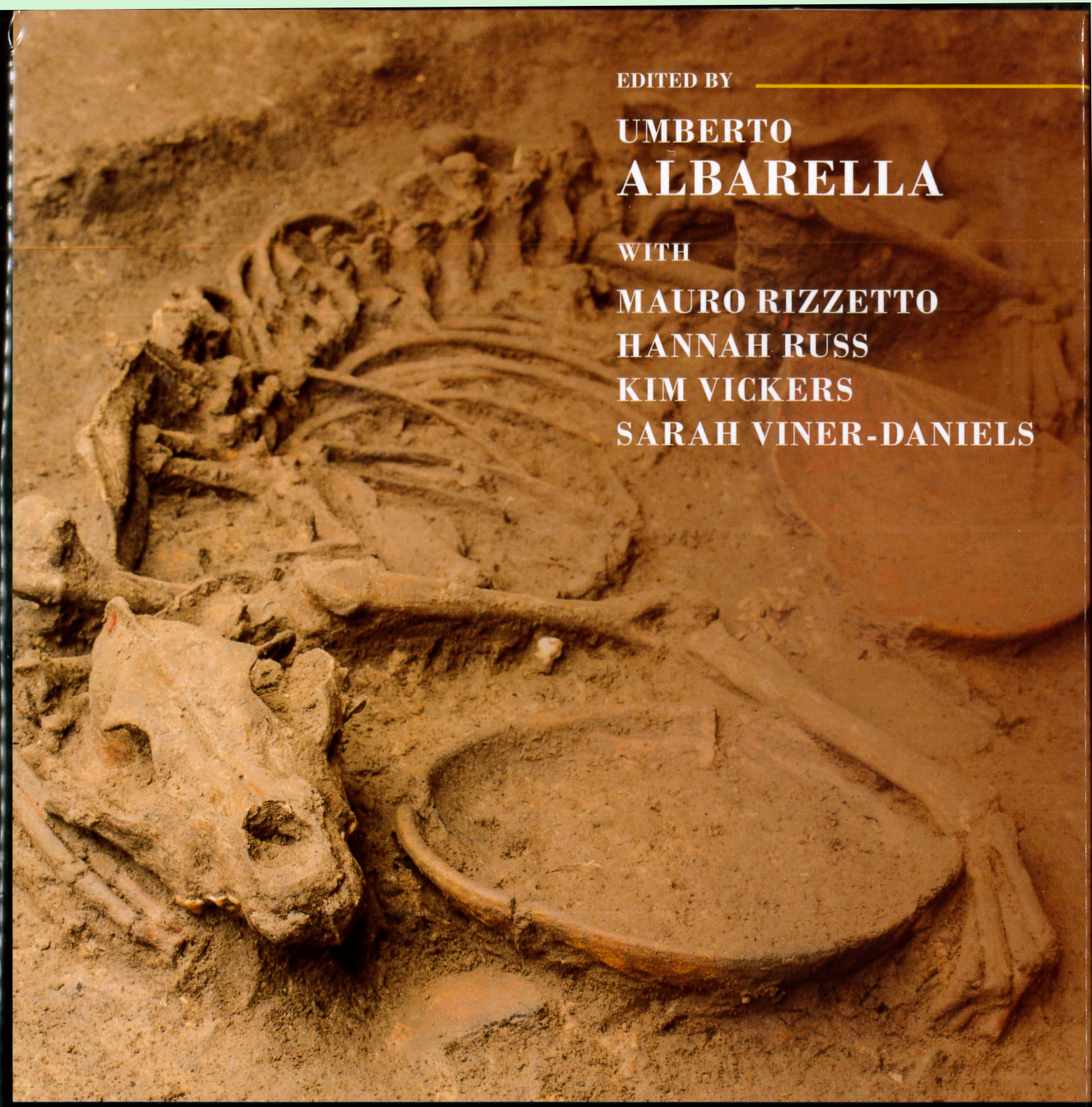

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The Oxford Handbook *of* ZOOARCHAEOLOGY

Oxford Handbooks Online

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Peter Bogucki

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Print Publication Date: Mar 2017 Subject: Archaeology Online Publication Date: Apr 2017

