domestic oven, some small pits with ashes, and burnt earthen remains can be detected. In one, a handle fragment of an Attic kantharos was found that dates this structure to the 4th century BCE. The second structure is the so-called Building D, which burnt down and was violently destroyed around 200 BCE (Oller et al., 2018b; Morera et al., 2020). It consists of a two-story rectangular building (8 × 2 m) embedded in a vertical cut in the rock. To the west of Building D, two new structures appeared, Buildings F and G. They maintain the same structure and orientation as Building D, located one beside the other, following a cut in the geological terrain and adapting to the slope of the

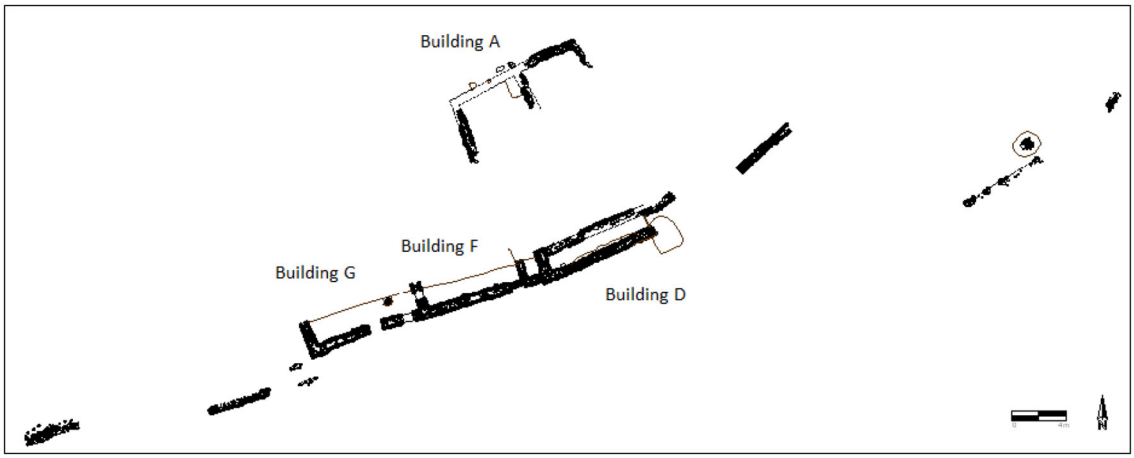

FIGURE 2
Layout of the Iron Age occupation at the site of Tossal de Baltarga.

hill. The materials and coins recovered inside allow us to place the destruction of both buildings during the same event that affected Building D in the last quarter of the 3rd century BCE. At the same time, the documentation of the three buildings in a row raises the possibility of a planned and unitary disposition of buildings in the settlement as a whole. Another area containing Iberian structures has been preserved at the eastern end of the settlement beneath the structures of the Republican phase (Building C). This space is difficult to interpret, but it demonstrates the settlement's expansion.

The proximity of Tossal de Baltarga to the site of El Castellot de Bolvir, the main Cerretanian *oppidum* known so far, as well as the fact that each settlement is visible from the other, allow us to consider it a point of visual control dependent on this oppidum (Olesti et al., 2023).

1.2 Building G

This article focuses on the so-called Building G (Figure 2). It was a two-story building, owing to the discovery of elements associated with a ground and upper floor (Figures 3A–C).

1.2.1 Previous research: the ground floor

The lower floor of building G is a space of 8 × 2 m, where more than 500 faunal remains were recovered (Colominas et al., 2023). These belong to the articulated skeletons of six individuals who were poorly preserved due to the collapse of the building and its destruction by fire. Interestingly, an articulated horse (*Equus caballus*), more than 4 years old, and a horse bit were recovered in the eastern portion of the ground floor, and four adult sheep (*Ovis aries*) and a goat (*Capra hircus*) of 12–20 months old were found in the western part of the same building (Colominas et al., 2023). Charred wood remains were documented during the excavation in the open space of the building entrance, pointing to a door existing in the southern wall that may have been closed at the time of the building's destruction by fire. The study of the animals documented on the floor, in addition to a range of organic remains preserved by fire and penning deposits, revealed the existence of a stable (Colominas et al., 2023; Portillo et al., 2023; Figure 3B).

Studying these materials allowed us to propose livestock strategies developed at Tossal de Baltarga. The phytolith records from the livestock penning deposits indicate that caprine displayed variable herbivorous regimes, including herbaceous plants, mainly Pooideae grasses and weeds, which are consistent with the macrobotanical assemblages, composed mainly of wild plants and, to a much lesser extent, cereals, such as barley and wheat. In contrast, phytolith results from the area of the horse point toward a different vegetal component, dominated by panicoid grasses, including millet (*Panicum miliaceum*; Portillo et al., 2023). Therefore, we propose different dietary regimes for the horse and the caprids because of their living in the pen. These different dietary regimes between the species are not surprising, as they have different requirements. Of further interest was the documentation of different feeding practices among the four sheep throughout their lives. The dental microwear pattern documented in the sheep individuals reflects a very similar soft diet between them during their final days, probably mainly composed of wet ensilaged leafy fodder. Furthermore, sequential isotopic results show that the feeding habits of the sheep during the first year of life were based on C_3 plants with little variability in their isotopic composition. It is probable that the herd fed in the same location during this period, exploiting the local resources. This pattern, however, changed after the second year of life for at least one of the sheep. After its second summer and during its second year of life, this individual joined the practice of vertical mobility and descended to a lowland location (Messana et al., 2023a). At the contemporary Lacetan site of Sant Esteve d'Olius (Solsonés), isotopic results revealed the presence of at least two individuals with external provenance to Solsonés. Their low $\delta^{18}O$ values can be related to high-altitude pastures, such as those of the Pyrenees (Messana et al., 2023b). Therefore, the existence of an exchange axis between Solsonés and Cerdanya cannot be excluded. In this scenario, the mobility detected at Tossal de Baltarga would have been directed not toward the coastal plains, but rather toward the neighboring midlands, such as those

