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EAT THIS IN REMEMBRANCE: THE ZOOARCHAEOLOGY OF SECULAR AND  
RELIGIOUS SITES IN 17<sup>TH</sup>-CENTURY NEW MEXICO

A Thesis Presented  
by  
ANA C. OPISHINSKI

Submitted to the Office of Graduate Studies,  
University of Massachusetts Boston,  
in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

August 2019

Historical Archaeology Program

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ANA C. OPISHINSKI

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## ABSTRACT

### EAT THIS IN REMEMBRANCE: THE ZOOARCHAEOLOGY OF SECULAR AND RELIGIOUS SITES IN 17<sup>TH</sup>-CENTURY NEW MEXICO

August 2019

Ana C. Opishinski, B.A., University of Rhode Island  
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Directed by Dr. David B. Landon

This thesis examines the faunal remains from LA 20,000, a 17<sup>th</sup>-century Spanish *estancia* near Santa Fe, New Mexico that was inhabited by a family of Spanish colonists and indigenous laborers. The data collected from these specimens are examined to better understand the diet of the site's inhabitants, especially in conjunction with existing data on the plant portion of the diet at this site. Creating a more complete picture of the diet, the analysis covers Number of Identified Specimens (NISP), Minimum Number of Individuals (MNI), potential meat weight represented by the various species, bone modifications, and ageing and kill-off patterns. These all allow for a deeper understanding of the diet and negotiation of identity through foodways. For more context, the results of the analysis of LA 20,000's collection are compared to data from Awatovi mission, which was inhabited contemporaneously. The comparison of these two collections reveals differing strategies

between the secular and religious households that are affected by identity, politics, food availability, and social structure. This work is one of the first in-depth zooarchaeological analyses of the 17<sup>th</sup>-century New Mexican diet and it can be used to help understand the various strategies of power that Spanish colonists utilized.

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I would also like to thank a few people very close to me. First and foremost, I want to thank my fiancée, Sam, for always having dinner ready when I got home from class, always making me laugh when I was drained and didn’t want to work anymore, and for trying your best to understand archaeology when I made you proof-read my papers. Second, I’d like to thank my best friend in the program, Ivana, for reminding me never to take things too seriously, for hours of chatting in the labs, for putting up with me 24/7 in New Mexico, and for all in all, becoming a lifelong friend. Third, I’d like to thank my group of friends for asking me every Wednesday night how my thesis was coming, while pretending to know what I was talking about. Lastly, I’d like to thank my parents and family. At age 7 I told you I wanted to be an archaeologist, and since then you’ve helped me reach my goal. Of course, my idea of what archeology is has changed since then, but your support never has.

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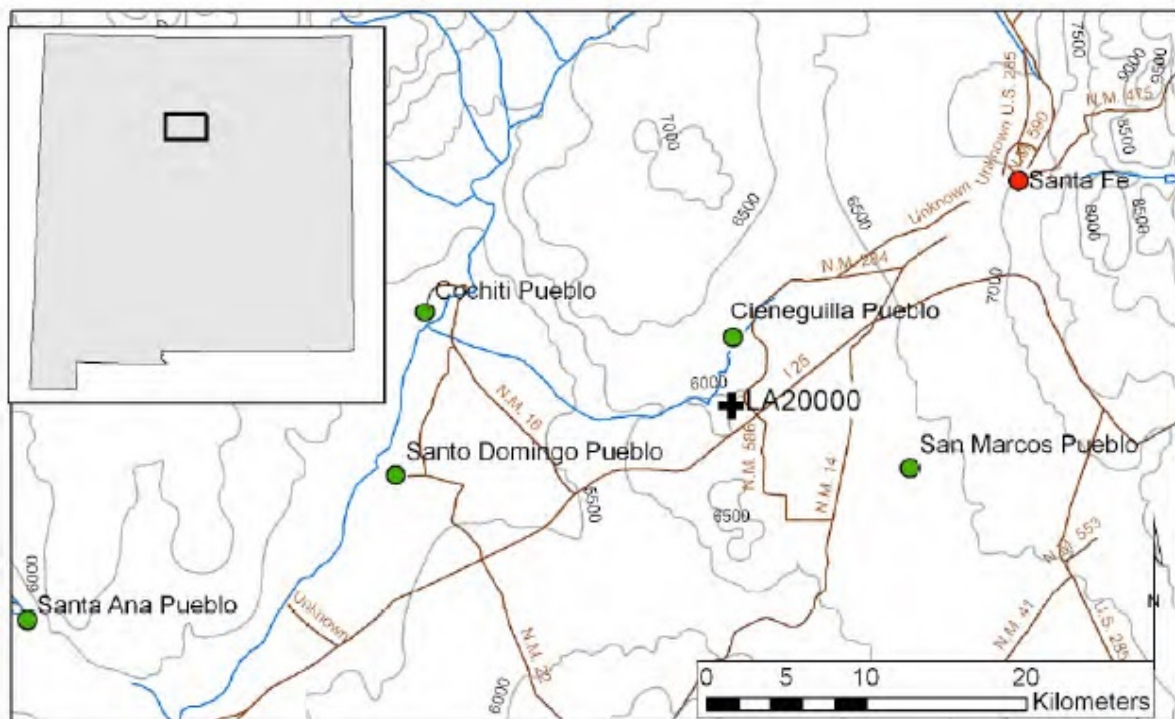
## CHAPTER 1

### INTRODUCTION

This thesis is the culmination of the zooarchaeological analysis of faunal remains collected at the Sanchez Site (LA 20,000), a 17<sup>th</sup>-century Spanish *estancia* located about 25 kilometers southwest of Santa Fe, New Mexico (Figure 1). The site was originally excavated in the 1980s and 1990s first by the Museum of New Mexico, then by David H. Snow and Dr. Marianne Stoller as part of an undergraduate archaeological field school, and again from 2015-2017 under the direction of Dr. Heather Trigg at the Fiske Memorial Center for Archaeological Research at the University of Massachusetts, Boston. LA 20,000 is unique because it dates to the first permanent occupation of New Mexico by Spanish colonists (1598-1680) and was never re-inhabited. This short occupation makes the site ideal for studying the first semi-permanent Spanish settlements in New Mexico and the effects of colonization, and helps illuminate a period to which few historical documents refer.

The initial Spanish colonization of New Mexico officially lasted until 1680, at which point the indigenous groups, united under a religious leader, Popé, revolted and forced the settlers out of the area for 12 years. During the Pueblo Revolt many documents were destroyed, leaving a blank spot in the social history of New Mexico's Early Colonial Period (1598-1680); because of this, we know little of the "everyday person," and his or her

activities, culture, and society (Snow 1992:186). Surprisingly, despite the lack of documentary evidence, most of the research conducted on this period is documentary or archival work, resulting in a one-sided presentation of history (Majewski and Ayers 1997:57; Snow 1992:186). Until recently, archaeology in the Southwest has focused on pre-contact sites, with the research being done on 17<sup>th</sup>-century sites falling into the category of salvage archaeology. The results of this research were mostly grey literature and did not contribute much to the general understanding of the colonial Southwest because they often lacked anthropological or archaeological research orientation, focused on church, political, or state history, and analyzed the Pueblo and Spanish sides of history separately (Snow 1992:185; Lycett 2005:101). Anthropologically-focused archaeological research is one of the ways that this time period and its social history can be better understood.



**Figure 1: Map Showing the Location of LA 20,000**

Historical archaeology has moved towards a re-evaluation of its understanding of the colonial experience and its many impacts on the individual, societal, cultural, and global levels. In the Southwest, archaeology's methods and theories can be used not only to add to the general dearth of knowledge caused by the lack of 17<sup>th</sup>-century documentary evidence, but they can also provide data that would never be found in written documents. For instance, the effects of both direct contact with Spanish colonists as well as with new biological, material, and psychological agents on the indigenous communities are poorly understood and are a key area of archaeological and anthropological studies (Pavao-Zuckerman and Jenks 2017:528). The answer to many questions can be found through an analysis of the material culture because it embodies part of the daily life through which colonialism was experienced (Majewski and Ayers 1997:59; Dietler 2006:221); in this thesis I seek to understand the material remains of the 17<sup>th</sup>-century foodways and how they relate to the colonial encounter, as well as add to the growing body of literature that is beginning to comprehensively study 17<sup>th</sup>-century colonial New Mexico.

For this study, the faunal samples collected by Trigg were combined with the legacy collection excavated by Snow and Stoller, which had been partially analyzed but never published or formally reported. Between these two sample sets, a fairly robust collection was created and allowed for study of the meat portion of the diet at LA 20,000. Despite the notable amount of research conducted both on foodways and the American Southwest, very little data exist pertaining to the early Spanish colonial diet in New Mexico, and what does exist focuses more on the plant portion of the diet. The goal of this research is to provide a zooarchaeological analysis of the Spanish colonial diet at LA 20,000 to complement the

study on the plant portion of the diet at LA 20,000 done by Trigg (2004) and to compare the diet at LA 20,000, a secular home-site, to the diet at Awatovi Pueblo, a Franciscan mission site. By comparing the faunal data to both paleoethnobotanical data and foodways from other sites, I hope to answer the following questions: What animal species were utilized in the Spanish colonial diet in New Mexico and how? How did food availability, traditional food practices, and interactions between different ethnic groups shape the foodways at LA 20,000? How do the meat and plant portions of the diet at LA 20,000 compare? How was food used differently at a secular ranch site than at a religious mission site, and how does this relate to identity and colonial politics?

Foodways were selected as the focus of study because they bridge the connections between the individual, group, society, and the diverse types of identity at these different scales of analysis. They were also selected because food is something humans consume daily, not simply for caloric or nutritional intake, but as an expression of material culture and identity (Dietler 2006:222). Studying food from an archaeological perspective means examining not only bones and seeds, which are the actual remnants of foods themselves, but also the dishes, tablewares, and food preparation areas and tools, among other things. These items tend to preserve well archaeologically, so besides being a good reflection of past culture, food is also an easily accessible aspect of life for archaeologists to study. In particular, faunal remains were selected for this study because: 1) They have never been fully analyzed for LA 20,000 or other 17<sup>th</sup>-century Spanish *estancias* in New Mexico, 2) Other aspects of the diet and foodways at LA 20,000 have previously been analyzed (Trigg 2004, 2017; Connick 2018; Gruber 2018; Brinkman 2019), and 3) The introduction of European

domestic animals to New Mexico, where there were very few domesticated species, adds an interesting dynamic to the colonial endeavors of the colonists and the actions of the Pueblos. Keeping these reasons in mind is important as the previously mentioned research questions are explored throughout the remainder of this work.

The following chapter of this thesis places this research in its historical context by examining New Mexican food, diet, and animals. It begins with a discussion of foodways in the American Southwest prior to the arrival of Europeans, followed by a history of Spanish colonization of New Mexico, highlighting the issues that arose surrounding food and provisioning. At this point, a discussion of the colonists' diet is included, along with information about what foods and animals they brought to New Mexico. Also discussed are the systems of food tribute and labor the colonists imposed upon the indigenous people once they had settled and how these systems differed in religious contexts versus secular contexts. The goal of the historic background chapter is to highlight the many factors that contributed to diet, attitudes surrounding food, and food availability.

The third chapter focuses on methodology. It opens with an overview of the site and the collection itself, followed by a section on recording and identification methods and another on analytical methods. The identification and recording section outlines standard zooarchaeological methods that were employed for identifying the samples in terms of species, element, and modifications, and it also explains how the data were recorded, standardized, and organized in tables. The analytical section outlines which analyses were performed on the collection once everything was identified; it outlines how the following topics were examined: taxonomic frequency, potential meat weight, kill-off and ageing

patterns, and bone modifications. All the methodologies were selected to better understand diet and food processing at LA 20,000. Following the methodology chapter is the results chapter, which provides the results of the aforementioned methodologies for the collection. It also discusses data located in catalogs from the 1990s separately from the data gathered by the author from the extant collection. A summary of all the data is included at the end of the results chapter.

The results are then compared both to the plant portion of the diet, which was analyzed by Trigg (2004), and to faunal data from Awatovi Pueblo, which was analyzed by Chapin-Pyritz (2000) for her doctoral dissertation. Though located in present-day Arizona, Awatovi Pueblo was inhabited contemporaneously with LA 20,000 and has the most complete available faunal data for comparison. As a mission site, it provides the religious foil for the secular LA 20,000 in understanding how the religious and secular colonial labor regimes affected foodways and identity. The concluding chapter pulls on all the collected data in addition to theoretical frameworks about food, identity, and ethnicity. This chapter begins with an overview of the theories utilized by the author to contextualize the results of the faunal analysis. The data are then explained in relation to these theories to answer the research questions outlined above.

## CHAPTER 2

### HISTORICAL BACKGROUND

#### **Pre-Columbian Indigenous Foodways**

To understand foodways in 17<sup>th</sup>-century colonial New Mexico, one must first understand the food traditions that existed prior to colonists' arrival with their Old World plants and animals. When the colonists arrived in New Mexico in the 16<sup>th</sup> century, several cultural and tribal groups had inhabited that area for generations. The groups the Spanish came to interact most closely with during colonization were the Pueblo; the Spanish called their villages "pueblo" and the people that lived within them by the name "Pueblos" (Liebmann 2015:2). They interacted with them most because the Pueblos lived in permanent settlements around waterways from the Rio Grande westward to the Jemez Mountains and eastward to the Great Plains. Accounts differ, so records state the Spanish encountered anywhere from twenty to eighty inhabited Pueblo villages (Beck 1962:24; Roberts and Roberts 1986:34; Barrett 2002: 124). Though the Spanish called the Pueblos by one name and they shared *some* cultural traits, they were *not* a single tribe and possessed no common language (Liebmann 2015:2).

Besides living in permanent villages, the Pueblos' main shared cultural trait was their practice of agriculture. People living nearer to the Rio Grande practiced traditional

agriculture; those living further from rivers practiced dry farming, digging deeply into the soil and planting near *arroyos* (Roberts and Roberts 1986:38; Kessell 1997:46; Majewki and Ayers 1997:63). Agriculture was the focus of the pre-Columbian Puebloan economy, which was secondarily based on hunting, gathering, craft production, and trade (Spielmann 1989:102). Of the plants cultivated by the Pueblos, maize was the most common, followed closely by beans and squash. Maize production, consumption, and distribution occurred at the household level, with men involved in all aspects of crop production and women working the fields, processing, and storing the maize (Beck 1962:25; Spielmann 1989:103). Maize was made into flat cakes, the staple of the Puebloan diet.

In addition to maize, the Pueblo found uses for over seventy plants in their cooking, dyes, and medicine; these included yucca, *piñon*, goosefoot, purslane, cactus, beeweed, sunflowers, wild grapes, wild plums, walnuts, cattails, and mustard plants (Roberts and Roberts 1986:39; Heather Trigg, pers. comm.). Archaeological evidence supports the notion that maize was essential in the pre-contact Puebloan diet. At both Gran Quivira and Pecos Pueblos, for instance, archaeological and paleoethnobotanical data point to a heavy reliance on maize, beans, and squash, supplemented by local wild plants, such as *Chenopodium*, cacti, and *piñon* (Spielmann 1989:102). These data indicate that, although the Pueblo relied on agriculture, they also utilized local plants for sustenance. In fact, most of the Pueblos' protein needs were met by plants; bone chemistry data from Pecos indicates that only 45% of the Pueblos' protein needs were met by meat, indicating their diet was largely plant-based (Spielmann 1989:102). The people of the American Southwest were not vegetarian, however, and met their protein needs by supplementing plants with meat.

Wild animal species available for meat in New Mexico vary widely based on habitat and altitude. The altitude in New Mexico ranges from 2,800-13,200 feet and the landscape includes plains, deserts, river valleys, and mountains. The Pueblos had access to all these landscapes and the animals and plants within them, but because they mostly inhabited river valleys, their diets typically contained a few local wild animals. Species they hunted regularly included rabbits, hares, squirrel, and other small game, and occasionally larger species, such as deer, mountain sheep, and pronghorn (Roberts and Roberts 1986:39; MacCameron 1994:30). One reason small game dominated the meat portion of the diet may be because larger species were overhunted. Around the 12<sup>th</sup> century the amount of large game in the Puebloan diet decreased, and archaeologists believe this reflects overhunting (Crow Canyon Archaeological Center 2014). Additionally, archaeological evidence at Gran Quivira Pueblo indicates antelope were overhunted by the 16<sup>th</sup> century (Spielmann 1989:103). In addition to mammalian meats, some sources say the Pueblo ate fish, and in 1610, Spanish chronicler Gaspar de Villagr  reported the Pueblos were good fishermen (Trigg 2005:41). Some say other tribes avoided consuming fish, but this seems to be an uncommon statement (Beck 1962:25).

In addition to hunting and fishing, Pueblo groups traded for meat. As stated before, the pre-Columbian economy was partially based on trade, which occurred between the Pueblos, Plains Indians, and other nomadic groups. One of the primary items acquired was bison meat, which the Pueblos often traded for maize (Spielmann et al 2006:103). Pueblo men occasionally travelled to the Great Plains themselves to hunt bison, returning with processed hides and jerky (Roberts and Roberts 1986:39). Bison meat supplemented up to

20% of the Pueblos' annual protein intake, providing enough protein for a healthy diet (Spielmann 1989:103). The Pueblos relied heavily on wild game for their meat because there were few domesticated species in the Americas before the arrival of Europeans; at the time of contact the only domesticates were dogs, llamas, alpacas, guinea pigs, turkeys, Muscovy ducks, and possibly a type of chicken (Crosby 2003:74). Of these, Pueblos kept domesticated turkeys for feathers and dogs for work (Trigg 2005:46; Barrett 2012), so their interaction with domesticated animals was limited compared to Europeans'.

In addition to Pueblo groups, several nomadic groups inhabited parts of New Mexico and the Southwest, but the Spanish primarily interacted with the Navajo and Apache (Beck 1962:28). The Navajo occupied lands north and west of the Pueblos and relied primarily on hunting and gathering, although after colonization they lived on ranching settlements and cultivated crops. The Apache lived to the west as mobile hunters and gatherers (Cordell 1989:20). As nomadic hunters and gatherers, these groups relied on wild plants and local game, such as deer and elk, and traded with the Pueblos for maize; after the arrival of European animals in the area, they also consumed cattle, sheep, and horse meat. Some sources say they eschewed consuming bear, pork, fish, and turkey (Beck 1962:31).

Disagreement exists concerning the arrival of these nomadic groups in the Southwest: some archaeologists believe they arrived as early as 1200, whereas others believe that they arrived in the 16<sup>th</sup> century, not long before the Spanish colonists themselves (Roberts and Roberts 1968:43). Regardless, they were an integral part of the landscape, economy, and culture of New Mexico when the Spanish colonists first arrived, and they shaped the pre-Columbian foodways of the Southwest through hunting and trade.

## **European Exploration and the Colonization of New Mexico**

Although the first explorations by Europeans into New Mexico began early in the 16<sup>th</sup> century, the first large, organized expedition occurred in 1540. Francisco Vázquez de Coronado led about 2,000 Europeans, African slaves, Native Americans, and clergymen, and 1,000 horses and 600 mules, cattle, and sheep on this venture (Beck 1962:45; Cordell 1989:25; Flint and Flint 2002a). Early expeditions exaggerated the mineral wealth of New Mexico, but were often truthful about the difficulties they had in terms of acquiring food and navigating the landscape. For example, in 1572 Cabeza de Vaca reported that “They [the Indians from Tularosa village] guided us down through more than fifty leagues, mostly over rugged mountain desert so dry there was a dearth of game, and we suffered great hunger” (Cabeza de Vaca quoted in Roberts and Roberts 1986:56). Coronado’s expedition encountered similar difficulties with provisioning and, when the explorers arrived at Zuni Pueblo, one wrote that they found “something [they] prized more than gold or silver, namely much maize, beans, and chickens larger than those here of New Spain, and salt better and whiter than [they] have ever seen” (Cárdenas 1540:33). These statements reflect the difficulties colonial expeditions had in sustaining themselves and foreshadow the relationships Spanish colonists had with food and with Pueblos throughout the 17<sup>th</sup> century.

About forty years passed before expeditions into New Mexico resumed. During that time, many slave-hunting raids into New Mexico occurred, with Spanish colonists looking for Native Americans to work their silver mines (Beck 1962:48). The clergy saw these slave raids as problematic because they mistreated the indigenous population and so an expedition was organized by Franciscan priests to Christianize the indigenous groups in New Mexico

and thereby add them *and* their lands to the Spanish Empire (Cordell 1989:27; Flint and Flint 2002b). Departing in June 1582, this expedition brought horses and livestock for food and trading goods to use as negotiating tools (Beck 1962:49). Yet when they reached the Rio Grande pueblos in August they were already in dire need of provisions and were glad to find “great fields of maize, wheat, and gourds” and eventually traded trinkets with the Pueblos for maize, bean, gourds, cotton blankets, and tanned cowhides (Escalante and Barrado 1583:155). Again, Spanish explorers in New Mexico encountered difficulties in provisioning themselves and were forced to rely on Puebloan crops to feed themselves.

Throughout the latter half of the 16<sup>th</sup> century, other Spanish ventures into New Mexico occurred, although none successfully settled the area. These expeditions all faced difficulties in provisioning and feeding themselves and relied on Pueblo peoples for food, sometimes trading for victuals, sometimes taking them by force. These activities led to unfriendly relations with the local tribes; they often felt exploited and mistreated by the Spanish explorers and these hostilities sometimes led to open fighting. The precedent established by these expeditions set the tone for Oñate’s expedition, the Spanish venture that finally succeeded in colonizing New Mexico in 1598.

Juan de Oñate was selected as the leader of the official colonizing expedition because of his wealth, connections, and military career. His father, Cristobal de Oñate, founded Guadalajara and was immensely wealthy from the discovery of silver mines. Juan de Oñate was also married to Isabel de Tolosa Cortes-Moctezuma, the granddaughter of conquistador Hernán Cortés and the great-granddaughter of Moctezuma, the last Aztec emperor. His relatives, the Zaldívars, were prominent wealthy miners, and two of them accompanied

Oñate on his expedition as lieutenants. These influential connections in addition to a twenty-year military career helped Oñate become the leader of the expedition.

To legally secure the governorship of New Mexico and lead an expedition, Oñate first signed a contract in 1595 with the Viceroy of Mexico (Hammond and Rey 1953:7-10). In this contract Oñate included *not only* what he aimed to personally acquire, such as land rights and titles, but also what supplies, such as livestock, medicine, and tools, he would provide for the expedition at his own expense. If he upheld his part of the bargain, Oñate would receive the title of governor, a 6,000-peso salary, tax exemptions, the right to give the title of *Hidalgo* to five generations of his descendants, the right to land grants and the use of native labor, and the right to appoint titles (Oñate 1595). The contract was originally approved, but in September 1596, Oñate was ordered to halt his preparations while his papers and contract were reviewed by a new Viceroy.

To ensure that Oñate upheld his part of the contract, the new Viceroy ordered that all the men and supplies Oñate gathered be inspected. Don Lope de Ulloa y Lemos conducted this inspection from December 1596 to January 1597 (Hammond and Rey 1953:12). That summer, Oñate was permitted to carry on with his preparations, with the stipulation that another inspection be conducted before he departed, due to the lapse in time since Ulloa's inspection (DeMarco and Craddock 2015:1). This second inspection was conducted by Juan de Frias Salazar from December 22, 1597 to January 8, 1598, after which Oñate's expedition departed for New Mexico (Hammond and Rey 1953:14; Wroth 2017). Each inspection generated an inventory report tallying the soldiers, goods, and livestock furnished for the overall mission, some provided by Oñate and some owned by individual soldiers.

These records provide some of the only remaining information about Spanish colonists' foodways and European animals in New Mexico since most documents were destroyed in the Pueblo Revolt of 1680. Because this project's goal is to understand the meat portion of the 17<sup>th</sup>-century New Mexican diet, Table 1 tallies all the livestock listed in the inventories. Most goods in the inventories were listed numerically, but some items were listed non-numerically such as "some horses" or "a few oxen." In these cases, they were counted as two because the adjectives are plural, but this prevented overestimation. Because of the colloquial nature of the supply lists' terminology, animals were grouped into broader categories. For instance, cattle were referred to as cows, calves, cattle, oxen, and steer in the documents. The animals the colonists brought were assigned to the following categories: cattle (cows, calves, oxen, steer), horses (horses, colts, mares), other equids (donkeys, asses, mules, jackasses), caprinae (sheep, goats, rams), hogs (hogs, sows), and unspecified animals.

If the Salazar Inspection list is accurate, Oñate's expedition brought 2,098 head of cattle, 1,547 horses, 118 other equids, 4,376 caprinae, 55 hogs, and 202 unspecified animals, for a total of 8,396 head of livestock (Salazar 1598). These numbers are interesting because the Oñate expedition is consistently cited as having brought 7,000 head of livestock (Beck 1962:53; Roberts and Roberts 1986:85; Barrett 2012), but the totals from the historical documents are higher. Chickens and other small animals, such as dogs, are not included in the inspection lists, so the total number of animals brought by Oñate and his colonists must have been even greater.

<b>Table 1: Animals Listed in the Oñate Contract and Three Expedition Inspections</b>				
	<b>Oñate Contract<sup>1</sup></b>	<b>Ulloa Inspection<sup>2</sup></b>	<b>Salazar Inspection<sup>3</sup></b>	<b>Gordejuela Inspection<sup>4</sup></b>
Cattle (Cows, Calves, Oxen, Steers)	1100	1994	2098	402
Horses (Horses, Colts, Mares)	325	377	1547	353
Other Equids (Donkeys/Asses, Mules/Jackasses)	25	30	118	18
Caprinae (Sheep, Goats, Rams)	5000	5451	4376	
Hogs (Hogs, Sows)			55	
Hens				
Unspecified Animals			202	
Total	6,450	7,852	8,396	773
<ol style="list-style-type: none"> <li>1. Oñate, Don Juan de (1595) Contract of Don Juan de Oñate for the Discovery and Conquest of New Mexico. In <i>Juan de Oñate: Colonizer of New Mexico, 1595-1628</i>, George P. Hammond and Agapito Rey, translators, pp 42-57. University of New Mexico Press, Albuquerque.</li> <li>2. Ulloa, Lope de (1597) The Ulloa Inspection. In <i>Juan de Oñate: Colonizer of New Mexico, 1595-1628</i>, George P. Hammond and Agapito Rey, translators, pp 94-168. University of New Mexico Press, Albuquerque.</li> <li>3. Salazar, Juan de Frias (1598) Inspection made by Juan de Frias Salazar of the Expedition. In <i>Juan de Oñate: Colonizer of New Mexico, 1595-1628</i>, George P. Hammond and Agapito Rey, translators, pp 199-308. University of New Mexico Press, Albuquerque.</li> <li>4. Gordejuela, Juan de, and Juan de Sotelo (1600) Inspection Made by Don Juan de Gordejuela and Juan de Sotelo by Order of Don Gaspar de Zuñiga y Acevedo, Count of Monterrey, Governor and Captain General of New Spain, August 1600. In <i>Juan de Oñate: Colonizer of New Mexico, 1595-1628</i>, George P. Hammond and Agapito Rey, translators, pp 514-579. University of New Mexico Press, Albuquerque.</li> </ol>				

In addition to livestock, the inspection records list an enormous amount of goods that relate to animals and goods made from animal products. Most of the goods brought for animals were horse-related. The Oñate expedition alone brought 161 bridles, 71 complete and 46 incomplete sets of horse armor, 5,424 horseshoes, and 213 saddles of several types (Salazar 1598). The emphasis on horses came not only from their usefulness on a long-distance expedition but also from Spain's equine culture. In medieval Spain, horses were

plentiful and cheap, making them a possession of the masses, not an exclusive item of the nobility as was elsewhere in Europe (Crosby 2003:79). Once New Mexico was colonized, horses were important in war, travel, cattle ranching, and the exchange of information (Crosby 2003:80). The remainder of the goods brought related to animals were mostly farm-related, and include forty-two plowshares and thirty goad sticks for cowboys.

In addition to the goods related to animals, the expedition brought a plethora of goods made from animal products, such as leather or wool. Most of these goods were clothing related, but secondary animal products were also used to make bags, finger rings, and tents. Leather shoes were an important secondary-animal product and must have had a high intrinsic value because Oñate brought 949 pairs of shoes and boots to New Mexico (Salazar 1598; Gordejuela and Sotelo 1600). The demand for secondary animal products, such as these shoes, must have been high, and likely affected the ways New Mexican colonists viewed and processed animals once their initial stock began to dwindle. The production of secondary animal products, such as hides, wool, and tallow, also impacts the zooarchaeological interpretation of foodways since animal herds could have been used for food, goods, or a combination of both.

After the Salazar Inspection, Oñate set out for New Mexico on May 4, 1598. During the first leg of the journey, he made a formal declaration of Spanish possession of the “lands, Pueblos, Cities, and villas, solid and plane houses that are now found in the said Kingdoms of New Mexico, and those that are neighbors...with the mountains, rivers, river banks, waters, pastures, meadows, dales, passes, and all its native Indians as are included and comprised in them” (Oñate 1598). His proclamation demonstrates that he intended not only

to take control of the land, but also to extract natural resources and labor from New Mexico. This perspective on resources was different from his predecessors, who had all penetrated New Mexico looking for gold, mineral wealth, or souls to convert.

The colonizing party moved slowly because of its baggage and because the livestock needed to stop and graze, so Oñate went ahead with a group of thirty soldiers. By late May they encountered their first Puebloan village along the Rio Grande, and placed it under the dominion of Christianity and of Spain. In July 1598, Oñate established his colony's headquarters at San Juan, and within two weeks laid the foundation for a church (Roberts and Roberts 1986:86). Within six months, they moved to the west side of the Rio Grande and established San Gabriel, the second Spanish settlement in New Mexico. While awaiting the slow-moving caravan, Oñate and some of his men explored the surrounding land, traveling eastward towards the present-day Texas border in search of bison, and as far westward as the San Francisco Mountains in Arizona (Office of the State Historian 2005). Oñate also visited Acoma Pueblo and the Hopi and Zuni villages. As they traveled, they continued to tell indigenous groups they were under the rule of Spain and, like previous Spanish expeditions, demanded supplies and food from the natives.