(p. iv) OXFORD UNIVERSITY PRESS

Great Clarendon Street, Oxford, OX2 6DP,
United Kingdom

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First Edition published in 2017
Impression: 1

Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10016, United States of America

British Library Cataloguing in Publication Data

Oxford Handbooks Online

Camelid hunting and herding in Inca times: a view from the south of the empire

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The Oxford Handbook of Zooarchaeology
Edited by Umberto Albarella, Hannah Russ, Kim Vickers, and Sarah Viner-Daniels

Print Publication Date: Mar 2017
Subject: Archaeology, Scientific Archaeology, Environmental Archaeology, Archaeology of South America
Online Publication Date: Apr 2017 DOI: 10.1093/oxfordhb/9780199686476.013.45

Abstract and Keywords

South American Camelids (SAC) occupied a central role in the development of Andean societies and were an essential element of the cultural landscape. During the Inca period camelids had a major significance to people, integrating their economy, social, political, and ritual life. Camelids were a key instrument for the expansion and establishment of the Inca Empire. Llamas were used as beasts of burden for transporting goods along extensive redistribution networks that connected the highlands, valleys, and Pacific coast. From a utilitarian perspective camelids provided different products (e.g. meat, wool). This chapter illustrates the strategies used by the Incas for managing these ungulates by presenting some case studies from the Qollasuyu, the southeastern quarter of the Inca Empire.

Keywords: camelids, Incas, Argentina, management practices, size variation, isotopes, slaughtering patterns

Introduction

SOUTH American Camelids (SAC) occupied a central role in the development of Andean societies and were integral to their cultural landscape. It is important to highlight that camelids are the only large herd mammals that were domesticated in all the Americas, a co-evolutive process that gave origin to two domesticated forms: the alpaca (*Vicugna pacos*) and the llama (*Lama glama*), and their different breeds. The present wild forms—vicuña (*Vicugna vicugna*) and guanaco (*Lama guanicoe*)—were also exploited since the Early Holocene and hunting was maintained during the Inca period (AD 1450–1536 for northwestern Argentina), and persisted until Colonial (AD 1536–1816) and Republican (AD

1853 onwards) periods, but with a different impact on the sustainability of wild camelid populations.

During the Inca period camelids had a major significance, integrating economy, social, political, and ritual life. Camelids were a key instrument for the expansion and establishment of the empire. Llamas were used as beasts of burden for transporting goods along extensive redistribution networks that connected the highlands, valleys, and Pacific coast. From a utilitarian perspective camelids provided different products (e.g. meat, wool). During Inca times, as well as in previous periods, camelids were used for domestic consumption but also sacrificed in public festivities during the religious annual cycle (Dedenbach-Salazar Sáenz, 1990). They were widely depicted in rock art and appear represented as figurines made of raw materials that had symbolic value, such as certain kinds of stones (*illas* and *conopas*), *mullu* seashells (*Spondylus* sp.), and metals (gold and silver), and are found in offerings in different religious and ritual contexts. **(p. 661)**

In colonial times the general number of wild and domesticated camelids declined drastically due to over-slaughtering, competition with introduced species (e.g. sheep and goat), and illnesses (e.g. mercury pollution due to the amalgamation process used in silver mines). As a consequence, their geographic distribution was significantly reduced. Nevertheless, they still remain a core element of many rural communities in the Puna region (above *c*.3,200 m). Camelids, both wild and domesticated, are emblematic animals of the Andes and Patagonia.

They have been exported all over the world, and their use as wool producers and pets has expanded due to economic globalization. Several sustainable programs are currently under development, either to improve their living conditions and that of the local traditional herder communities that rely on them, or as an alternative commercial project for present-day farmers.

Recent Genetic and Archaeological Studies on Camelids

A review of background information about the biology of these ungulates and the criteria used for their classification, both from a Linnaean and ethnographical perspective, is necessary to understand the use and management practices developed in the past. At present, SAC are represented by four different species: two wild, the vicuña and the guanaco, and two domesticated, the llama and the alpaca.