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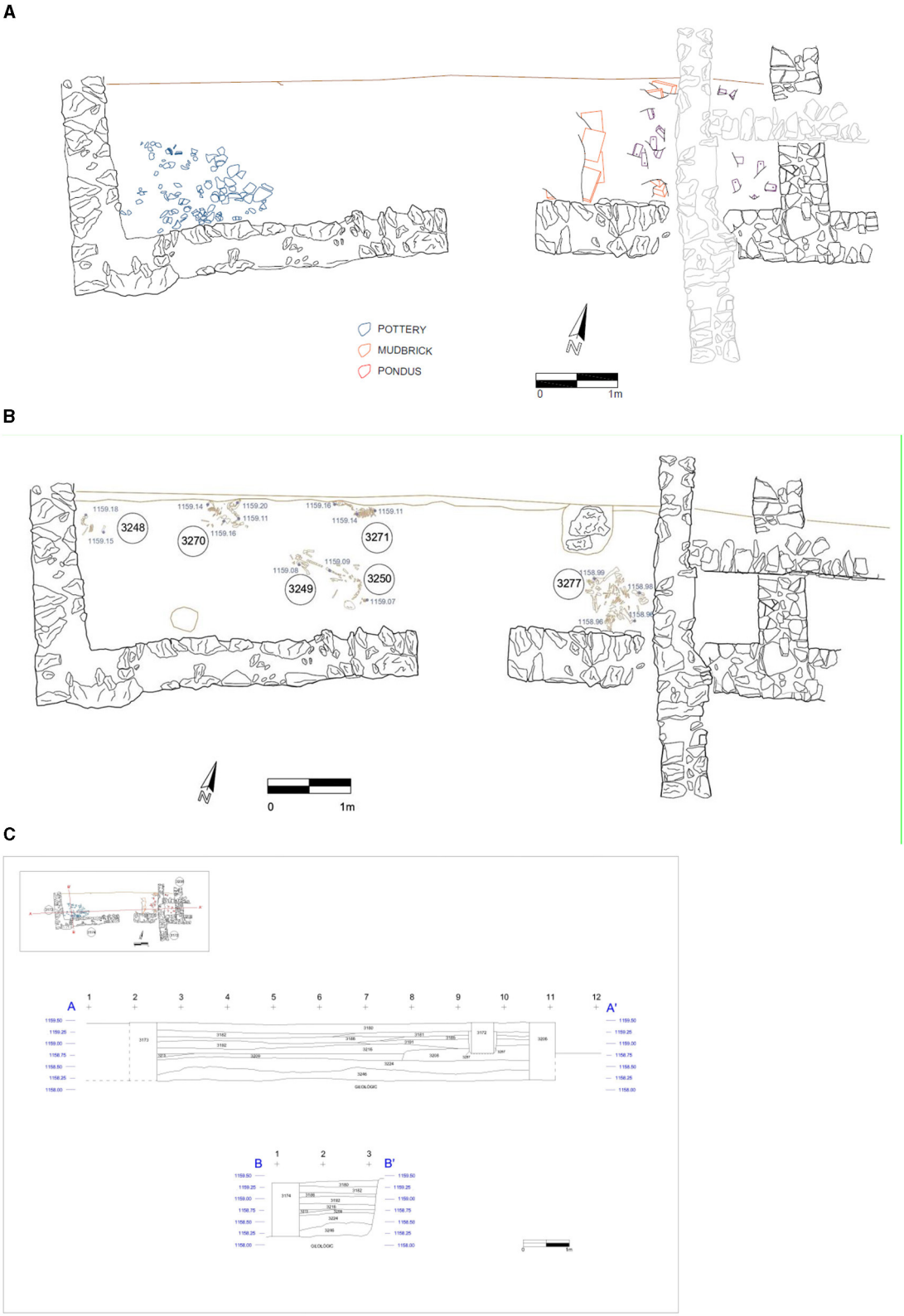

FIGURE 3
Layout of the ground floor and the upper floor of Building G at Tossal de Baltarga. **(A)** Upper floor (J. Morera). **(B)** Lower floor (J. Morera). **(C)** Archaeological section of Building G with indications of the archaeological layers mentioned in the text (J. Morera).

belonging to the Lacetani or, alternatively, the Ausetani. Both were Iberian *civitates* that are well identified in ancient literary sources and archaeology and that occupied the upper valleys of the pre-Pyrenean rivers, separated from the Cerretani by high elevations, such as the Cadí and Puigmal mountain ranges. Such animal movements would imply agreements and exchanges, which

are rarely documented in the historical and archaeological record. However, such contacts with other local communities must have been frequent, as the ancient ethnonym Ausoceretes in Avienus could indicate. When the Roman writer Avienus (*OM*, 549–552) mentions the older Pyrenean communities, he highlights the Ausoceretes, a name that is a mixture of *Ausetani* and *Cerretani*. It is possible to assume that this mixed name was an indicator of the close relationship between both Iberian communities and probably sharing a large common territory. Probably around the 4th century BCE, these communities developed a strong territoriality, splitting their land into two political entities, the Ausetani and Cerretani, while maintaining some collaboration between them, such as the seasonal mobility of part of their flocks. Therefore, through the different evidence recovered in Building G, we propose that the inhabitants of Tossal de Baltarga had different strategies for feeding their animals according to the species, the seasons, and possible agreements with other communities.

Through sequential isotope analyses of $\delta^{18}O$ and $\delta^{13}C$ values, we also know that sheep births at Tossal de Baltarga occurred from late winter to spring, in agreement with the natural lambing season in high and mid-temperate latitudes (Messana et al., 2023b). Anthropogenic modifications to extend or shift the expected breeding season were not detected. Furthermore, lambing occurred over quite a short period. The small number of samples did not allow absolute conclusions to be drawn, but it appears that people at Tossal de Baltarga were not interested in obtaining milk all year round and did not need two different birth seasons to increase the herd size. Therefore, the reproduction pattern documented in Building G accords with the livestock necessities of their inhabitants. The best strategy was, hence, to rely on natural births in late winter/spring, with a reduced duration to minimize the labor of caring for pregnant and newborn animals and ensure their survival (Messana et al., 2023b).

1.2.2 The upper floor

Due to the destruction caused by the fire and the building's collapse, documented by a 60-cm-thick layer, it is difficult to determine the features of the upper floor, but its presence is confirmed by the documentation of several burned fragments of wooden beams and branches that were probably from the roofing structure. We must assume that the dimensions of both lower and upper floors were equal and that access to the upper floor existed from the northern part of the building, as no evidence of a staircase from the lower room was detected. According to micromorphological observations, the collapse deposit comprised red silty clay and vertically oriented medium to coarse angular gravels (Portillo et al., 2023). It displayed mineralogical components, including limestones, siltstones, quartz grains, and burnt silty clay aggregates, as well as anthropogenic materials, such as charred woody plant remains, small animal bones displaced by bioturbation from the lower unit, and remains of earth construction.

The only significant constructive feature macroscopically identified in the upper space is the presence of several mudbricks in the eastern part of the room. Only six of them could be distinguished within the burnt remains of the floor: four in the northeastern part and two in the southeastern section, together with burned fragments, along the western edge of this area. This evidence could indicate the existence of a mudbrick wall separating two spaces in this upper floor or perhaps a bench. Thus, there was a clear stratigraphic difference between the eastern and western zones of the upper room: a cleaner space in the east, with the remains of burnt earth (a domestic fire for heating?), mudbricks, and almost no stones, and a western space with the important presence of large stones. The separation coincides with the position of the lower floor's door. This disposition could suggest the existence of two rooms on the upper floor. We also propose that, at least in this eastern room, the walls could have been built with mudbricks. The distribution of the materials can also show possible differences between the uses of these spaces, as discussed in later.

2 Materials and methods

The finds under study here come from the upper floor of Building G. They consist of a pottery assemblage; seed, fruit, and wood remains; a loom assemblage; and metal objects.

2.1 Pottery assemblages

The analysis of the pottery assemblage from the upper floor of Building G has allowed the study of a total of 1,307 fragments, including some complete vessels, and the identification of 67 individuals. The methodology involved the identification of the chrono-typology and function of the fragments and a general classification into four main types according to their use: transport, storage, tableware, and cookware (Tàrraga, 2020, p. 8–10). Another basic differentiation was between handmade and imported pottery, with handmade productions clearly represented more (Morera, 2017; Alliot, 2022). Regarding counting these materials, an important consideration must be made. Because of their context within a destruction layer, most of the pottery was greatly affected, producing a large number of fragments. Therefore, to avoid overrepresenting the materials, not only the total number of fragments was considered but also the minimum number of individuals (MNI; Tàrraga, 2020, p. 20).

2.1.1 Residue analysis

Organic residue analysis was carried out on eight ceramic vessels found on the upper floor of the building (Tarifa-Mateo et al., 2021). Most of them were handmade cooking vessels. They were almost complete in their preservation, and during the excavation process, the original sediments were kept inside them, which helped preserve the organic residues (Tarifa-Mateo, 2021).

The analyses were carried out using gas chromatography techniques. In each of the selected vessels, a first superficial scraping was performed on the internal part of the vessel. The powder obtained from this first scraping was discarded to avoid erroneous results due to possible contamination by exogenous lipids (Stacey, 2009). Next, in the same area where the surface scraping was performed, a sample of 1–2 g of ceramic powder was taken.

