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ACCLIMATISING THE USEFUL ANIMAL IN THE IBERIAN WORLD AND BEYOND

Spaces of Acclimatization: *Reales Sitios* and the Introduction of Exotic Species in Spain (18th Century–Mid-19th Century)

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Abstract: Between the mid-eighteenth and mid-nineteenth centuries, the Spanish Crown promoted the introduction, breeding, and acclimatization of exotic animal species within the *Reales Sitios*. Drawing on archival sources, natural history texts, and contemporary press accounts, this study analyses these courtly spaces as environments where exotic species were observed, bred, and evaluated for potential productive uses before the institutionalization of acclimatization societies in Europe. It highlights a certain continuity in exotic animal husbandry practices, the role of specialized personnel, and how political instability, economic calculations, and the circulation of practical knowledge shaped the scope and long-term trajectory of these projects within a broader European context.

Keywords: Spain; acclimatization; domestication; *Reales Sitios*; royal menagerie; animal breeding; exotic animals; zoological gardens.

1. Introduction: Rethinking Acclimatization in Spain

The introduction of ideas about acclimatizing exotic animals in Spain in the mid-nineteenth century was closely linked to the circulation of scientific knowledge from France, particularly through the influence of the *Société impériale d'acclimatation*. These ideas were mediated in Spain by naturalists such as Mariano de la Paz Graells, who played a central role in promoting acclimatization. The creation in 1855 of the Spanish section of the *Société* and the 1859 inauguration of the Acclimatization Zoological Garden of the *Jardín Botánico del Museo de Ciencias Naturales* (Botanical Garden of the Natural Sciences Museum) in Madrid, placed the country at the forefront of European initiatives. However, political instability and a lack of resources precipitated the closure of the project in 1869.¹

Historiography on the acclimatization of exotic animals in Spain has focused mainly on the movement that developed in the mid-nineteenth century, particularly around the figure of Mariano de la Paz Graells and the institutional initiatives associated with the Spanish Society of Acclimatization.² By contrast, this article directs attention towards earlier experiences promoted by the Spanish Crown within the *Reales Sitios* (Royal Sites), a network of royal estates that included Casa de Campo, Aranjuez, La Granja de San Ildefonso, and Buen Retiro.

Studies on exotic fauna at court have highlighted the symbolic value of animals and their circulation through diplomatic exchange and imperial net-

¹ For more information about the Acclimatization Zoological Garden of Madrid, see Santiago Aragón Albillos, *El zoológico del Museo de Ciencias Naturales de Madrid: Mariano de la Paz Graells (1809–1898), la sociedad de aclimatación y los animales útiles* (Madrid: CSIC, 2005).

² Only with the studies of Santiago Aragón is acclimatization in Spain fully addressed, particularly around Mariano de la Paz Graells and the Zoological Garden of the *Jardín Botánico del Museo de Ciencias Naturales* of Madrid. Some of his works, like *El zoológico del Museo de Ciencias Naturales de Madrid: Mariano de la Paz Graells (1809–1898)*, and “Le rayonnement international de la Société zoologique d’acclimatation: participation de l’Espagne entre 1854 et 1861,” *Revue d’histoire des sciences* 58, n.º 1 (2005): 169–206, are fundamental to understanding the introduction of acclimatization ideas in Spain, the Spanish initiatives, and the connection of the Spanish case with international dynamics, especially with Paris.

works.³ While this literature has been fundamental in understanding the presence of exotic species in Spain, less attention has been paid to their experimental management.⁴ This study therefore examines how the *Reales Sitios* functioned de facto as spaces for breeding, acclimatization, domestication, and hybridization, shifting the focus from courtly display towards practices associated with useful knowledge and animal management before the formal institutionalization of acclimatization in the nineteenth century.