Recent genetic studies have confirmed the validity of the two main genera (*Vicugna* and *Lama*) and the existence of two monophyletic groups (Marín et al., 2007b). In central and south-central Andes there are two subspecies of vicuña: a northern form (*V. vicugna mensalis*) and a southern form (*V. vicugna vicugna*) that comprise separate mitochondrial lineages (Marín et al., 2007a). There is also a clear genetic difference between the two existing guanaco (*L. guanicoe*) populations. In Peru and northern Chile (Ayacucho and Putre) there is one subspecies (*L. g. cacsilensis*), while another one (*L. g. guanicoe*) is present in the rest of the known geographical distribution all the way down to Patagonia and Tierra del Fuego (Marín et al., 2013). However, genetic studies are still lacking for guanaco populations from northwestern Argentina.

Combined analyses of chromosomal and molecular markers have shown close genetic similarity between the vicuña (*V. vicugna*) and the alpaca (*V. pacos*) and between the guanaco (*L. guanicoe*) and the llama (*L. glama*). Although these same studies also show the existence of a hybridization process among the domesticated forms, these results support the idea that the alpaca is derived from the northern vicuña and the llama from the northern guanaco (Wheeler et al., 2006; Marín et al., 2007b).

Certain external features (e.g. fibre shape and colour, ear and tail form) and body proportions can be used for differentiating between the four present species. In addition, size variation is very significant among camelids. There is a body-size gradient **(p. 662)** among present camelids starting with vicuñas as the smallest (35–50 kg), followed by the alpaca (55–65 kg), then the guanaco (80–130 kg), and finally the llama (80–150 kg) as the largest. This means that vicuñas and alpacas overlap in size, as do the guanaco and llamas. Guanaco and llamas also have a wide variation that needs to be accounted for when undertaking osteometric studies (Mengoni Goñalons and Yacobaccio, 2006; Mengoni Goñalons, 2008). The remarkable variability in the size of domestic camelids across the Andean region is particularly pronounced in llamas (e.g. Miller and Gill, 1990; Yacobaccio, 2010).

The two subspecies of vicuña differ in live weight and body size (Yacobaccio, 2006), with the northern form (*V. v. mensalis*) smaller than the southern one (*V. v. vicugna*). Also the north-Andean guanaco (*L. g. cacsilensis*) is smaller than some of the representatives of the Patagonian forms (*L. g. guanicoe*), which have a broader distribution (Mengoni Goñalons, 2008). This variation in size emphasizes the importance of choosing the correct standard when measuring and comparing bones. The osteometric standard should be based on contemporary wild camelids from the same or a neighbouring region from which the archaeological material is derived (Mengoni Goñalons and Yacobaccio, 2006).

The study of pre-Hispanic camelid mummies has discovered alpaca and llama breeds that have no present-day counterpart in Peru (Wheeler et al., 1995). This evidence reveals a

greater diversity of morphotypes in the past that probably lasted until the Inca period, and that was reduced in the aftermath of the Spanish conquest.

The Spanish terms for the four camelid species derive from the *Quechua* and *Aymara* languages but the Spanish chroniclers from the sixteenth and seventeenth centuries also recorded ethno-categories based on different criteria for classifying them. The domesticated forms (llama and alpaca) were described with categories based on utilitarian purposes (e.g. cargo animals, wool producers) or certain physical traits (e.g. wool colour and fibre characteristics). Wild camelids (guanaco and vicuña) were clearly differentiated from the domesticated ones.

Criteria for Taxonomic Identification: Indicators or Markers

Different criteria have been used to study the variability of archaeological camelid remains (Mengoni Goñalons and Yacobaccio, 2006). Both direct and indirect indicators can be used, either based on characteristics of the materials involved (teeth, bone, or fibre) or on assemblage properties (Mengoni Goñalons, 2008). For example, dental morphology and bone size are used for classifying camelid remains and assigning them to a known morphotype category. Mortality profiles and stable isotope analyses can be used to assess management practices, either for wild species or domesticates. All this is usually complemented with contextual information in order to understand the (p. 663) processes involved in the formation of bone assemblages and the significance of faunal remains within a broader social context.