The ceramic powder was mixed with 4 mL of MeOH and sonicated in an ultrasonic bath for 15 min. Then, 200 μL of sulphuric acid (H_2SO_4) was added and exposed to a temperature of 70°C for 4 h. After cooling, 4 mL of cyclohexane (C_6H_{12}) was added, creating two liquid phases, and the cyclohexane phase containing the lipids was extracted with the aid of a Pasteur pipette. Finally, a standard (50 μL of Tetracontan, C_{34}) was added and the samples were evaporated under a gentle argon beam, transferred to vials, and injected into the gas chromatograph. To find out whether the sample contained organic residues, it was analyzed by a gas chromatograph with a flame ionization detector at a programmed temperature of 70°C−320 °C, with ramps of 6°C/min. If this first step gave a positive result, a new analysis was carried out using a gas chromatograph with a mass spectrometer, which made identifying the compounds found in the sample possible. Finally, if fatty acids ($C_{16:0}$ and $C_{18:0}$) were identified, they could be analyzed by gas chromatography combustion isotope ratio mass spectrometry, which indicated the δ-value of the carbon, allowing the origin of the fatty acids to be determined. The resulting $\delta^{13}C_{16:0}$ and $\delta^{13}C_{18:0}$ values were compared in a scatterplot with the results obtained in studies performed so far of current reference value analysis (Stacey, 2009; Debono-Spiteri et al., 2011; Tarifa-Mateo et al., 2023).

2.2 Archaeobotanical remains

Macrobotanical remains were recovered using bucket flotation and water sieving with a 2-mm and a 0.35-mm mesh size. The smallest portion was washed again using the wash-over method. Charcoal fragments greater than 5 mm were hand-picked during the excavation process.

The charred fruit and seed remains were identified using the Jacomet (2006) cereal guide and *The Seed Atlas of the Netherlands* (Cappers et al., 2012). To count cereal remains, the criteria proposed by Jones (1990) and Hillman et al. (1996) at a 1992 London workshop were followed, whilst legumes and wild plant seeds were counted following the criteria proposed by Buxó (1997).

As for the anthracological remains, both hand-picked and recovered fragments from sieved samples were analyzed. The wood taxa were identified by analyzing the three anatomical wood sections (transversal, radial longitudinal, and tangential longitudinal) of each analyzed fragment. The samples were prepared manually by fracturing each piece of charcoal and were examined with an optical microscope with reflected light and bright/dark field. The keys for their identification are described by Schweingruber (1990) in an atlas of European species and comparisons with reference samples of modern wood were made when necessary.

2.3 Metal objects

One iron tool and one gold earring were collected from the upper floor. The iron tool consisted of a pickaxe, which was well preserved despite the violent destruction of the site. Before the study, the pickaxe was restored by Delia Eguiluz following standard methods (Eguiluz and Morell, 2020). The main corrosion products found in the object were iron oxides, such as magnetite and hematite, and hydrated iron oxides, such as limonite or goethite, which manifested in the most superficial layers of the piece. The pickaxe was cleaned mechanically to remove all corrosion products not optimal for the stability of the preserved metal. A scalpel, a fiberglass pencil, and a micro-lathe (which was only used to remove the most resistant concretions) were used. The chlorides present in this piece are some of the most dangerous corrosion agents for archaeological iron and were eliminated through chemical cleaning with NaOH. This alkaline solution causes the diffuse chloride ions present to move toward the solution. For iron stabilization, a low concentration of tannic acid was used, and finally, the iron was protected with a layer of acrylic resin.

The gold earring appeared inside an almost complete handmade pottery jar as an occultation of wealth. Despite the deformation of the earring due to the general fire, the gold foil was well preserved, and an X-ray Fluorescence (XRF)/X-ray Diffraction (XRD) screening by Ignasi Queralt Mitjans (CSIC/IDAEA) was possible. Following standard methods, XRF/XRD analysis is a non-destructive technique that provides detailed information about the crystallographic structure, chemical composition, and physical properties of a material and has been applied to gold objects (Carlos de la Fuente Cullell et al., 2006). It is based on the constructive interference of monochromatic X-rays and a crystalline sample (Queralt and Olesti, 2017).

3 Results

3.1 The pottery assemblage

In the western part of the upper floor, a large concentration of pottery was found within the layers of the collapsed building. In this regard, several depositions of ceramic material were documented within the 60-cm-thick destruction layer, the most extensive accumulation of ceramic material ever found at a Cerretanian site.

The study of these materials allowed the documentation of 1,307 fragments of pottery, including cooking pots, bowls, containers, jugs, lids, and cups, some of them complete (Figure 4). The largest number of pieces relate to cookware, mainly cooking pots and lids (58.2% of the assemblage), but there is also fineware (34.3%) and a small percentage of storage vessels (4.5%). The complete lack of amphorae is especially remarkable. As is usual for this phase at Tossal de Baltarga and the Cerretanian sites in general (Morera, 2017), most of the materials are handmade (78% of MNI), and only a few fragments of fine ware can be identified as "imported materials", essentially the forms Lamb. 25, 27b, and 29 from the Rosas workshop, suggesting a date in the 3rd century BCE. Regarding the origin of the pottery, 22% was wheel-made, mainly coming from the area of *Emporion*, a high percentage compared to other domestic areas from Tossal de Baltarga, and especially from Castellot de Bolvir, where 5%−10% of imported wheel-made pottery is common (Morera, 2017).

Organic residues documented in seven of these jars indicate the exploitation and consumption of differ ent animal and plant species by the Cerretani (Table 1).

Vessels BTB01, BTB02, and BTB03 presented organic residues of animal fat corresponding to *Suidae*. BTB01 was a cooking pot where pork remains were processed. BTB02 and BTB03 were vessels that contained pork remains (as stew or soup).

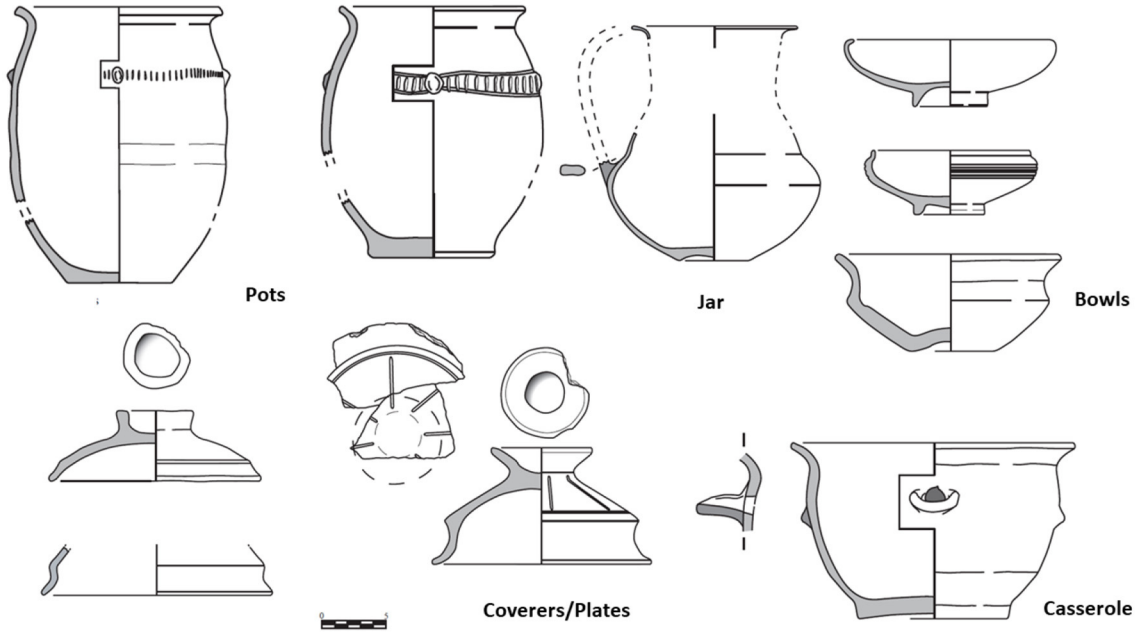

FIGURE 4
Typology of the main pottery productions, upper floor (Tàrraga, 2020).