The barrenness of the landscape proved to be more of a challenge than expected for the colonists. Before the main body of the expedition even reached San Gabriel, the settlers exhausted their wheat supply and had begun to live off their livestock (Barrett 2012). Then when colonists failed to find precious metals or gems, they refused to shift to farming or herding and continued to search for riches. Many colonists had come for a quick source of wealth, not the long-term task of establishing a colony in rough terrain, and their lack of

interest in agriculture started to cause a shortage of food (Beck 1962:54; Roberts and Roberts 1986:87; Office of the State Historian 2005). Because of these difficulties, the colony was plagued by desertion and dissent. Besides food, one of the main causes of disagreement among the colonists was how to treat the indigenous population. The clergy had come to Christianize them, and therefore wanted to limit taking Indian food and labor. Colonists, on the other hand, were ready to exploit the local populations for food, labor, and goods to prevent losing their own investments in the expedition (Beck 1962:55). As had occurred with Spanish expeditions before, the relations with the Pueblos soon turned sour; the Acoma Pueblos were the first to resist.

In December 1598, Oñate's nephew, Captain Zaldívar, stopped at Acoma en route to Zuni and demanded provisions. The Acoma blamed one of Zaldívar's soldiers for violating a woman and accused the whole party of taking far too much food. The Acoma attacked, killing thirteen soldiers and inviting the wrath of Oñate. Oñate retaliated for three days, at the end of which several hundred Acoma were dead and several hundred more were taken prisoner. In addition, Oñate mandated that men over twenty-five have one foot cut off, men between ages twelve and twenty-five and women over twelve be forced into twenty years of slavery, and sixty girls were sent to Mexico City to serve in convents, never to see their homeland again (Office of the State Historian 2005; Trigg 2005:60). Despite the Spaniards' ferocity, a number of small rebellions challenged Spanish dominion throughout the 17<sup>th</sup> century, culminating the Pueblo Revolt of 1680, which succeeded in ousting the colonists from New Mexico for twelve years.

On March 2, 1599, Oñate wrote to the Viceroy of New Spain, detailing the richness of the land, regions yet to be explored, sources of gold, silver, and pearls, and the potential to convert many more Native Americans. What he really wanted was more supplies and reinforcements to help defend his tiny colony from further attack (Beck 1962:57). His request was granted, and 73 soldiers began preparations to join the colony. Before they left for New Mexico, however, they were inspected by Don Juan de Gordejuela and Juan de Sotelo in August of 1600. The reinforcements brought much-needed supplies, as the colonists had not yet begun to produce enough food to support themselves (Roberts and Roberts 1986:89). The livestock inventoried by Gordejuela and Sotelo are also listed in Table 1.

Oñate's reinforcements brought 402 head of cattle, 353 horses, and 18 other equids, totaling 773 head of livestock (Gordejuela and Sotelo 1600). Between this group and Oñate's party, the colonists brought 9,169 head of livestock, made up of 2,500 head of cattle, 1,900 horses, 136 other equids, 4,376 caprinae, 55 hogs, and 202 unspecified animals. The data show an initial emphasis on sheep, goats, and cattle for food, with very few hogs; horses were brought in considerable number for use as military mounts, a means of travel, and as draft animals, as it was taboo in Spanish society to consume horse meat (Gifford-Gonzalez and Sunseri 2007:271). The animals that are listed indicate a strong preference for animals that graze in herds and for domesticated European livestock.

The resources brought by the new soldiers enabled Oñate to undertake new explorations. In 1601, he and some of his men explored eastward as far as present-day Oklahoma and Kansas where they saw bison. They deemed their journey unsuccessful since they did not find gold and when the party returned to New Mexico, they found the colony

mostly deserted. When Oñate was away most of the people and soldiers who lost fortunes in New Mexico decided to leave, along with the clergy, who were having difficulty converting Native Americans to Christianity. Around 100 people remained in the settlement when Oñate returned (Heather Trigg, 2019, pers. comm.). The deserters spread the news of the failing colony and the government in New Spain launched an inquiry into the New Mexico venture.

### **Secular Life in the Royal Colony**

Despite these difficulties, Oñate remained the governor of New Mexico until August 1607. The Crown almost abandoned New Mexico, but word came that the Franciscan friars converted about 7,000 Native Americans, so the king decided not to ignore his new subjects (Liebmann 2015:3). New Mexico then became a royal colony, meaning the government covered its expenses and controlled the direction of the settlement, which it decided would be for missionary work, not for finding precious metals (Roberts and Roberts 1986:90; Cordell 1989:18; Lycett 2005:103).

Under the direction of the Crown, New Mexico slowly became more populated with colonists. Their population was small: less than 1,000 in 1600 and approximately 2,900 in 1680 (MacCameron 1994:21). They were drastically outnumbered by the Pueblos, whose population was estimated by different colonists as 60,000 in 1598; 48,700 in 1626; 64,500 in 1630; 15,575 in 1641; 26,650 in 1660; and 17,000 in 1678 (Barrett 2002:140; Trigg 2005:43). Though the colonists are referred to as culturally “Spanish,” they were not a homogenous group. In the beginning they were mostly Spaniards but there were a handful of French, Flemish, and Portuguese settlers. Because of this, there was no uniform “Spanish” culture to be implemented upon the Pueblo peoples (Snow 1992:188; Kessell 1997:48). By

1680, 80-90% of the “colonists” were born in New Mexico, and most of them had “mixed blood,” as descendants of Spaniards, Mexican Indians, Pueblos, and other groups (Scholes 1935:97). Seventeenth-century Spanish society was based on the *casta* system, which measured one’s “blood-purity” and connected social status, yet in New Mexico the importance of the *casta* system seems to have been diminished. Because New Mexico was an isolated frontier, had limited resources, and a small European population, *casta* identity was more flexible than it would have been in Spain (Scholes 1935:97; Trigg 2005:212). This does not mean that status, class, and race did not matter in New Mexico, but that social structures were more flexible; status was still important but less tied to one’s appearance and family background and more to social standing and class markers.

During the seventeenth century, not only did the demographics change, but so did the face of the New Mexican landscape. A small Spanish population congregated around Santa Fe, with two thirds of the colonists radiating out to establish small farms, or *ranchos*, and larger ranches, or *estancias*. Colonists inhabiting the rural areas occupied about 464,000 acres of irrigable lands and had access to over 4 million acres of grazing land for their herds (Snow 1979:47). In addition to seeking out the best agricultural land, most colonists lived near pueblos, so they could extract labor and tribute goods (Trigg 2005:72). Interactions between the colonists and indigenous groups gravitated around systems of labor and tribute.

The most common relationship between the Pueblos and the Spanish colonists was based around labor. Pueblos and other indigenous people were conscripted to work for the colonists on their farms or in workshops either as live-in servants or through the *encomienda* and *repartimiento* systems. Under the *encomienda* system, Spanish soldiers were given

Indians to oversee in exchange for tribute items, such as maize or hides; an *encomienda* grant could last for several generations (Spielmann et al 2006:103; Barrett 2012). Tribute was collected once or twice a year and provided an income larger than an *encomendero's* own household production (Trigg 2005:65). The *repartimiento* system allowed Spaniards to force Indians to work for them; the colonists were supposed to compensate them for their work, but typically paid little to nothing (Roberts and Roberts 1986:99; Spielmann 1989:106). This system was easily abused as the Spanish forced them to work for too much time, which prevented Pueblos from working their own land and in turn affected their ability to produce goods for tribute. Even elected officials abused this system, forcing Pueblos to give more tribute than required, produce goods in “sweatshops,” and build missions, the governor’s palace and other official buildings in Santa Fe (Roberts and Roberts 1986:100; Cordell 1989:27; Spielmann 1989:106). Because the labor of the Pueblo peoples was so essential for supporting the colony, the church, government, and individual colonial households often competed for their labor, creating additional demands (Lycett 2005: 99; Liebmann 2015:5). Though these relations were exploitative, the fact that indigenous people and settlers worked closely together caused an exchange of knowledge, goods, and customs.

Some of the customs exchanged between the groups centered on food. Each group came to the interactions with a knowledge of its own culture’s foodways. The Pueblos’ traditional foodways were based on maize and locally available game, whereas the colonists’ foodways were based on wheat, influences from European, African, and Arabian cuisines, meat from domesticated animals, and foods they had adopted in New Spain. For the colonists, food also became a symbol of identity and superiority. Spaniards in the Americas

believed maintaining control over indigenous groups was based on upholding a sense of Spanish identity, and therefore superiority. Since the *casta* system was not rigid in New Mexico, however, colonists had to turn to status symbols to display their identities. One of the ways in which they did this was to consume European foods rather than locally available food. For instance, European wheat came to represent the upper classes, and American foods, especially maize, came to signify indigeneity and lower classes (Snow 1990:289; Crosby 2003:107; Trigg 2004:240). Although it seems extreme, some colonists paid as much as four times the cost of meat for wheat bread in New Mexico (Trigg 2005:128), because they saw wheat as essential to their diet and identity.

New Mexican colonists also valued their domesticated animals, rather than consume locally available game. As we know from the inspection lists, they brought horses, cattle, mules, donkeys, sheep, goats, and pigs. Of these, sheep, goats, cattle, and pigs were considered edible, while horses and mules were draft animals. For several reasons, sheep became the most ubiquitous livestock in New Mexico, though cattle dominated most other areas of the Spanish Empire. One reason is that New Mexico's dry climate and high altitude are more suited to sheep than cattle. Sheep were also valued because mutton was common in traditional Spanish meals, their wool was used for cloth, and their skins used specifically to hold mercury, which was essential to silver mining. Cattle were less important in New Mexico because of the presence of bison on the nearby Great Plains. Bison meat, hides, and tallow were so like cow products that the colonists found it more productive to trade for these goods rather than raise enormous cattle herds themselves (MacCameron 1994:22; Crosby 2003:92). Although much later in time, a census from 1827 indicates that New Mexico

possessed 250,000 sheep and goats, 5,000 cattle, 2,150 mules, and 850 horses (MacCameron 1994:22). If these data are at all indicative of animal populations in the 17<sup>th</sup> century, then one can see the relative importance of different domesticated species to the Spanish.

Archaeologically, little research has been performed on the meat portion of the 17<sup>th</sup>-century diet, but the limited work done at rural Spanish *estancias* has shown the colonists preferred domesticated animals. For instance, at LA 591, the Las Majadas site, faunal remains were mostly sheep and goats, with fewer numbers of horses and cattle; at LA 9142, the Signal Site, goats and sheep dominated the assemblage (Trigg 2005:102). Clearly, a preference for European foods was being followed. The consumption of purely European foods was an ideal, however, and New Mexico's foodways were influenced by food availability, the mixing of classes and ethnicities, and attempts to display status.

Some evidence exists to support the adoption of indigenous food traditions by nonindigenous colonists. One example comes from a document listing the foods each friar traveling to New Mexico was provided; among European foods such as bacon and butter are the New World foods corn and chilis (Velasco 1631). The inclusion of foods that were staples in the indigenous diet shows the colonists were willing to accept some non-European foods or had already adopted them many years prior. Another example is the presence of stone *comales* at Spanish sites in New Mexico. By the time the colonists arrived in New Mexico, they had already adopted maize tortillas into their diet, but stone *comales* were used uniquely by the Pueblos to make tortillas, indicating they not only adopted indigenous cuisines, but also Puebloan cooking techniques, or married Pueblo people, or had Pueblo cooks working in their kitchens (Trigg 2005:126). Archaeological evidence of quelite seeds

and goosefoot at two Spanish colonial sites, the Sanchez Site and the La Fonda Hotel, also hint that the colonists were eating locally available native plants, despite the fact they were viewed as “last-resort” foods (Trigg 2005:127). Besides food remains, the presence of many Puebloan ceramics, Pueblo-style mealing bins, subfloor open firepits, maize, and chipped stone tools at Spanish colonial sites confirms the high level of cross-cultural exchange that occurred between the groups (Snow 1992:187). The relations developed through colonial labor systems clearly facilitated the exchange of ideas, goods, and technology between the two cultural groups and therefore influenced the development of 17<sup>th</sup>-century New Mexican foodways.

### **Religious Life in the Royal Colony**

As a counterpart to civil life, religious life in New Mexico was shaped by similar policies of labor and colonization, albeit with different impacts on culture and foodways. As a royal colony, the official goal of New Mexico was to “civilize” the local populations. The Spaniards not only wanted the Native groups to adopt Catholicism, but to adopt *all* aspects of Spanish culture, such as dress, customs, manners, morals, and diet (Lycett 2005:104; Trigg 2005:38). The Spanish thought indigenous groups could be most effectively “civilized” via religion and labor, so developing missions was essential. The Crown even spent an estimated 1.2 million pesos at that time supporting the New Mexican missions and their goals (Beck 1962:61; Scholes 1975:18).

The Franciscan Order established their missions and *conventos* within Pueblo villages; the *conventos* included a church and workshops, in addition to *estancia* households, so the converted Pueblos could live under the friars’ supervision (Lyett 2005:104; Edwards

2015:26). By the first quarter of the 17<sup>th</sup> century, religious *estancias* had been established at almost all pueblo villages and missions (Snow 1979:46). These working households represented an ecclesiastical counterpart to colonists' secular ones. Unlike the colonists' homes, which usually housed extended families and their servants, the only European presence at *convento* households were the friars, who were all adult men that had typically been born outside of New Mexico (Trigg 2005:95). The remainder of the inhabitants at *conventos* were Puebloan converts, typically adults, who were relied upon to produce goods in workshops, tend the missions' herds and fields, and do household chores. The other Pueblos in these settlements resided in the surrounding mission village. The demographics of those occupying *convento* households shaped their labor relations, agricultural production, and foodways.

The Franciscan *convento* households had more access to outside goods and knowledge and a larger workforce than secular households. This meant they had the potential for more specialization (Trigg 2005:108), yet they seemed to operate similarly to secular *estancias*, albeit on a larger scale. One historical document reports that the friars had a large number of native people working for them: "they are now occupied in guarding the cattle and horses and the very large fields of wheat and corn that they plant [for the religious] as well as the vegetable gardens and orchards, and the stables where they keep three or four saddle horses...In these and other similar services, such as porters, men and women cooks, wood-choppers, and millers, more than thirty or forty Indians are constantly employed" (Del Rio de Loza 1639:71). In addition to these activities, spinning and textile production also occurred, as Pueblos made cloth, *mantas* (blankets), hides, and stockings to clothe the friars and for

export (Trigg 2005:110). Additionally, 17<sup>th</sup>-century missions came to be known for their expansive animal holdings, especially their sheep herds, which were all tended by Puebloan workers (Scholes 1935:106; Snow 1992:190; Barrett 2002:143; Trigg 2005:66).

Reports vary, but estimates put the Franciscans' herd size in the thousands. For instance, in 1639 the *cabildo* of Santa Fe said the friars had plenty of horses when some soldiers had none and that they had 1,000-2,000 sheep when most laymen only had a few hundred (Scholes 1935:108; Trigg 2005:109). Another document reports that the *conventos* exported between 1,000 and 3,000 head of livestock to Parral, Mexico in the late 1650s (Trigg 2005:109). Although these may be exaggerations, the statements support the notion that missions could produce much more than colonists' *estancias*, though both produced similar goods. Such large-scale production at *conventos* allowed the Franciscans to trade hides, livestock, textiles, salt, and piñon nuts for profit (Trigg 2005:66). The missions also served as centers of redistribution in times of famine since they generated enough food and resources for the nearby communities by conscripting indigenous labor (Scholes 1935:108; Lycett 2005:106; Edwards 2015:27). Archaeologically, one might expect the mission compounds to represent very strict adherence to Spanish customs and foodways because of the rigid structure of religious life and the friars' supervision, but the extant evidence points to the contrary.

In terms of foodways, the faunal remains at Spanish mission sites are a mixture of domestic and wild species. Faunal remains from excavated *conventos* include deer, bighorn sheep, domestic sheep, goat, bison, pig, horse, antelope, wolf, dog, fox, coyote, rabbit, porcupine, beaver, prairie dog, mouse, fox, large feline, wood rat, ground squirrel, hawk, and

possibly a domestic cat (Toulouse 1949:25; Trigg 2005:80, 147). At *conventos*, the quantity of non-domestic fauna is considerably greater than at secular sites. For instance, at the missions at both Abo and Awatovi the faunal remains were an even mix of European livestock and local game, with 43% of Abo's assemblage being bison and 55% domesticated sheep or goat. The assemblage also included lynx, wood rat, ground squirrel, cottontail, mule deer, western red-tailed hawk, and domestic pig (Toulouse 1949:25). The large amount of wild, local game in *convento* assemblages, despite the abundance and availability of domestic herds, may reflect the native peoples' contributions to the *convento* household's diets (Trigg 2005:119). Because Pueblos outnumbered the friars and provided almost all the *conventos*' labor, they affected the *conventos*' household practices and provisioning, and this can be seen in their faunal assemblages.

### **Impacts on Indigenous Populations**

Despite maintaining some traditional foodways within the confines of mission life, the Pueblos' reality was that the living conditions in the colony were structured to Spanish cultural norms and were not always easy to accept. Pueblos living outside *convetno* households were still subject to Spanish law, religion, customs, and *encomienda*. The result of colonization was that Pueblos faced many hardships, several of which would have impacted 17<sup>th</sup>-century foodways.

The first of these hardships was disease. The European settlers brought smallpox, whooping cough, measles, and other illnesses to which the Native Americans were quite susceptible. A smallpox epidemic broke out in 1638 and two other waves of disease swept through New Mexico in 1640 and 1671 (Trigg 2005:54). In 1640 alone, an estimated 3,000

Pueblos died from smallpox (Roberts and Roberts 1986:101; Barrett 2002:150). A combination of disease, famine, and other circumstances caused approximately a 68% reduction in the Puebloan population in New Mexico from 1629 to 1641 (Barrett 2002:151). Fewer people to work the fields may have reduced Pueblo crop production so much that they did not have enough surplus maize for trade, and may have left many without enough food throughout the year, forcing them to rely on mission handouts, which were likely European foods (Barrett 2002:145).

In addition to not being able to farm their own crops, Pueblos had less time to hunt, meaning they had less access to animal protein. Since they were forced to give most of their crops and goods to the colonists, continuing to trade for bison would have been difficult, so their best solution would have been to eat small, local animals (Spielmann 1989:110). At Gran Quivira Pueblo, for instance, excavations show that small mammals, such as rabbits and woodrats, were more common in 17<sup>th</sup>-century deposits, while bison bone decreased. This shows small mammal hunting supplemented the loss of bison meat and long-distance hunting of large game (Spielmann 1989:110). The Pueblos, clearly, were heavily impacted by the arrival of the Spanish colonists. Being forced to give maize and other goods as tribute, in addition to tending European crops and flocks, also caused an increase of Apache attacks on Pueblos because they were viewed as aiding the colonists and as participating in a Spanish way of life (Barrett 2002:145). Overall, the Pueblos' access to food suffered because the systems set up by the colonists reduced their agricultural production and potential for trade.

The above accounts paint the backdrop for Spanish settlement in New Mexico. One of the common themes throughout early colonial New Mexico's history was difficulties with

provisioning and food. Tensions were constantly high because early expedition parties habitually demanded food from the indigenous groups they encountered. Colonists continually ran out of food and a lack of food was one of the reasons that many of Oñate's settlers abandoned the colony. Food continued to be a point of intersection between colonists and the indigenous groups after Spanish settlement, as Pueblos were forced to give some of their crops as tribute through *encomienda* and to tend European crops and livestock. After colonization, Pueblos and colonists were intricately tied together in an economic system revolving around food and food production. These relations produced complex attitudes surrounding food and diet that were influenced by food availability, the demand by some for European foods as status symbols, regular interactions between colonists and indigenous people at the household level, and the intermingling of castes and ethnicities on the frontier. Excavations at LA 20,000 help illuminate how these tensions played out in reality on a 17<sup>th</sup>-century New Mexican Spanish *estancia*.

## CHAPTER 3

### METHODS AND MATERIALS

#### **The Site: LA 20,000**

The Sanchez Site (LA 20,000), located 25 miles southwest of Santa Fe, was first discovered in 1980, when a backhoe dug a trench through the site's midden, uncovering faunal remains, Puebloan ceramics, charcoal, and imported majolica (Trigg 2017:3). After its discovery it was excavated from 1980-1995 by a series of field schools run by David H. Snow and Dr. Marianne Stoller, and then again from 2015-2017 by Dr. Heather Trigg. Excavations have shown the site to be the most complete, most architecturally complex 17<sup>th</sup>-century Spanish ranch discovered in New Mexico to date (Trigg 2017:3). The site itself is composed of a 10-15 room house, barn, and corral (Snow n.d.; Barrett 2012; Trigg 2017:10). As discovered through excavations, the barn is the most architecturally complex of these buildings. It has stone structures in its interior that have been identified as pillars, and some reconstructions depict the barn as a two-story structure with a fancy façade. The corral is likely connected to the barn, meaning the two would have been built as one large structure (Trigg 2017:10). The site also contains a *horno* (bread oven), a *torreon* (tower), and several smaller structures adjacent to the corral (Snow n.d.; Barrett 2012; Trigg 2017:10). Because of its size, farm architecture, and location on a stream, the site has been labeled as an *estancia*,

which refers to a medium-sized establishment devoted to raising mostly livestock and a few crops that is larger than a subsistence-oriented family farm (Barrett 2012). The owner of said *estancia* is not known, though genealogy research suggests Alonso Varela Jaramillo, brother-in-law of Simón Péres de Bustillo, whose family were prominent colonists in New Mexico (Barrett 2012). The few remaining documents indicate that most colonists' households were comprised of an extended family plus native people who worked and lived there (Trigg 2004:230). As an *estancia*, LA 20,000 itself was likely inhabited by a large colonist family and multiple indigenous temporary laborers and slaves, all of whom were needed to manage the farm's operations.

During the 17<sup>th</sup> century, there was only one inhabited pueblo in the Santa Fe River Valley, and this is likely from where the majority of LA 20,000's temporary laborers came. The pueblo, Cienega Pueblo (Figure 1), was probably created by the Spanish as part of a *reducción*, a process by which the Puebloan population was amassed into fewer settlements for management purposes; *visitas* occurred here from at least 1640-80 (Lycett 2005:105). If so, most of Cienega Pueblo's residents originally came from La Bajada Pueblo (LA 7), which was abandoned early in the 17<sup>th</sup> century (Barrett 2012). The only other contemporary sites close to LA 20,000 were located to the south. One was LA 15, located at the junction of Cienega Creek and Mocho Arroyo, and the other was LA 164, located about 2/3 of a mile south of where the Santa Fe River, Alamo Creek, and Cienega Creek converge (Barrett 2012). Other than these, the closest settlements to the Sanchez Site were Santa Fe and San Marcos Pueblo.

Although LA 20,000 has been excavated for several decades, very little research has been published. What has been published so far was completed by Dr. Trigg and has focused on paleoethnobotany. She determined the residents of LA 20,000 consumed a mixture of European and locally available plants and produce (Trigg 2004:231). One of the goals of this research is to determine if the faunal portion of the diet is as complex as the plant portion.

### **The Collection and Recording Methods**

Faunal materials from LA 20,000 were collected both by Stoller and Snow's and Trigg's excavations. For over a decade, Snow's samples were in storage but were located and returned to UMass Boston in the summer of 2017. The samples seem to come from many locations across the whole of LA 20,000 although much of the provenience and excavation information was lost. In addition to these, Trigg collected samples during the 2015, 2016, and 2017 field seasons. These came from various locations, including a midden, the house, and the corral, and were sieved through a ¼ inch screen. Flotation samples were taken from features for paleoethnobotanical interpretation, and would have recovered faunal material smaller than ¼ inch in the heavy fraction. The heavy fractions were visually scanned for diagnostic fragments or complete bones that would have been missed with a ¼" screen. All samples are stored at UMass Boston's Zooarchaeology Lab, although a bag inventory list from David Snow indicates that some faunal samples from his excavations are missing. In addition to the bag inventory lists, a catalog from 1993-1995 was included with Stoller and Snow's samples. Because the bones listed in the catalog are absent from the current collection, the information from the catalog was analyzed separately. The results are later compared to the existing faunal collection.

The samples from earlier excavations had a plethora of different labeling systems and included various levels of provenience information, so one of the first steps taken was to organize the samples systematically. One of the few consistent pieces of information on each bag was the excavation year, so Snow and Stoller's samples were organized by year and given new catalog numbers in the format: UMB# Year-Bag# (i.e. UMB# 1988-17). A handful of samples did not have an excavation year recorded so their UMB# begins with 0000. A bag inventory connects the bags by UMB# to any provenience information they may have had for cross-reference. All the faunal samples in the collection were analyzed between the Fall of 2017 and Summer of 2018 by the author and checked by Dr. David B. Landon. Each specimen was identified to taxon, element, and side, and was examined for butchery marks, burning, pathologies, and evidence of taphonomic processes according to anatomical and zooarchaeological guidelines outlined by Sisson and Grossman (1953), Olsen (1968,1980), Wheeler and Jones (1989), Hillson (1992, 2005), Fisher (1995), Gilbert, Martin, and Savage (1996), O'Connor (2000), Reitz and Wing (2008), and Beisaw (2013).

The data from this analysis were recorded in data tables organized sequentially by excavation year. Each line in the data tables includes the taxonomic identification, skeletal element, the side of the specimen, the portion of each skeletal element, quantity, weight, modifications, age/degree of fusion, taphonomy, and any additional notes. Notes most often included information about bones that cross-mend or articulate with one another and which specimens were discovered articulated in situ. The other categories had standardized language so recording was consistent across the collection. The standardized options for recording information can be found in Appendix A. All specimens were kept within their

original excavation bags but within these were subdivided into smaller bags based on identification. Each small bag contains a bag tag with the same information logged into the data tables, so that each small bag corresponds to one line in the data table and each large bag contains all its original specimens from excavation.

Within each provenience, specimens were sorted into taxonomic class: Amphibia, Aves, Osteichthyes, Mammalia, or Reptilia and are in the data tables alphabetically. Once allocated into taxonomic classes, each specimen was identified to the most specific level possible, from scientific family down to species, and then its identification was recorded both on the bag tag and in the data tables. Mammals dominated the collection but sometimes could not be more precisely identified, so they were sorted into size categories, providing information on the relative significance of size classes and their preservation in the collection. Size assignment was based on bone density, curvature, and thickness. Small mammals were considered rabbit-sized or smaller, and large mammals were a grown pig or larger. Medium mammals include everything between those ranges, including Cervidae because their gracile skeletons are similar in size to *Ovis/Capra* (Reitz and Wing 2008:204). Some specimens were only identifiable to a class level; these fragments were labeled with their class and then “unidentified,” indicating there was not enough detail for further diagnostic analysis, rather than “unidentifiable” (O’Connor 2000:42). Some samples were so small or ambiguous they were put into a general “Vertebrate” category and could not be analyzed further. This identification system ensured everything in the collection was examined, identified in detail, and recorded in data tables.

## Analytical Methods

After identification, several analytical techniques were utilized to interpret the collection. The short occupation period of LA 20,000 coupled with the incomplete provenience information for about half of the samples, made differentiating spatial or temporal changes difficult, so the whole collection was analyzed as a single unit. Spatial analysis of the faunal collection was simply not in the scope of this study but could be attempted in future research.

The first step in analysis was to quantify the relative frequency of taxa, which can be estimated from the number of identified specimens (NISP), the minimum number of individuals (MNI), and bone weight. Relative frequencies of taxa are used to evaluate the relative importance of animals in a diet obtained through various subsistence strategies (Chapin-Pyritz 2000:92; Reitz and Wing 2008:202). The NISP, sometimes referred to as the total number of fragments (TNF), is simply the total count of specimens in each taxonomic category (O'Connor 2000:54). Although not an entirely accurate representation of the past because it is affected by fragmentation, taphonomic processes, recovery biases, and the number and type of bones in skeletons, NISP calculations are a starting point for investigating the relative frequency of each identified taxa (O'Connor 2000:56; Reitz and Wing 2008:203-20).

The second calculation made was the minimum number of individuals (MNI). MNI is an *estimate* of the *smallest* number of individual animals necessary to account for the skeletal specimens in a collection (O'Connor 2000:60; Reitz and Wing 2008:205); it is like a minimum vessel count in ceramic analyses. The concept of MNI is based upon the fact that

vertebrates are symmetrical and that the appendicular skeleton of each contains one left and one right of each bone. MNI was calculated by taking the most abundant skeletal element for each taxon, dividing them into left and right sides, and then using the greater number as the minimum number of individuals. MNI is influenced not only by the same factors that affect NISP, as well as any subjective choices made by the analyzer. As a *minimum* estimate, MNI represents a good counterpoint to NISP. NISP typically exaggerates the importance of species whose skeletal elements are more easily recovered and identified and diminishes the importance of species represented only by a few bones, whereas MNI can overemphasize the importance of small, rare animals (Reitz and Wing 2008:213).

Bone weight can help evaluate the levels of bone fragmentation, spatial and temporal changes, the estimated size of specimens, and distinctions between primary and secondary refuse (Reitz and Wing 2008:211). Although comparing taxa by weight can overrepresent large animals, weight of the skeleton is a good representation of the weight of the live animal, accounting for differently sized creatures (O'Connor 2000:57). Therefore, weight can be used as a proxy to estimate the amount of meat each taxon contributed to the diet (Reitz and Wing 2008:211). Though the LA 20,000 collection is analyzed separately for the potential meat weight it represents, it is also quantified by its taxa weight as a point of comparison to MNI and NISP.