The discourse on acclimatization in Spain was frequently shaped by the contrast between the country's perceived natural potential and a recurring narrative of unrealised possibilities. Contemporary naturalists emphasized that Spain's geographical diversity, climatic conditions, and imperial connections offered exceptional opportunities for the introduction and adaptation of exotic species. At the same time, many authors lamented the discontinuity of these initiatives and the absence of stable institutional support.⁵

While contemporary experts like Graells used the rhetoric of failure, frequently blamed to estate-led inconsistency or a supposed lack of popular scientific culture, often tinged with social and nationalist prejudices, which attributed failures to the supposed "barbarism" of the people,⁶ or the "deplorable ignorance" of the peasantry.⁷ This narrative was primarily a calculated

³ In the early twenty-first century, references to the acclimatization of exotic animals appeared scattered in general studies on royal animal collecting, such as Carlos Gómez-Centurión, *Alhajas para soberanos: los animales reales en el siglo XVIII: de las leoneras a las mascotas de cámara* (Valladolid: Junta de Castilla y León, 2011); by the same author, "Curiosidades vivas. Los animales de América y Filipinas en la ménagerie real durante el siglo XVIII," *Anuario de Estudios Americanos* 66, n.º 2 (2009): 181–211; or Helen Cowie, *Conquering Nature in Spain and its Empire, 1750–1850* (Manchester: Manchester University Press, 2011); as well as Dolores Carmen Morales Muñiz, "La fauna exótica en la Península Ibérica: apuntes para el estudio del coleccionismo animal en el Medievo hispánico," *Espacio, Tiempo y Forma. Serie III, Historia Medieval* 13 (2000): 233–270.

⁴ Other works dealt more explicitly with specific cases, such as the acclimatization of camels in Carlos Gómez-Centurión, "Exóticos pero útiles: los camellos reales de Aranjuez durante el siglo XVIII," *Cuadernos Dieciochistas* 9 (2008): 155–180; or Helen Cowie, *Llama* (London: Reaktion Books, 2017).

⁵ Estanislao Malingre, "Aclimatación de animales y vegetales útiles," *Eco de la Ganadería y la agricultura*, 10 December 1866, 548–55.

⁶ Mariano de la Paz Graells, "Memoria sobre la aclimatación, domesticación y propagación de animales útiles en nuestro país. Escrita por el Doctor D. Mariano de la Paz Graells, catedrático de Ampliación de la Zoología en la Universidad Central. Presentada al Excmo. Sr. Ministro de Fomento," *Boletín Oficial del Ministerio de Fomento* (1855): 202.

⁷ Esteban Hernández y Fernández, "Utilidad de los Jardines de Aclimatación," *Revista de España* 44, n.º 176 (1875): 532–542, on 540.

rhetorical strategy rather than an objective description of facts or a mere personal feeling. To understand this tension, it is crucial to note that Graells was fully aware of earlier crown achievements; indeed, he actively relied on technical data provided by the *Reales Sitios* to update the Société d'Acclimatation in Paris, and even requested a medal from the French society to honor to advocate for more centralized support, this sentiment was not unique to Spain.⁸

The pioneering role of the Spanish monarchy was explicitly recognized by French naturalists. Isidore Geoffroy Saint-Hilaire admitted that France had initially “allowed Spain and England to take the lead” (*laissé l’Espagne et l’Angleterre prendre les devants*) in the practical application of acclimatization.⁹ This admission suggests that the *Reales Sitios* and the Spanish administrative efforts served as a crucial stimulus, a precedent that the French Société d'Acclimatation sought to emulate and eventually surpass. Although some of these experiences within the *Reales Sitios* were cited by nineteenth-century French naturalists, such as Buffon,¹⁰ Geoffroy Saint-Hilaire,¹¹ or Philip Henry Gosse,¹² to illustrate Spain’s early role in species translocation, their influence on France appears to have been indirect and selective. Authors such as Buffon and other naturalists were aware of some Spanish experiments, yet these were often framed within narratives of limitation or failure. This suggests that knowledge of Spanish practices circulated unevenly and was shaped by broader dynamics of scientific competition and imperial rivalry. Rather than serving as explicit models, these experiences functioned

⁸ Denis Diagre-Vanderpelen, “The National Sericultural Utopia and Debates on the Acclimatization of Plants in New-born Belgium (1830–1865),” *HoST-Journal of History of Science and Technology* 15, n.º 1 (2021): 71–106, on 86–87; for a comparative perspective on how French and Spanish commentators shared similar anxieties regarding the structural failures of their respective acclimatization projects, see also *Le Monde illustré*, n.º 62, 19 July 1858, 385.

⁹ Isidore Geoffroy Saint-Hilaire, *Acclimatation et domestication des animaux utiles* (Paris: Librairie Agricole de la Maison Rustique, 1861).

¹⁰ Georges-Louis Leclerc, Comte de Buffon, *Histoire naturelle, générale et particulière*, Supplément, vol. 6 (Paris: Imprimerie Royale, 1778). In this supplement, Buffon frequently used the Spanish management of camels and Andean camelids as a primary empirical reference to test his theories on species degeneration, acclimatization, and the limits of domestication.