BTB06 and BTB08 presented organic residues of animal fat corresponding to ruminants. In BTB08, the presence of plant sterols (stigmasterols) indicates the mixing of ruminant and plant remains. BTB07 was the jar with the higher presence of lipids, corresponding to dairy products, such as milk or cheese, as well as the presence of plants (triterpenes). The jar was probably used to contain milk, usually boiled with plants to improve its flavor. BTB04 presented a mixed presence of lipids, indicating a combination of different animal fats whose origins we were not able to differentiate. Furthermore, there were remains of pitch (diterpenes, dehydroacetic acid). The combination of both elements could be related to the same vessel being used for different purposes or the use of pine pitch to proof the jar and, later, the jar being used to process the animal meat (Tarifa-Mateo, 2021; Figure 5).

3.2 The archaeobotanical assemblage (seeds, fruits, and wood charcoal)

Although the number of cultivated plant remains is low, corresponding to the upper floor, four different cereal species have been identified in Stratigraphic unit (SU) 3182, SU 3192, and SU 3224: oat (*Avena* sp.), hulled barley (*Hordeum vulgare*), naked wheat (*Triticum aestivum/durum/turgidum*), and emmer (*T. dicoccum*; Table 2). They are staple crops, basic products in the human diet, although some of them could also have been used to feed livestock (such as barley or oats) should not be ruled out. Only one single chaff of emmer remains was found. Compared to the cereal remains of the lower floor, the most significant difference is the absence of millet, the charred macrobotanical remains of which were concentrated along with phytoliths in the area of the ground-floor stable where the horse was kept. It has been suggested that the millet was intended for the only horse to consume (Colominas et al., 2023; Portillo et al., 2023). Regarding legumes, one species—vetch (*Vicia sativa*)—and one genus—vetch/pea (*Vicia/Lathyrus*)—have been identified, which would have been part of the human diet, although they could also have been used to feed livestock, as in the case of certain cereal species.

The number of charred remains corresponding to wild plants is very low (10 remains), corresponding to two taxa of goosefoot and *Poaceae* (Table 2). This case is striking compared to those found on the lower floor (122 remains and 6 taxa in SU 3246), which include weeds, ruderals, and a shrub. White goosefoot (*Chenopodium album*) is present in cultivated (cereal) fields and/or anthropised lands.

Regarding wood charcoal remains, 43 charcoal fragments have been identified from 4 stratigraphic units that correspond to the collapse of the upper floor (SU 3224 and 3182), and 45 have been identified from the soil of the ground floor (SU 3246 and 3249; Table 3). From the upper floor, four taxa have been identified, with *Pinus sylvestris/uncinata* (Scots/black pine) being the most abundant (77%), followed by *Abies alba* (silver fir, 11%) and *Buxus sempervirens* (boxwood, 9.5%). One fragment of *Populus sp./Salix sp.* (poplar/willow) has also been identified (2.5%). Finally, a beam made from Scots/black pine has been identified and corresponds to the support system for the upper floor (SU 3251).

Some relevant differences can be seen among the SU, even though the total numbers are also very different. SU 3182 is exclusively represented by silver fir and, at the same time, is the only SU where this species is represented. SU 3224 is the more numerous and the more diverse because three taxa have been identified: Scots pine, boxwood, and poplar/willow, with the last two being present

TABLE 1 Results from 8 pots sampled from Tossal de Baltarga pottery assemblage.

Sample	TLE mg·g^{-1}	P/S ratio	Lipids detected	¶^{13}C		Commodities
				$C_{16:0}$	$C_{18:0}$	
BTB01	260.13	3.59	FA(14–32, 16:1, 16 > 18, 18:1); Alkanes (A); Alcohols (OH)	−28.4	−26.7	Animal fat (wild boar)
BTB02	31.5	1.61	FA(14–28, 16 > 18, 18:1); Alkanes (A); Contaminants (*)	−26.9	−26.3	Animal fat (wild boar)
BTB03	16.88	2.14	FA(14–30, 16 > 18, 18:1); Alkanes (A); Contaminants (*)	−26.1	−25.4	Animal fat (non ruminant)
BTB04	46.92	1	FA(14–30, 16 > 18, 18:1); Diterperns: 7-Oxodehydroabietic; Alkanes (A); Contaminants (*)	−22.1	−22.3	Animal fat (?) and pine resin
BTB05	0	–	–	–	–	Indetectable
BTB06	63.84	1.74	FA(14–30, 16 > 18, 18:1); Alcanos (A); Contaminantes (*)	−26.5	−27.1	Animal fat (ruminant)
BTB07	1937.52	3.81	FA(14–30, 16 > 18, 18:1); Triterpens: germanicol; Sterols: Cholesterol	−25.5	−30.4	Dairy products and plants
BTB08	49.9	3.74	FA(13–30, 16 > 18, 18:1); Esteroles (S) Alkanes (A); Alcohols (OH); Contaminants (*)	−27.4	−27.9	Animal fat (ruminant) and plants

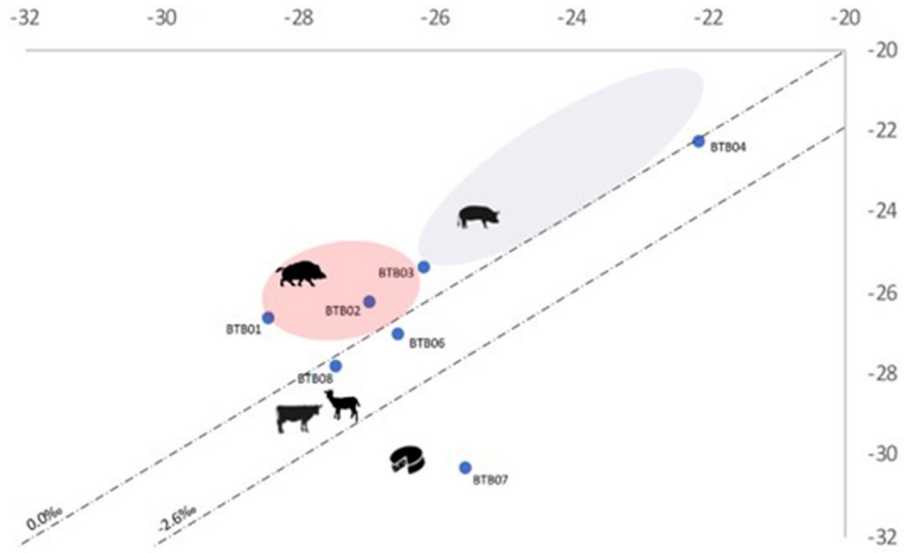

FIGURE 5
The gas chromatography combustion isotope ratio mass spectrometry results of the tested samples δ13C18:0 vs δ13C16:0 from Tossal de Baltarga pottery assemblage compared with δ13C values from modern reference animal fat (Regert, 2011; Debono-Spiteri et al., 2016; Tarifa-Mateo et al., 2023).

exclusively in SU 3224. Finally, all five fragments analyzed from the beam (SU 3251) have been classified as Scots pine.

3.3 The loom assemblage

In the eastern part of the upper floor, a large concentration of *pondera* was documented. Specifically, 52 fragments corresponding to 19 individuals were identified in a small 2 × 2-m space. Unfortunately, reconstructing their original position is not possible, as most were displaced from their original spot during the creation of the Roman wall. However, that they were located in this eastern area that was stratigraphically different from the western part is certain. In fact, the aforementioned presence of several mudbricks in this space suggests the existence of a separate room for the textile activity.

The *pondera* are of ceramic material and have similar dimensions: a rectangular shape of approximately 16 cm in height by 8 cm in length by 5 cm in width. The documentation of five spindle whorls in the same space also reinforces the existence of this textile activity. Although finding these two elements at the Cerretanian sites (Morera, 2017) is not uncommon, such a concentration of materials related to textile activity is thus far unprecedented.

TABLE 2 The table summarizes the number of remains from domesticated and wild plants recovered from each floor of Building G.