The overall goal of the research is to understand the past diet, so these different analyses culminate in making estimates of dietary contribution. Because zooarchaeologists only have bones, they are only able to estimate the diet as far as how much meat weight, calories, or vitamins a collection represents, not the nutritional value of past diets nor the

total amount of meat consumed at a site (Reitz and Wing 2008:233). The first step in determining the potential meat weight was to calculate an estimate of the total body weight of the animals in the collection (Reitz and Wing 2008:235). This was found by multiplying the MNI of each taxon by the average weight of an individual for that taxa. Although this only gives the total body weight of the minimum number of animals in the collection, it connects the faunal remains to their dietary significance.

Once the total body mass was calculated, the potential meat weight of the edible parts of animals was calculated. This method is based on known relationships between an animal's total weight, skin weight, visceral weight, skeletal weight, and muscle weight taken from the literature. Published averages helped determine the relationship between an animal's body weight and meat weight, therefore the potential meat weight was calculated using standard percentages: 70% of the body mass for birds and short-legged mammals and 50% for long-legged mammals (Reitz and Wing 2008:237). The potential meat weight of a representative individual is multiplied by the MNI to calculate the estimated meat each taxon generated. Unfortunately, this method calculates the potential meat weight only for animals in the collection and does not account for any meat that may have been transported off the site or those that were never brought there in the first place due to off-site butchery.

The third type of analysis the LA 20,000 collection underwent was for bone modifications and pathologies. The modifications most important to this study were those caused by humans, which included butchery marks, burning, and green breaking. Human modifications were described using the following terms set by Fisher (1995): cut, saw, scrape, chop, shear, flaked, percussion pits, crushed, puncture, burning, polish, human

gnawing, incipient fracture, spiral fracture, and excavation damage. Modifications directly related to humans help differentiate food animals from draft animals and lend clues to the ethnic identity of the butcher, the social class of the consumers, whether the butcher was a specialist, and whether the carcasses were being prepared for trade, consumption, or feasting. The possible non-human, taphonomic modifications included weathering (levels 1-5 as cited in Beisaw 2013:111), abrasion, trampling, carnivore gnawing, rodent gnawing, unspecified gnawing, digestion, root etching, and vascular grooves. Other types of bone modification can inform us about cooking techniques, food disposal, offerings, tools or ornamentation, secondary animal products, and taphonomy (Reitz and Wing 2008:242).

As is customary, butchery marks are displayed on skeletal diagrams to summarize their location and orientation. These images can help determine if the butchery represents a pattern of primary or secondary butchery, or both. For instance, saw and chop marks are more often associated with primary butchery and the initial disarticulation of the carcass, whereas cut marks are associated with secondary butchery, as the meat is removed from the bone for consumption; scrape marks can be associated with secondary animal products, such as skinning the animal for its hide (Reitz and Wing 2008:243). Bone modifications can also refer to pathologies and animal health, which are related to how animals were utilized as well as humans' attitudes towards them. For instance, evidence can be found within the skeleton of physical stresses caused by such things as stalling, penning, traction, weight-bearing, and crowding (Reitz and Wing 2008:243). Because pathologies are so varied, no standardized terminology was created to describe them in the collection. When bones with pathological symptoms were analyzed, their condition was described in the "Notes" section.

The final analysis undertaken on the collection was for kill-off patterns and age profiles. Essentially, this means determining how old the specimens were at death and looking for patterns to see if any animal husbandry practices, such as culling, selective seasonal slaughter, or the slaughter of old animals for by-products, were followed. Age at death can also illuminate if the animals were raised and consumed on site, raised for consumption elsewhere, or imported, and whether animals were killed for meat or were used for secondary-animal products, such as wool or milk (Reitz and Wing 2008:192). Ageing animals from their skeletons can be subjective because growth is affected by factors such as nutrition or environment, but standardized fusion sequences of bones' epiphyseal plates are often used to determine relative age at death. The levels of fusion were noted as the samples were analyzed. These were then divided into early-, middle-, and late-fusing bones and the levels of ossification were tallied for each domestic species, following Chaplin (Reitz and Wing 2008:194). Early fusing bones include the distal scapula, distal humerus, proximal radius, acetabulum/pelvis, proximal metapodial, and proximal phalanx. Middle-fusing bones include the distal tibia and distal metapodial, and late-fusing bones include the proximal humerus, distal radius, proximal and distal ulna, proximal and distal femur, proximal tibia, and vertebral body. Unfused specimens in the early category were assumed to represent juveniles, while unfused specimens in the middle and late categories are assumed to represent subadults; fused specimens in the late fusing category represent adults. This methodology works since the order of bone fusion is consistent among mammals, so domestic species can be compared relatively using the same scale of fusion (O'Connor 2000:92). The exact age of animals at death could not be calculated with this method.

In addition to bone fusion, tooth development and attrition rates were used to estimate animals' ages at death. Tooth development varies in each individual and across populations due to nutrition, disease, environment, and stress. Tooth attrition, which occurs as specimens age, is also not a consistent factor by which to measure age because diet, behavior, and an individual's anatomical differences cause teeth to wear at different rates. These factors make it difficult to pinpoint an individual's age with their tooth development, as individuals of the same age may have dissimilar stages of tooth growth or wear. For archaeologists, therefore, using a modern reference group to determine chronological ages for specimens in the past can be difficult (Hillson 2005:211). However, because the specimens in an archaeological collection are presumed to have come from animals that experienced similar diets, stressors, and environments, their growth and wear rates can be compared relatively to one another.

To compare growth and attrition, several charts have been published for domestic species that allow archaeological specimens to be compared to a single, standardized scale. One of the most common methods is the Grant Dental Attrition Age Estimation Method, which was first published by Grant in 1982. The author used updated charts available in Hillson (2005), which provide the wear charts for cattle, sheep/goats, and pigs. With this method, each tooth was compared against the chart and assigned a score, called a tooth wear stage (TWS), which range from 1-20 (Hillson 2005:327). Because all the teeth were compared against the same scale, their relative ages could be compared, although their chronological ages could not be calculated from this information alone.

If a specimen contained multiple teeth as part of a tooth row, its chronological age *could* be estimated. This method, developed by Payne (1987), was used on sheep/goat

mandibles. Because this technique compares the teeth on a tooth row to an age scale, it does require that the specimen have several premolars and molars intact. Full tooth rows were aged using the Payne scale, and then partial tooth rows were compared to the aged ones to estimate the age at death for all tooth row specimens. The ages of the animals can be used to understand animal husbandry practices, which provide insight on how domestic species were utilized.

The above analytical methods were all selected to interpret the collection for information about diet and butchery practices. Since these are not the only possible analytical techniques that can be applied in zooarchaeological analyses, the collection was identified and organized in a way to make it useful for future researchers. The results summarizing taxonomic frequency, potential meat weight, bone modifications, and age profiles are presented in the following chapter.

## CHAPTER 4

### RESULTS

This chapter outlines the results of the aforementioned analytical methods, focusing on taxonomic frequency, potential meat weight, bone modifications, and kill-off patterns. A general summary of the collection can be found in Table 2; a summary of the full collection can be found in Appendix B. The collection from LA 20,000 was made up of a total of 8,832 specimens, weighing 13.36kg. The specimens were identified to the most specific taxonomic identification, and these fell into 43 different identification groups overall, representing 27 different taxa. Of these, 3.4% by count could not be identified further than an indeterminate vertebrate category, due to fragmentation or burning that made them indistinguishable.

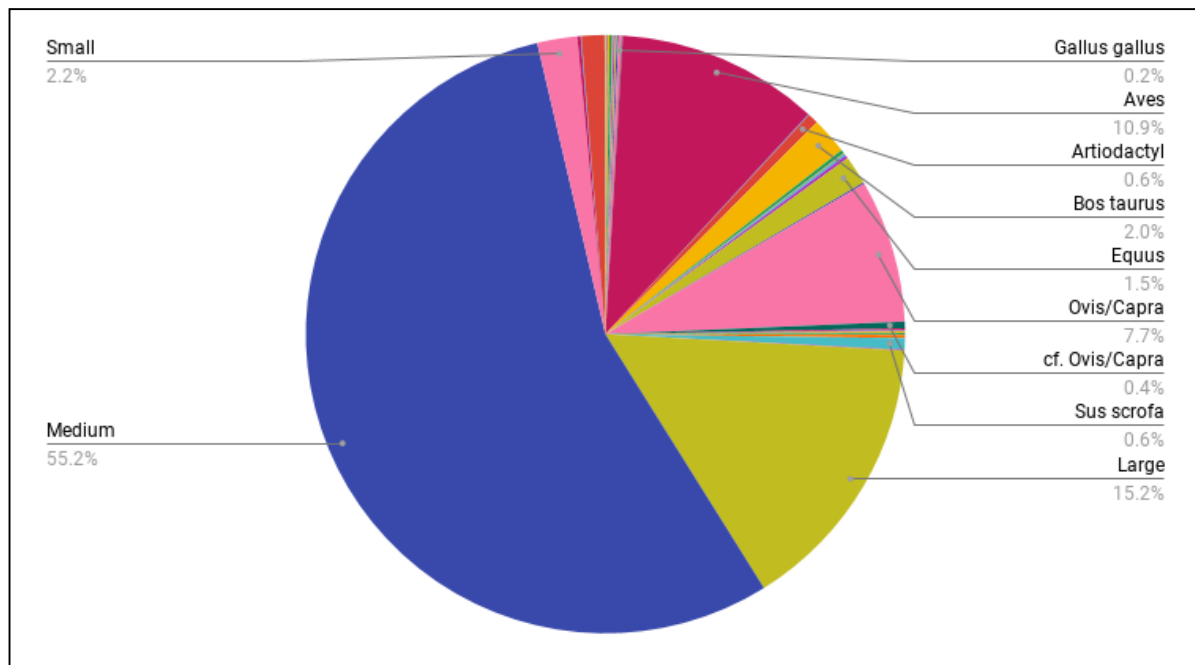
<b>Table 2: Summary of the LA 20,000 Faunal Collection</b>				
<b>Taxonomic ID</b>	<b>Common Name</b>	<b>Count</b>	<b>Weight (g)</b>	<b>MNI</b>
Anura	Frog	2	<0.1	1
Bufonidae	Toad	1	0.2	1
Ranidae	True Frog	2	<0.1	1
Amphibia/Reptilia		3	<0.1	
Anatidae	Duck/Goose/Swan	1	0.2	1
cf. Anatidae	Duck/Goose/Swan	1	2.1	
Anserinae	Duck/Goose	2	2.1	1
cf. Phasianidae	Ground-living Birds	2	1.2	1

Galliformes	Ground-living Birds	2	1.9	2
<i>Gallus gallus</i>	Chicken	4	4.7	1
cf. <i>Gallus gallus</i>	Chicken	1	0.5	
Aves	Birds	248	22.7	2
Gastropod	Snail	1	<0.1	
Artiodactyl	Even-toed Mammals	13	35	1
<i>Bos taurus</i>	Cow	45	918.9	2
cf. <i>Bos taurus</i>	Cow	4	35.2	
Cervidae	Deer	1	19.1	1
cf. Cervidae	Deer	3	36.8	
<i>Equus caballus</i>	Horse	5	808.2	1
<i>Equus</i> sp.	Horse/Donkey/Mule	34	553.4	1
Leporidae sp.	Rabbit/Hare	2	<0.1	1
<i>Ovis/Capra</i>	Sheep/Goat	175	1213.5	6
cf. <i>Ovis/Capra</i>	Sheep/Goat	8	70.3	
cf. <i>Ovis aries</i>	Sheep	2	37.9	
<i>Procyonidae</i> sp.	Raccoon	1	0.5	1
cf. <i>Procyonidae</i>	Raccoon	1	0.9	
Rodentia	Rodent	2	0.3	1
<i>Sciuridae</i> sp.	Squirrel	2	0.6	
Suidae	Pig	4	19.4	
<i>Sus scrofa</i>	Domestic Pig	14	111.6	2
cf. <i>Sylvilagus</i>	Cottontail Rabbit	1	1.1	1
Large Mammalia		346	3363.9	
Medium Mammalia		1253	2450.6	
Small Mammalia		49	19.2	
Mammalia, unid.		6264	3581.5	
Cypriniforms	Ray-Finned Fish	4	0.6	1
Perciforms	Ray-Finned Fish	1	0.6	1
Osteichthyes	Fish	28	0.8	
Lacertilia	Lizard	1	<0.1	1
Vertebrate		298	36.7	
Fossil		1	20.2	
		<b>8832</b>	<b>13372.4</b>	

## Taxonomic Frequency

### Number of Identified Specimens (NISP)

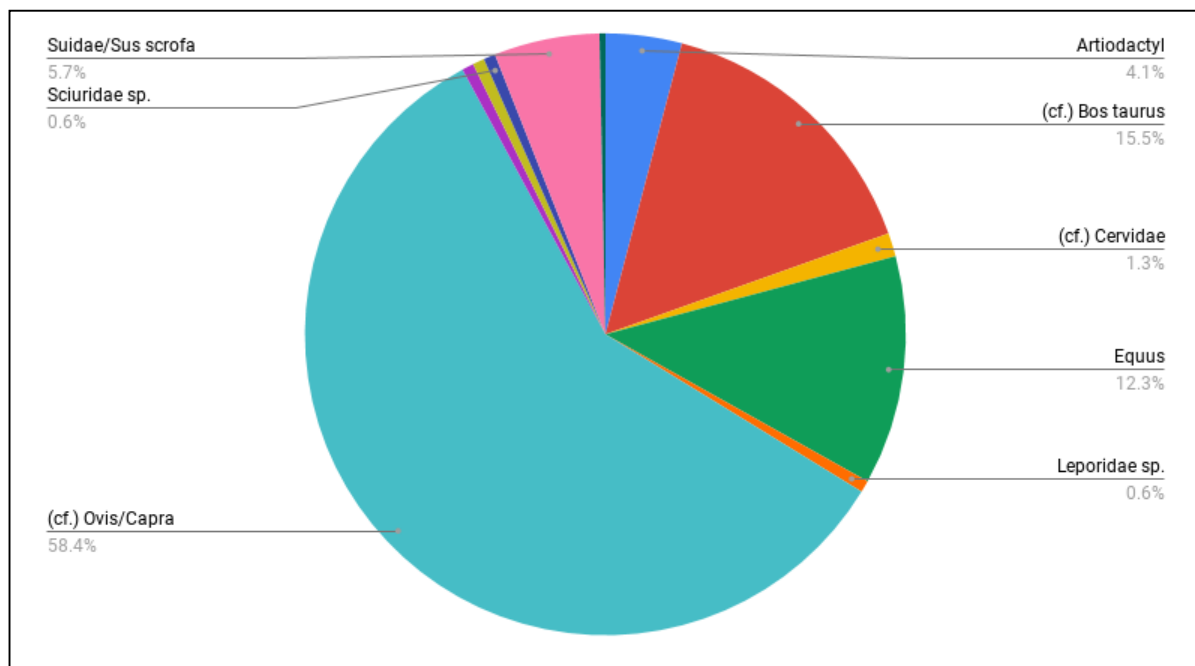
NISP is the most basic way of looking at the collection, as each bone fragment is considered a single specimen, so all the taxa are quantified by count. By NISP, mammals dominated the collection, making up 96.4% of the collection, followed by Aves at 3.1%, Osteichthyes 0.4% and Amphibia/Reptilia 0.1%.



**Figure 2: LA 20,000 Taxa Identified by NISP (N=2,269)**

When the collection is examined by the most specific scientific classification of each sample, more diversity can be seen (Figure 2). In the mammalian category, there were 6,263 specimens that were not able to be identified more specifically than class. By NISP, these made up 70.9% of the whole collection and 76.1% of all identified mammal specimens. For clarity, they were not included in Figure 2. After removal of these unidentified fragments, the collection shows a dominance of medium-sized mammals. The medium-sized mammals

include not only the indeterminate “Mammalia-medium” classification, but also *Ovis/Capra*, Cervidae, and *Sus scrofa*, all of which together make up 16.5% of the whole collection by NISP and 64.3% when the unidentifiable mammal and vertebrate fragments are excluded. Large mammals, which include “Mammalia-large,” *Bos taurus*, and equids, are second-most common and make up 4.9% of the collection or 19.1% when unidentifiable mammal and vertebrate fragments are excluded. The remaining 4.3% of the collection is comprised of small mammals, fish, reptiles, birds, and amphibians.



**Figure 3: Mammalian Taxonomic Identification by NISP (N=317)**

When the mammalian samples are examined separately and only include specimens identified to a sub-class level, a preference for *Ovis/Capra* emerges (Figure 3). Although only 317 Mammalia bone specimens were identified to a sub-order level, *Ovis/Capra* makes up 58.4% of them, with a total of 185 specimens. This is followed by *Bos taurus*, at 15.5%, which is closely followed by equids at 12.3%. All are European domesticates. Suidae make

up the fourth most popular mammalian taxa, at 5.7% of the mammals. In this category, 14 specimens were successfully identified as domesticated *Sus scrofa*, while only four were identified more loosely as Suidae; Suidae could include native, wild pigs, yet no other wild pigs were identified in the collection, so the author assumed these were likely domesticated swine. If so, European domesticates make up 91.1% of these identified mammals by NISP, clearly dominating the assemblage.

In the mammalian category, very few local species were identified, which all together make up 1.3% of the identified mammals and less than 1% of the collection by NISP. These include one Cervid and three cf. Cervidae bones, representing the only big-game-sized native animal, one single *Leporidae* specimen was found as was one *Sylvilagus* specimen, which were both traditionally part of the Puebloan diet as small game mammals. The remaining mammals identified in the collection included two cf. *Procyonidae* bones, two Rodentia bones, and two *Sciuridae* sp. These small mammals would have been available as food as part of garden-hunting strategies; whether these were considered typical food sources by European or American cultures at this time is unclear, and they likely entered the collection not as the result of being foodstuffs, but as commensal animals.

In addition to mammals, the collection also contained birds, amphibians, and reptiles. Though Aves make up 3.1% of the whole collection by NISP, this is because 146 avian eggshell fragments were included in the calculations. If these are disregarded, only 115 specimens can be attributed to Aves and they make up a mere 1.3% of the collection. Within the category, 102 specimens could not be identified further than the class Aves, and the remaining bones included 2 (cf.) Anatidae, 2 Anserinae, 2 cf. Phasianidae, 3 Galliformes, and

4 *Gallus gallus* specimens. Since most of these are identified to a family or order level, they are not specific enough to know if they represent Old World or New World species; *Gallus gallus*, the domesticated chicken, is the only taxon known to be an Old World species.

Documentary evidence also supports the presence of chickens in New Mexico because they were included in supply lists of items given to friars traveling to New Mexico (Scholes 1930). The other identified bird specimens come from taxa commonly consumed as game, and include turkeys, geese, and ducks. A 16<sup>th</sup>-century Spanish cookbook mentions consuming a variety of fowl, including chickens, ducks, geese, wild doves, and woodpigeons, so consuming poultry is very much in line with historic Spanish cuisine (De Nola 1529). Turkeys were kept by Pueblos, although whether they kept for food or for their feathers is debated (Trigg 2005:46). Therefore, the consumption of birds might reflect either European or American food traditions.

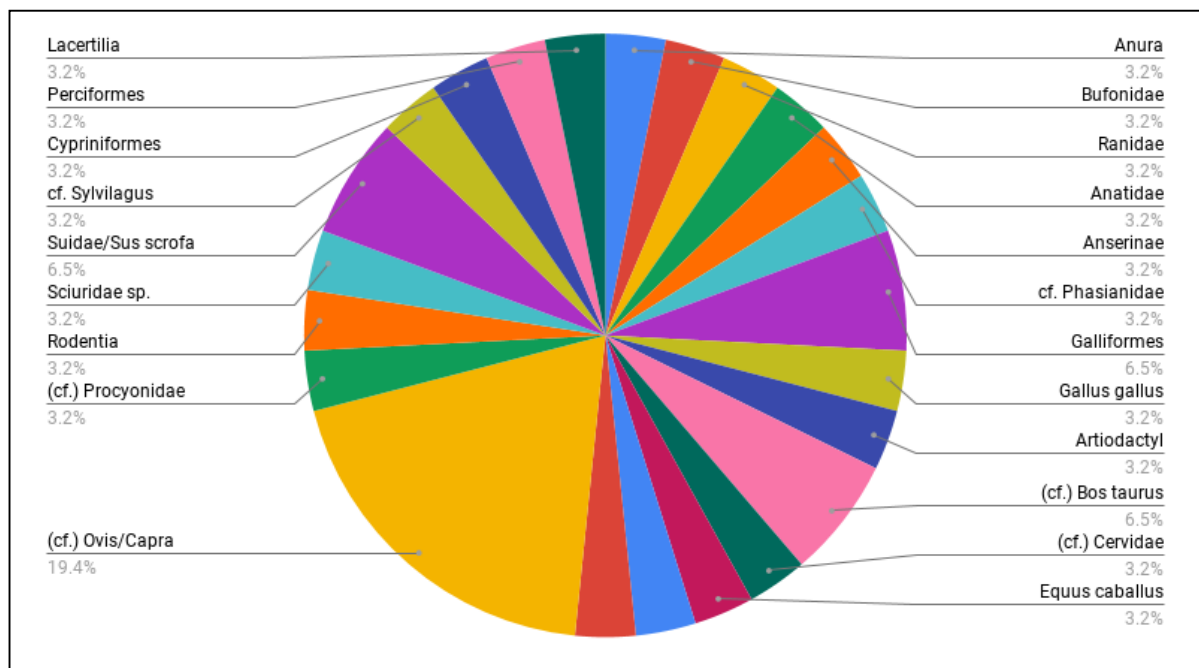
Fish, amphibian, and reptile specimens number very few. While fish bones likely represent the remains of food, the amphibian and reptilian specimens are probably the remains of small, local species that became mixed with the assemblage. New Mexico currently has 123 species of amphibians and reptiles and they are quite common on the landscape (Degenhardt, Painter, and Price 2005). Therefore, the presence of several specimens of frogs, toads, and lizards in the collection is likely from contamination, though they do support the identification of the landscape around LA 20,000 as wet or marshy. The fish species, on the other hand, had to have arrived on the site through anthropogenic action. The few fish in the collection include 4 Cypriniforms, 1 Perciforms, and 28 general Osteichthyes. Cypriniforms are ray-finned fishes, of which New Mexico contains many

species, including *Cyprinella lutrensis*, *Dionda episcopa*, *Pimephales promelas*, and *Catostomus commersonii*, among others. Perciforms is a superorder of ray-finned fish containing over 10,000 species, several of which also inhabit New Mexico, including *Percina macrolepida*, *Micropterus salmoides*, and, *Lepomis megalotis* (New Mexico Department of Game and Fish 2015). Though only 33 fish specimens were recovered, their presence indicates inhabitants of the site were consuming local, freshwater fish species. LA 20,000 is situated on an arroyo that used to be a running stream, so the fish may have been acquired from here or from nearby Cienega Creek.

### **Minimum Number of Individuals (MNI)**

Because MNI calculations aim to identify the minimum number of individuals in a taxon, MNI calculations were only made for specimens identified to a degree more specific than taxonomic order. This is because specimens in size classifications, such as “Mammalia-large,” likely came from individuals of several species and could skew the data. In this case, MNI was only calculated for a total of 24 taxonomic groups, and these findings are presented in Figure 4. In total the MNI for the collection was 33, with *up to* an additional two large mammals, four medium mammals, and one small mammal. The most common taxon is *Ovis/Capra*, with an MNI of six, followed by a three-way tie for second place between *Galliformes*, *Bos taurus*, and *Suidae/Sus scrofa*, each of which had an MNI of two. Although the MNI calculations tend to underestimate the number of animals that lived at a site, the dominance of *Ovis/Capra* again indicates that sheep/goats were quite prominent at LA 20,000. *Bos taurus*, *Suidae/Sus scrofa*, and *Galliformes* all had an MNI of two, and yet, based upon NISP calculations and historical documents, these taxa are unlikely to have had

equal levels of dietary or economic importance at LA 20,000. *Equus caballus* and other equids were diminished in importance since each had an MNI of one, and yet these taxa ranked higher by NISP and, if combined, they would have also tied for second place. Regardless, the fact that the assemblage's most common taxa by MNI was *Ovis/Capra*, a European domesticate, as are two of the three taxa in second place, confirms that the collection from LA 20,000 is consistently dominated by European domesticates while locally available species make up very little of the assemblage.



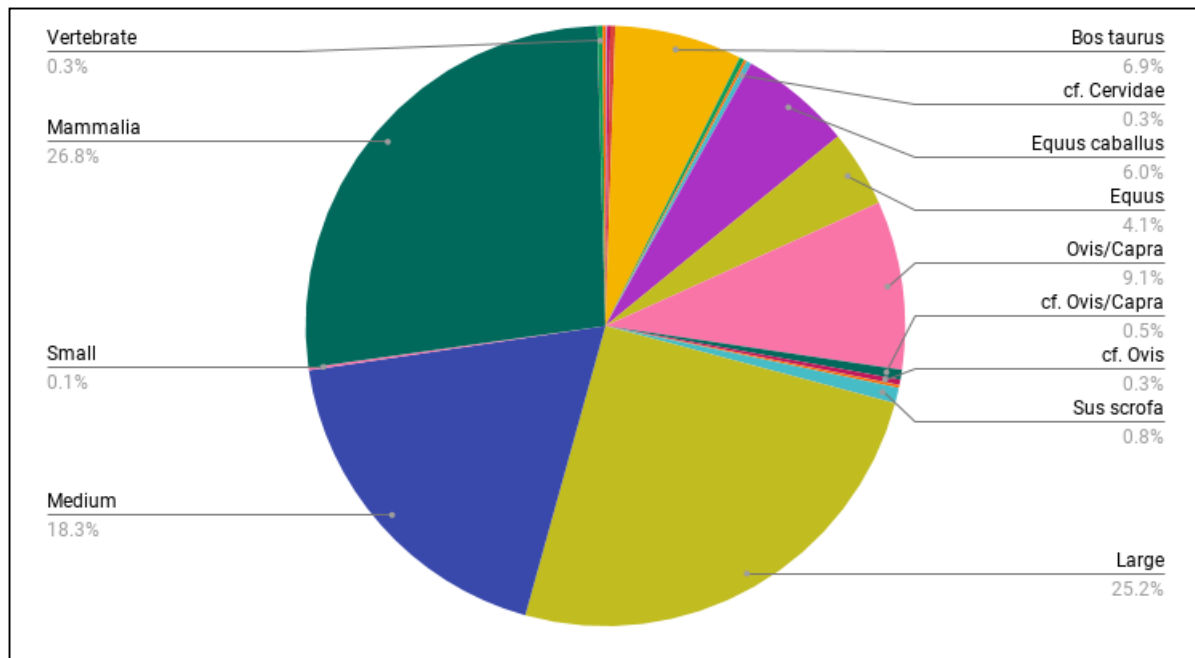
**Figure 4: LA 20,000 Taxa by MNI (N=33)**

The remainder of the species in the collection, including *Cervidae* and other local species, each had an MNI of one, suggesting they had equal representation and value at LA 20,000. This, however, is highly unlikely given the taxonomic frequency represented by NISP. As stated before, MNI can overemphasize the importance of small, rare animals in a collection, whereas NISP exaggerates the importance of species whose skeletal elements are

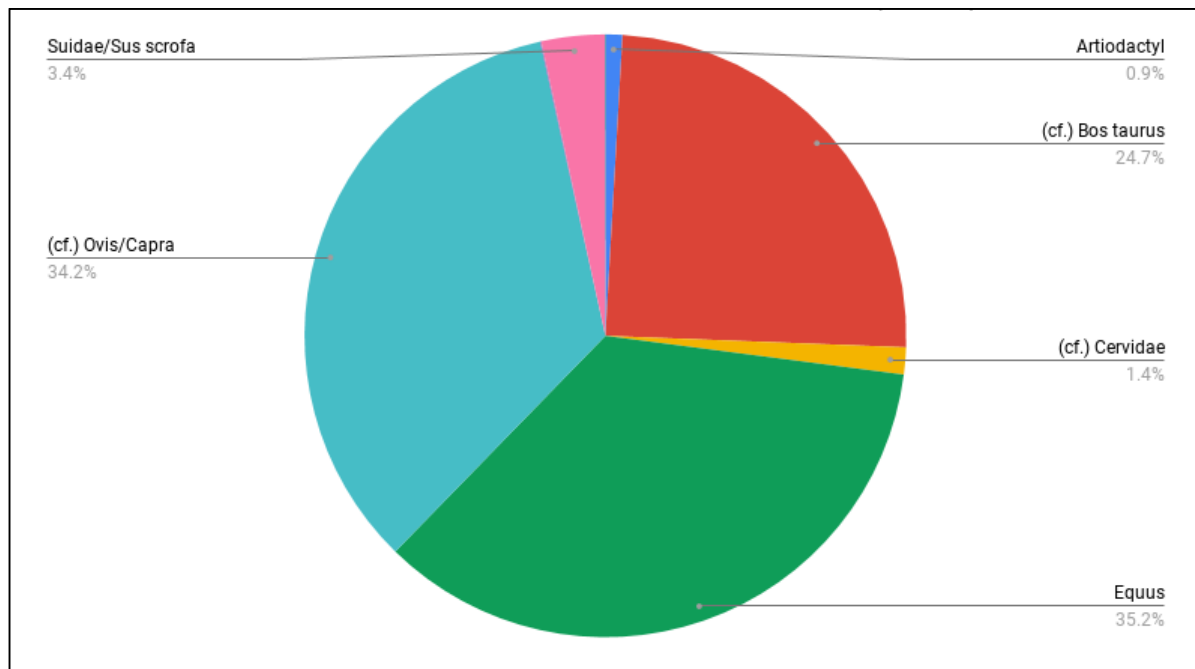
more easily recovered and identifiable (Reitz and Wing 2008:213). Because of this, the reader needs to keep in mind that the collection does not represent all the animals that ever existed at LA 20,000 nor does either analytical method truly represent past species' diversity.