The Incas at Their Southeastern Quarter

A series of coordinated policies were implemented by the Incas during their occupation of northern Chile and Argentina. This vast and diverse region formed part of the Qollasuyu, which was only incorporated into the empire during the first half of the fifteenth century AD. These strategies involved the construction of a great number of administrative and state installations along the road network (*qhapaq ñan*), the placing of several shrines at high elevations, and the development of several state farms.

Other state policies included the intensification of craft, mine, agricultural, and pastoral production. In many cases these activities involved corvée labour (*mit´a*). Power was

exercised through a system based on reciprocity and hospitality relationships in which ceremonial feasting acted as a way for reproducing social order. These practices varied regionally as well as in their timing, and in some cases the Inca presence is only revealed by certain architectural features and cultural material (Williams et al., 2009).

The intensification of an economy usually implies an increase in the control of several aspects of production, distribution, and consumption of products and goods (e.g. D'Altroy and Hastorf, 2001). In an agro-pastoral economy this may involve herd specialization. This means keeping the domestic animals segregated due to the specificity of their products (meat, fibre, or transportation), or for particular purposes (e.g. religious ceremonies) or for maintaining certain segments of society (e.g. feeding those in charge of the production of certain goods).

It is reasonable to assume that slaughter concentrated on individuals whose killing did not compromise the stability of the herds (e.g. unproductive adults), as has been highlighted by several authors (e.g. Flannery et al., 1989). Whenever prime-age animals were culled it was because there was a surplus of individuals which otherwise would be kept alive, especially in herds that are used for mixed production (e.g. meat and fibre). Management of vicuñas and guanacos that belonged to the Inca state could imply restrictions for their slaughter which may have been limited to ceremonial purposes or other special occasions.

It is also expected that access to and, therefore, redistribution of some products (e.g. meat for cooking and fibre for crafts) could have been regulated or even centralized, if the provisioning system was indirect. An outcome of this increase in control would be a relative standardization in the production of primary products (meat) and goods (textiles) and the regulation of their circulation.

Certain aspects of the products consumed, the techniques used for food preparation, the culinary equipment, and the social context of their use, either private or public, can **(p. 664)** contribute to the interpretation of faunal bone materials. For example, different segments of the society (elite, commoners) could have preferential access to certain products (e.g. animals with a special diet). Additionally, the context of use (daily meals or feasting) might determine the kinds and amounts of products to be used or consumed.

Some Case Studies from Northwestern Argentina (NWA)

This section will focus on zooarchaeological markers used to analyse production, distribution, and consumption patterns. The zooarchaeological indicators are represented by the size variation of the camelids, information pertaining to their diet derived from stable isotope data ($\delta^{13}C$ and $\delta^{15}N$), and age profiles derived from each assemblage. These criteria were applied to a selection of sites located in the northern section of northwestern Argentina (NWA), whose faunal assemblages were studied by the writer. This data will be complemented with information from sites studied by other colleagues.

Three major environmental units can be identified in the NWA region, each with its particular topography, water supply, and vegetation. Major changes in altitude and vegetation occur within a relative short distance (*c*.100 km). The *puna* is a high-altitude plateau (in general, above 3,000 m) traversed by mountains and valleys (*quebradas*), covered by different kinds of herbaceous and shrub steppes. The sierras that run at a lower altitude are covered by a tall shrub steppe, which may include either trees or large cacti, depending on the local topographical conditions of the *bolsones* (basins placed between mountains) and more open valleys. The eastern flank of the sierras is called *yungas* and captures the humid winds coming from the Atlantic and allows the growth of a very diverse and dense rainforest.

The last two zones have been heavily transformed by deforestation and overgrazing, but also by the installation of different kinds of urban and agricultural architectures, which can often be traced back to pre-Hispanic times. The *puna* and high *quebradas* provide the ideal pastures for rearing camelids and other herbivores. Literature about current populations shows that camelids living above 4,000 m have a diet dominated by C3 plants and their average $\delta^{13}C$ values are lower (guanaco: 19,4‰; vicuña: 18,3‰; llama: 19,3‰) than those which live below that altitude with a C3 and C4 mixed diet (vicuña: 15,3‰; llama: 17,0‰). These data indicate that altitude correlates with the quality of pastures available in these different environments and, therefore, suggest the probable provenance of the camelids exploited at the sites analysed in this chapter. This present set of values will be used as a baseline for interpreting isotope variability within the archaeological samples.