Floor	Upper	Lower
SU	3,224; 3,182; 3,192	3,246
Total cult	27	25
List of taxa	*Avena* sp. Cerealia *Hordeum vulgare* *Triticum aestivum/durum/turgidum* *Triticum dicoccum* *Triticum* sp. *Vicia sativa* *Vicia/Lathyrus* sp.	Cerealia *Hordeum vulgare* *Panicum miliaceum* *Triticum aestivum/durum/turgidum* *Triticum monococcum* *Vicia/Lathyrus* sp.
Total wild	10	122
List of taxa	*Chenopodium album* Poaceae	*Carex* sp *Chenopodium album* *Crataegus* sp. Fabaceae *Fallopia convolvulus* *Gallium* sp. *Physalis alkekengi*

SU,.
The taxa identified are also listed for each floor.

3.4 The metal assemblage

The metal assemblage recovered from the upper floor is composed of an iron pickaxe and a gold earring (Figure 6). The pickaxe, *dolabra* in Latin, is a T-shaped hand tool used for cutting and digging. It has a vertical blade on one side of its head and a broad flat "ax" blade on the opposite. They were specialized tools used for forestry or agricultural work. The pickaxe from Building G measures a total of 38 cm: 17 cm on the side of the vertical ax and 21 cm on the part of the horizontal hoe. It is large compared to other known Iberian pickaxes (Sanahuja, 1971, p. 98). These tools, particularly larger ones, were especially used for clearing woodland as they enable trees to be felled and roots to be dug out at cut.

The second metallic object was a gold earring. While excavating the rear part of the building, we documented a thin layer (5 cm) of charred remains covering the cut in the bedrock. In the central lower part of this layer, a small jar with a naviform gold earring inside was identified. It is not the first time we have recovered this type of material, as a similar gold earring was found in El Castellot de Bolvir, the main Cerretanian site in Cerdanya (Queralt and Olesti, 2017). Both earrings have similar measurements (2 × 2 cm) and the same design: a tiny gold foil rolled over an (unidentified) organic core. The piece from Tossal de Baltarga presented a deformation due to the destruction of the building by fire: the original naviform shape was partially modified, likely due to the core of the earring that supported the gold foil breaking up under high temperatures.

This find could be related to the building's owners hiding an expensive object. Moreover, its position within this burnt layer of sediment leads us to consider that perhaps there was some kind of material applied to the bedrock to cover it, probably mud, maybe with an aesthetic function as well as a practical one, to avoid the rock from continuous collapsing into the room. It is also possible that the mud had a function as insulation from humidity and cold from the bedrock.

TABLE 3 Charcoal remains from the upper and lower floor of Building G at Tossal de Baltarga.

SU/floor	3,249 upper	3,224 upper	3,182 upper	3,246 lower	Total	
					N	%
Abies alba			5		5	5.68
Buxus sempervirens		4			4	4.55
Pinus tp. *sylvestris/nigra*	20	33		22	75	85.23
Populus/Salix sp.		1			1	1.14
Rosaceae/Maloideae				3	3	3.41
Total det	20	38	5	25	88	100.00

SU,.

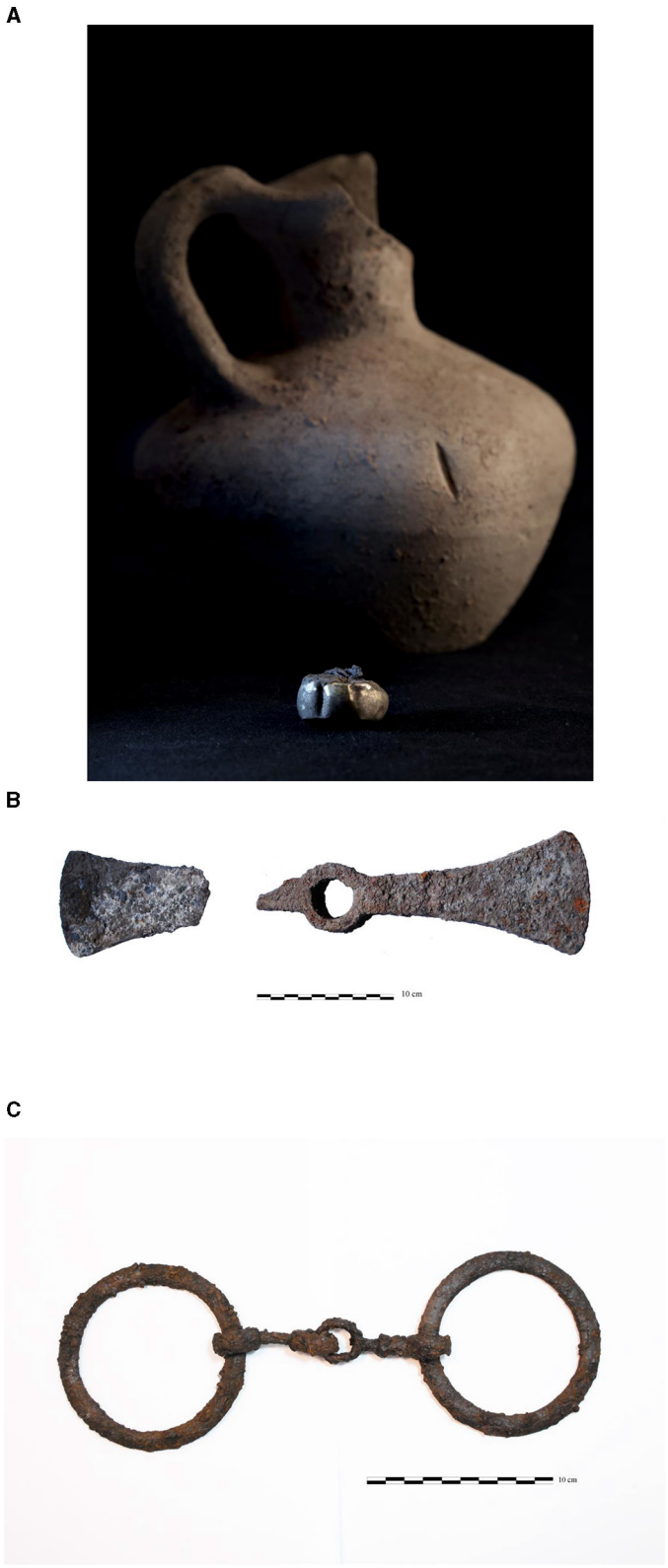

FIGURE 6
Main metal objects: gold earring hidden in a pottery jar **(A)**, pickaxe **(B)**, and horse bit **(C)**.