### **Bone Weights**

Another way to look at the taxonomic representation was by comparing the bone weights of each taxa. The specimens from LA 20,000 weighed a total of 13.37kg. The same 43 identification groups representing 23 different taxa were used to compare the specimens by weight as they were by NISP. By weight, the indeterminate vertebrate category only made up a mere 0.3% of the collection. Again, mammals dominated. By bone weight, mammals made up 99.3% of the collection, followed by Aves at 0.3%, with all other taxonomic classes making up less than 0.1%. When the collection was examined by the most specific taxonomic classifications, the diversity of the collection became more apparent, although mammals still make up the distinct majority (Figure 5). Unidentified mammalian specimens make up 26.9%. Unlike by NISP, large mammals, which includes "Mammalia-large," all *Equus*, and *Bos taurus*, are the most common category, making up 42.7% by weight; following is medium mammals, which includes "Mammalia – medium," Cervidae, *Ovis/Capra*, and *Sus scrofa*, and make up 29.7%. These three categories account for 99.3% of the collection by weight, while the amphibians, fish, reptiles, and small mammals make up the remaining 0.7% by weight.



**Figure 5: LA 20,000 Identified Taxa by Weight (N=8,832)**



**Figure 6: Mammalian Taxonomic Identification by Weight (N=317)**

When the identified mammals are analyzed separately, as seen in Figure 6, *Ovis/Capra*, Equids, and *Bos taurus* specimens each make up about a third of the bone

weight. The next closest category is Suidae/*Sus scrofa* at a mere 3.4%. Equids make up the largest percentage, at 35.2%, though by NISP only make up 12.3%. The difference has to do with the robustness of Equid bones. *Ovis/Capra* bones are much smaller, yet come in a close second with 34.2% of the mammalian bone weight; they also dominated the assemblage by NISP. Their prominence in all three taxonomic frequency quantifications indicates a heavy presence of *Ovis/Capra* at the site. *Bos taurus* comes in third with 24.7%, though by NISP only made up 15.5% of the mammals. Like with Equid bones, the difference has to do with the robustness of the bones. The dominance of these three categories, once again, continues to suggest a heavy presence of European domesticates at LA 20,000 in lieu of almost all locally available game species. By bone weight, the only locally available species that accounted for more than 1% was Cervidae at 1.4%. Overall, all three calculations indicated a high preference for European domesticates at LA 20,000, with only a small representation of deer, fish, and small mammals.

### **Potential Meat Weight**

As stated before, potential meat weight was calculated by finding the estimated weight of all the individuals in a collection by MNI, and then using predetermined percentages to measure how much of that would be edible. One of the difficulties encountered was finding reliable sample weights for animals in the past. Domestic animals in the past were much smaller than today's counterparts, which have been bred and enhanced to produce more muscle for agribusiness. Unfortunately, no data exist on the size or weight of domestic animals in 17<sup>th</sup>-century New Mexico. To overcome this other species had to be substituted. For domesticated mammals, the author selected heirloom breeds descended from

introduced Spanish domestic stock, because they are closest to historical, traditional livestock breeds used by farmers before the rise of agribusiness. For this study, the heritage breeds used were the Navajo-Churro Sheep, Spanish Goat, Texas Longhorn, Galiceno Horse, and Choctaw Hog (The Livestock Conservancy). For birds, most were assumed to be wild species, except for *Gallus gallus* (domesticated chicken), because chickens were listed in historical documents as having been brought to New Mexico. For example, based upon the per capita amount cited in a 1630 supply inventory, about 2,200 chickens were brought to New Mexico (Scholes 1930).

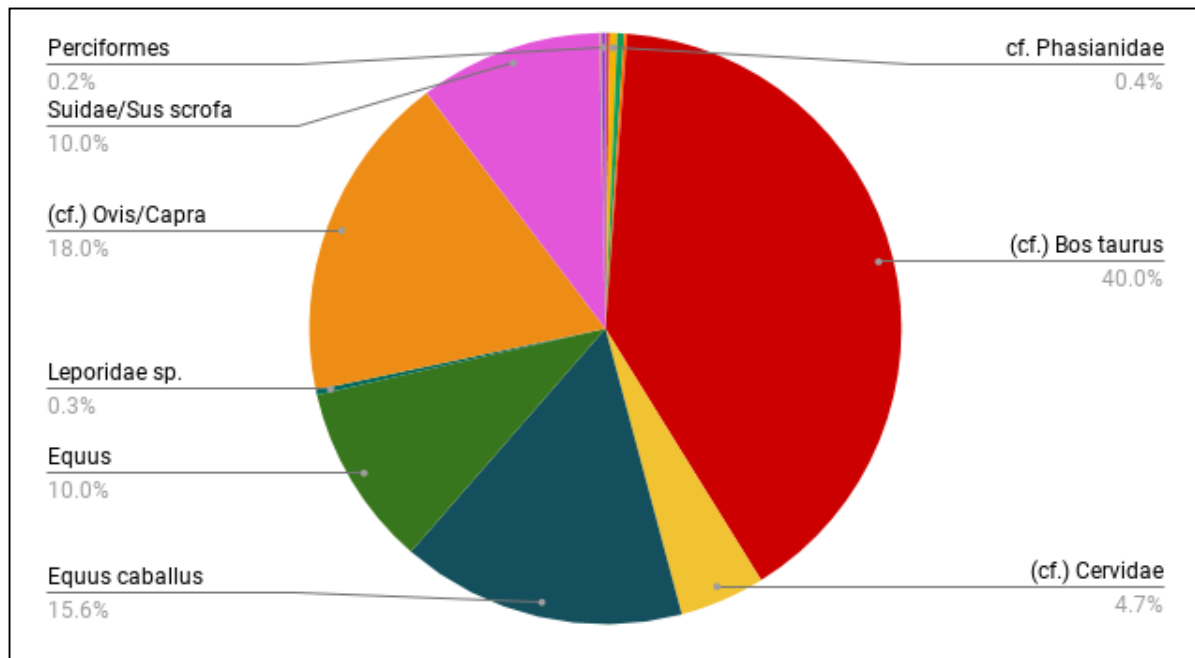
Other than the domesticated chicken, the bird remains in the collection came from *Anatidae* (ducks, geese, swans), *Anserinae* (geese, swans), cf. *Phasianidae* (chickens, turkey, quails), and *Galliformes*, which were likely also chickens that were too ambiguous to identify further. For the *Anatidae*, *Anas platyrhynchos* (mallard) was selected as the sample species because they are one of the most commonly eaten ducks and are native to New Mexico. The example species selected for *Anserinae* was *Branta canadensis* (Canadian goose) since they are common across and native to New Mexico; the example species selected for cf. *Phasianidae* was *Meleagris gallopavo* (wild turkey), since they were kept by Pueblo and could have been as an easily accessible food source.

For fish, only two orders were represented in the collection: *Cypriniforms* and *Perciforms*. Both are considered ray-finned fish and New Mexico has many native species belonging to each order. For the *Cypriniforms*, the River Carpsucker was chosen as the example species because it inhabits the Rio Grande River basin where LA 20,000 is located and because they are an edible fish. *Micropterus salmoides* (largemouth bass) and

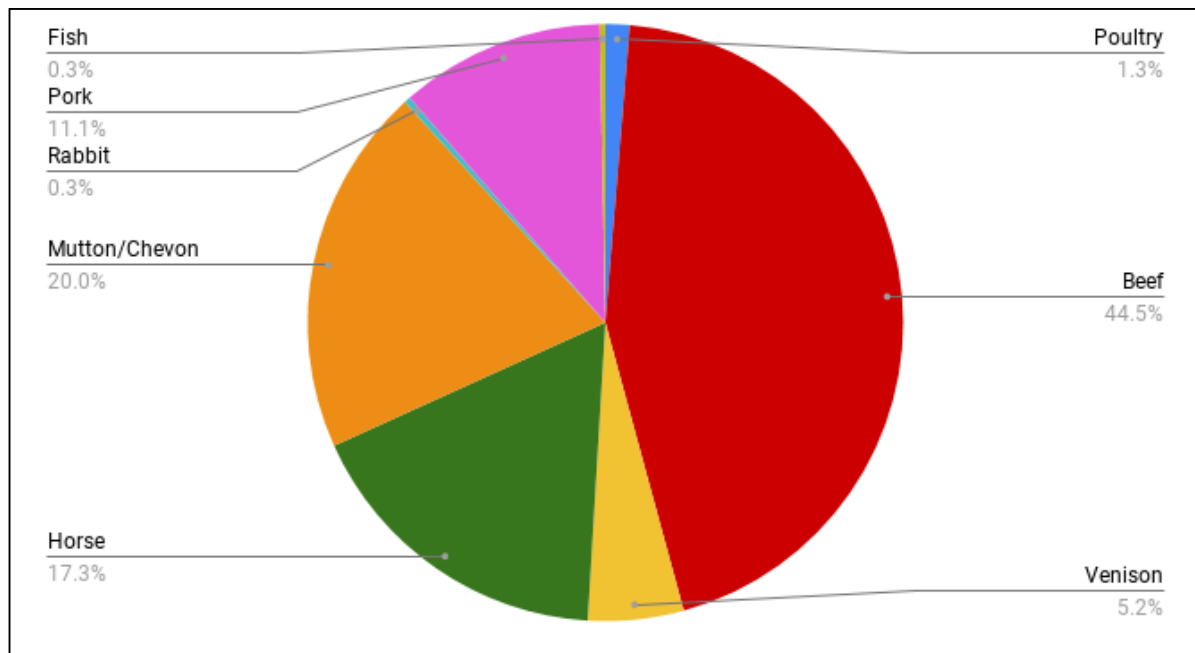
*Micropterus dolomieu* (small mouth bass) were both selected as the sample species for *Perciforms* because they are common freshwater fish in New Mexico and are regularly consumed (New Mexico Department of Game and Fish 2015); their weights were averaged for the calculations. Commensal animals, such as raccoons, rats, and frogs were not included in this analysis, but some small mammals were. Table 3 shows the average weight of each example species, the total body mass it contributed to the diet by MNI and the potential meat weight, as calculated by the predetermined percentages. Potential meat weight is also presented in Figures 7 and 8.

Figure 7 is important from a zooarchaeological perspective because it displays the full diversity of all possible food species at LA 20,000, whereas Figure 8 shows the dietary variety by common food names. For Figure 8, all fish, birds, and rabbits/hares, were combined into single categories. In Figure 7, both *Equus caballus* and *Equus* were included, but in Figure 8, only *Equus caballus* was included; Although neither species is considered a “meat” species, some *Equus caballus* specimens contained clear butchery marks indicating they were likely consumed and so horse meat was added as a category in Figure 8. The other equids, which were represented by a donkey, were not included in Figure 8 because they did not contain butchery marks and because donkeys, asses, and mules were not traditionally eaten by any of the ethnic groups inhabiting the Southwest. More information on the butchered horse bones is included later in the chapter.

<b>Table 3: Body Mass and Potential Meat Weight of Food Species at LA 20,000</b>					
<b>Taxa</b>	<b>Species Used to Estimate Weight</b>	<b>MNI</b>	<b>Average Weight (lbs.)</b>	<b>Total Body Mass</b>	<b>Meat Weight</b>
Anatidae	Mallard	1	2	2	1.4
Anserinae	Canadian Goose	1	8.25	5.8	4.06
cf. Phasianidae	Wild Turkey	1	13	13	9.1
Galliformes	Chicken	2	5.7	11.4	7.98
<i>Gallus gallus</i>	Chicken	1	5.7	5.7	3.99
(cf.) <i>Bos taurus</i>	Texas Longhorn	2	900	1800	900
(cf.) Cervidae	Mule Deer	1	210	210	105
<i>Equus caballus</i>	Galiceno Horse	1	700	700	350
Equus	Standard Donkey	1	450	450	225
<i>Leporidae</i> sp.	Antelope Jackrabbit	1	8.7	8.7	6.09
(cf.) <i>Ovis/Capra</i>	Navajo-Churro Sheep & Spanish Goat	6	135	810	405
<i>Suidae/Sus scrofa</i>	Choctaw Hog	2	225	450	225
cf. <i>Sylvilagus</i>	Desert Cottontail	1	1.9	1.9	0.95
Cypriniforms	River Carpsucker	1	3	3	1.5
Perciforms	Largemouth & Smallmouth Bass	1	9.3	9.3	4.65



**Figure 7: Potential Meat Weight of Food Species at LA 20,000 by Taxa**



**Figure 8: Potential Meat Weight of Food Species at LA 20,000 by Common Name**

The most prevalent type of meat at LA 20,000 is beef, accounting for 44.5% of the potential meat weight. Beef was common in the Spanish diet prior to the colonization of the Americas, but the availability of cattle in the Spanish colonies made beef even more popular as a food source. For instance, an English man reported in 1550 that one could obtain a whole quarter of an ox for as cheaply as two shillings and six pence in Mexico City (Crosby 2003:85). Counting for inflation, a quarter ox would have cost \$46 in 1550 in Mexico City (The National Archives 2017), but the price of a quarter ox today is approximately \$600 (Piño Creek Ranch 2018). Beef and veal are also featured in many 16<sup>th</sup>-century Spanish recipes, as well as beef broth, cow's milk, and butter (De Nola 1529). Though cattle were outranked by *Ovis/Capra* in terms of NISP, the size of cattle compared to these sheep and goats means they contributed more meat to the diet at LA 20,000, as well as dairy products, which are not directly reflected by faunal data

Mutton and chevon, especially based on the prominence of *Ovis/Capra* specimens in the collection, would have also been a substantial part of the meat-based portion of the diet at LA 20,000 and represents 20% of the collection's potential meat weight. Mutton was probably more common than chevon in New Mexico because the supply lists from the colonizing groups list more sheep than goats and on other sites sheep outnumber goats 4:1 (Lycett 2005:11). Recipes from 16<sup>th</sup>-century Spain include the meat of sheep, lambs, goats, and kids, as well as sheep's or goat's milk and cheese, so, like cattle, these animals and their dairy products were very much a part of historical Spanish cuisine; some 16<sup>th</sup>-century recipes exist for kid pie, pottage of marinated mutton, sheep spleens, and cheeses (De Nola 1529). Sheep, goats, and cattle are all herd animals, so their dominance of the diet by potential meat

weight is likely the result of them being easily accessible sources of food, especially considering LA 20,000 was a working *estancia*.

Following beef and mutton in rank is horse meat. Although horses were not viewed as an edible food source by the Spanish, the presence of *Equus caballus* bones in the collection with butchery marks indicates that at least one horse was butchered, presumably for food, at LA 20,000. This single horse represents 17.3% of the collection's potential meat weight, although, beef and mutton likely made up most of the meat intake and horses were probably not eaten very often, if at all, by the colonists.

Pork, making up 11.1% of the potential meat weight, was also somewhat common in the diet of those residing at LA 20,000; it may have made up a larger percentage than represented by the data because the contributions of horse meat were likely overexaggerated. In the 16<sup>th</sup> century, Spanish recipes with pork included bacon, pork fat/lard, roast pork, boiled pork, fried suckling pig, and "lardy broth of wild pig" (De Nola 1529). Pigs became very common in the Caribbean once the Spanish crossed the Atlantic, so they remained a prominent part of the Spanish colonial diet (Crosby 2003:79). The arid environment of New Mexico, however, was less suitable to pigs than sheep or cattle, since they tend to live in highly vegetated, wet habitats, so this explains why they are not as prominent in the collection and would have made up a smaller portion of the potential meat weight at LA 20,000.

Following pork is venison, or deer meat, which accounts for 5.3% of the potential meat weight; numerically, this is the first wild, non-domesticated animal represented in the diet. Varieties of deer were eaten in medieval Europe, such as Fallow Deer in England

(Thomas 2007), and Red Deer, Fallow Deer, and Roe Deer all inhabit the Iberian Peninsula, but, based upon existing 16<sup>th</sup>-century Spanish recipes, deer does not seem to have been considered a regular part of Spanish cuisine. Deer were, however, hunted by the Pueblo and other mobile indigenous groups of the Southwest and may have been viewed as a viable source of meat by Spanish colonists because of their existence in the medieval European diet, so its presence in the assemblage is not unusual. What is surprising is how little of the assemblage it accounts for, as it was a readily available source of wild game that could be acquired both through hunting and trading.

Following deer, poultry, fish, and rabbit make up 1.9% of the potential meat weight combined. Though poultry, which accounts for 1.3% of the potential meat weight, is a mix of domesticated chicken and wildfowl, this subsistence strategy was not uncommon for Spanish cuisine. The abovementioned cookbook contains many dishes featuring poultry including peacock, capon, hen, woodpigeon, geese, wild doves, and wild ducks (De Nola 1529), a mixture of wild and domesticated fowl. Though they may have been unfamiliar with some of the birds in New Mexico, such as turkeys, the colonists would have been accustomed to eating both wild and domesticated birds. Indigenous groups of the Southwest also consumed wildfowl, so the presence of birds in the assemblage is not indicative of one food tradition or another. Fish and rabbit were also consumed by Europeans and indigenous groups alike, so their presence, again, does not signify one particular tradition. Spanish fish recipes called for fish pastry, grilled fish, fish casserole, pottage of fish, and fried fish, and they used many species including swordfish, cuttlefish, barbel, catfish, wolfish, and red scorpionfish among others; Spanish recipes for rabbit included pickled rabbits, bisque of rabbit, roasted rabbit,

boiled rabbit, and pottage of cooked hare (De Nola 1529). The low quantities of these types of food is odd given that both Europeans and Americans had traditions of eating them, though the explanation could be due to site formation processes destroying the more fragile bones of smaller species. Regardless, data indicates the diet at LA 20,000 was dominated by the meat of European domesticates: beef and mutton, followed by (possibly) horse meat and pork.

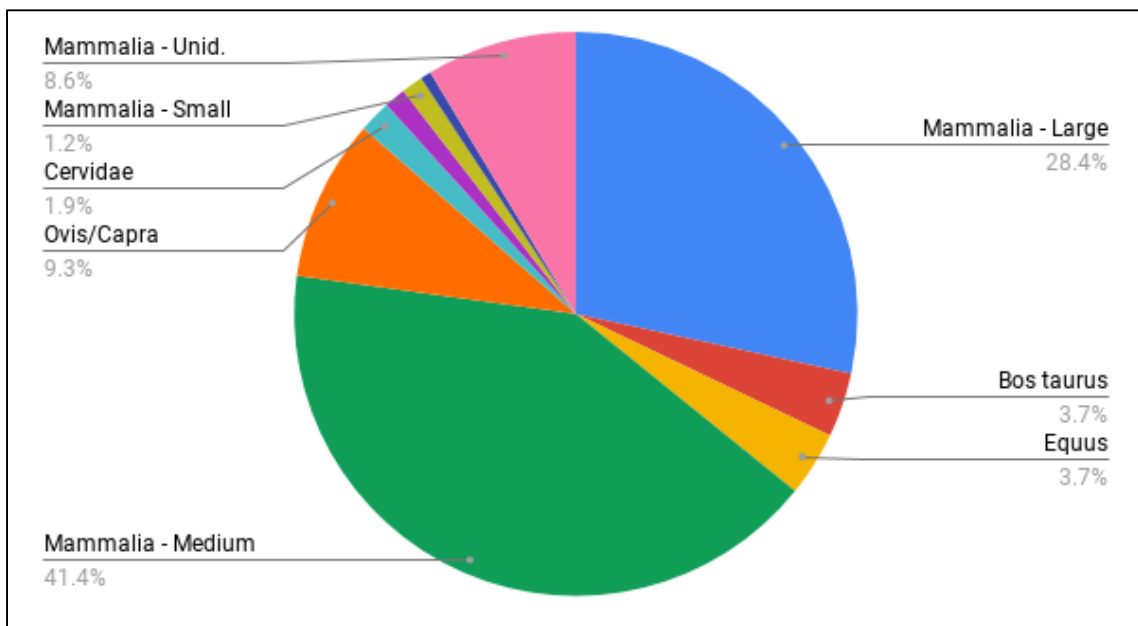
### **Bone Modifications**

Bone modifications recorded for this study can be divided into anthropogenic modifications, caused by humans during butchering or cooking, and non-anthropogenic, which include modifications made by taphonomic processes, weather, and animals. As an overview, 1,856 specimens showed signs of human modification; 1,388 were calcined, 306 were burnt, 47 had cutmarks, 38 had chop marks, 25 were sheared, 1 was punctured, 5 had saw marks, and 46 had spiral fractures. One hundred seventy-four specimens showed signs of non-anthropogenic modification; 93 contained various levels of weathering, 11 were sun-bleached, 58 had root etching, 11 were gnawed by carnivores, and 1 was gnawed by a rodent. Although a total of 1,856 different modifications were recorded, they are not necessarily mutually exclusive. For example, a specimen may have had butchery marks and been weathered, so it would have been counted in both categories.

### **Butchery Marks**

Before examining the butchery marks in detail, it is important to understand what taxa were being butchered and, presumably, targeted as food. All 162 anthropogenic butchery marks were recorded on only ten taxonomic groups: *Bos taurus*, *Equus*, *Ovis/Capra*,

Cervidae, *Sus*, Aves, and small, medium, large, and unidentified mammals (Table 11). Of these medium mammal specimens contained the most: 67 butchery marks, accounting for 41.4% of all butchery marks. This was followed by large mammals with 28.4%, and *Ovis/Capra* with 9.3% (15 butchery marks). All large mammals combined (large mammals, *Bos taurus*, and *Equus*) contained 35.8% of all butchery marks, whereas all medium mammals combined (medium mammals, *Ovis/Capra*, *Sus*, and *Cervidae*) contained 53.8%. Only two small mammalian bones were found to have butchery marks, while a single avian tibiotarsus had a cut mark.



**Figure 9: Distribution of Butchery Marks by Taxa (N=162)**

Based on these numbers and the previous data, large and medium domesticated mammals were heavily targeted as food. Fish, small mammals, and poultry may have been a larger part of the diet, but as these smaller creatures do not need as much processing before being cooked, their lack of butchery marks is not odd. As has been mentioned before,

mutton, beef, and pork were all common foods in the European diet, and these animals clearly show the most signs of butchery at LA 20,000. Deer were eaten in Europe and by indigenous groups in the Americas, so the presence of a few butchered deer was expected. The most surprising taxa with butchery marks, however, is *Equus*. Equid bones contained as many butchery marks (N=5) as *Bos taurus* did, although eating horse meat was taboo in Spanish society and indigenous American groups had no experience with horses since they were introduced by the colonists themselves. Horses could have been killed and butchered for several reasons, including an act of mercy (if a horse was injured, sick, or old), an act of last resort (if no other food was available), an act of resourcefulness (i.e. indigenous groups making use of a previously unavailable food source), or an act of defiance (i.e. indigenous people killing Spaniards' animals). Regardless, the butchery patterns indicate that mostly medium and large domesticates were being butchered by humans.

The location of butchery marks can be indicative of how animals were processed during primary and secondary butchery and is also shaped by the butchers' tastes, traditions, religion, and market guidelines (Landon 1996:58). Snow and Bowen (n.d.) determined that, in their analysis of 17<sup>th</sup>-century faunal remains from Santa Fe, Spanish butchery patterns followed the same structure as English patterns, so this is outlined below and then compared to the patterning at LA 20,000.

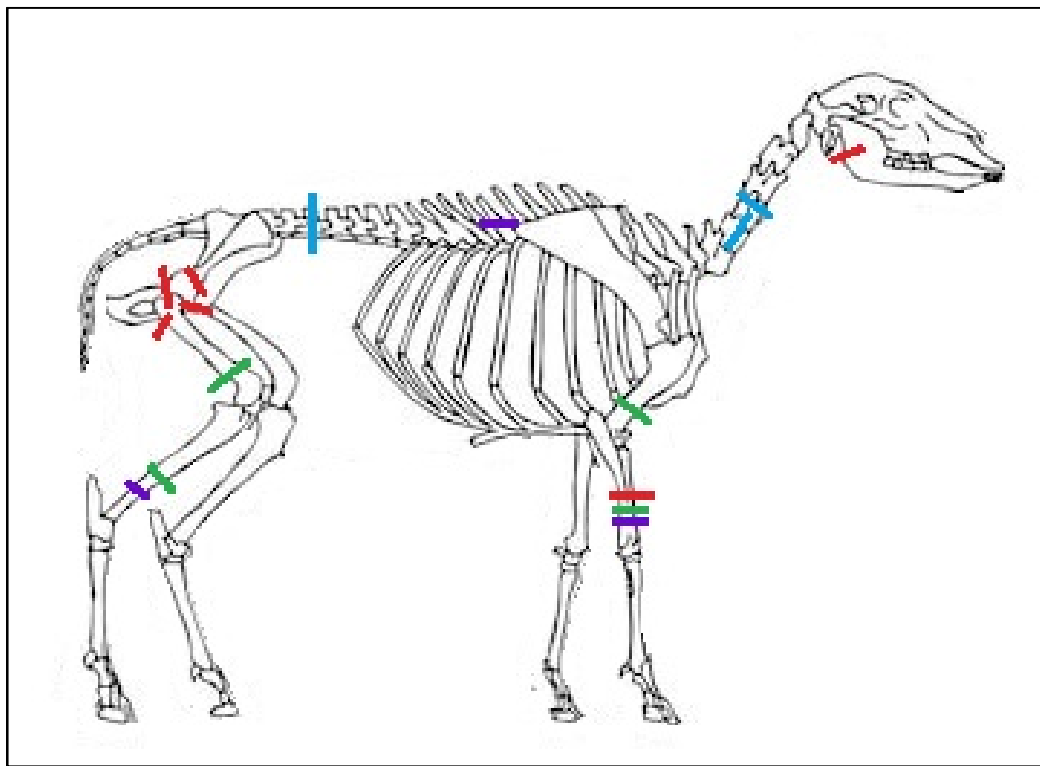
The method outlined below comes from Peles (2010), who summarized it from Landon (1996). European butchery practices commenced with separating the head from the body, which would result in chop or saw marks on the condyles, atlas, axis, or posterior cranial cavity (Peles 2010:44). Then the carcass was divided in half into a left and right

portion, resulting in longitudinal cut or chop marks on vertebra. After the carcass was split, the humerus and scapula were disarticulated from one another, and then the radius/ulna were disarticulated from the humerus at the elbow joint, and then the two are disarticulated. Cut marks along these long bones indicate the removal of meat from the bone, whereas shearing is indicative of portioning the humerus or radius into smaller sections (Peles 2010:45). Metacarpals were also disarticulated from the radius but do not bear much meat.

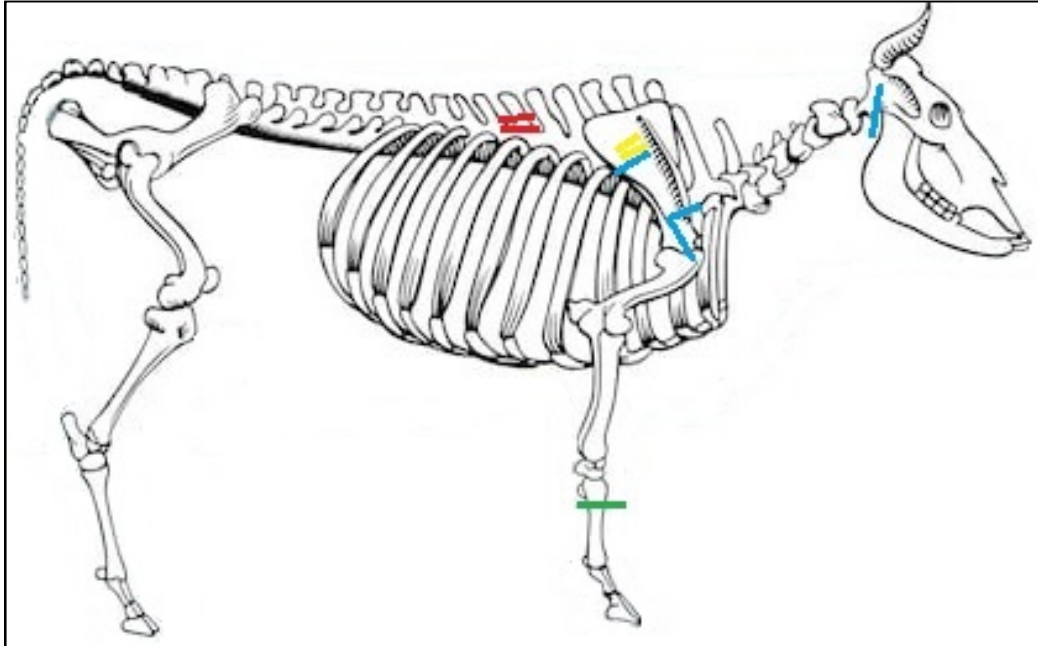
The pelvis was regularly divided into smaller parts, and often contains marks from disarticulation with the hind legs. Cut marks on the ilium may be from the removal of the sacrum, and cut marks near the acetabulum are indicative of removing the hind leg. As with the forelimb, cut marks along the femur or tibia are indicative of meat removal, while these bones may also have been chopped into smaller portions (Peles 2010:46). Metapodials were removed from the hind leg, though chop marks on the distal end may be indicative of marrow removal. As a summary, the head was removed first, the carcass split longitudinally, and the limbs disarticulated at the joints. Chop and cut marks at the skull, down the spine, and at the epiphyses of long bones indicate primary butchery, whereas cut marks along bone shafts indicate secondary butchery. Some variation may be the result of differences in tertiary butchery as cuts of meat are prepared and cooked for consumption.