The site Pucará de Volcán is placed in the southern portion of the Quebrada de Humahuaca (Jujuy), at *c*.2,100 m (Fig. 42.1). It is a large and complex site with a main residential area, a cemetery, agro-pastoral structures, and other installations. The faunal (p. 665) materials come from a trash feature (Tum1B2) associated with a series of

habitation structures and open spaces surrounding an artificial mound located to the west of the main residential area. The ceramics in the deposit show it as culturally homogenous and are dated to 1390–1640 cal AD. The site occupied a strategic position within the cultural landscape by connecting different localities placed to the east (*yungas*) and west (*pre-puna*) of the Quebrada de Humahuaca (Cremonte and Scaro, 2010).

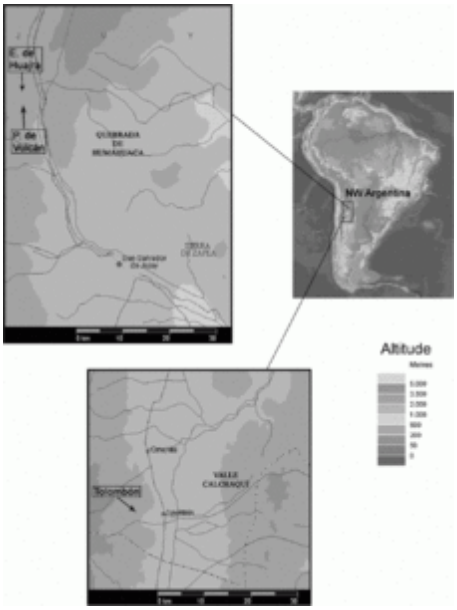

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Figure 42.1 Location of sites mentioned in the text.

Author's own image.

Esquina de Huajra is also located at the Quebrada de Humahuaca, a few kilometres north of Pucará de Volcán at *c*.2,000 m (Fig. 42.1). There are a series of architectural installations, mainly residential structures, burial features, and terracing structures. The bones, together with other elements of material culture, come from a domestic context accumulated in a patio (Terrace 1—Floor) adjacent to a residence. Several indicators (p. 666) (pottery and other elements) suggest a high-status context dating to 1520–1620 cal AD. The locality probably had a strategic role connecting the *quebrada* with the eastern *yungas* (Cremonte et al., 2006–2007; Scaro and Cremonte, 2012).

The locality of Tolombón is situated close to the western bank of Santa María river (Valle Yocavil-Calchaquí, Salta), at *c*.1,700 m (Fig. 42.1). The architecture includes residential areas, public spaces, burial grounds, and defence and agricultural structures. The faunal assemblage comes from a residential space (Structure 6, Architectural Division A) where excavations revealed several layers containing ceramics, stone artefacts, and shell ornaments, among other elements, and also plant and animal bone remains. It was occupied during the Late period (1291–1628 cal AD) and is the only residential structure from which Inca pottery was retrieved. This site played a very important role during native Indian resistance against the Spaniards (Williams, 2002–2005; Williams, 2010).

Camelid Importance and Their Size Variability

Camelids dominate most of the faunal assemblages of this time period while other species are also present but in low frequencies. Other ungulates, such as deer, are present at some sites. For example, the taruca (*Hippocamelus antisensis*) was identified at Esquina de Huajra and Tolombón and has also been found in other NWA contexts (e.g. Mercolli, 2010). Nevertheless, the camelid index (proportion of NISP camelids in relation to total NISP artiodactyls) is extremely high: 0.94 for Esquina de Huajra, 0.97 for Pucará de Volcán, and 0.93 for Tolombón. Medium- and small-size mammals (rodents, edentates, and carnivores) are occasionally present but in low frequencies. The presence of the muscovy duck (*Cairina moschata*), a domesticated bird, at Esquina de Huajra is a highlight. Ungulates (basically camelids) appear to be the most abundant taxa in most assemblages.