¹¹ Saint-Hilaire, *Acclimatation et domestication des animaux utiles*, 31, see also 468.

¹² Gosse explicitly relies on Graells’ observations at the Buen Retiro to provide empirical evidence on the ostrich’s resistance to European climates and its dietary requirements see Louis-An-dré Gosse, *Des avantages que présenterait en Algérie la domestication de l’autruche d’Afrique: Mé-moire lu a la Société Impériale Zoologique d’Acclimatation* (Paris: Imprimerie de L. Martinet, 1857), 131–133.

as points of reference, sometimes to emulate, but also to critique, within the development of acclimatization discourse in France.

To contrast this narrative of failure with the actual activity of these dynastic infrastructures, it is necessary to examine the daily management of these spaces. Consequently, the following sections document how the Spanish Court promoted projects for the acclimatization and domestication of exotic fauna for productive purposes, analyzing the factors that conditioned their continuity while offering a detailed overview of experimental protocols and the extent of their dissemination. The research draws on primary sources from the Archivo General de Palacio (AGP) and the Archivo del Museo Nacional de Ciencias Naturales (AMNCN), supplemented by period publications, manuals, and records from contemporary scientific institutions.

2. Exotic Animals at the *Reales Sitios*: Attempts at Acclimatization

Since the colonial expansion and domination in the American continent, the Spanish Crown had shown interest in gathering information on native animals and domestic fowl, particularly regarding their breeding and potential utility. This interest is reflected in sources such as the *Relaciones Geográficas de Indias*,¹³ This interest was also expressed in explorers' chronicles and in the circulation of plants and animals brought back to Spain, some of which later spread throughout Europe. One notable example cases was the introduction of the guajolote or American turkey (*Meleagris gallopavo*), which proved to be of great benefit to the domestic economy in Spain.¹⁴ Although its process of acclimatization in Spain and elsewhere in the continent is not precisely documented, its incorporation appears to have been relatively rapid and “spontaneous,”¹⁵ becoming an important American contribution to Euro-

¹³ Howard F. Cline, “The *Relaciones Geográficas* of the Spanish Indies, 1577–1586,” *The Hispanic American Historical Review* 44, n.º 3 (1964): 341–374.

¹⁴ Arlie William Schorger, *The Wild Turkey: Its History and Domestication* (Norman: University of Oklahoma Press, 1966); Telésforo de Aranzadi, “Fauna americana. Conferencia leída el día 28 de abril de 1891,” in *Conferencias publicadas, Ateneo Científico, Literario y Artístico de Madrid* (Madrid: Ateneo de Madrid, 1892), 47–48.

¹⁵ Vanessa Quintanar Cabello, “Cocinar las Indias. Alimentos americanos en la corte española (siglos XVI-XVII). Usos, textos y representaciones,” *Librosdelacorte.es* 29 (2024): 156–179, on 164.

pean food supplies.¹⁶ This process needs to be understood within the framework of what modern historiography refers to as the *Columbian Exchange*: the unequal transfer of animal and plant species, diseases and knowledge that followed Columbus' voyages and subsequent colonial domination.¹⁷ While American species such as corn, potatoes, cocoa and turkeys were progressively incorporated into everyday European life, the arrival of horses, cattle, pigs and wheat in America contributed to transforming aspects of indigenous economies, diets, and mobility. However, unlike the often rapid and partially unintended spread of many of these species through colonial exchange networks, targeted experiments to acclimatize animals for specific economic purposes became more prominent in eighteenth-century Spain within Enlightenment programmes centred on useful knowledge, agricultural improvement, and economic self-sufficiency. Indeed, from the mid-eighteenth century onwards, a profound shift occurred in the nature of this Columbian Exchange, transforming it into a more controlled and recorded phenomenon directed by the Enlightenment court, which found its primary experimental execution within the *Reales Sitios*.