A summary of the number and direction of butchery marks for *Ovis/Capra*, *Bos taurus*, and *Equus caballus* can be found on Figures 10, 11, and 12, respectively. These three taxa were the only ones that contained enough butchery marks for deeper analysis. For these three taxa, *Ovis/Capra* had the most butchery marks, the patterning of which most closely resemble the typical “Spanish” method outlined above. Several vertebrae were sheared,

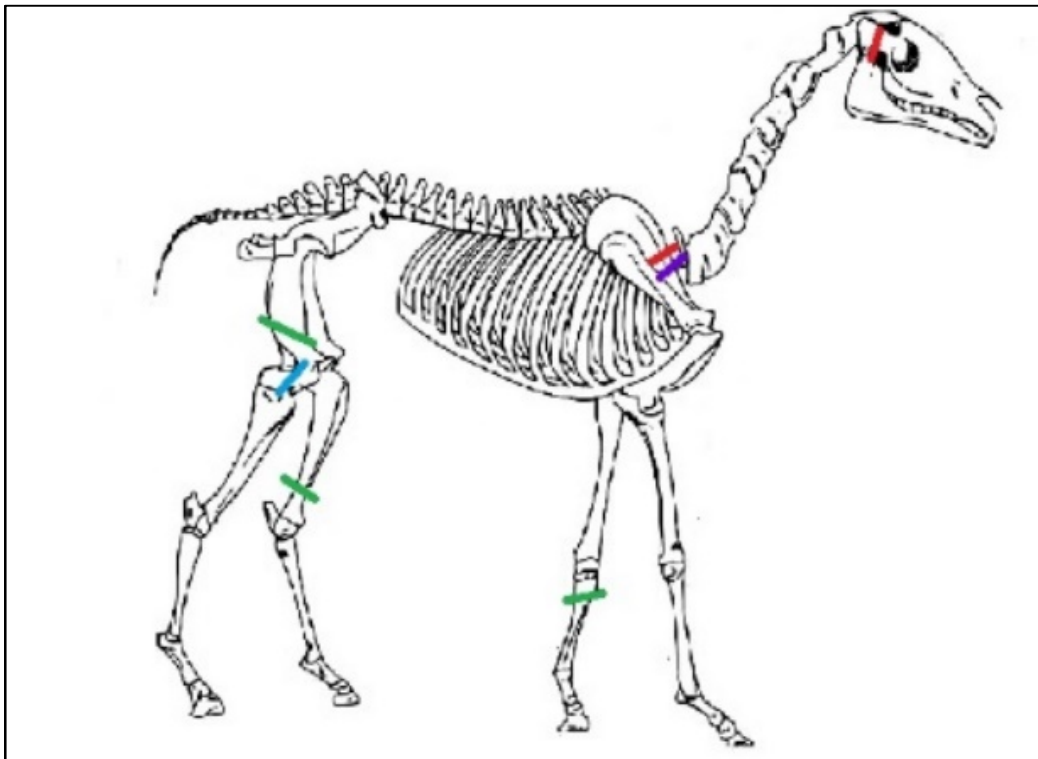
indicating the removal of the head and splitting of the carcass longitudinally. Cut marks present on the acetabulum, and right radius, as well as chop marks at the distal tibia and distal radius are indicative of separating limbs at the joints during secondary butchery. There were fewer butchery marks on *Bos* bones, but these do point to primary butchery. The sheared specimens include vertebrae, an occipital condyle, representing the removal of the head and splitting of the carcass during primary butchery, and a scapula, indicating the disarticulation of the forelimb during secondary butchery. The cut marks on a thoracic vertebral spine point to the removal of meat from bone either during secondary or tertiary butchery. The spiral fractures are discussed below.



**Figure 10: Skeletal Diagram Summarizing the Location and Direction of Butchery Marks on *Ovis/Capra* Specimens. On these diagrams, red lines represent cut marks, yellow for saw marks, blue for shears, purple for chops, and green for spiral fractures/green breaks.**



**Figure 11: Skeletal Diagram Summarizing the Location and Direction of Butchery Marks on *Bos taurus* Specimens**

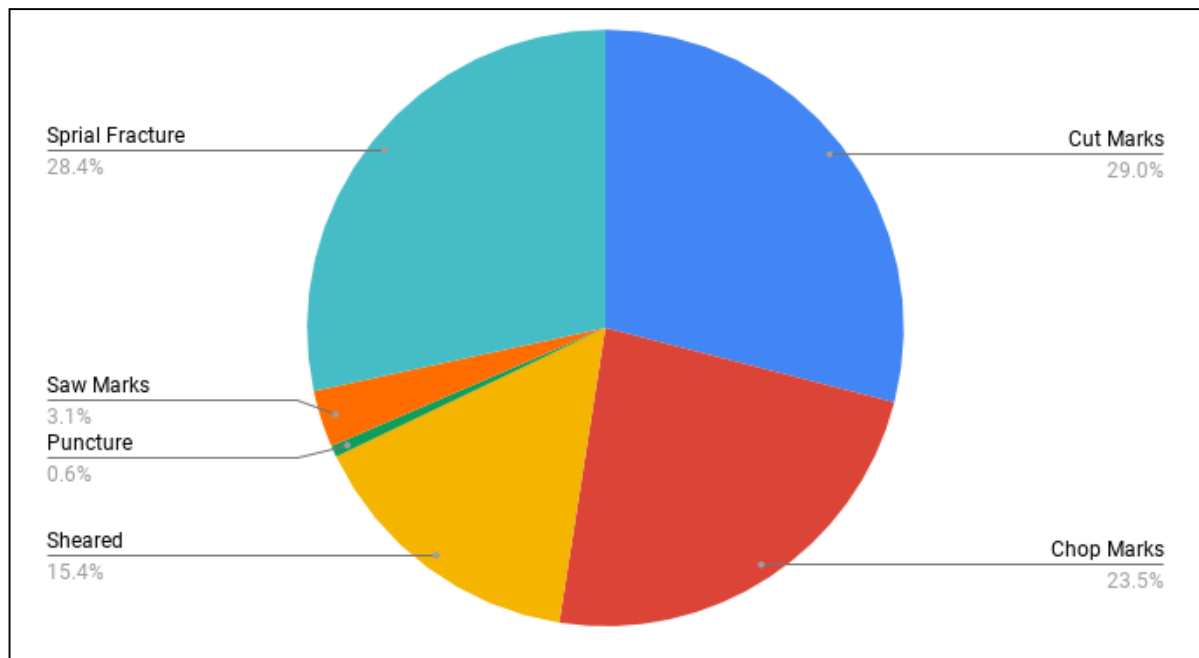


**Figure 12: Skeletal Diagram Summarizing the Location and Direction of Butchery Marks on *Equus* Specimens**

The *Equus* butchery patterns are interesting because they do not follow the same butchery patterning as the other two domestics; that is, the butchery marks and locations seem more random. None of the vertebra or ribs contained signs of butchery, though this could be because only one thoracic vertebra fragment was identified to this taxon. The ends of long bones were sheared, and a few long bone shafts were spirally fractured, as if these horses were opportunistically used for consumption rather than methodically slaughtered for food. Their butchery patterning differs quite a lot from the systematic butchery of the other food-bearing domestic species yet undisputedly shows that horses were in fact being consumed. Though eating horses was taboo in Spanish society, indigenous groups may have eaten them, and, if desperate enough, some colonists may have too. A full analysis of all the butchery patterns can reveal more about the consumption and economic activities occurring at the *estancia*, and may help explain why horses were being eaten.

In terms of the types of butchery marks, a summary can be found in Figure 13. The types of butchery marks from the collection point to primary and secondary processing of carcasses. Primary butchery, or the initial disarticulation of the carcass, is associated with shearing, saw, and chop marks, which make up 42% of the total butchery marks in the collection. Secondary butchery, where meat is removed from bones for consumption, is often associated with cut marks, which account for 29%. Scrape marks, which are associated with filleting meat off the bone or the creation of secondary animal products, such as hides, were not present in the collection at all (Chapin-Pyritz 2000:99; Reitz and Wing 2008:243). This patterning means most of the animals at LA 20,000 were butchered and dressed on-site and were intended more so for food than certain secondary goods, such as hides. Other secondary

goods, like wool or milk could have been a large part of the production goals of the *estancia*, but unfortunately do not leave signatures on the bones. The presence of spindle whorls at LA 20,000 supports the idea spinning wool occurred on site, as well as the production of other secondary animal products. This makes sense as LA 20,000 was one of the largest farms in colonial New Mexico and may have been engaged in local production and exchange of meat as well as some other products, and would have also needed to produce goods for use on site.



**Figure 13: Types of Butchery Marks by Specimen Count (N=162)**

Spiral fractures were almost as numerous as cut marks, and are often cited as being caused by humans. Although they can be the result of carnivore consumption or trampling, they are typically caused by humans when they twist a fresh bone to break it in two to access the marrow cavity (Meyers et al. 1980; David B. Landon, 2018, pers. comm.). Since spiral fractures can be non-anthropogenic, understanding them within the context of LA 20,000

helps demonstrate their presence. Of the 46 spiral fractures in the collection, 45 occurred on long bones, excellent sources of bone marrow for consumption. In addition, some of the spiral fractures were on bones with other processing marks, including two spiral fractures on specimens with cut marks, two on bones with chop marks, three on bones with shears, and one on a specimen with burning. The frequency of spiral fractures on long bones, a source of marrow, and their occurrence with other butchery marks shows humans at LA 20,000 were frequently accessing marrow cavities. Bone marrow is high in fat, calcium, magnesium, and phosphorous, and other trace minerals, and is consumed by countless cultures worldwide. Humeri, tibiae, and femurs contain the most marrow and the most meat, so they are often targeted first for food, the radii and metapodials are often targeted only once food becomes scarce (Chapin-Pyritz 2000:203). Radii and metapodials contained both butchery marks and spiral fractures, meaning these lower priority cuts were necessary to the diet. This fact, coupled with the fact that horses were consumed demonstrates that food was sometimes scarce at LA 20,000 despite its being a farm. Food scarcity and the consumption of these poorer foods may have been during times of famine or if better cuts of meat were traded away, leaving the inhabitants with the meat-poor leftovers; they could also reflect the social hierarchy within the site, with the farm family getting the better cuts of meat while the indigenous laborers had access to the leftovers. Overall, the butchery patterns illuminate LA 20,000 as a working farm that managed the primary and secondary butchery of domestic animals, likely traded meat locally, whose inhabitants periodically dealt with food scarcity or differential social access to food.

The tools used to butcher these animals can sometimes lend insight to the identity or preference of the butcher. One way is to look at what types of tools were being utilized. Until the arrival of Europeans, indigenous groups used stone tools, later incorporating introduced metal tools. Determining if bones were butchered with stone or metal tools would require SEM analysis and is out of the scope of this research. Even then, cut marks made by stone tools versus metal tools can be ambiguous (Lucido 2013:73). What is known, however, is that stone tools were found at LA 20,000, and include utilized flakes, modified flakes, bifaces, and a single scraper, all of which have evidence of being used on a hard surface, such as bone (Clint Lindsay, 2018, pers. comm.). In addition, some specimens, including an *Ovis/Capra* mandible, have irregular cut marks, which could be evidence of stone tool use (David B. Landon, 2018, pers. comm.). Although these are not conclusive, the evidence suggests possibly a mixture of stone and metal tool usage at LA 20,000, and therefore, a mixture of different butchery tool preferences.

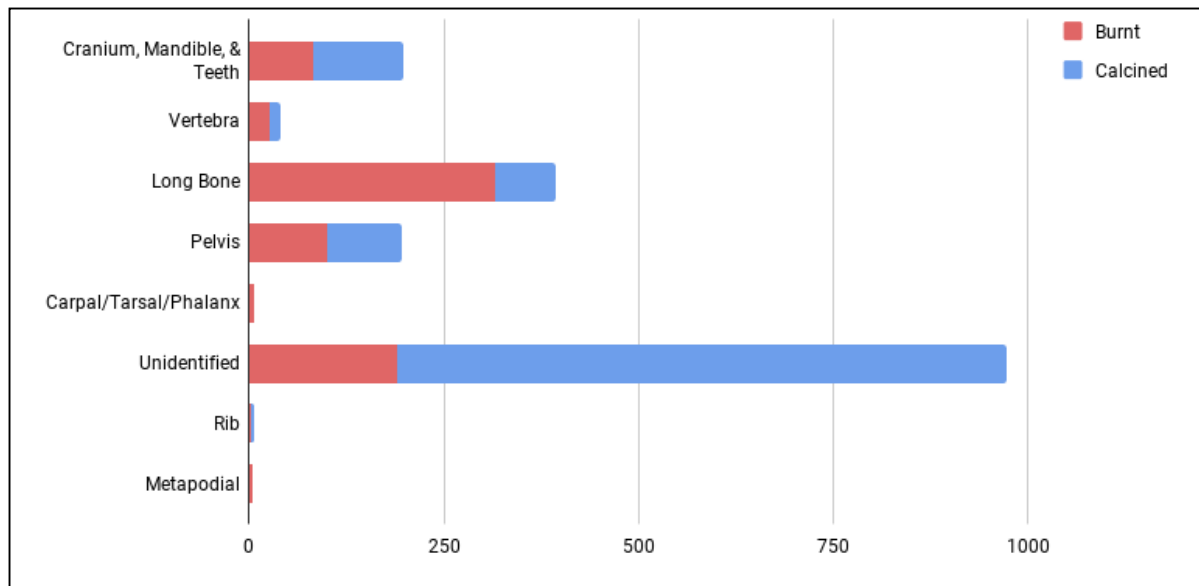
### **Heat Modified Bones**

In addition to butchery, burnt and calcined bones can indicate how meat was prepared or how bones were disposed. In the collection, 1,388 were specimens were calcined, which was defined as grey to white/blue in color, and 306 were burnt, which were defined as brown to black. Of these, 88.7% of them by NISP (or 53.5% by weight) were considered unidentifiable mammalian specimens, each with an average weight of only 1.54 grams. After these, the most common types of heat modified bone were long bone shafts, cranial fragments, and the innominate. By NISP, cranial fragments made up 5.7% of the burned/calcined bones, long bones 3.4%, the innominate 0.6%, and ribs 0.5%. By bone

weight, cranial fragments made up 10.9%, long bones 21.7%, the innominate 10.8% and vertebra 2.2%. The breakdown of levels of calcification and burning for different skeletal portions can be found in Figure 14.

Although ascertaining why bones were heat modified is difficult, a generalization is that bones discarded in fires as waste, elements of small animals that drop into fires during roasting, and remains used as fuel sources will be calcined whereas burning observed on articular surfaces of bones is the result of roasting (Chapin-Pyritz 2000:97). The vast amount of heat modified specimens that were heavily fragmented indicate these bones were not burnt during cooking, but were likely used as fuel in fire or burnt as part of waste disposal. The elevated representation of cranial and innominate fragments, which are usually considered waste products, also indicates that bones were likely being burnt as fuel or as a process of waste removal. The presence of a thermal feature in Unit 2017-C.5 filled with burnt and calcined cranial and innominate fragments, long bone shafts, and unidentified fragments supports this notion. Any evidence these bones may have contained from when they were cooked disappeared when they were later tossed into the flames for disposal.

Only one bone was found with burning on its articular surface, indicating roasting: an *Equus caballus* distal right femur (Figure 15). It also had a spiral fracture and was sheared, evidence it was prepared by humans for consumption and then roasted for food. The lack of evidence for roasting may be the result of bones being discarded into the fire, reused as fuel or a preference for other preparation methods, such as boiling or drying.



**Figure 14: Anatomical Locations of Burnt and Calcined Bones by Weight in Grams (N=1,694)**

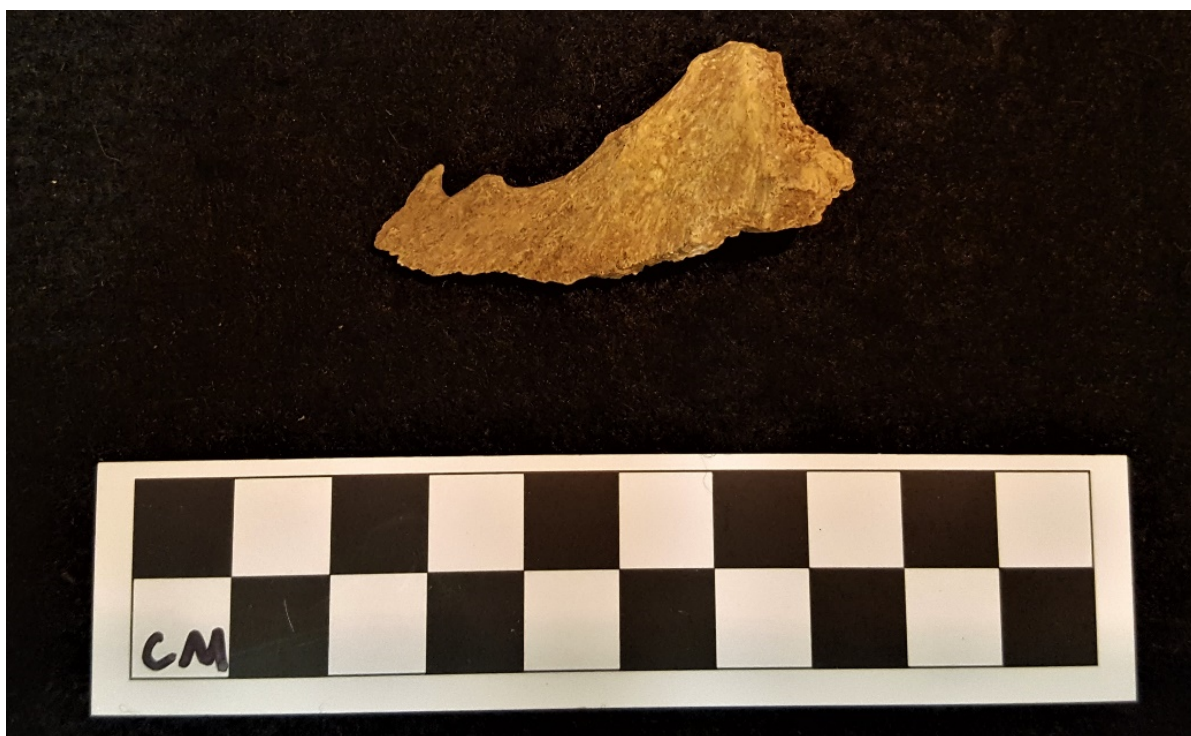


**Figure 15: A Right, Distal *Equus caballus* Femur with Burning on its Articular Surface (EU 2016-K, Cxt. 170, Level 9, FS# 266)**

## Pathologies

Three specimens in the collection showed signs of pathological modifications: the acetabular branch of a pubis (Figure 16), an astragalus (Figure 17), and a sesamoid (Figure 18). The pubis bone came from a medium sized mammal, was thinned, and had developed small bone elongations due to multiple pregnancies (Peles 2010:50; Landon 2018, pers. comm.). Given the size of the specimen and the fact that LA 20,000 was a working farm, this pubis likely came from an *Ovis/Capra* that was bred multiple times as part of an animal husbandry strategy.

The sesamoid bone in the collection came from a *Bos taurus*. Sesamoid bones are small nodules located where a tendon passes over joints in the feet, so they are located at points of skeletal stress. This sesamoid looked condensed and warped, the result of a physically demanding existence and overworking (David B. Landon, 2018, pers. comm), meaning this cow experienced stress in its feet, likely from work as a draft animal. The astragalus bone in the collection, which came from an *Equus*, also experienced stress and developed arthritis. The specimen is distorted and has grown many bony protuberances from being overworked. The severity of the pathology is from work as a weight-bearing animal over a long life. Although only three specimens with pathologies exist in the collection, they speak to the rigorous life and hardiness of the domestic animals brought to New Mexico by the settlers to help with the rigorous task of founding a colony.



**Figure 16: The Acetabular Branch of a Pubis from a Medium-sized Mammal Affected by Pregnancies (UMB# 1990-21)**



**Figure 17: Three Views of a *Bos taurus* Sesamoid with a Stress-Related Pathology (EU 2015-J, Cxt. 66, Level 8, FS# 219)**



**Figure 18: Four Views of a Left *Equus* Astragalus with a Stress-Related Pathology (EU 2015-J, Cxt. 66, Lev. 8, FS# 219)**

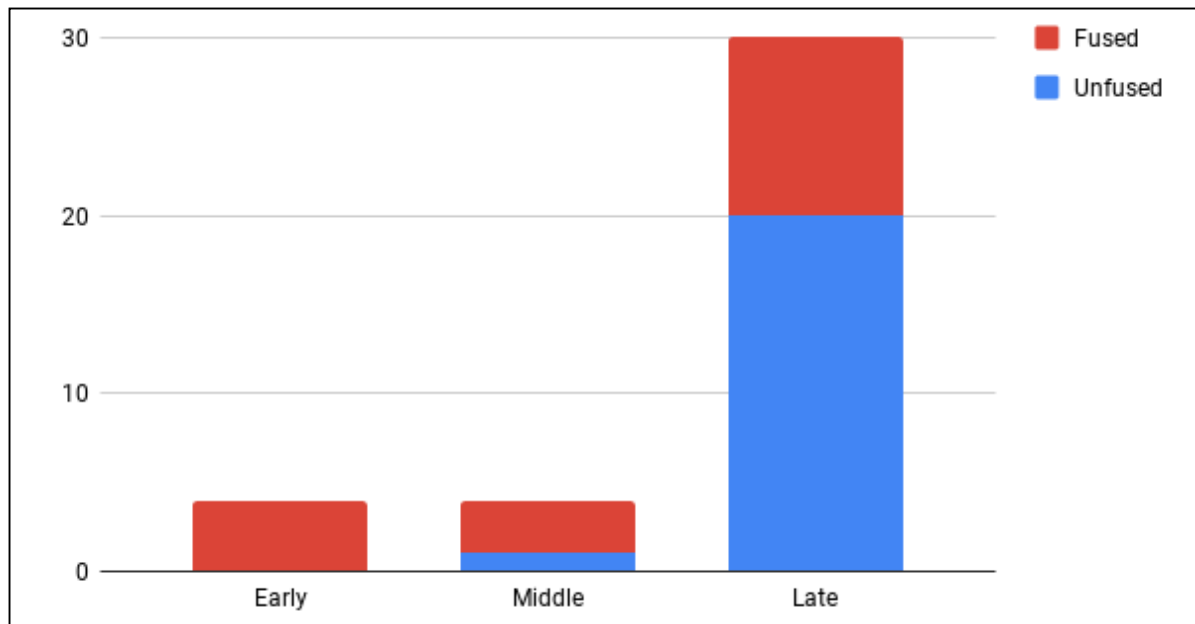
### **Ageing and Kill-off Patterns**

While the specimens were analyzed, the level of fusion on epiphyseal growth plates was noted on all long bones, vertebral bodies, and phalanges. Although a sample size of about 30 MNI would be needed to accurately estimate kill-off profiles (Crabtree 1990:184), the summary of the age-related data from the collection is included here. The specimens were grouped into age classes of early, middle, and late-fusing bones and the number of fused and unfused specimens for each age class was tallied. As stated before, unfused specimens in the early category are assumed to represent juveniles, while unfused specimens in the middle and late categories are assumed to represent subadults; fused specimens in the late fusing category are meant to represent adults.

Of the examined species, *Ovis/Capra* was the most numerous, with a total of 38 specimens that could be classified into ossification age groups. The breakdown of these three age classes can be seen in Figure 19, with blue representing unfused specimens and red representing fused. All the specimens in the early-fusing category were fused, so no juvenile

specimens were present; bones from the middle and -late fusing categories were a mixture of fused and unfused, representing both subadults and mature adults. In addition to these 38 specimens were an ulnar carpal, lunate carpal, radius shaft, and iliac shaft that were all classified as juvenile because of their size. None of these contained epiphyseal plates so they could not be included in the ossification analysis, but they are important for determining age profiles. Additionally, one previously discussed cf. *Ovis/Capra* right pubis bone notably showed signs of age/stress.

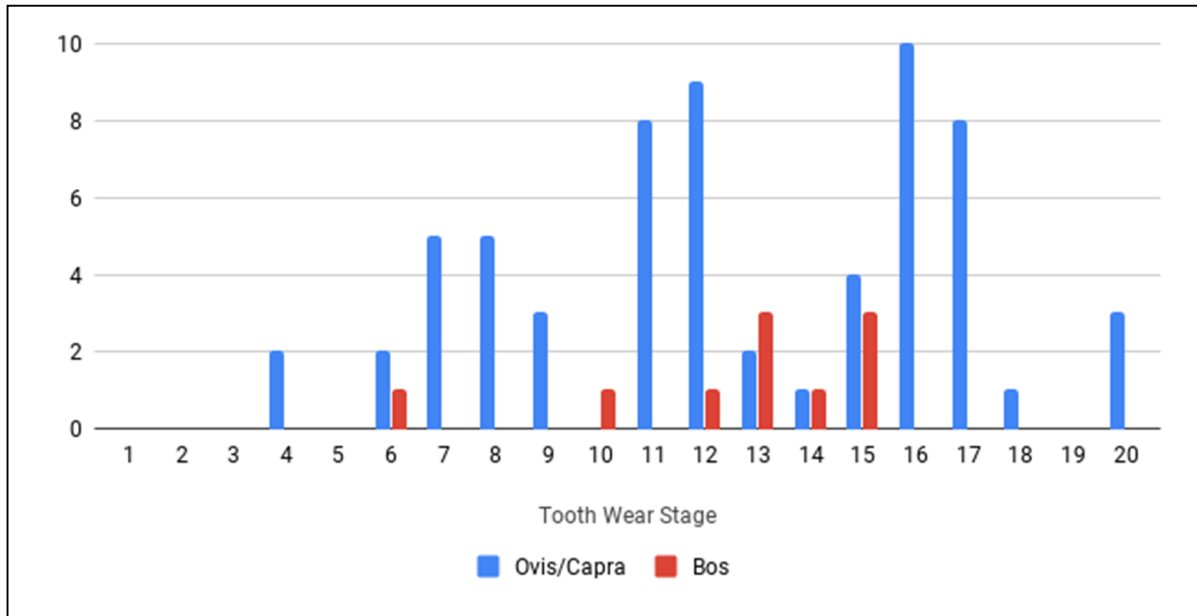
Based on the data from Figure 19 and the other juvenile-sized bones and pubis bone, the *Ovis/Capra* collection can be interpreted as a mixture of all ages. At LA 20,000 *Ovis/Capra* were somewhat targeted for slaughter as young adults, since about 55% of the specimens in the age classes came from subadults. Juveniles also died on site, but some *Ovis/Capra* were permitted to live to an older age to reproduce multiple times. These data are also supported by the 63 *Ovis/Capra* teeth recovered from the site.



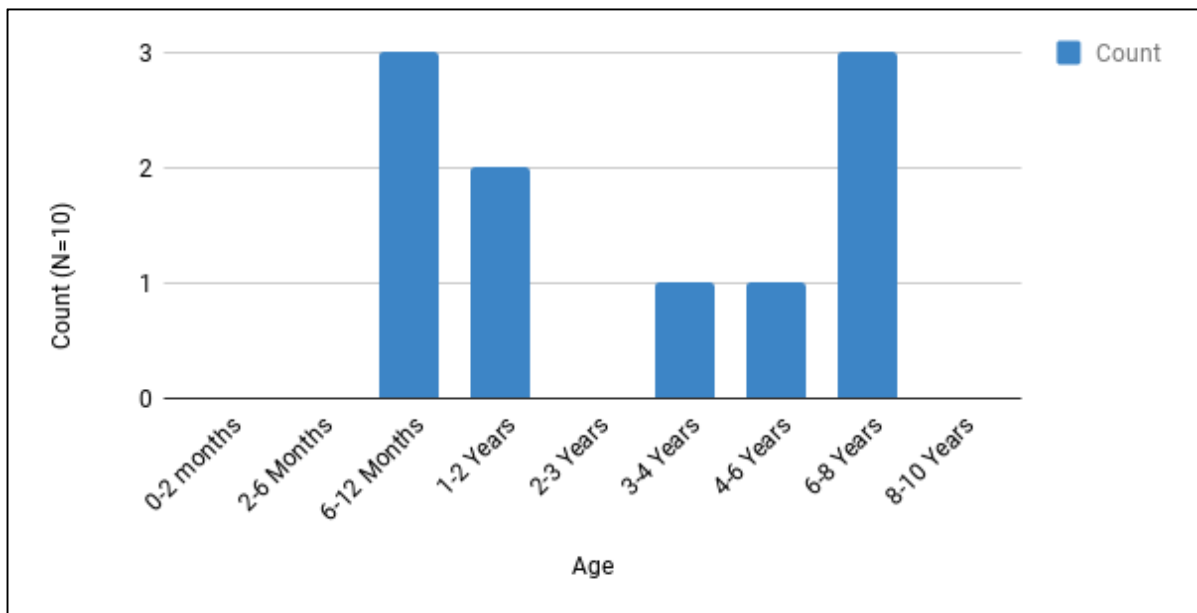
**Figure 19: *Ovis/Capra* Bone Ossification by Age Class (N=38)**

Teeth were all assigned tooth wear stages (TWS) according to the Grant Dental Attrition Age Estimation Method (Figure 20) and tooth rows were assigned chronological ages according to the Payne Method (Figure 21). By both TWS and chronological age, the *Ovis/Capra* teeth tend to cluster into two age categories: by TWS 7-12 and 15-17 and by chronological age, 6 months to 2 years and 3-8 years. These two clusters demonstrate that sheep/goats were either slaughtered in their prime or were permitted to reach sexual maturity and old age. Patterns like these tend to represent patterns of culling males from herds while letting females live long enough to reproduce multiple times (David B. Landon, 2018, pers. comm.). The general spread of ages at death indicates that *Ovis/Capra* were raised *and* consumed at the site, with some living longer for reproductive reasons or for their wool or milk (Reitz and Wing 2008:192). These findings are in line with the other data, all of which

point to the dominance of *Ovis/Capra* at LA 20,000, as they show sheep and goats were bred, raised, and consumed, and possibly used for secondary products here.