Most of the Late period (1000–1536 AD) NWA sites show a great variability in the size of camelids present (e.g. Mercolli, 2010). Using the present NWA guanaco as a modern standard and the log-difference technique (following Meadow, 1999) it was possible to classify the bone specimens from these three sites within the two main size groups: small and large camelids. But it was also possible to further visually distinguish three sub-groups: one overlaps in size with the present vicuñas, another which probably corresponds to large llamas and a third that falls around the standard of the guanaco that corresponds to value 0 (Fig. 42.2). At present no alpacas have been found in northwestern Argentina, probably due to the unsuitable environment (Mengoni Goñalons and Yacobaccio, 2006). This last size sub-group could be composed of either small llamas, guanacos, or some kind of domestic (?) hybrid. All bones shown in the figure belong to osteologically mature animals. It is important to have in mind that camelids lack substantial sexual dimorphism (Mengoni Goñalons and Yacobaccio, 2006) that could obscure this interpretation. **(p. 667)**

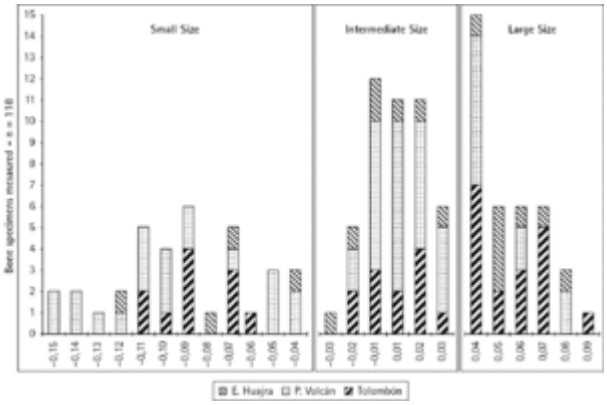

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Figure 42.2 Log-difference between the archaeological specimens of the three case studies discussed and the modern standard. Measurements used as a standard were taken from two modern guanacos of northwestern Argentina from Cumbres Calchaquíes and Nevado de Aconquija.

Author's own image.

At these three sites large camelids are represented in similar proportions (50–60%) to small ones (40–50%). But, if we consider the whole range of size variability some interesting patterns emerge. At Esquina de Huajra and Pucará de Volcán the three size subgroups are represented, the very small (vicuñas) as well as the very large (llamas) individuals, but additionally a notable number of intermediate-size animals. However, at Tolombón there is a clear bimodal size distribution, with very small camelids (vicuñas) and very large ones (cargo llamas?) dominant. Vicuñas seem to have been used continuously and llamas probably varied in size and management conditions, as we will see in the next section.

Diet Variability and Management Practices

We were able to expand the importance of the size variability issue by using other indicators. Herd management involves several aspects that include the kinds of animals, the nature and distance of the feeding grounds, and the slaughter patterns. **(p. 668)**

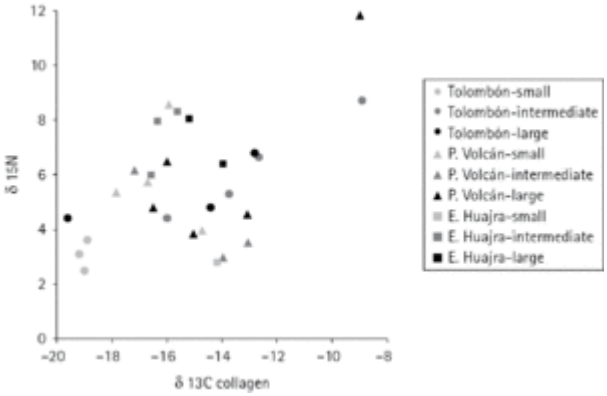

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Figure 42.3 Carbon and nitrogen values of a selected sample of measured bones and camelid group size.

Author's own image.