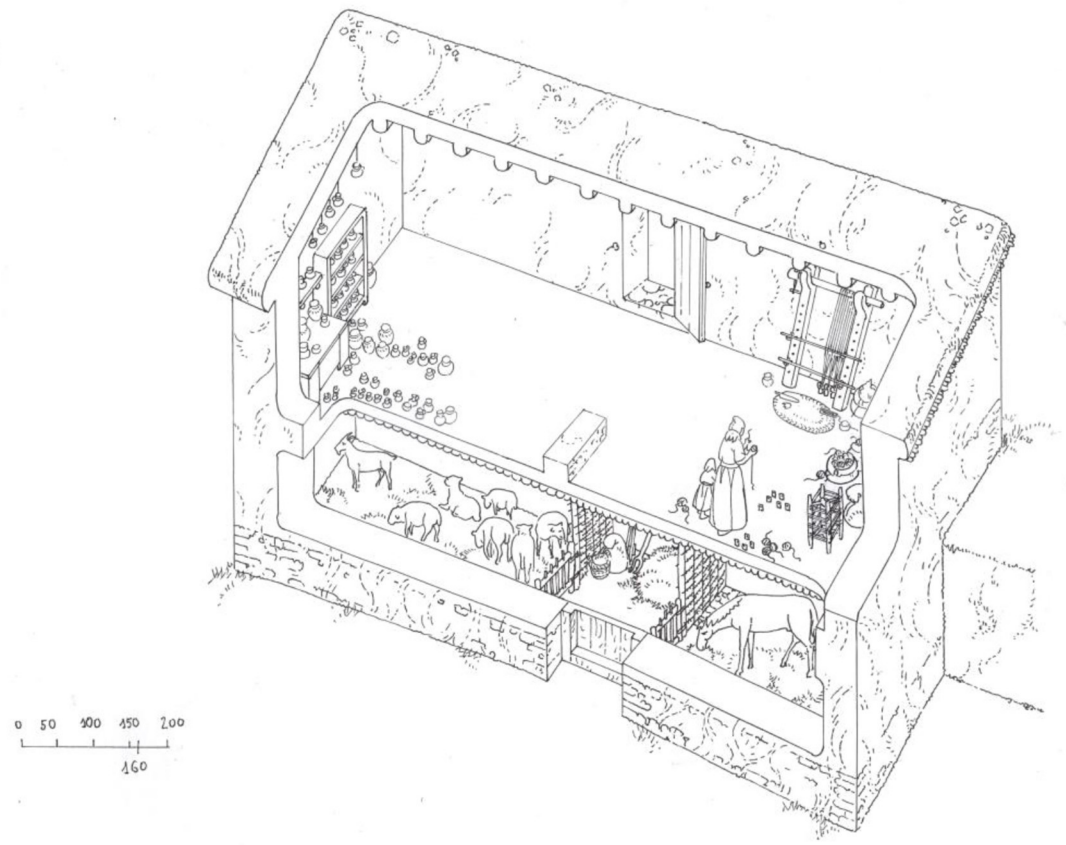

FIGURE 7
Re-creation of the building G. drawing by Francesc Riart.

4 Discussion

With the new data provided from the remains of the upper floor, combined with existing information from the animal pen on the lower floor, whose main finds were presented earlier, we are able to propose an initial approach to the economic strategies of the Cerretani using the exceptional example of the entire Building G (Figure 7). We consider this building to be a non-residential unit that differs, as far as we know, from the other buildings at Tossal of Baltarga. Buildings F and G, which also had two stories, had a completely different internal distribution, and despite belonging to the same Iron Age community, they show different, complementary production patterns.

4.1 Exploitation of animal resources

From the animal remains recovered in the stable, that four sheep, one goat, and one horse were alive at the settlement before the fire is clear, and their management and care were necessary to exploit their resources. No cattle remains were documented in Building G, but this animal was consumed in the settlement, as we have documented some cattle remains in other buildings of the settlement. In fact, cattle remains predominate at Castellot de Bolvir and in the Republican phase of Tossal de Baltarga, showing animal husbandry focused on cattle in this mountainous area during the Middle and Late Iron Age (Rendu, 2003; Colominas, 2017; Colominas et al., 2020). Therefore, we must assume that this species was kept outside the buildings or out of the settlement when the fire occurred at Tossal de Baltarga, showing different penning and feeding strategies between caprines and cattle, at least during that particular season.

The residue analyses carried out on several jars recovered from the upper floor of the building indicate the consumption of different animal resources, such as animal fat/meat from ruminants and pork, as well as dairy products (milk and/or cheese). Therefore, we know from these analyses that these animal resources (meat and dairy products) were obtained and consumed at Tossal de Baltarga.

The study of the mortality profiles of the four sheep and the goat found in the stable of Building G corroborates these data. It has allowed us to determine that all the sheep were adults when they died, suggesting that they were kept alive to exploit their wool and perhaps also their milk, as they were between 2 and 4 years old, exceeding the optimum weight for meat. In contrast, the goat was 12–20 months old, just at the optimal weight for meat when it died.

Therefore, this individual could have been slaughtered soon, which would indicate the exploitation of this animal to obtain meat, or it could have been kept alive until later ages to exploit its milk and/or to use it as a breeding animal (Colominas et al., 2023).

The exploitation of wool at Tossal de Baltarga is also documented through the presence of the loom and spindle whorls. The loom could be related to other types of textile production, such as linen, but there is no indication of linen in either the macrobotanical or phytolith data. It is also the case that the absence of flax seeds in a poor archaeobotanical assemblage is common. Flax seeds have a low chance of being preserved, and they are rare in the Iron Age. In fact, the exploitation of linen in the Eastern Pyrenees is documented in the Neolithic and medieval periods, although, at least in medieval times, scarce and naturally occurring plants were usually exploited due to the need for an elaborate system of irrigation for cultivating flax (Miró, 2022, p. 398). In Coll del Moro (Gandesa, Catalonia), an Iberian textile center dedicated to linen has been documented, but in this case, the loom (evidenced by similar *pondera* to the ones at Tossal de Baltarga) was placed next to two large deposits where the linen had to be softened before being woven (Rafel et al., 1994). Nothing similar was documented at Tossal de Baltarga. Therefore, the loom being used to produce wool seems more feasible at Tossal de Baltarga, considering the presence of four adult sheep on the ground floor. It is also likely that, due to the documented mobility of the sheep at Tossal de Baltarga, they were sheared at the site in spring, contributing to this local textile production.

We have also documented the preparation and/or consumption of pork in the building through lipid analyses. There are no pig remains in Building G, but their presence is attested at the settlement, as 68 pig remains were recovered in Building F. Therefore, the occupants of Building G could easily have had access to this resource. The separation of pigs from ruminants and herbivores was recommended by the ancient agronomists, as Columella mentions (Rust. 6.5.1). There were warnings about having pigs coexist with other species because pigs could easily transmit diseases to the other animals. This is also supported by ethnographic literature (e.g., Portillo et al., 2021).

The presence of a horse in the building shows that this animal was used for riding, as it was more than 4 years old when it died. Once horses reach this age, they are usually considered adults and they can start to be ridden (Arbogast et al., 2002). The presence of a horse bit in the same room could be an indication that it was already trained for this activity.

Another potential use of animal by-products is as dung deposits, like those documented in the stable on the ground floor, such as for manure, among other uses. The phytolith and micromorphological analysis of two block sediments from the penning deposits showed that concentrations of dung spherulites in the sample from the central area of the west sector, which was directly associated with one of the sheep, were scarce or even absent (BTB-3), in contrast to the sample taken on the corner of the east sector close to the horse remains (BTB-4; Portillo et al., 2023). Therefore, these differences in the concentration of dung spherulites could be related to the interest in the obtention of animal manure. Ancient agronomists considered different types of animal manure to be of greater or lesser quality. Following Columella (Rust. 2.15), donkey manure was the most sought after because it could be directly used in agriculture as a fertilizer. The second best was sheep; the third, goat; and, finally, horse and cattle. Today, farmers still consider sheep manure to be one of the best because of its high nitrogen content, which is much higher than in horse manure. That sheep manure was considered to be high quality in antiquity could explain why it was quickly removed from the stable at Tossal de Baltarga, while horse manure, which was of lesser interest, was also collected but in lower proportions.

4.2 Agricultural practices

The archaeobotanical analysis of the remains in Building G at Tossal de Baltarga allows us to gain an understanding of plant/crop management in the settlement. In general, the indicators of the agricultural practices in Building G are coherent with the general patterns of Cerretanian farming, which is especially well documented at the site of Castellot (Berrocal-Barberà, 2021). A large cereal production, mainly based on hulled barley and naked wheat, was complemented with legumes and grasses. This pattern is also seen generally across northeastern Iberian (Albizuri et al., 2011).