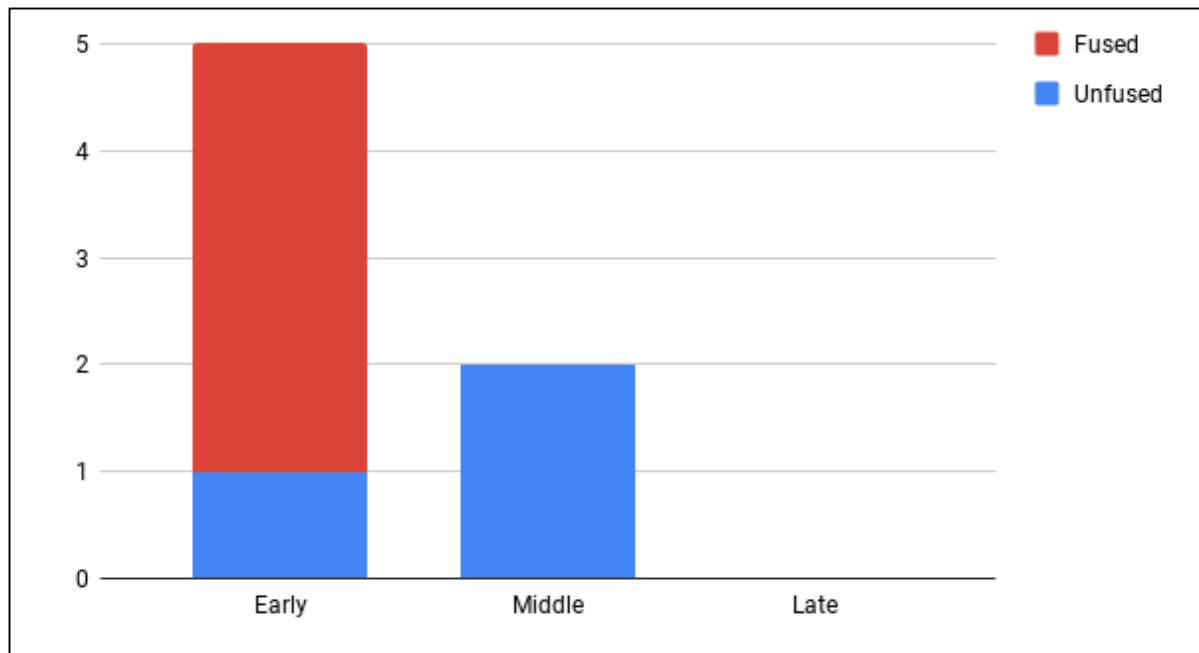


**Figure 20: Ovis/Capra (N=63) and Bos (N=10) Age Estimation by Grant Dental Attrition Age Estimation Method**



**Figure 21: Ovis/Capra Age at Death by Payne System for Recording Attrition (N=10)**

Second in number, *Bos taurus* had only seven bones that were assignable to age classes, as well as ten teeth that were given a TWS (Figure 20). The age class breakdown for *Bos* can be seen in Figure 22; it is remarkably different from the *Ovis/Capra* age spread, especially since no specimens whatsoever were assigned to the late-fusing category and no middle-fusing bones were ossified. Since unfused specimens in the middle-fusing category represent subadults, the *Bos taurus* age profile seems to be almost wholly made up of subadults and juveniles. The teeth also match this pattern. Though there were no *Bos taurus* tooth rows that could be given a chronological age, the TWS patterning compared to *Ovis/Capra*'s is telling. *Ovis/Capra* was divided into two clusters, yet, as seen on Figure 20, the majority of the TWS for *Bos* sits right between these two clusters. Since tooth wear stages are comparable, then one can assume that the *Bos* specimens were from prime-aged, subadult individuals, a perfect age for meat slaughter. The possible presence of juvenile cattle at LA 20,000 may indicate that cows were raised at the *estancia* in addition to sheep/goats, but the absence of older specimens, which would have been necessary for breeding and herd maintenance, makes this claim somewhat unsupportable, though the sample size is very small. This could suggest that cattle were imported from other farms and slaughtered for food at LA 20,000 when necessary (Reitz and Wing 2008:192). The fact that cattle do not seem to have been as intensively raised at LA 20,000 is interesting giving their contribution to the diet in terms of potential meat weight.

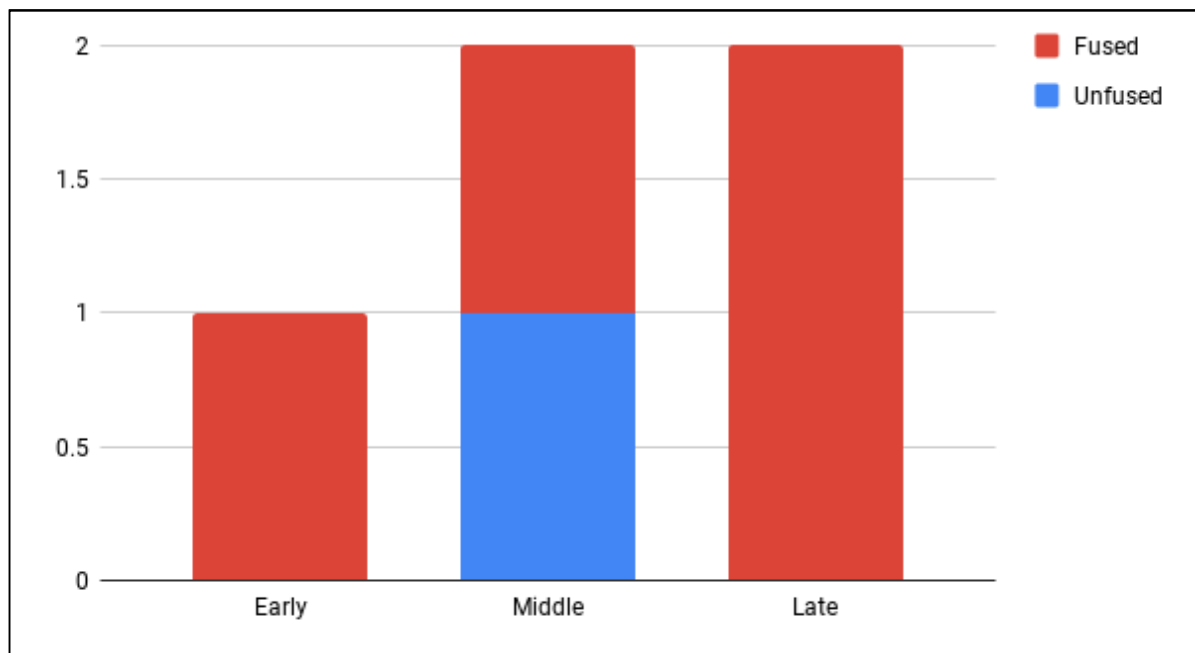


**Figure 22: *Bos* Bone Ossification by Age Class (N=7)**

*Sus scrofa* had a total of only nine specimens that contained any indication of age at death. Of these, two were identified as fetal bones: an ilium, and a humerus, both of which begin ossification in the fetus around 45 days from conception (Prummel 1987:29). The presence of fetal bones indicates LA 20,000 was a breeding site and that the specimens may be the result of the slaughter of a pregnant sow or of birthing or gestation failures (Martín and García-González 2015:78). In addition to these two fetal bones were three juvenile specimens: an incisor, a tooth fragment, and an ilium. The last three *Sus* specimens were an unfused ilium, an unfused metapodial, and a fused vertebra. Only the vertebra is a late-fusing element, ossifying between 4 and 7 years of age in pigs; all the other *Sus* specimens indicate a prenatal or very young age at death. The lack of prime-aged swine at LA 20,000 may be because they were bred on site and exported to other sites, because they did not cope with the climate and did not survive well in New Mexico, or because there were very few pigs at LA

20,000 and, after the initial stock, did not repopulate. Pigs made up very little of the collection by NISP, little of the diet by edible weight, and, considering there is only one adult specimen in the collection, were probably not common at LA 20,000, or, given the climate and historical data, elsewhere in New Mexico at all.

The equine at LA 20,000 have a different age patterning than the other domestic species because they are not typically subject to animal husbandry practices that would raise them for food. In total there were seven *Equus* bones that contained information about age at death. One was a deciduous premolar that was aged to about 2.5-3.5 years (Hillson 2005:240), however, because this tooth was deciduous, it may have fallen out at 2.5-3.5 years of age, while the animal lived longer. The other specimens all indicate that the equids of LA 20,000 lived into adulthood. Figure 23 shows the levels of fusion in early-, middle-, and late-fusing *Equus* bones.



**Figure 23: Equus Ossification by Age Class (N=5)**

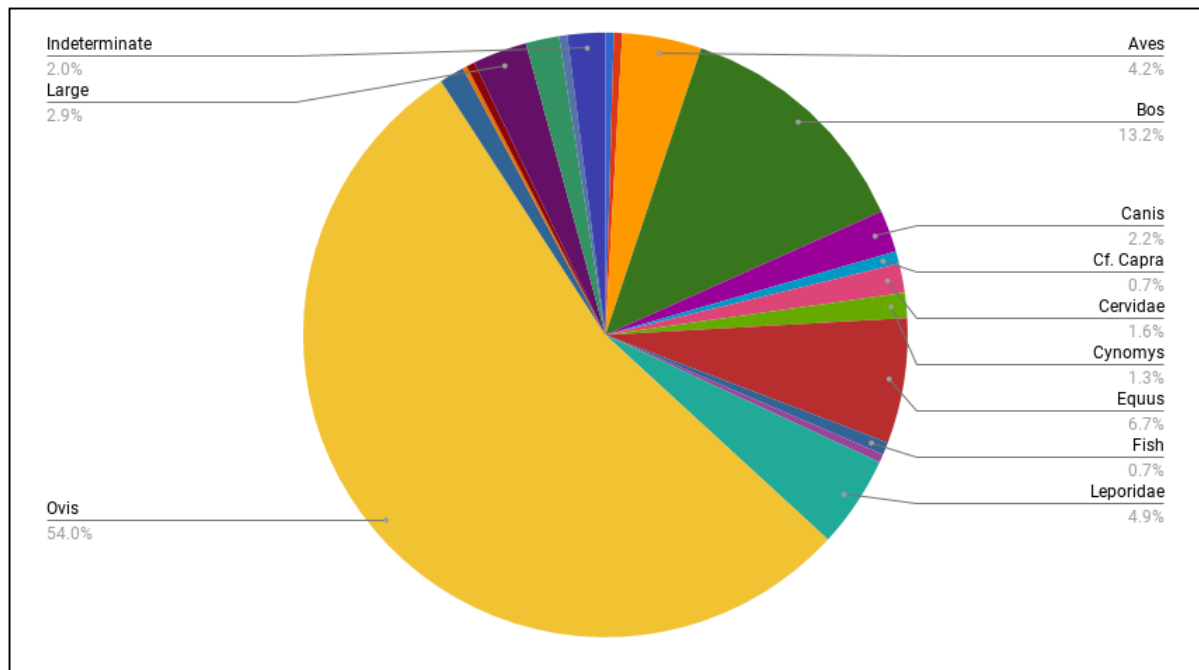
All but one specimen, a radius without an ulna fused to it, were fused, indicating horses and other equids lived to maturity. Considering that these animals are important for transportation and draft work, evidence they lived to adulthood is unsurprising. Even the *Equus caballus* scapula with butchery marks was large and had many deep vascular grooves, suggesting that horse lived out its usefulness before being slaughtered. The previously mentioned *Equus* astragalus bone with a stress-related pathology shows how long and hard these animals were worked during their lives. Clearly, these animals were useful for more than food, so were permitted to live full, albeit strenuous, lives.

### **Results from the 1990s Catalog**

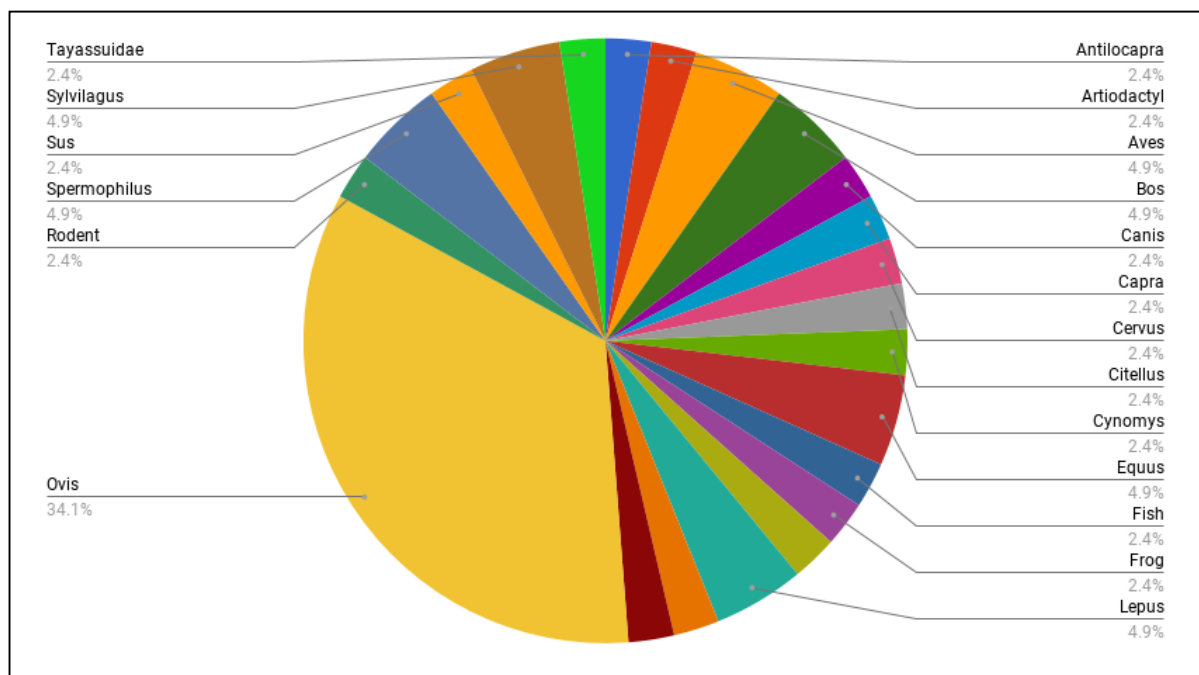
Three additional catalogs pertaining to LA 20,000's faunal collection were held by the Las Golondrinas Museum, and were analyzed separately from the physical collection. The data contained within them refers to material excavated between 1980 and 1995 with bone identifications to taxon and element, and when possible, which region of each bone fragment. Based on the provenience information listed in these documents, it appears that the bones identified in them are missing from the present collection; some bags listed in the catalogs are missing from the entirely, and other bags present in the current collection do not contain the bones listed in the older catalogs. For instance, bag 51-275, which was relabeled as UMB#1987-56, was supposed to have the proximal head of a left *Equid* femur, yet nothing resembling that bone is in bag 51-275. Since these specimens are missing and the catalog data, therefore, cannot be verified, the data are discussed separately from the rest of the collection below, but the two datasets will be integrated in the final analyses.

The old catalogs contain varying levels of specificity in their identifications, likely because they were written by different individuals, so the deepest level of information that can be reliably gleaned from them is a species list and the NISP. An attempt to calculate MNI was made, but its accuracy as an estimation is questionable. Table 4 lists all the taxonomic identifications recorded in the catalogs; some have been grouped together due to ambiguity, but the verbatim terms from catalogs are included in the parentheses. Altogether, the catalogs represent about 20 taxonomic groups, with an NISP of 448 and MNI of 39. Most of the classifications from the catalog overlap with taxa found in the present collection, with a few additions. The additional identifications in the catalog were *Antilocapra* (pronghorn), *Canis* (dog/coyote), *Citellus* (ground squirrel), *Cynomys* (prairie dog), *Meleagris* (turkey), *Odocoileus* (American deer), *Spermophilus* (ground squirrel), and *Tayassuidae* (peccary). Some of these could fall into the broader taxonomic identifications made for the current collection, such as *Citellus* and *Spermophilus*, which would fall into the broader family Sciuridae. Once this is considered, only *Antilocapra*, *Canis*, and *Tayassuidae* were unique to the catalog.

<b>Table 4: Summary of Faunal Specimens from Old Catalogs</b>		
Taxonomic Identification	NISP	MNI
<i>Antilocapra</i>	2	1
Artiodactyl	2	1
Aves (Bird, <i>Gallus</i> , <i>Meleagris</i> )	19	Aves: 2 <i>Gallus</i> : 1 <i>Meleagris</i> : 1
<i>Bos</i>	59	2
<i>Canis</i>	10	1
Cf. <i>Capra</i> (Goat, Sheep/Goat)	3	1
Cervidae ( <i>Cervus</i> , <i>Odocoileus</i> )	7	1
<i>Cynomys</i>	6	1
<i>Equus</i>	30	2
Fish/Osteichthyes	3	1
Frog	2	1
Leporidae ( <i>Lepus</i> , <i>Sylvilagus</i> )	22	<i>Lepus</i> : 2 <i>Sylvilagus</i> : 2
<i>Ovis</i>	242	14
<i>Spermophilus</i> / <i>Citellus</i>	6	<i>Spermophilus</i> : 1 <i>Citellus</i> : 1
<i>Sus</i>	1	1
<i>Tayassuidae</i>	2	1
Large (Large, <i>Bos</i> / <i>Equus</i> )	13	
Medium	8	
Small (Small, Unspecified Rodent)	2	Rodent: 1
Indeterminate	9	
<b>Total</b>	<b>448</b>	<b>39</b>



**Figure 24: Taxa Identified in Old Catalogs by NISP**



**Figure 25: Taxa Identified in Old Catalogs by MNI**

Figures 24 and 25 are graphical representations of the NISP data and MNI data, respectively. By NISP, *Ovis* dominates, with *Bos*, and *Equus* making up the next two largest categories and altogether comprising 73.9% of the catalog taxa. By MNI, *Ovis* continues to dominate, with fourteen individuals. All other taxa are represented by only one or two individuals. Because of this, *Bos* and *Equus* are no longer more numerous than other species, but are tied with *Aves*, *Lepus*, and *Sylvilagus*, all of which have an MNI of 2. This small shift in the MNI may represent a greater reliance on locally available birds and small mammals in the diet than expected. However, many specimens collected by Trigg came from areas previously excavated in the 1980s and 1990s, so the presence of these smaller bones in the catalog may be because they were collected in the earlier excavations and then subsequently lost. Regardless, the meat mass they would have contributed to the diet would have been far less than the European domesticates. According to both MNI and NISP calculations *Ovis* strongly dominate the assemblage. Although they are clearly important to life at LA 20,000, the presence of wild species outside of the ones identified in the extant faunal collection is interesting.

The wild taxa identified in the catalogs include *Sylvilagus*, *Canis* (if not a domesticated dog), *Lepus*, *Cynomys*, *Odocoileus*, *Spermophilus*, *Osteichthyes*, *Cervus*, *Meleagris*, and *Tayassuidae*. Altogether they make up 13.2% of the total catalog collection by NISP, though in the physical collection wild species only make up 1.87% by NISP. *Sylvilagus* (cottontail rabbit) are the most common with an NISP of 14, followed by the closely-related *Lepus* (Hares and Jackrabbits) with 8, both of which have an MNI of 2. Rabbits and hares were an easily accessible and common source of meat in the pre-

Columbian Puebloan diet. *Cynomys* (prairie dogs) and *Spermophilus* (ground squirrel) represent a similar source of easily-acquired small game. Though there were only two *Tayassuidae* (peccary) bones identified, this animal might be considered a source of small-medium game similar to domestic pork, although little information exists concerning whether it was eaten by the indigenous groups of New Mexico, especially because it can be found only in the extremely southern portions of the Southwest.

Deer, identified both as *Cervus* and *Odocoileus* in the catalogs, was one of the few sources of large game for pre-Columbian indigenous groups, yet here only seven deer bones, representing a minimum of only one individual, were identified, corresponding with the data from the existing collection. Only three *Osteichthyes* (fish) bones were identified in the catalogs, but the lack of fish could be due to the fragile nature of their bones, the scarcity of waterways in New Mexico, or the preference for other foods. The ten identified *Canis* bones, with an MNI of one, were not identified any more specifically, and coyotes, wolves, and foxes are all native to New Mexico, so these bones could belong to any of these canids; they could also represent domestic dogs, which were both possessed by the Pueblo and brought by Europeans. Regardless, they were more likely scavengers or pets, rather than food, especially considering none of them had butchery marks. Lastly, the presence of two *Meleagris* (turkey) bones is interesting because turkeys are native only to the Americas, and were kept by Pueblo for their feathers, which were used for clothing, blankets and ceremonial objects (Barrett 2012; Sorensen 2016). Around 1200 AD turkey consumption in Mesa Verde peaked but when people moved to the Rio Grande, they began to rely on deer meat instead (Sorensen

2016). The presence of turkey bones indicates that turkeys were still being utilized in the area, either for food or for feathers, though by whom is unclear.

## **Summary**

The data from the faunal collection at LA 20,000 can be summarized as a heavy dominance of *Ovis/Capra*, followed by other European domesticates: *Bos taurus*, Equids, and *Sus scrofa*, in that order. The age profiles and butchery patterns indicate that *Ovis/Capra* were the primary animal raised at the *estancia*, as young males were culled from the herds and other individuals were bred multiple times to perpetuate the herd. Prime-aged *Ovis/Capra* were slaughtered, following typical European butchery practices, although with a possible mixture of stone and metal tools, and primary and secondary butchery were undertaken on site. The extent to which dressed *Ovis/Capra* carcasses were traded locally is unknown, but the butchery patterns and the size of the *estancia* suggest LA 20,000 was involved in trading networks.

Some evidence suggests that *Bos taurus* were traded to the site, used as draft animals, and butchered for food when necessary. There is a possibility they were raised at LA 20,000, but only in few numbers. They did provide a substantial amount of meat to the diet, however, so their importance should not be disregarded. Horses were also used as draft animals and for transportation, although direct evidence shows they were slaughtered and roasted for food occasionally. The horse bones from the collection did not represent any methodical butchery pattern, so they were probably only eaten as a last resort, and allowed to live out their lives before being consumed. Domestic pigs were not common at LA 20,000 and were probably only present on the site if one was traded there.

Wild animals were sparse, but do point to the consumption of fish, deer, and small mammals by the inhabitants. These species may have been acquired directly by those living at the *estancia* or through trade. The presence of these animals, coupled with evidence of horse consumption and low-priority cuts of meat may mean a few things. First, it may demonstrate periodic food scarcity and the consumption of “famine foods” as a way to combat hunger. Second it may demonstrate that, although LA 20,000 was a working farm with access to meat, the best cuts were traded away for profit, leaving the farmers themselves with lower quality foods. Third, the mixture of foods represents the presence of multiple ethnic groups living at one site and interacting in the colony. Domestic European animals were most readily available and therefore the most common meat eaten, but local game may show a preference for a different type of cuisine to supplement the diet. In this scenario, horses were probably eaten by indigenous individuals who did not have a taboo against eating them. Overall, the meat portion of the diet shows a heavy reliance on domestic herd animals, because they were most easily accessible, but does not discount the mixture of different food traditions and ethnicities present at the site.

## CHAPTER 5

### COMPARATIVE ANALYSIS

This chapter's goal is to understand how the faunal portion of LA 20,000's diet compares to the plant-based portion of the diet at the site, as well as faunal assemblages of other sites. Plant remains from flotation samples were examined by Trigg. Her results along with what is known about the site's cooking artifacts are examined to create an overview of the diet. The study assemblage is also compared to faunal data from Awatovi mission site to understand how religious *estancias* and secular *estancias* compare, and how the systems of labor at these sites affected diet.

#### **LA 20,000's Plant-Based Diet**

The plant-based diet at LA 20,000 proved to be a complex mixture of Spanish/European and Pueblo. When Oñate first traveled to New Mexico, he brought an enormous amount of plant extracts and oils with him, including chamomile, dill, citrus, myrtle, fennel, rose, quince, marshmallow, and borage; the second expedition brought saffron, aniseed, almonds, hazelnuts, sesame, walnuts, lavender, rosemary, Jamaica tree fruit, native and Castilian spices, marjoram, pepper, capers, olives, raisins, coriander, and cinnamon (Trigg 2004:228). Though not all these plants were used for food, the extensive list of European plants they brought indicates a high preference for maintaining a Spanish or

European cuisine. Once the colonists developed farming, accounts state they grew cabbage, onions, garlic, lettuce, cucumbers, radishes, artichokes, and carrots – all Old World crops (Trigg 2004:228). LA 20,000 was no exception to the rule, and archaeology demonstrates Old World crops were cultivated there.

Soil samples from several locations around LA 20,000 contained a plethora of plant remains. European plants recovered include bread and emmer wheat, peas, apricots, and peaches. Local indigenous plants found on site include maize, which was actively cultivated by the Pueblos, as well as goosefoot, purslane, ground-cherry, and piñon nuts, all of which were traditionally gathered by the Pueblos for consumption (Trigg 2004:231; Trigg 2017:12). The presence of indigenous plants at LA 20,000 means its inhabitants were making use of their local environment, but the presence of goosefoot, purslane, and quelite may indicate food stress, as all three were viewed by the colonists as “last-resort foods.” In fact, goosefoot and purslane were recovered from *all* 17<sup>th</sup>-century Spanish sites in New Mexico, and quelite was very prominent at LA 20,000 and the La Fonda Hotel site in Santa Fe, meaning the colonists were consuming them regularly and ubiquitously, and therefore coping with limited sources of food (Trigg 2005:127). Their preference for Spanish cuisine, especially as a status symbol, was difficult to maintain, and food stress may have been a common issue across all of New Mexico.

In addition to the plant remains found at LA 20,000, several artifacts were uncovered that shed light on the diet. One of the largest was a Spanish-style *horno*, or bread oven, for baking wheat bread. As mentioned before, wheat bread was one of the staple foods of Spanish identity. Conversely, fragments of sandstone *comales*, griddles used to make

Puebloan maize tortillas, were also discovered. The colonists had already adopted maize tortillas into their diet in Mexico, but their *comales* were always ceramic or metal, whereas Puebloan ones were sandstone. The effort required to build the *horno* indicates a preference for Spanish wheat bread, but the *comal* fragments demonstrate maize tortillas were being cooked and consumed at the *estancia* (Trigg 2004:234, 2005:126). The mixtures of the two breads, foods closely associated with either Spanish or Indian identity in the 17<sup>th</sup> century suggests complex attitudes towards food, status, and availability at LA 20,000.

Other ceramic artifacts recovered from LA 20,000 include fragments of jars, bowls, and “modified” soup plates, all of Puebloan manufacture, and imported olive jars and Mexican majolica (Trigg 2017:12). Soup plates and other flanged-rim vessels are considered Spanish forms, having no precursor in the Americas, and were frequently used by the Spaniards for stews (Snow 1984:105). Pueblo peoples manufactured these dishes for the colonists, though they are more associated with Spanish cuisine. Earthenware olive jars were also associated with Spanish identity because they are an imported ware used to ship olives, wine, oil, and other liquids, many of which were quintessential Spanish foods. In several studies in New Mexico, majolica and other glazed wares were considered rare markers of “Spanishness” or of elite status. However, in other contexts Voss has challenged the association of majolica with elite status and maintains that different ware types were associated with function, so a household would have had both “high” and “low” ceramics and used them side-by-side for different purposes (Voss 2012:43). Therefore, the mixture of ceramics at LA 20,000 may speak less to the status of the site and more to the effort made to acquire Spanish foods and consume Spanish dishes.

### ***Awatovi Convento***

Zooarchaeological data from mission sites in the Southwest are sparse, with most studies focused on the pre-colonial diet or the plant portion of the diet. Existing data on faunal remains is rudimentary: typically lists of which taxa were identified in an assemblage. Because of this, a limited amount of zooarchaeological data was available for comparison. Awatovi Pueblo was selected as a comparison site because it had the most available zooarchaeological data and because it compared well as a religious foil to the secular LA 20,000.

Awatovi lies approximately 300 miles west of LA 20,000, in what is now Arizona, and was occupied by the Hopi Pueblo from the 16<sup>th</sup> century onward. Spanish colonists first encountered it in 1540, and this and subsequent encounters were marked by violence and hostility between the groups. During the 17<sup>th</sup> century, Franciscans settled at the pueblo, bringing European crops and livestock. The population flourished, increasing from about 1,000 to 3,000 after Spanish contact due to *reducción*; this included 900 converted Hopi living there in 1664, making it one of the most heavily populated pueblo villages (Chapin-Pyritz 2000:187; NPS 2017). The Franciscans developed a mission and built three churches at the site. As well as religion, the friars brought the forced labor systems discussed in Chapter 2. At the hands of the friars, the Hopi suffered labor injustices, as well as efforts to abolish their religion, the prohibition of sacred dances, and acts of sexual violence against women, among other things (Chapin-Pyritz 2000:27; Liebmann 2015:6; NPS 2017). Because these social and labor conditions compare with those happening at 17<sup>th</sup>-century *estancias*,

Awatovi makes a good comparison for LA 20,000 to understand how religious or secular labor relations shaped the diet.

Awatovi Pueblo was excavated by Harvard University's Peabody Museum of Archaeology and Ethnology from 1935-1939. The staff were experts from Harvard, while the excavation crew was almost entirely Hopi. During this project, they excavated over 13,000 rooms, which contained 11,700 stone and bone artifacts, 8,500 pottery specimens, and over half a million potsherds (NPS 2017). These were sampled and analyzed by Regina Louise Chapin-Pyritz in 2000 for her doctoral dissertation at the University of Arizona. She examined faunal elements from three contexts: 965 from the prehistoric Western Mound, 2,204 from the historic-era Hopi village, and 2,065 from the Spanish mission. The Hopi village and Spanish mission were inhabited simultaneously, though the Spanish mission was where the friars and some neophytes resided and the village was where the remainder of the Pueblos lived. Her data are used in the following comparison.

Table 5 displays a summary of her data as well as the combined data from the existing LA 20,000 collection and the old catalogs. For clarity, some taxonomic identifications were grouped, such as Anatidae and its subfamily Anserinae, or all Jackrabbit species being listed as *Lepus* sp. The size categories for mammals were edited for clarity as well: Chapin-Pyritz's size categories from "very small" to "medium" are comparable to the "small" and "medium" categories used in this thesis while her "medium-large" to "large" categories are comparable to the "large" category used here. Unidentified mammalian and vertebrate fragments are not included in the table because the scale was too large. Chapin-

Pyritz only calculated NISP and discussed butchery patterns, so these are the only aspects discussed in relation to data from LA 20,000.