The first of these indicators is represented by the stable isotopes $\delta^{13}C$ and $\delta^{15}N$, which can help in investigating the variability in management practices of each size sub-group. A selected sample of the measured bones that was used for isotope analyses had acceptable values of bone collagen carbon and nitrogen concentrations (Mengoni Goñalons, 2007). None of the isotopic values obtained from the sampled bones differ from those observed in modern counterparts (*puna* vicuñas, guanacos, and llamas) and fall within their expected range.

At Esquina de Huajra (n = 5) camelid diet is relatively homogeneous with $\delta^{13}C$ values that range between -16.3‰ and -13.9‰ (with a coefficient of variation (CV) = 6.7%). These values (Fig. 42.3) are similar to those from camelids that graze below 4,000 m, as we have seen above. This suggests that vicuñas (very small-sized individuals) and domesticates (larger individuals) fed on a mixture of C3 and C4 plants.

At Pucará de Volcán the animals (n = 12) vary notably in carbon isotope (CV = 16.2%), ranging from -17.9‰ to -9.0‰ (Fig. 42.3), though most signatures overlap with those of camelids (llamas and vicuñas) living below 4,000 m. Additionally, the intermediate and large sub-group includes individuals that have carbon enriched diets (> -13.0‰). One individual especially has a very positive carbon and high nitrogen signature, suggesting the use of fertilizers in some pasturelands (e.g. Szpak et al., 2012). These values also indicate that llama-sized animals had access to different pastures. This is to be expected when herds are kept segregated and the locality is provisioned from different altitudinal zones, a scenario compatible with the existence of complex redistribution networks of products and goods. **(p. 669)**

The Tolombón samples (n = 11) also present a high variability (CV = 21.8%) with carbon isotopic values between -19.6‰ and -8.9‰ (Fig. 42.3). This is also indicative of camelids being fed on different pastures. Small-sized individuals (vicuñas) had a similar diet to animals that live above 4,000 m. The intermediate sized sub-group also shows great variability but it is compatible with that of camelids living below 4,000 m on a C3 and C4

diet. Nonetheless, there is an individual within this size sub-group with a very enriched carbon diet (-8.9‰), suggesting a diet centred on C4. Again these values show that people had access to a wide range of camelids coming from different as well as distant sources, thanks to an articulated redistribution system.

This stable isotope data uncovered aspects of variability that could not be appreciated by using size variation alone. Animals of the same size may feed on different plants and, consequently, have different diets. The use of multiple zooarchaeological markers helps to understand the complexity of the production and redistribution system.

Age Profiles: From Production to Consumption

Certain aspects of faunal assemblages need to be considered when analysing slaughter patterns. One is their aggregative character and the nature of its corresponding archaeological context, aspects that have been considered when presenting the above case studies. Another issue is that certain practices take place at a particular age within the life cycle of an animal. In camelids 2 to 3 years is a critical age at which their future role is defined, either as producers of secondary products (wool or transportation) or for reproduction. Beyond the age of 7 years animals are, generally, not considered productive anymore, although they may be kept alive. These aspects determine certain developments in the life of an animal, which influence cultural preferences and decisions. The three age classes used in this study were based on fusion stages: early (< 12–18 months), intermediate (< 18–36 m), and late fusion (< 36–48 m). These categories were applied to the individuals of the main large-size group (most probably llamas).

At Esquina de Huajra consumption was focused on young (< 18 months) and young-adult (24–36 months) individuals. Nearly 50% died between 18 and 48 months. Only 25% survived above 36–48 months (Fig. 42.4). This indicates a culinary preference and access to prime cuts probably associated with the high status of those occupying this sector of the site. The pottery associated with the bone assemblage includes prestige goods (Scaro and Cremonte, 2012) and probably consumption of *hauté cuisine* dishes prepared with tender meat belonging to young animals besides more common dishes served as one-pot meals.

At Pucará de Volcán slaughter was concentrated on very young animals (newborns or *teques* and weaned individuals or *tuis*) and young adults of prime age (< 4 years old). A little more than half of the animals were slaughtered before 4 years of age (Fig. 42.4). (p. 670) The age category < 36–48 months surprisingly shows a slight increase in the surviving fraction, which in many contexts has been referred to as ‘resurrection’. This

signals the introduction of body parts of animals belonging to that particular age category and, therefore, implies access to a surplus stock of prime-age animals that could be sacrificed at will. In this case we think that quality was the choice, implying the access to body parts of high-value animals.