Some features indicate that the inhabitants of Building G had access to these agricultural products, but they were not the direct producers. The absence of storage silos (underground pits) and just one fragment of grinding stone identified at Tossal de Baltarga are such indicators that contrast with the large number of silos (25) and grinding stones (16) at El Castellot (Morera, 2017). In addition, the slight presence of cattle (absent in Building G and the lower floors/stables of Buildings F and D), with just nine examples preserved at the whole site, could indicate less involvement in plowing at the site. The possibility also exists that plowing was done with equid or that cattle were brought from other sites to plow fields, but this hypothesis needs to be worked on. It is also true that the role of the horses in the Iberian period is mainly linked to transport and military applications, especially from the 3rd century BCE onwards (Quesada, 1998). As a hypothesis, combining these data with the absence of silos and grinding stones at Tossal de Baltarga, we consider that the inhabitants of Building G could have benefitted from the crops produced by the Cerretani at other sites. The inhabitants from Tossal de Baltarge were mainly focused on complementary livestock activities, where access to pasture lands and wild plants was fundamental.

Charred macrobotanical remains show differences between the upper floor and the lower floor regarding both the number of remains and the taxa identified. In the upper floor, where only 49 remains have been recovered, crops are the best represented. On the lower floor, by comparison, 187 remains have been recovered, most belonging to different types of wild plants. Although these numbers are low, this distribution of wild and domesticated plants is coherent with the hypothesis of specialized use of space where the ground floor would have only been used for livestock while the upper floor would have been the domestic space in which textile manufacturing and food storage coexisted (Portillo et al., 2023).

Among the cultivated plants, most (73.08%) have been identified only as *Cerealia* due to preservation issues. However, among the other 26.92%, different types of crops have been identified, such as hulled barley (*Hordeum vulgare*), naked wheat (*Triticum aestivum/durum/turgidum*), millet (*Panicum miliaceum*), and einkorn (*T. Monococcum*). Also, some leguminous seeds have been identified. The phytolith records point to a horse diet supplemented with millet (Portillo et al., 2023). Dental microwear patterns in the sheep also reflect a soft diet, probably composed mainly of wet ensilaged leafy fodder (Gallego-Valle et al., 2020; Colominas et al., 2023). On the contrary, millet is the only cereal absent from the upper floor, and perhaps this indicates their preferred use as fodder than for human consumption at least in Building G.

Regarding wild seeds, almost all of them correspond to weeds and ruderal plants, but there are some shrubs. White goosefoot (*Chenopodium album*) and bedstraw (*Galium* sp.) were the largest group of seed remains, both weeds commonly present in cultivated (cereal) fields and/or anthropised lands, along with wild buckwheat (*Fallopia convolvulus*). Their presence in Building G may be due to their consumption by animals who grazed in the same fields once they had been harvested, as well as in fallow lands. Alternatively, it may be due to animals carrying them in their pelage, especially in the case of bedstraw.

4.3 Forest exploitation

The anthracological analysis carried out on the different SUs in Building G has identified the use and exploitation of several kinds of wood, all of them corresponding to the natural environment surrounding Tossal de Baltarga, such as Scots/black pine, silver fir, or boxwood.

Focusing on the use of these types of wood, we can observe that silver fir was only documented in SU 3182, corresponding to the remains of the loom from the upper floor. There were no indicators of silver fir in the stable. We know from the ancient agronomists, or even Vitruvius (2.10.10), that silver fir was one of the most appreciated timbers in antiquity due to its straightness, and it was traditionally used in architecture or construction and for cabinetmaking. Silver fir was not used in the rest of the building, but it has been documented in other structures at Tossal de Baltarga and El Castellot (Morera, 2017; López-Bultó, 2021a,b).

The strong presence of Scots pine in SU 3224 and 3246 and the five fragments analyzed from a beam (SU 3251) indicate that it was the main wood used by the inhabitants of Building G (85.2%). Due to the narrow width of the building (2 m documented on the lower floor), beams made from Scots pine were more than sufficient to support the upper floor and its roof. Its abundance in the collapsed upper floor may indicate that the floor itself was made from Scots pine, although wood from objects and furniture may be mixed in the assemblage because the presence of a few fragments of boxwood and poplar/willow are also indicated. Different items produced from boxwood and poplar may have occupied the upper floor, especially the western part, where an important number of pottery vessels were documented. While boxwood was likely used to produce different objects or cupboards, poplar/willow could have been used in basket making.

Finally, SU 3246 is also significant as we know the existence of different wooden structures in the stable associated with the stable floor: a hole post in the caprine area, the stable door, and two fences separating the caprine and horse areas from the entrance area. Scots pine would be the main wood used in these kinds of structures, but the presence of Rosaceae/Maloideae is also documented. The use of the different species of the genus Rosacea/Maloideae is usually related to the consumption of their fruits, despite their wood also being appreciated for cabinetmaking. In the case of SU 3246, it could also be associated with the animals' bedding, especially in the horse area.

Another forest product documented in Building G is the pine pitch documented in jar BTB04. As the residue analysis shows, the pine pitch could have been used to impermeabilise the jar, or perhaps it was a product stored therewithin. The sealing of pottery, especially amphoras, with pine pitch was common in antiquity, in which products such as wine were kept during their transport. Pine pitch did not only seal the container but also acted as a preservative against the threat of temperature changes during the journey. But in the case of Tossal de Baltarga, sample BTB04 was from a cooking pot, as the presence of animal fat indicates, and it seems more likely that it was reused as a jar for storing pitch. Another interesting possibility, mentioned by Mangas and Hernando (2011, p. 46), is the link between sea salt and pitch producers in Roman times because of the need to seal the (pottery and esparto) containers for transporting salt.

Pinaceae resins have recently been detected in Neolithic vessels from the northeastern coast of the Iberian Peninsula, among Barcelona and the river Ebro (Breu et al., 2023). Pitch is known to have been an important commodity in the Pyrenees in medieval times (Miró, 2022), but its production is attested at least from Roman times. A pine pitch kiln from the 2nd century CE has been also documented in the Madriu Valley (Andorra), within the Cerretanian territory, using *Pinus mugo* as the raw material (Orengo et al., 2013). Recently, another pitch kiln has been documented from late antiquity in Bolquera (Cerdanya, Toledo, 2018). But efficient pine pitch was also produced in forests in the middle or lowlands. Despite its function as waterproofing, and perhaps in relation to storing salt, another important use of pine pitch in antiquity was as an antiseptic for animal wounds and infections. The ancient agronomists pointed out its utility in the care of livestock and the need to bring pine pitch to the pasture lands. In fact, one of the best examples is its use during sheep shearing. Varro (Agr. 2.11) mentions that "if in the course of shearing a sheep has been wounded, one anoints the place with liquid pitch". Paladius (*De veteran medicina*, 14.3.3) also mentions pine pitch as a medicine for livestock. It is our opinion that the presence of pine pitch at Tossal de Baltarga, again in relation to the documented presence of sheep and a textile loom in the same building, must be linked to this veterinary function.

Finally, this important and complex exploitation of forest resources must be linked to the presence of the magnificent iron pickaxe from the upper floor. The pickaxe was an effective tool for clearing woodland in antiquity, used, for instance, by the Roman army to expand their infrastructure and logistical projects, and it could have been crucial for managing the Cerretani forest. It is not surprising to find it at Tossal de Baltarga, a site surrounded by dense

forests where trees such as silver fir were exploited, perhaps, also for export.

4.4 Mining

Another resource that the inhabitants of Building G exploited was mines. The ancient writers mention the richness of Pyrenean metals: silver (Diod. 5.35), iron and silver (Livy, 34, 21, 7), or iron, lead, gold, and silver (Pliny NH, 4, 112; Strabo, 3, 2, 19). We cannot determine the source of all these metals mentioned, but at El Castellot de Bolvir, from the 2nd–1st century BCE, we know of the existence of a poly-metallurgic workshop where gold, cinnabar, iron, bronze, lead, and silver were produced (Olesti et al., 2017). In the case of Building G, the identification of two iron tools, the horse bit and the pickaxe, which are very effective from the technical point of view, implies considerable technological knowledge. In fact, at El Castellot, an iron kiln from the 4th–3rd century BCE was documented. But at Tossal de Baltarga there are no data on the local production of iron tools. From a historical point of view, the iron from the Eastern Pyrenees was highly appreciated, at least from late antiquity (Olesti, 2023) and especially in the medieval period.