<b>Table 5: A Comparison of the Taxa from Awatovi <i>Convento</i> and LA 20,000 by NISP Percentages</b>					
<b>Class</b>	<b>Taxonomic ID</b>	<b>Common Name</b>	<b>Historic Hopi Village (N=2,198)</b>	<b>Spanish Mission (N=2,056)</b>	<b>LA 20,000 (N=2,552)</b>
Amphibia	Anura/Ranidae	Frogs			0.24
Amphibia	Bufonidae	Toads			0.04
Aves	Accipitridae	Hawks, Vultures	0.45	0.63	
Aves	Anatidae	Duck/Goose			0.16
Aves	Falconidae	Falcons	0.45		
Aves	Phasianidae	Quails, Pheasants, Peacocks,			0.16
Aves	<i>Gallus gallus</i>	Chicken	0.09	0.09	0.27
Aves	<i>Meleagris gallopovo</i>	Turkey	0.73		0.08
Aves	<i>Grus canadensis</i>	Sandhill Crane	0.05		
Aves	<i>Covus corax</i>	Raven	0.23	0.15	
Aves	Unid.	Birds, general	0.18	0.05	4.58
Mammalia	Lepus sp.	Jackrabbits	12.65	14.4	0.39
Mammalia	Sylvilagus sp.	Cottontail Rabbits	10.69	12.06	0.59
Mammalia	Sciuridae	Squirrels	0.55	0.19	0.35
Mammalia	Cricetidae	Rats & Mice	0.96	0.05	
Mammalia	Erethizontidae	New World Porcupines	0.23	0.15	
Mammalia	<i>Castor canadensis</i>	Beavers		0.15	
Mammalia	Procyonidae sp.	Raccoons			0.08
Mammalia	Rodentia	Rodents, general			0.08
Mammalia	Canidae	Dogs, Foxes, and Coyotes	5.55	5.35	0.39
Mammalia	<i>Taxidea taxus</i>	Badger	0.41	0.05	
Mammalia	<i>Felis rufus</i>	Bobcat	1.59	1.55	
Mammalia	<i>Felis domesticas</i>	Domestic Cat	1.27		
Mammalia	Artiodactyla	Artiodactyls, general	15.33	14.69	0.63
Mammalia	Cervidae	Deer & Elk	5.23	4.62	0.43
Mammalia	<i>Antilocapra sp.</i>	Pronghorn	8.28	8.46	0.08
Mammalia	<i>Sus scrofa</i>	Old World Swine	0.09	1.61	0.71
Mammalia	<i>Tayassuisae</i>	Peccary			0.71
Mammalia	Bovidae	Bovids, general	0.05		
Mammalia	<i>Ovis canadensis</i>	Bighorn Sheep	1.04	0.97	
Mammalia	<i>Bos taurus</i>	Domestic Cow	0.5	0.68	4.23
Mammalia	<i>Ovis/Capra</i>	Domestic Sheep/Goat	18.42	26.31	16.85

Mammalia	<i>Equus sp.</i>	Horse/Donkey	0.09	0.39	2.5
Mammalia	<i>Equus caballus</i>	Horse		0.09	0.2
Mammalia	Small/Medium	Very Small – Med. Mammal	4.46	1.51	0.2
Mammalia	Medium/Large	Med/Large - Large Mammal	10.78	5.74	63.48
Osteichthyes		Fish			1.41
Reptilia	<i>Chrysemys picta</i>	Painted Turtle		0.05	
Reptilia	Lacertilia	Lizard			0.04
			<b>100.35</b>	<b>99.99</b>	<b>98.99</b>

For the sampled Awatovi collection overall, Mammalia accounted for 98.5%, while Aves made up 1.4% and Reptilia 0.02% by NISP (Chapin-Pyritz 2000:111). These percentages compare well with those at LA 20,000: Mammalia made up 96.4%, Aves 3.1%, fish 0.4% and Reptilia/Amphibia 0.1%. What differed somewhat between the two sites were the taxa identified and the gap between domestic and wild species use. As seen in Table 5, both the historic Hopi village and the Spanish mission contained a somewhat different array of taxa than LA 20,000. A total of 27 different taxa were identified at Awatovi, with taxa exclusive to the site including Accipitridae (hawks/vultures), Falconidae (falcons), *Covus corax* (raven), *Grus canadensis* (Sandhill crane), Erethizontidae (porcupines), *Castor canadensis* (beaver), *Taxidea taxus* (badger), *Felis rufus* (bobcat), *Felis domesticas* (domestic cat), *Ovis canadensis* (bighorn sheep) and *Chrysemys picta* (painted turtle). Most taxa exclusive to LA 20,000, including Anura/Ranidae (frogs), Bufonidae (toads), Lacertilia (lizards), and Osteichthyes (fish) are water-related animals whose presence can be explained by the site's proximity to a stream.

Overall Awatovi's collection was dominated by wild taxa. From the Hopi village, 42.03% of specimens were from wild species and 19.19% from domestic, while at the

Spanish mission 43.24% were from wild and 29.17% domestic. In the village, wild game outnumbered domestic specimens about 2.2:1 and in the mission about 1.5:1; the ratio might be even higher because some wild animals were processed off site, meaning their NISP is low (Chapin-Pyritz 2000:207). At LA 20,000 specimens identified to domestic taxa outnumbered wild taxa approximately 5:1. Though the differences between LA 20,000 and Awatovi overall are great, the slight difference between the Hopi village and the mission shows a higher preference for domestic stock in the mission, and may be explained the influence of the friars residing there. The use of domestics and other taxa at Awatovi as explained by Chapin-Pyritz (2000) is summarized below.

One of the main trends Chapin-Pyritz noted was that domestic livestock use increased over time while the use of large, wild game decreased, though small game was still important to the diet. Spanish-introduced domestics account for the highest portion of specimens in all three contexts, at 19.2% by NISP, whereas large, wild game account for 13.5%, even though they were present in the prehistoric context and domestic stock were not (2000:176.). The fact that domestic species account for the largest portion shows they rapidly took the place of large, wild game. For example, both the Spanish mission and the Hopi village had similar percentages of large, wild game at 14% and 14.5% respectively, yet domestic ungulates made up 28.5% of the NISP at the mission and 19% at the village, notably outnumbering large, wild game (Chapin-Pyritz 2000:176). The higher proportion of domestic specimens at the mission reflects both the friars' control over the herds, and therefore easier access to the meat, and a preference for consuming domestic meats. The lower amount of domesticates at the village could demonstrate: 1) continuing Puebloan food traditions; 2) the result of feeding

a larger population with limited resources; and/or 3) the possession of fewer domestic animals by those living in the Hopi village (though the friars did give domestic animals to indigenous people it was often to subvert social hierarchies). Clearly, the high prominence of domesticates shows they became an essential part of the diet at Awatovi and quickly replaced large game species, such as pronghorns and deer, though the difference between the two contexts at Awatovi shows differing levels of integration of domestic meat into the diet.

Like LA 20,000 *Ovis/Capra* are the most numerous domestic taxa with a NISP of 405 at the Hopi village and 541 at the Spanish mission. Over 25% of the bones identified at the Spanish mission were *Ovis/Capra*, while they made up 18.4% of specimens from the Hopi village. Possibly because of the taxa's abundance, most of the charred/calcined remains from the Spanish mission were also *Ovis/Capra*. Chapin-Pyritz (2000:185) suggests they were utilized as a heat source to fire pottery or to heat piki stones. Ceremonial uses for *Ovis/Capra* are demonstrated by the remains of two domestic sheep recovered from a slab in the center of a Puebloan kiva (Brew 1937:126). This shows the introduced species were not only viewed as a food source, but, for some, as an acceptable substitute in Puebloan ceremonial practices; Awatovi was more welcoming to the Spaniards than other Pueblo villages, so the use of European sheep in Puebloan religious spaces may represent an attempt to please the friars. Clearly, sheep/goats were used in numerous ways, but their presence in the assemblage indicates they were a main component of the diet, especially at the mission, though were not as important as at LA 20,000 because they were still outnumbered by wild species.

Cows were found in even amounts across the two historic contexts at Awatovi but were more numerous at LA 20,000 by NISP. Cows were common in colonial New Mexico,

but were less popular at northern missions (Chapin-Pyritz 2000:146). Horses and other equids were also scarce; only sixteen equid specimens were recovered from historic contexts, though seven contained butchery marks consistent with meat removal or were broken in a manner consistent with accessing marrow (Chapin-Pyritz 2000:211). The high frequency of butchery marks on equid bones mirrors equid butchery at LA 20,000. Swine, as the other European farm animal, were discovered at Awatovi, but, once again, were significantly outstripped in abundance by other species. Chapin-Pyritz argues that the paucity of these animals at Awatovi shows they were utilized for subsistence, but very infrequently.

In terms of local game, Lagomorphs accounted for the largest percentage of both the historic and prehistoric contexts and are second only to domestic livestock by NISP. They make up 52.6% of the assemblage from pre-contact contexts and 24.7% from historic contexts (Chapin-Pyritz 2000:129). Though the presence of rabbits and hares in the diet dropped by about 50% from pre-contact contexts to historic ones, they were utilized fairly equally in the Hopi village (23.34%) and Spanish mission (26.46%) throughout the colonial period. In fact, the higher parentage at the Spanish mission may be because the friars actively chose to eat a food highly associated with the Puebloan diet as an act of solidarity, even though domestic animals were readily available. At LA 20,000 rabbits and hares only accounted for 0.98% of the identified species, indicating those residing here chose not to consume an essential Puebloan food-source in lieu of domestic meat. Other small mammals were consumed at Awatovi through the historic period (Chapin-Pyritz 2000:162). Though they are usually disarticulated by hand after cooking, some specimens did contain butchery marks or burning. Chapin-Pyritz found evidence for the consumption of porcupines at both

the mission and village, rock squirrel in the village, and beaver only in the mission; beaver and porcupine have been identified as food at other pueblo villages.

Mixed evidence for the consumption of birds at Awatovi exists. Since the site is not near waterways, the waterfowl present in LA 20,000's assemblage are absent. Birds were noted in similar levels between the prehistoric Western Mound and the Hopi village, but were less common at the Spanish mission both in terms of number and taxonomic variety. Like at LA 20,000, chickens were the only Old World avian species recovered and were found in equal numbers in the mission and village (Chapin-Pyritz 2000:150). All butchery marks on bird specimens were on the wing elements, suggesting birds were used for ceremonial feathers rather than food (Chapin-Pyritz 2000:151). Birds were not typically consumed by the Hopi and their scarcity at the Spanish mission indicates even the friars and neophytes residing there did not consume copious amounts of poultry. Only one bird bone at LA 20,000 had butchery marks, but it does provide evidence for the consumption of poultry at the *estancia*.

Chapin-Pyritz noted carnivore specimens decreased from the prehistoric to the historic contexts. Coyotes, dogs, bobcats, badgers, and domestic cats were all identified at Awatovi, and a few ambiguous canids at were identified in the old catalogs from LA 20,000. At Awatovi, they decreased from 14.1% by NISP in prehistoric contexts to 5.4% in historic contexts, even though the colonists introduced domestic cats and Spanish greyhounds (Chapin-Pyritz 2000:136). The introduction of additional carnivores did *increase* their NISP from 136 at the Western Mound to 194 in the Hopi Village and 143 in the Spanish Mission, but they made up a smaller proportion of the collection in the later contexts. Of these, bobcat,

domestic cat, dog, and coyote bones all contained skinning marks from when their pelts were removed, and some contained butchery marks associated with meat removal (Chapin-Pyritz 2000:171). The presence of butchery marks on these animals differs greatly from LA 20,000, where none of the canid specimens contained any butchery marks, and demonstrates a non-European practice of consuming carnivores, as well these species being utilized for furs.

In addition to taxonomic information, Chapin-Pyritz noted butchery patterns at Awatovi. Generally, the specimens were subject to butchering, breakage, and burning, as well as weathering and gnawing. Many bones of both domestic (33% of all specimens) and wild fauna (37%) in historic contexts were broken with methods consistent for marrow-removal; only 4.5% of artiodactyl bones from prehistoric contexts were broken in this way (Chapin-Pyritz 2000:178). In addition to marrow, high percentages of broken cranial elements showed brains were regularly removed for food or tanning purposes (Chapin-Pyritz 2000:206). The minimal number of burnt bones from historic contexts demonstrated other methods of food preparation were utilized, such as drying or stewing, though burning patterns from the prehistoric Western mound indicate Hopi roasted their meat prior to contact (Chapin-Pyritz 2000:180). At LA 20,000 most of the heat-modified bones were used as fuel in fires, whereas the lack of burnt bones at Awatovi indicates food was not typically not cooked in open flame nor were bones used as fuel or disposed of in fires.

Overall, Awatovi represents different foodways patterns than LA 20,000. Awatovi's assemblage contains a greater variety of wild local animals, though in both historic areas the domestic species were dominated by *Ovis/Capra*. Large artiodactyls, which include pronghorn, bighorn sheep, elk, and deer, were overtaken in importance by domesticates

because they were easier to access in managed herds. The same is true for LA 20,000 but the sites' assemblages differ regarding local species and small game. The large indigenous population at Awatovi flavored the foodways at the site, with all residents regularly continuing to consume small, local game, especially rabbits and hares, which were a cornerstone of the pre-contact Puebloan diet. The presence of rabbits and hares in high numbers at the Hopi village and Spanish mission means the friars were actively consuming a food traditionally associated more with Puebloan culture, although they also consumed vast numbers of domestic sheep. The mixture of different foods at the Spanish mission is probably due to of the accessibility of domestic meats combined with the friars' willingness to eat like their flock to show solidarity. At other missions, friars assumed different attitudes towards food, with some eating exclusively "Spanish" and others not (Trigg 2004). At LA 20,000 the residents avoided eating local meats when possible, likely because they had more access to domestic stock and because fewer indigenous people resided there. Conversely, the mixture of different foods at the Hopi village is probably the combined result of the accessibility of newly-introduced domestic meats, the preexisting indigenous foodways, and a population increase with its associated food pressures (Chapin-Pyritz 2000:187). Access to both wild and domestic species helped the Hopi maintain some foodways traditions while supplementing their diet with the more accessible domestic species to feed an increased village population. At Awatovi, the high presence of both local game and of *Ovis/Capra* suggests the overall diet was shaped by food accessibility, with individual decisions further shaping the food practices at both the Spanish Mission and at the Hopi Village.

## CHAPTER 6

### DISCUSSION AND CONCLUSION

The conclusion of this thesis aims to answer the final question outlined in the introduction chapter: How was food used differently at a secular ranch site from a religious mission site, and how does this relate to identity and colonial politics? In other words, what does the variability between the two Spanish sites, LA 20,000 and the Spanish mission, mean? In the above chapter, I summarized the foodways at both sites, as well as Awatovi's Hopi village, which should contextualize the changes made to Puebloan foodways during colonization and should therefore frame the 17<sup>th</sup>-century Spanish foodways not as opposites of a pre-contact Puebloan diet, but as different food practices that developed during a time of intermingling ethnicities and transforming foodways in general. To answer to this question, a discussion of identity is included, followed by an explanation of the results at the two sites within this theoretical framework.

Identity in the Spanish Empire was based on the *regimen de castas*, a social ranking structure based status on “blood purity,” but in the colonies, especially the frontier regions such as New Mexico, it was based on a complex mixture of parentage, economic status, and appearance, among other things (Scholes 1935:97; Trigg 2005:212). With the mutability of the caste system in New Mexico, individual identity itself could be more fluid, enabling

people to manipulate or reaffirm their identities through their everyday actions. This flexibility allowed individuals to portray certain identities in certain social situations, resulting in a variety of outcomes, including crossing social boundaries (Gardaphé and Xu 2007:9; Sunseri 2009:322). Generally, individuals might work towards emphasizing an identity in one context and downplaying it in another depending on their perception of the social, economic, and political advantages of their actions (Emberling 1997:310; Rodríguez-Alegría 2005). For some, portraying only one identity or social rank would be beneficial, whereas others might need to call upon multiple identities to negotiate their daily life.

Within the *casta* system, for instance, high-ranking individuals might only need to call upon their high status, since they do not need to benefit from having ties to or affinity with multiple social groups (Sunseri 2009:322). Individuals ranked lower, on the other hand, can benefit from having connections with multiple groups. For example, Sunseri's research on the genízaro community at *Casitas Viejas* showed individuals developed a variety of different identities. As a detribalized people, they had been charged with acting as a buffer between the Spanish colonists and Native American groups on the plains, and depending on whom the genízaro were negotiating with, their food and hospitality tactics changed to meet that group's preferences; their food selection and situational identity were survival tactics rather than a reflection of ethnicity (Sunseri 2017). Food can also be utilized politically; Rodríguez-Alegría (2005) has demonstrated how throughout the Spanish Empire conquistadores used food and feasting to create political alliances with caciques and other indigenous elites to gain access to resources and control indigenous labor. Although food tends to be viewed as parallel to identity, especially ethnic identity, these examples show it

can be utilized or mobilized as part of the process of identifying with or aligning oneself with certain social groups. Food choice, therefore, does depend on one's cultural background but *also* what role or identity one wants to assume. The material traces of these food choices are seen in the archaeological record.

The conclusions we can draw about LA 20,000 was that it was a sheep farm operated by an extended family of colonists and indigenous laborers. It is the largest and most architecturally complex Spanish home site in New Mexico, so its inhabitants were probably high status, and the head of house was probably an *encomendero* who received tribute and labor from Pueblos. Based on production levels, the farm was engaged in the local economy and traded for Puebloan manufactured ceramics, imported foods, livestock, such as cattle and swine, and a small amount of local game, like deer. Old World plants, including wheat, were grown here and local plants were acquired to supplement the diet. Attempts at eating Spanish foods were made as evidenced by the building of the *horno* and presence of olive jars, though locally available foods were consumed, too. The meat-based portion of the diet at the site was mostly from European domesticates, especially sheep and cattle, with very few local species. The plant portion of the diet revealed a more complex mixture between European plants and locally available plants. Though the site was a working farm with large herds, some evidence points to food stress as a recurring issue, as horses and other “famine foods,” like goosefoot and purslane were consumed here. This could also be the result of different food cultures intermingling.

The emphasis on European domesticate animals for food comes from not only their accessibility, but also from their association with the colonists' sense of Spanish status. Since

*casta* boundaries were less rigid, and less appearance-based, the use of status symbols or status foods would have been necessary if people aimed to signify their rank or socially distance themselves from others. Since the colonists at LA 20,000 were high status, they used food to mirror their social position, making the effort to raise, import, and consume traditional Spanish foods on Spanish-style dishes, even though these were manufactured locally by Pueblos.

Though some traditional Puebloan foodways were practiced at LA 20,000, local foods, especially game meats, were uncommon here probably because they were viewed by the farm owners as lower-status and because they required more effort to acquire than any of the farmed foods. Some were incorporated into the diet because the colonists and indigenous laborers worked closely together, resulting in the exchange of knowledge and practices surrounding food (Snow 1992:187). These one-on-one interactions shaped the diet at LA 20,000 because it resulted in the adoption of many local plants into the diet. Plants were easier than animals for the colonists to incorporate into their diet because they were already farming domesticated herd species and did not need additional sources of meat. The diet at LA 20,000 is thus the result of the colonists attempting to eat high-status Spanish foods while simultaneously interacting closely with indigenous laborers, all while navigating food accessibility, pressure, and shortage.

Awatovi represents a different development of foodways in 17<sup>th</sup>-century New Mexico. Awatovi was a religious site, so although it was a prominent site and missions had some economic power, it was high status more because of its religious and political connotations, and less for its economic connections. The inhabitants here were almost wholly

indigenous, a mixture of Pueblos from different villages consolidated into one mission, with only a handful of friars. The friars would have been the only ones at the site with an in-depth knowledge of status foods and Spanish cuisines, and they apparently did not fully uphold these standards. The diet at Awatovi was equally dominated by sheep and wild species, especially rabbits and hares. These were a staple Puebloan food and would have remained easy for the Pueblo to catch while still living under the labor constraints of the mission. European livestock certainly took hold at Awatovi, with sheep/goats making up the majority, but although livestock replaced large, wild game in the assemblage, it was not nearly as important to the diet as it was at LA 20,000.

In the Hopi Village at Awatovi, Pueblos incorporated European sheep and goats into their diet because they were readily available sources of large game and the archaeological record suggests they took the place of large local game in the Puebloan diet. The presence of so many rabbits and hares in the mission contexts, which would reflect the diets of the friars, however, cannot be explained by the adoption of a more readily available food source, but was cited as the friars' willingness to eat more like their flock. Their diet, therefore, reflects the adoption of two dietary practices, one reflecting solidarity with their neighbors, and one reflecting higher status Spanish culture.

The difference between the religious and secular labor arrangements and the impacts they had on foodways comes down to interactions between individuals of different status and ethnicity, food availability, demographics, and food scarcity. At LA 20,000, a financially-independent estancia, the farmers would have benefited from showing solidarity with higher-classes and those with whom they were hoping to trade, rather than consistently aligning

themselves with their labor base. This choice would have been very impactful in certain social situations, especially since Santa Fe was nearby, where the economically powerful governors and other influential figures resided. Simultaneously, individuals of different ethnicities and status worked closely together to operate the farm, so eventually these close interactions resulted in the exchange of knowledge, including knowledge surrounding food. The food remains at LA 20,000 reflect the attempts to display a high-status identity while also sharing food knowledge with indigenous individuals.

At Awatovi, on the other hand, there were only a handful of friars for 1,000-3,000 Pueblo, so their food choices and situational identities might have influenced their power and survival. The friars would have benefited from showing solidarity with their neophytes and Hopi neighbors by consuming the same foods as them while; they would also benefit from consuming status foods that would be recognized in politically and economically powerful Spanish colonial-circles. Though friars made a wide variety of dietary choices at other mission sites (Trigg 2004:233), the dual identity approach adopted at Awatovi may have been part of the reason that the Pueblos there were more welcoming to the colonists. Overall, the secular and religious structures at each site played into which identities the inhabitants wanted to portray for different economic, political, or social reasons, and therefore which foods they consumed.

Situated in the larger context of the Spanish Empire these data help to understand the evaluation of material culture as not only a reflection of identity but also as a tool and to expand our knowledge of the varying tactics employed in colonial contexts. In several other case studies, archaeologists have found variability in ways Spanish colonists utilized material

culture to navigate politics, power, and social relationships. For example, in Locumbilla, Peru and Tarapays, Bolivia the Spanish ate with *kurakas* with the goal of establishing alliances to manage indigenous laborers (Rodríguez-Alegría 2005:564). In Florida, they spread their influence by integrating with caciques through intermarriage, feasting, and gift giving, aligning themselves with the existing elite structure. Liebmann has argued that in the Jemez valley the Franciscans initially differentiated themselves from Pueblos through dominating mission architecture, and yet after the Pueblo Revolt of 1680 built smaller churches to downplay differences between themselves and the Pueblos (Liebmann 2015:8). Since these examples include material culture other than food, all of this demonstrates that power in the Spanish Empire was negotiated culturally and materially, not always through violence, government, or coercion, and that although these tactics are small-scale and based in daily action, they are powerful (Rodríguez-Alegría 2005:565). Being able to understand the variability in colonial responses helps create a more complete understanding of the past and allows us to better answer anthropologically oriented questions about politics, identity, colonialism, and how these are enacted through daily life and the material culture people use every day.

## APPENDIX A: FAUNAL DATABASE STANDARD FORMATTING

Provenience Information	<p>For 1980-1998 Samples: UMB#</p> <p>For 2015-2017 Samples: Excavation Unit, Context, Level, Field Sample #</p> <p>(All Information Recorded Directly from Excavation Bags)</p>
Class	<p>Amphibia</p> <p>Aves</p> <p>Mammalia</p> <p>Osteichthyes</p> <p>Reptilia</p> <p>Vertebrate</p> <p>Other</p>
Taxon	<p>The Most Specific Taxonomic Identification After Class</p> <p>Mammalian Size Classifications:</p> <p>Small: Rabbit-sized or Smaller</p> <p>Medium: Larger than a Rabbit, Smaller than a Large Pig</p> <p>Large: Larger than a Large Pig</p>
Element	<p>Scapula</p> <p>Humerus</p> <p>Radius</p> <p>Ulna</p> <p>Metacarpal</p> <p>Carpals</p> <p>Femur</p> <p>Tibia</p> <p>Fibula</p> <p>Metatarsal</p> <p>Tarsals</p> <p>Phalanges</p> <p>Cranium</p> <p>Teeth</p> <p>Mandible/Maxilla</p> <p>Pelvis</p> <p>    Ilium</p> <p>    Ischium</p> <p>    Pubis</p>

	Vertebra Cervical Thoracic Lumbar Caudal Long Bone Rib
Side	Left Right
Position	Left Blank if Indeterminate Anterior Body Distal Inferior Middle Posterior Proximal Shaft Superior
	Cranial and Vertebral Regions Described More Specifically When Possible
Count	Specimen Count Per Bag
Weight	Specimen Weight Per Bag, Grams
Modifications	<p>Chop: Broad, relatively short, linear depressions that generally have a V-shaped cross section</p> <p>Cut Marks: Short, parallel striations with V-shaped cross-section; do not follow contours on bones</p> <p>Flaked: Produced by applying a strong force to a bone with a hard object (i.e. a hammerstone or anvil); flakes have bulbs of percussion; sometimes have ripple marks</p> <p>Human Chew: Creates Mashed Edges</p> <p>Green Break and/or Spiral Fracture: Bone Broken along a Torque</p>

Saw: Multiple, closely spaced, parallel cut marks that cumulatively create a deep incision

Scrape: Multiple, closely spaced parallel striations that are elongate, narrow, and linear; produced by moving a sharp tool perpendicular to the long axis of the tool edge

Shear: Bone separated into two along a flat plane

Puncture: Mostly caused by projectile points

Age

Fused Epiphyses

Unfused Epiphyses

Tooth Wear Stages Were Given for Teeth

Taphonomy

Abrasion: Loss of surface detail

Carnivore Gnawing: Can produce striations, furrows, pits, puncture, ragged edges, chipped edges, sinuous edges, polish, and flakes; do follow contours on a bone

Excavation Damage: Caused by modern tools; can be recognized by lighter color of freshly exposed subsurface of bone

Gnawing – unspecified

Polish: Smooth & rounded surface

Rodent Gnawing: Multiple parallel lines that are relatively broad, flat-bottomed, or slightly rounded in cross section; occur in long, relatively regular rows

Root Etching: Thin, shallow lines etched into the surface of bones by acids associated with plant roots; can be pitted surface; U-shaped cross section; squiggly patterns

Sun Bleached: Bone weathered to level 1-2, but white in color

Vascular Grooves: Can be confused with cutmarks; fine grooves created by contact between bone and blood vessels; Smooth internal surface can be seen microscopically

### Weathering

Level 1: Some cracking of bone surface. Skin or other tissue may or may not be present

Level 2: Cracking and flaking of bone surface. Only remnants of ligaments and cartilage might be present

Level 3: Surface has fibrous texture. Layers of bone may be gone. No tissues present

Level 4: Surface is coarse. Splinters fall from bone when moved

Level 5: Bone is fragile and may fall apart without being moved

# APPENDIX B: SUMMARY OF THE LA 20,000 FAUNAL COLLECTION

Class	Taxonomic ID	Element	Side	Position	Count	Weight (g)
Amphibia	Anura	Skull		Dentary	1	<0.1
Amphibia	Anura	Long Bone		Shaft	1	<0.1
Amphibia	Bufonidae	Humerus		Proximal	1	0.2
Amphibia	Ranidae	Femur		Distal & Shaft	1	<0.1
Amphibia	Ranidae	Humerus		Distal & Shaft	1	<0.1
Amphibia/Reptile		Unidentified			3	<0.1
Aves	Anatidae	Rib	Left	Proximal	1	0.2
Aves	cf. Anatidae	Humerus	Right	Proximal Shaft	1	2.1
Aves	Anserinae	Pelvis	Right	Acetabulum	1	0.9
Aves	Anserinae	Scapula	Left	Proximal	1	1.2
Aves	cf. Phasianidae	Femur	Left	Proximal Shaft	1	0.8
Aves	cf. Phasianidae	Tarsometatarsus		Distal Shaft	1	0.4
Aves	Galliformes	Femur	Left	Shaft	1	1.5
Aves	Galliformes	Pelvis	Right	Acetabulum	2	0.9
Aves	<i>Gallus gallus</i>	Coracoid	Left		1	1
Aves	<i>Gallus gallus</i>	Coracoid	Right		1	0.8
Aves	<i>Gallus gallus</i>	Tarsometatarsus		Distal Shaft	1	0.7
Aves	<i>Gallus gallus</i>	Tibiotarsus		Shaft	1	2.2
Aves		Coracoid	Right		1	<0.1
Aves		Cuneiform			1	<0.1
Aves		Eggshell		Fragment	146	1.8
Aves		Femur	Left	Head	1	0.2
Aves		Furculum		Fragment	2	0.4
Aves		Long Bone		Articular Surface	1	0.5
Aves		Long Bone		Shaft	38	8.6
Aves		Phalanx		Proximal	1	<0.1
Aves		Phalanx			1	0.7