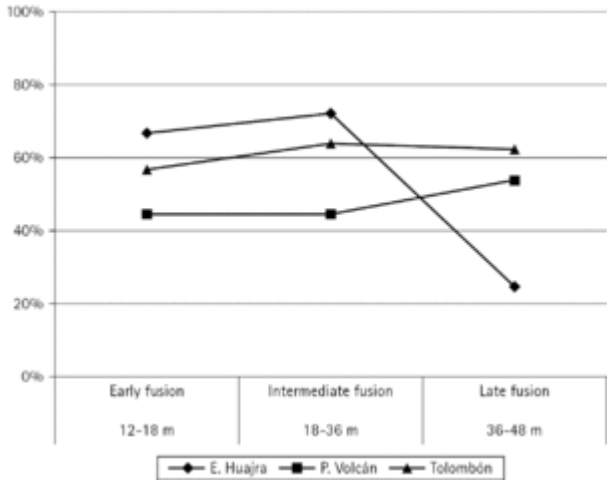

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Figure 42.4 Survivorship curves based on fused elements (innominate, scapula, long bones, and first phalanx) relative counts (%).

Author's own image.

At Tolombón nearly 40% of the animals died before 48 months (Fig. 42.4). The survival of a high percentage of animals between 2 and 4 years old suggests an interest in keeping a stock of animals of an age typical of producers of secondary products, either wool or transportation. In this particular case, sacrifice was concentrated on those animals that were considered to be surplus and did not affect the reproduction and maintenance of the herd population.

Some Comparisons and Thoughts for Future Research

The three cases briefly presented here allow discussion of how Inca strategies of political dominance and resource administration developed in the southeastern section of their empire. The Incas always adapted their policies to local conditions so we cannot (p. 671) generalize the patterns observed at these sites but it is possible to dwell upon some aspects that have a wider significance.

Contrary to what is traditionally assumed, wild camelids (vicuñas and guanacos) were hunted and consumed, both in domestic and public contexts. In this sense, the exploitation of these animals shows a similar pattern to that recorded in some pre-Inca Late period sites of both Quebrada de Humahuaca and Calchaquí valley (e.g. Mercolli, 2010). The persistence of hunting is even seen in some isolated areas such as the

highlands of central-west and northwest Argentina above 3,000 m where vicuñas and guanacos were hunted and/or captured for shearing, probably associated with communal practices (*chaku*) during Inca times (Bárcena et al., 2008; Ratto and Orgaz, 2002–2004).

Domesticated llama herds were bred at different altitudes and their meat travelled relatively long distances through a redistribution network that connected the camelid productive zones (probably located at the *puna* or close by) with those in the lower valley areas that concentrated most of the urban and agricultural activities. Herds were kept segregated as is evidenced by the isotope information and were used for different purposes.

Consumption occurred at the domestic and public level. Culling patterns show certain meat preferences for young individuals and the existence of a surplus of animals of prime age that was either used in elite households or during feasting performances. As camelids were readily accessible they were also probably used in common daily domestic contexts, but as an ingredient of stews and soups, with its associated specific culinary equipment.

In sum, the Qollasuyu region offered abundant land, animals, and crops allowing the Incas to intensively manage locally available resources and provision more distant products that were obtained at the very southern end of their empire. All of this was accomplished by means of strategic political control on all aspects of the productive-consumption system based on the material evidence already mentioned above.

Acknowledgments

Several colleagues collaborated generously with information and I sincerely appreciate the help of Félix Acuto, Pablo Cahiza, Isabel Cartajena, Beatriz Cremonte, Andrés Izeta, Pablo Mercolli, Norma Ratto, Beatriz Ventura, and Verónica Williams. Isotope analyses were carried out by Randy Culp at CAIS-University and by Robert Tykot at the Department of Anthropology—University of Florida. Carolina Mengoni Goñalons and Mercedes Rocco kindly helped with the preparation of the figures.

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