Another metal documented at Tossal de Baltarga's Building G was gold. The gold naviform earring from Tossal de Baltarga showed considerable alteration due to the general fire at the site, but we were able to carry out an XRF/XRD screening (Queralt, 2021). It was composed of 70.26% Au, 28.59% Ag, and 1.16% Cu. These results differ from the Cerretanian earring documented at El Castellot. That gold earring was composed of 91.3% Au, 6.99% Ag, and 1.69% Cu (Queralt and Olesti, 2017). These results were compared with the analysis of natural alluvial gold particles from the Cerdanya region (Les Guilleteres d'All, 4 km from Tossal de Baltarga) that were 97% Au, 2.30% Ag, and 0.09% Cu. As can be observed, the earring from El Castellot was not far from the typical composition of natural electrum in alluvial plains, but this was not the case for the piece from Tossal de Baltarga. The Castellot earring could possibly be considered the result of the exploitation of natural alluvial gold from the Cerdanya plain, likely obtained by gold panning, as has been documented in the northwest of the Iberian Peninsula for similar dates (Curras and Sánchez-Palencia, 2021). It is possible that during smelting, a low proportion of silver was incorporated, similar to the gold produced in Roman times in the Cerdanya region (Queralt and Olesti, 2017). But in the case of the Tossal de Baltarga earring, the incorporation of silver was higher, indicating that the Cerretani had important technological knowledge of the management of metals and metallurgy.

4.5 Ceramic production

The important ceramic assemblage recovered in Buildings G, D, and F highlights the relevance of this production among the Cerretanii. As the example of Tossal de Baltarga shows, as well as other sites such as El Castellot of Bolvir and Serrat del Castellar (Fontanals de Cerdanya), most of the pottery was handmade and, therefore, locally produced (Morera, 2017; Alliot, 2022). However, the issue of local pottery production is still far from being solved in this region, as no direct evidence for pottery workshops has been discovered so far. The presence of local workshops in the main *oppida* of the area should be expected, but they are also likely in other smaller sites like farms and dispersed settlements. Again, the lack of evidence prevents any type of certainty in this field, but we must highlight that in the Iberian phase at Tossal de Baltarga, a small oven was documented in the so-called Building A, located just to the north of Building D. The oven dates to the first half of the 4th century BCE, but it was affected by the reconstruction of the space in the Roman Republican phase, and determining its function was impossible (Oller et al., 2018b, p. 35). We cannot rule out that this structure, or similar ones that were not preserved, were used for this small-scale pottery production. More archaeological data are needed to approach this subject.

5 Conclusion

The destruction by fire of Building G has made it possible to reconstruct the internal organization of a highly diverse production unit at a specific moment. It was a multipurpose building, in a very specific historical context, soon to be violently destroyed and probably used in anticipation of a period of conflict.

The different activities developed there (wool, milk/cheese, storage, and textile production) could be related to the direct users of the building, but the subsistence of the group implies a wider array of economic tasks that are only indirectly identified in the remains of Building G: agriculture, forest exploitation, meat production, metallurgy, and so on. For this reason, we consider Building G as a part of a larger productive system that consists of the totality of Tossal de Baltarga's buildings (A, F, and D), all of them different and complementary. Tossal de Baltarga was not an *oppidum*, a walled hillfort, but a middle-size residential center visually controlling the Cerdanya plain, where perhaps an aristocratic family carried out their main economic and social activities.

In this way, the absence of underground storage pits (silos) and grinding stones, not only in Building G but also for the rest of the site, is striking compared to their concentration at the site of Castellot (Morera, 2017). The inhabitants of Tossal Baltarga consumed these agricultural products, but they did not store or process them at the site, which did occur at the main center of El Castellot. At Tossal de Baltarga, they used a different method: cereals were stored in pottery jars and were processed using querns. The same could be said for the low percentage of cattle remains not only in Building G but also at the site. This could be explained by the community's lower level of agricultural activity and their dependence on other Cerretanian sites, most notably El Castellot de Bolvir.

The identification of an aristocratic group and their dependents may be bold, but the presence of a riding horse, its exceptional horse bit (which is not frequent in the Iberian domestic register), the gold earring, and several silver coins found in the site (Oller et al., 2018b) could be significant.

This case study highlights the diversity of practices carried out at a Late Iron Age production settlement: animal husbandry—to obtain and produce wool, meat, milk, and manure—and a horse to ride—for agriculture, forest exploitation, and mining. The modest importation of some vessels and the presence of several coins from *Emporion* and southern Gaul indicate a modest, yet effective,

trade with neighboring communities. The evidence of mobility of at least one of the sheep confirms these exchanges, which were likely linked to the need for salt and winter pastures. This is an interesting example that can be contrasted with other areas, such as southern Gaul (Jimenez-Manchón et al., 2023) or the coastal area of the northeastern Iberian Peninsula (Messana et al., 2023b), where, with the currently available data, livestock mobility appears to be short-distance and along a low altitudinal gradient.

The development of all these practices implies the diverse social and economic organization of the community living at Tossal de Baltarga and an intricate relationship with the environment. Could the settlement's violent end and previous instability have affected some of the usual productive patterns of this community, for instance the penning of the sheep inside the stable? Was this method of penning common among the Cerretani? Or did it take place just because of the threat of war? We are unable to answer these questions for the time being. Nevertheless, the data from Building G confirm that this community carried out a wide range of economic activities, that they had deep knowledge of resources in the Pyrenees, and that they adapted to seasonality, being an exceptional example of an Iron Age community case study.

Finally, from a wider perspective, considering the modest economic dimension of the Cerretanian communities, Building G at Tossal de Baltarga shows the capacity of this Iron Age community to take advantage of the complementary nature of the resources at their disposal, skilfully using specific local resources (summer pastures, highland wood, pine resin, and gold). In turn, these typical elements of Pyrenean areas are combined with productive forms that are well documented in other areas of the Iron Age Mediterranean (livestock, cereal agriculture, wool production, dairy products, textile production, etc.), demonstrating that, despite their low level of urban development, the technological and productive level of the Cerretani was in many ways comparable to that of other Iron Age communities. The concentration of all these forms of production in a single building could reveal the presence of an incipient aristocracy among these populations.

From a methodological point of view, the magnificent preservation of the bioarchaeological material from Building G at Tossal de Baltarga has allowed the articulation of a set of analyses focused on investigating the economic patterns of a household and a production unit, which until now, has not been documented for the Iberian Iron Age. The combination of a range of analytic procedures (residue analysis, osteology, dental microwear, stable isotopes, phytoliths, dung spherulite analyses, and thin-section micromorphology) from different disciplines (archaeozoology, archaeobotany, and geoarchaeology) has identified not only historical processes, such as the animal husbandry and the mobility of flocks, but also textile production or the exploitation of high mountain resources that have not been documented in a single building at any other Iron Age site in the Mediterranean facade of the Iberian Peninsula. It is also true that some interpretations remain hypothetical due to the stage of our research in the Cerdanya region. Despite these limitations, phenomena like the mobility of flocks through lower lands in winter involving the relation with other Iberian *civitates*, or the extensive use of a wide range of natural resources by a proto-urban community were not expected at the beginning of our work in the Pyrenean region.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

OO: Writing – original draft, Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing. JM: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. JO: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. JC: Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. LC: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. MP: Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. AB: Data curation, Investigation, Writing – original draft, Writing – review & editing. OL-B: Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. LO: Data curation, Investigation, Writing – original draft, Writing – review & editing. NT: Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. PT: Data curation, Investigation, Writing – original draft, Writing – review & editing. JS-L: Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. CM: Data curation, Investigation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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