Aves		Radius		Shaft	3	0.5
Aves		Rib		Proximal	2	<0.1
Aves		Rib		Shaft	1	<0.1
Aves		Sternum		Anterior Pillar	1	0.5
Aves		Sternum		Keel	5	2.8
Aves		Synsacrum		Fragment	3	0.1
Aves		Tarsometatarsus		Distal	1	0.3
Aves		Tarsometatarsus		Shaft	2	0.7
Aves		Tibiotarsus	Left	Distal Shaft	1	0.3
Aves		Tibiotarsus		Proximal Shaft	1	0.4
Aves		Unidentified			34	4.8
Aves		vertebra		Fragment	2	0.1
Gastropod					1	<0.1
Mammalia	Artiodactyl	3rd Phalanx			8	26.2
Mammalia	Artiodactyl	3rd Phalanx		Proximal	2	4.1
Mammalia	Artiodactyl	Phalanx		Fragment	3	4.7
Mammalia	<i>Bos taurus</i>	1st Phalanx			2	43.7
Mammalia	<i>Bos taurus</i>	2nd Phalanx			2	44.9
Mammalia	<i>Bos taurus</i>	P4	Right	Lower	1	3.7
Mammalia	<i>Bos taurus</i>	M1	Left	Lower	1	10.8
Mammalia	<i>Bos taurus</i>	M1	Left	Upper	1	6.4
Mammalia	<i>Bos taurus</i>	M3	Left	Upper	1	15.6
Mammalia	<i>Bos taurus</i>	dp2	Right	Upper	1	1
Mammalia	<i>Bos taurus</i>	dP4	Right	Lower	5	6.5
Mammalia	<i>Bos taurus</i>	dp4		Fragment	1	1.6
Mammalia	<i>Bos taurus</i>	Premolar		Upper Fragment	2	6.6
Mammalia	<i>Bos taurus</i>	Molar	Right	Upper	1	4
Mammalia	<i>Bos taurus</i>	Molar		Root	2	7.9
Mammalia	<i>Bos taurus</i>	Molar		Fragment	4	10.6
Mammalia	<i>Bos taurus</i>	Premolar/Molar		Fragment	4	5.9

Mammalia	<i>Bos taurus</i>	Cranium	Left	Squamosal	1	8.2
Mammalia	<i>Bos taurus</i>	Cranium	Right	Nasal Bone	1	16.9
Mammalia	<i>Bos taurus</i>	Cranium	Right	Occipital Condyle	1	35.4
Mammalia	<i>Bos taurus</i>	Maxilla	Left	M1, M2, M3	1	124.2
Mammalia	<i>Bos taurus</i>	Metacarpal	Right	Proximal	1	56.9
Mammalia	<i>Bos taurus</i>	Metapodial	Left	Distal	1	47.6
Mammalia	<i>Bos taurus</i>	Navicular Cuboid			1	57.7
Mammalia	<i>Bos taurus</i>	Pelvis	Right	Acetabulum	1	99.6
Mammalia	<i>Bos taurus</i>	Radius	Right	Proximal	1	27.7
Mammalia	<i>Bos taurus</i>	Sacrum		Ventral	1	16.9
Mammalia	<i>Bos taurus</i>	Scapula	Left	Posterior Border	1	83.4
Mammalia	<i>Bos taurus</i>	Scapula	Right	Posterior Border	1	56.3
Mammalia	<i>Bos taurus</i>	Scapula	Right	Middle	1	38.1
Mammalia	<i>Bos taurus</i>	Sesamoid			1	6.8
Mammalia	<i>Bos taurus</i>	Thoracic		Spinous Process	1	19.1
Mammalia	<i>Bos taurus</i>	Tibia	Left	Distal/Distal Shaft	1	41.1
Mammalia	<i>Bos taurus</i>	Ulna	Left	Proximal Shaft	1	13.8
Mammalia	cf. <i>Bos taurus</i>	3rd Phalanx			1	14.5
Mammalia	cf. <i>Bos taurus</i>	Incisor		Lower	1	1.3
Mammalia	cf. <i>Bos taurus</i>	Ischium	Left	Acetabulum	1	18.7
Mammalia	cf. <i>Bos taurus</i>	Molar		Fragment	1	0.7
Mammalia	Cervidae	Radius	Right	Proximal	1	19.1
Mammalia	cf. Cervidae	Cervical			1	15.9
Mammalia	cf. Cervidae	Humerus	Left	Distal	1	13.2
Mammalia	cf. Cervidae	Humerus	Right	Distal Shaft	1	7.7
Mammalia	<i>Equus caballus</i>	Femur	Right	Distal	1	301.5
Mammalia	<i>Equus caballus</i>	Mandible	Right	Condyle	1	48.8
Mammalia	<i>Equus caballus</i>	Pelvis	Left	Acetabulum	1	253.1
Mammalia	<i>Equus caballus</i>	Scapula	Right	Posterior Border	1	40.8
Mammalia	<i>Equus caballus</i>	Tibia	Left	Distal	1	164

Mammalia	<i>Equus</i>	Astragalus	Left		1	80.5
Mammalia	<i>Equus</i>	Distal Sesamoid			1	4.5
Mammalia	<i>Equus</i>	dp3 or dp4			1	4.8
Mammalia	<i>Equus</i>	First Carpal			1	9.9
Mammalia	<i>Equus</i>	Incisor			10	92.1
Mammalia	<i>Equus</i>	M2	Left	Lower	1	19.4
Mammalia	<i>Equus</i>	Mandible	Right	Condyle & Mandibular Notch	1	35.9
Mammalia	<i>Equus</i>	Mandible/Maxilla		Fragment	5	5.7
Mammalia	<i>Equus</i>	Metacarpal	Left	Proximal	1	98.2
Mammalia	<i>Equus</i>	Metapodial 2/4		Distal Shaft	1	1.9
Mammalia	<i>Equus</i>	Molar		Fragment	1	3.2
Mammalia	<i>Equus</i>	Premolar/Molar		Fragment	6	29.5
Mammalia	<i>Equus</i>	Radius	Left	Proximal	2	94.5
Mammalia	<i>Equus</i>	Thoracic		Body	1	42.5
Mammalia	<i>Equus</i>	3rd Phalanx			1	30.8
Mammalia	Leporidae sp.	Tooth		Fragment	2	<0.1
Mammalia	<i>Ovis/Capra</i>	4th Carpal	Right		1	1.2
Mammalia	<i>Ovis/Capra</i>	Accessory Carpal	Left		1	0.5
Mammalia	<i>Ovis/Capra</i>	Atlas		Fragment	3	38.5
Mammalia	<i>Ovis/Capra</i>	Axis			1	20.6
Mammalia	<i>Ovis/Capra</i>	Calcaneus	Left		1	5
Mammalia	<i>Ovis/Capra</i>	Cervical		C3 & C4	3	48.5
Mammalia	<i>Ovis/Capra</i>	Cervical		Left Half	1	5.9
Mammalia	<i>Ovis/Capra</i>	dp		Upper	1	0.2
Mammalia	<i>Ovis/Capra</i>	dP4	Right	Lower	1	1.6
Mammalia	<i>Ovis/Capra</i>	dp4	Right	Upper	1	1.6
Mammalia	<i>Ovis/Capra</i>	Femur	Left	Distal	1	4.4
Mammalia	<i>Ovis/Capra</i>	Femur	Left	Proximal Shaft	3	16.8
Mammalia	<i>Ovis/Capra</i>	Femur	Right	Distal	1	5.6
Mammalia	<i>Ovis/Capra</i>	Femur	Right	Shaft	4	69.5

Mammalia	<i>Ovis/Capra</i>	Humerus	Left	Distal	2	38.7
Mammalia	<i>Ovis/Capra</i>	Humerus	Left	Proximal & Shaft	6	51.9
Mammalia	<i>Ovis/Capra</i>	Humerus	Left	Shaft	2	44.7
Mammalia	<i>Ovis/Capra</i>	Humerus	Right	Proximal	1	22.1
Mammalia	<i>Ovis/Capra</i>	Ilium	Right	Shaft	1	11.1
Mammalia	<i>Ovis/Capra</i>	Incisor	Left		1	0.7
Mammalia	<i>Ovis/Capra</i>	Incisor	Right	Lower	1	1.2
Mammalia	<i>Ovis/Capra</i>	Incisor		Fragment	2	1
Mammalia	<i>Ovis/Capra</i>	Ischium	Left	Acetabulum	1	6.8
Mammalia	<i>Ovis/Capra</i>	Ischium	Right	Acetabulum	1	2
Mammalia	<i>Ovis/Capra</i>	Lumbar			7	42.8
Mammalia	<i>Ovis/Capra</i>	Lumbar & Sacrum			10	36.9
Mammalia	<i>Ovis/Capra</i>	Lunate Carpal			1	1.3
Mammalia	<i>Ovis/Capra</i>	M1	Left	Lower	2	1.7
Mammalia	<i>Ovis/Capra</i>	M1	Left	Upper	4	10.3
Mammalia	<i>Ovis/Capra</i>	M1	Right	Upper	1	1.7
Mammalia	<i>Ovis/Capra</i>	M1 or M2	Left	Lower	1	0.5
Mammalia	<i>Ovis/Capra</i>	M1 or M2	Left	Upper	4	7.7
Mammalia	<i>Ovis/Capra</i>	M1 or M2	Right	Upper	2	10.8
Mammalia	<i>Ovis/Capra</i>	M2	Left	Lower	1	1.4
Mammalia	<i>Ovis/Capra</i>	M2	Right	Lower	2	1.4
Mammalia	<i>Ovis/Capra</i>	M3	Left	Upper	1	6.2
Mammalia	<i>Ovis/Capra</i>	M3	Right	Upper	1	4.1
Mammalia	<i>Ovis/Capra</i>	M3		Fragment		0.4
Mammalia	<i>Ovis/Capra</i>	Mandible	Left	dP2, dP3, dP4, M1, M2	1	23.2
Mammalia	<i>Ovis/Capra</i>	Mandible	Left	dP3, dP4, M1, M2	1	31.7
Mammalia	<i>Ovis/Capra</i>	Mandible	Left	P2, dP3	1	6.7
Mammalia	<i>Ovis/Capra</i>	Mandible	Left	P3, P4, M1	1	5.8
Mammalia	<i>Ovis/Capra</i>	Mandible	Left & Right	I1, I2, I3, C1; I1, I2, I3	1	4.8
Mammalia	<i>Ovis/Capra</i>	Mandible	Right	P2, P3, P4	1	5.8

Mammalia	<i>Ovis/Capra</i>	Mandible	Right	P2, P3, P4, M1, M2, M3	1	65.6
Mammalia	<i>Ovis/Capra</i>	Mandible	Left	M2, M3	1	14.7
Mammalia	<i>Ovis/Capra</i>	Mandible	Left	P2, P3, P4, M1, M2, M3	1	26.6
Mammalia	<i>Ovis/Capra</i>	Mandible/Maxilla		Fragment	4	8.4
Mammalia	<i>Ovis/Capra</i>	Maxilla	Left	dp2, dp3	1	3.2
Mammalia	<i>Ovis/Capra</i>	Maxilla	Left	P2, P3, P4, M1, M2, M3	1	26.5
Mammalia	<i>Ovis/Capra</i>	Maxilla	Right	dp4, M1	1	8.2
Mammalia	<i>Ovis/Capra</i>	Metacarpal	Right	Proximal	1	0.7
Mammalia	<i>Ovis/Capra</i>	Metacarpal	Right	Proximal & Shaft	2	20.9
Mammalia	<i>Ovis/Capra</i>	Metacarpal		Proximal	1	1.1
Mammalia	<i>Ovis/Capra</i>	Metacarpal & Carpals	Right		7	36.1
Mammalia	<i>Ovis/Capra</i>	Metapodial	Right	Proximal & Shaft	1	7.5
Mammalia	<i>Ovis/Capra</i>	Metapodial		Proximal	2	3.8
Mammalia	<i>Ovis/Capra</i>	Metapodial		Distal	1	6.3
Mammalia	<i>Ovis/Capra</i>	Metapodial		Shaft	1	10.3
Mammalia	<i>Ovis/Capra</i>	Metatarsal	Left	Proximal	1	13.7
Mammalia	<i>Ovis/Capra</i>	Metatarsal	Right	Proximal	1	4
Mammalia	<i>Ovis/Capra</i>	Metatarsal	Right	Proximal & Shaft	3	54.5
Mammalia	<i>Ovis/Capra</i>	Metatarsal		Shaft	1	0.7
Mammalia	<i>Ovis/Capra</i>	Molar		Fragment	12	9.9
Mammalia	<i>Ovis/Capra</i>	P2		Upper	1	1
Mammalia	<i>Ovis/Capra</i>	Patella			1	4.6
Mammalia	<i>Ovis/Capra</i>	Pelvis	Right		1	30.5
Mammalia	<i>Ovis/Capra</i>	Premolar/Molar		Fragment	10	4.6
Mammalia	<i>Ovis/Capra</i>	Premolar/Molar		Upper Fragment	7	4.7
Mammalia	<i>Ovis/Capra</i>	Radius	Left	Proximal & Shaft	1	12.1
Mammalia	<i>Ovis/Capra</i>	Radius	Left	Shaft	1	1.2
Mammalia	<i>Ovis/Capra</i>	Radius	Right	Shaft	2	17.4
Mammalia	<i>Ovis/Capra</i>	Radius		Shaft	1	14.1
Mammalia	<i>Ovis/Capra</i>	Radius/Ulna	Right	Distal & Shaft	1	28

Mammalia	<i>Ovis/Capra</i>	Scapula	Left	Distal	2	39.8
Mammalia	<i>Ovis/Capra</i>	Scapula	Right	Distal	1	9.9
Mammalia	<i>Ovis/Capra</i>	Tarsal (Os Malleolus)	Left		1	0.5
Mammalia	<i>Ovis/Capra</i>	Thoracic		1st	6	44.5
Mammalia	<i>Ovis/Capra</i>	Tibia	Left	Shaft	1	19.3
Mammalia	<i>Ovis/Capra</i>	Tibia	Right	Distal	2	38.9
Mammalia	<i>Ovis/Capra</i>	Tibia	Right	Proximal Shaft	1	10.6
Mammalia	<i>Ovis/Capra</i>	Tooth		Fragment	4	0.7
Mammalia	<i>Ovis/Capra</i>	Ulna		Shaft	1	1.6
Mammalia	<i>Ovis/Capra</i>	Ulnar Carpal			2	1.5
Mammalia	cf. <i>Ovis/Capra</i>	3rd Phalanx		Proximal	1	0.5
Mammalia	cf. <i>Ovis/Capra</i>	Femur	Left	Distal Shaft	1	18.4
Mammalia	cf. <i>Ovis/Capra</i>	Lumbar			1	13.8
Mammalia	cf. <i>Ovis/Capra</i>	Mandible	Left	P2, P3, P4, M1	1	7.5
Mammalia	cf. <i>Ovis/Capra</i>	Premolar			1	0.9
Mammalia	cf. <i>Ovis/Capra</i>	Pubis	Right		1	2.2
Mammalia	cf. <i>Ovis/Capra</i>	Radius	Right	Shaft	1	18.2
Mammalia	cf. <i>Ovis/Capra</i>	Tibia	Left	Proximal Shaft	1	8.8
Mammalia	cf. <i>Ovis</i>	Cranium	Left	Squamosal	1	1.8
Mammalia	cf. <i>Ovis</i>	Horn Core			1	36.1
Mammalia	<i>Procyonidae</i> sp.	Calcaneus	Right		1	0.5
Mammalia	cf. <i>Procyonidae</i>	Thoracic			1	0.9
Mammalia	Rodentia	Pelvis	Left	Acetabulum	1	0.3
Mammalia	Rodentia	Ulna		Proximal	1	<0.1
Mammalia	<i>Sciuridae</i> sp.	Femur	Right	Proximal Shaft	1	<0.1
Mammalia	<i>Sciuridae</i> sp.	Pelvis	Right		1	0.6
Mammalia	Suidae	Canine		Lower	2	2.8
Mammalia	cf. Suidae	Ilium	Left	Shaft	1	6.6
Mammalia	<i>Sus scrofa</i>	dI		Lower	1	0.6

Mammalia	<i>Sus scrofa</i>	Femur	Left	Proximal Shaft	1	21.5
Mammalia	<i>Sus scrofa</i>	Fibula	Right		1	5.5
Mammalia	<i>Sus scrofa</i>	Humerus	Right	Shaft	1	0.4
Mammalia	<i>Sus scrofa</i>	Ilium	Right	Shaft	2	19.8
Mammalia	<i>Sus scrofa</i>	Incisor		Lower	2	2.5
Mammalia	<i>Sus scrofa</i>	Intermediate Carpal	Right		1	3.4
Mammalia	<i>Sus scrofa</i>	Metapodial		Distal	1	2.3
Mammalia	<i>Sus scrofa</i>	Molar		Fragment	1	1.2
Mammalia	<i>Sus scrofa</i>	Thoracic	Left Half		1	43.2
Mammalia	<i>Sus scrofa</i>	Thoracic		Superior	1	10.9
Mammalia	<i>Sus scrofa</i>	Tooth		Fragment	1	0.3
Mammalia	cf. <i>Sus scrofa</i>	Calcaneus	Right		1	10
Mammalia	cf. <i>Sylvilagus</i>	Tibia		Shaft	1	1.1
Mammalia	Large	3rd Phalanx			1	3.9
Mammalia	Large	Acetabulum	Left		2	22.7
Mammalia	Large	Acetabulum			1	13.8
Mammalia	Large	Carpal/Tarsal		Fragment	1	5.8
Mammalia	Large	Cervical	Right Half	Pedicle & Body	1	14.8
Mammalia	Large	Cervical		Articular Process	2	5.6
Mammalia	Large	Cervical		Fragment	1	2.5
Mammalia	Large	Cranium	Right	Orbit/Lacrimal Bone	1	2
Mammalia	Large	Cranium		Fragment	38	292.6
Mammalia	Large	Femur	Left	Distal Shaft	1	9.6
Mammalia	Large	Femur	Left	Proximal	2	1.8
Mammalia	Large	Humerus	Right	Distal Shaft	1	7.8
Mammalia	Large	Ilium	Right	Shaft	1	31.9
Mammalia	Large	Ilium		Acetabulum	1	12.1
Mammalia	Large	Incisor		Root	1	1.1
Mammalia	Large	Long Bone		Epiphysis	1	9.4

Mammalia	Large	Long Bone		Shaft	38	679.3
Mammalia	Large	Lumbar			2	122.1
Mammalia	Large	Lumbar	Left Half	Transverse Process & Articular Surface	1	15.8
Mammalia	Large	Lumbar		Fragment	2	15.2
Mammalia	Large	Mandible	Left	Anterior (Symphysial Surface)	1	27.8
Mammalia	Large	Mandible	Right	Anterior	1	27
Mammalia	Large	Mandible	Right	Body	3	13.4
Mammalia	Large	Mandible		Body	2	18.9
Mammalia	Large	Mandible/Maxilla		Body	9	69.3
Mammalia	Large	Maxilla		Fragment	3	18.4
Mammalia	Large	Metatarsal		Proximal Shaft	7	53.3
Mammalia	Large	Molar		Fragment	1	0.6
Mammalia	Large	Pelvis	Left	Ischiatic Spine	1	21.1
Mammalia	Large	Pelvis		Pubis & Acetabulum	5	29.5
Mammalia	Large	Phalanx		Distal	1	2.3
Mammalia	Large	Premolar/Molar		Fragment	14	15.8
Mammalia	Large	Pubis		Acetabular Branch	1	4.4
Mammalia	Large	Radius/Ulna		Shaft	1	32.1
Mammalia	Large	Rib	Left	Proximal	4	55.4
Mammalia	Large	Rib	Left	Proximal Shaft	2	54.6
Mammalia	Large	Rib	Left	Shaft	1	6
Mammalia	Large	Rib	Right	Proximal	5	83
Mammalia	Large	Rib	Right	Proximal Shaft	3	32.4
Mammalia	Large	Rib	Right	Shaft	4	216.2
Mammalia	Large	Rib		Proximal	11	34.7
Mammalia	Large	Rib		Shaft	84	824.7
Mammalia	Large	Scapula	Right	Middle	1	8.3
Mammalia	Large	Scapula	Right	Posterior Border	1	4.2
Mammalia	Large	Scapula		Anterior Border	2	10.2
Mammalia	Large	Scapula		Middle	11	131

Mammalia	Large	Thoracic		Articular Process	1	8.3
Mammalia	Large	Thoracic		Spinous Process	9	80
Mammalia	Large	Tibia	Right	Distal	1	7.8
Mammalia	Large	Tibia		Proximal Shaft	2	74.5
Mammalia	Large	Tooth		Fragment	21	13.1
Mammalia	Large	Tooth		Root	6	3.4
Mammalia	Large	Ulna		Shaft	1	2.5
Mammalia	Large	Vertebra		Articular Process	2	2.1
Mammalia	Large	Vertebra		Body	6	42.1
Mammalia	Large	Vertebra		Centrum	7	12.4
Mammalia	Large	Vertebra		Fragment	12	53.3
Mammalia	Medium	3rd Phalanx			1	1.4
Mammalia	Medium	Atlas			1	1.2
Mammalia	Medium	Calcaneus	Left		2	9
Mammalia	Medium	Canine Tooth		Fragment	1	0.4
Mammalia	Medium	Carpal			1	6.7
Mammalia	Medium	Carpal/Tarsal			2	2.4
Mammalia	Medium	Caudal Vertebra			1	0.3
Mammalia	Medium	Cervical		Articular Process	2	2.5
Mammalia	Medium	Cervical		Left Half	1	18.3
Mammalia	Medium	Costal Cartilage			8	6.7
Mammalia	Medium	Cranium	Right	Premaxilla	1	1.9
Mammalia	Medium	Cranium		Fragment	37	63.8
Mammalia	Medium	Femur		Distal	1	1.9
Mammalia	Medium	Femur		Proximal	2	5
Mammalia	Medium	Femur		Shaft	4	32
Mammalia	Medium	Humerus	Left	Distal Shaft	1	8
Mammalia	Medium	Humerus		Proximal	1	2.6
Mammalia	Medium	Humerus		Shaft	2	19
Mammalia	Medium	Hyoid	Left	Muscular Angle	2	0.6

Mammalia	Medium	Hyoid	Right	Muscular Angle	1	0.3
Mammalia	Medium	Hyoid		Muscular Angle	1	0.3
Mammalia	Medium	Ilium	Right	Shaft	4	43
Mammalia	Medium	Incisor	Right	Lower	1	0.4
Mammalia	Medium	Incisor		Fragment	5	1.4
Mammalia	Medium	Ischium	Right	Acetabulum	2	14.8
Mammalia	Medium	Ischium	Right		1	1.9
Mammalia	Medium	Ischium		Obturator Foramen	1	1.7
Mammalia	Medium	Long Bone		Epiphysis	2	11.7
Mammalia	Medium	Long Bone		Shaft	263	579.5
Mammalia	Medium	Lumbar	Left	Body & Transverse Process	1	1.9
Mammalia	Medium	Lumbar			2	12.9
Mammalia	Medium	Lumbar		Articular Process	3	2.6
Mammalia	Medium	Lumbar		Transverse Process	5	6
Mammalia	Medium	Lumbar		Fragment	3	12.8
Mammalia	Medium	Mandible	Left	Angle	2	5.7
Mammalia	Medium	Mandible	Left	Body	2	7.6
Mammalia	Medium	Mandible	Left	Condyle	2	5.3
Mammalia	Medium	Mandible	Left	Coronoid Process	1	2.2
Mammalia	Medium	Mandible	Right	Coronoid Process	2	4.3
Mammalia	Medium	Mandible		Body	5	12.7
Mammalia	Medium	Mandible		Condyle	1	2.3
Mammalia	Medium	Mandible		Coronoid Process	1	3.7
Mammalia	Medium	Mandible/Maxilla		Body	16	9.1
Mammalia	Medium	Maxilla		Body	7	6.5
Mammalia	Medium	Metapodial	Left	Proximal	1	2.3
Mammalia	Medium	Metapodial		Distal	6	13.3
Mammalia	Medium	Metapodial		Shaft	11	81.8
Mammalia	Medium	Metatarsal	Left		1	18.3
Mammalia	Medium	Metatarsal		Shaft	1	7.3

Mammalia	Medium	Molar		Fragment	3	2.4
Mammalia	Medium	Phalanx		Distal	4	1.7
Mammalia	Medium	Phalanx		Proximal	4	1.9
Mammalia	Medium	Premolar		Fragment	2	1
Mammalia	Medium	Premolar/Molar		Fragment	54	15.9
Mammalia	Medium	Premolar/Molar		Root	1	1.9
Mammalia	Medium	Pubis	Left	Acetabulum	1	2.2
Mammalia	Medium	Pubis	Right	Acetabulum	1	1
Mammalia	Medium	Pubis		Acetabulum	1	1.7
Mammalia	Medium	Radius	Left	Proximal Shaft	1	11.5
Mammalia	Medium	Radius		Shaft	8	51.9
Mammalia	Medium	Rib	Left	Proximal	9	12
Mammalia	Medium	Rib	Left	Proximal Shaft	2	4
Mammalia	Medium	Rib	Right	Proximal	8	18
Mammalia	Medium	Rib	Right	Shaft	5	17.1
Mammalia	Medium	Rib		Distal	7	7.3
Mammalia	Medium	Rib		Proximal	5	8.4
Mammalia	Medium	Rib		Proximal Shaft	11	26.1
Mammalia	Medium	Rib		Shaft	274	481.6
Mammalia	Medium	Sacrum		Wing	1	14.8
Mammalia	Medium	Scapula	Left	Middle	5	23.2
Mammalia	Medium	Scapula	Right	Middle	4	10.1
Mammalia	Medium	Scapula		Distal	2	3.5
Mammalia	Medium	Scapula		Middle	18	47.7
Mammalia	Medium	Teeth		Roots	2	0.4
Mammalia	Medium	Thoracic			4	22.5
Mammalia	Medium	Thoracic		Spinous Process	8	15.8
Mammalia	Medium	Thoracic		Fragment	2	2.7
Mammalia	Medium	Tibia	Left	Shaft	4	32.4
Mammalia	Medium	Tibia	Right	Proximal Shaft	1	17
Mammalia	Medium	Tibia		Shaft	2	23.1

Mammalia	Medium	Tooth		Fragment	26	6.2
Mammalia	Medium	Tooth		Root	16	5.1
Mammalia	Medium	Ulna	Left	Proximal	1	1.4
Mammalia	Medium	Vertebra		Articular Process	2	1.3
Mammalia	Medium	Vertebra		Body	22	33
Mammalia	Medium	Vertebra		Centrum	31	13.5
Mammalia	Medium	Vertebra		Fragment	51	51.1
Mammalia	Medium/Large	Cranium		Fragment	88	144.6
Mammalia	Medium/Large	Ilium	Right	Shaft	1	54.8
Mammalia	Medium/Large	Long Bone		Articular Surface	1	2.1
Mammalia	Medium/Large	Long Bone		Shaft	7	26.4
Mammalia	Medium/Large	Mandible		Body	3	7.5
Mammalia	Medium/Large	Mandible		Coronoid Process	1	2.2
Mammalia	Medium/Large	Mandible/Maxilla		Body	15	18.8
Mammalia	Medium/Large	Metapodial		Shaft	1	17.2
Mammalia	Medium/Large	Premolar/Molar		Fragment	5	2.2
Mammalia	Medium/Large	Rib		Shaft	20	62.5
Mammalia	Medium/Large	Scapula	Left	Proximal & Middle	4	20.6
Mammalia	Medium/Large	Tooth		Fragment	39	12.1
Mammalia	Medium/Large	Tooth		Root	7	5.2
Mammalia	Medium/Large	Vertebra		Body	2	8.7
Mammalia	Small	Caudal Vertebra			1	<0.1
Mammalia	Small	Cranium		Fragment	2	4
Mammalia	Small	Ilium	Right	Shaft	1	3.1
Mammalia	Small	Long Bone		Epiphysis	1	0.1
Mammalia	Small	Long Bone		Shaft	19	6.2
Mammalia	Small	Mandible/Maxilla		Fragment	1	<0.1
Mammalia	Small	Pelvis	Left	Acetabulum	1	0.3
Mammalia	Small	Rib	Left	Proximal	1	0.1
Mammalia	Small	Rib	Right	Proximal	1	0.1

Mammalia	Small	Rib		Proximal	2	0.1
Mammalia	Small	Rib		Shaft	13	3.2
Mammalia	Small	Scapula	Right	Middle	2	0.2
Mammalia	Small	Scapula		Middle	1	0.5
Mammalia	Small	Tooth		Fragment		
Mammalia	Small	Vertebra		Body	1	0.9
Mammalia	Small	Vertebra		Fragment	2	0.4
Mammalia	Small/Medium	Cranium		Fragment	3	0.4
Mammalia	Small/Medium	Long Bone		Shaft	14	9.5
Mammalia	Small/Medium	Lumbar		Superior Articular Process	1	0.4
Mammalia	Small/Medium	Rib	Left	Proximal Shaft	1	0.8
Mammalia	Small/Medium	Rib		Proximal	1	0.2
Mammalia	Small/Medium	Rib		Proximal Shaft	2	0.9
Mammalia	Small/Medium	Thoracic		Spinous Process	1	0.3
Mammalia	Small/Medium	Vertebra		Body	2	1.5
Mammalia	Small/Medium	Vertebra		Centrum	3	0.3
Mammalia	Small/Medium	Vertebra		Fragment	3	1.7
Mammalia		Long Bone		Shaft	2	2.1
Mammalia		Metapodial		Shaft	1	0.3
Mammalia		Pelvis		Acetabulum	1	0.1
Mammalia		Radius?		Shaft	1	0.5
Mammalia		Tooth		Fragment	26	5.5
Mammalia		Tooth		Root	1	<0.1
Mammalia		Vertebra		Fragment	1	1
Mammalia		Unidentified			6231	3572
Osteichthyes	Cypriniforms	Vertebra			4	0.6
Osteichthyes	Perciforms	Maxilla			1	0.6
Osteichthyes		Unidentified			28	0.8
Other		Fossil (Shell)			1	20.2
Reptilia	Lacertilia	Pelvis		Fragment	1	<0.1

Vertebrate		Unidentified			297	36.7
Vertebrate		Vertebra			1	<0.1
					8832	13372.4

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