From the mid-seventeenth century onwards, the monarchy's animal collections were housed in aviaries, lion enclosures, and corrals at the *Reales Sitios*. These were royal residences located mainly around Madrid, each with its own palaces, temples, gardens and hunting grounds, and animal enclosures, where the sovereign, the royal family and other members of the court resided temporarily. Recent historiography has defined the *Reales Sitios* as dynamic and interconnected spaces that played a key role in the territorial articulation of early modern monarchies.¹⁸ The Crown kept exotic animals in several of these *Reales Sitios*, especially in Casa de Campo, La Granja de San Ildefonso, Aranjuez and Buen Retiro, where the so-called *Casa de Fieras* (House of Beasts), or menagerie, would later be established. Opened to the public in 1774, it is considered one of the oldest zoological collections in Europe after

¹⁶ Richard Dwight Crawford, "Introduction to Europe and Diffusion of Domesticated Turkeys from the Americas," *Archivos de Zootecnia* 41, n.º 154 (1992): 307–314.

¹⁷ Alfred W. Crosby, *El intercambio transoceánico: consecuencias biológicas y culturales de 1492* (México: Universidad Nacional Autónoma de México, 1991); Charles C. Mann, *1493: una nueva historia del mundo después de Colón* (Buenos Aires: Katz, 2013).

¹⁸ Ana Echevarría Arsuaga, José Eloy Hortal Muñoz and Elena Paulino Montero, "El origen de los Sitios Reales en las Coronas Ibéricas (s. XIV–XVI): de espacios cortesanos a redes de poder," *e-Spania* 47 (2024): 4.

the Imperial Menagerie in Schönbrunn (Vienna). These collections mainly displayed animals for prestige and entertainment, although some species were also bred or used for their products.

This territorial network of spaces was accompanied by a transformation in mindset. As Arturo Morgado has suggested, the transition from the early modern to the contemporary period involved a gradual shift in the representation and use of animals.¹⁹ Without entirely abandoning their heraldic or symbolic meanings, eighteenth century approaches increasingly prioritized perspectives linked to Natural History and economic utility, in line with Enlightenment reformism. This shift was manifest in the management of the *Casa de Fieras* and the *Reales Sitios*, where traditional displays of power began to coexist with systematic practices of observation and breeding. Exotic fauna was thus redefined, not only as a sign of prestige, but also as a source of empirical knowledge and potential economic benefit.²⁰

During the reign of Carlos III (1759–1788), ideas about acclimatizing animals (sometimes referred in contemporary Spanish sources as “*connaturalización*”), were integrated into a broader Enlightenment programme that promoted agriculture and the dissemination of knowledge through institutions such as the *Sociedades Económicas de Amigos del País* (Economic Societies of Friends of the Country) and the Royal Cabinet of Natural History. The Royal Decree of 1787, which regulated the Royal Garden of Cartagena (Murcia, Spain), already contained some of the basic elements of acclimatization theories.²¹ In 1788, the first acclimatization gardens were founded in Orotava (Tenerife, Spain) and Sanlúcar de Barrameda (Cádiz, Spain). Although these gardens focused primarily on the acclimatization of plants, the Sanlúcar project also contemplated the acclimatization of exotic animals such as Angora goats, Andean camelids, camels or bison, as well as less visible species such

¹⁹ Arturo Jesús Morgado García, “Una visión cultural de los animales,” in *Los animales en la historia y en la cultura*, coord. Arturo Jesús Morgado García and José Joaquín Rodríguez Moreno (Cádiz: Universidad de Cádiz, Servicio de Publicaciones, 2011), 13–41.

²⁰ Indeed, an indicator of the growing interest in exotic utilitarian fauna is the marked decline in the acquisition and prestige of big cats and other wild beasts from the mid-eighteenth century onwards. On this shift in courtly preferences, see Magnus Roberto de Mello Pereira, “Las cosas singulares de piedras, animales, plantas: la formación y el funcionamiento de la red imperial española de remesas científicas en el Virreinato del Río de la Plata,” *Anais do Museu Paulista* 21, n.º 1 (2013): 91–138, on 101.

²¹ De Mello Pereira, “Las cosas singulares de piedras, animales, plantas,” 98.

as silkworms from Cochinchina (part of Vietnam) and cochineal insects.²² These insects were valued for their productive potential: silkworms were associated with sericulture and textile manufacture, while cochineal insects were highly prized for the production of red dyes used in European textile industries.²³

These practices were also influenced by Buffon's ideas, disseminated in Spain through José Clavijo y Fajardo's translations of the *Histoire naturelle*, published from 1785 onwards. As director of the Royal Cabinet of Natural History, Clavijo supplemented Buffon's text with observations drawn from animals kept at the *Reales Sitios*, including accounts of monkeys reproducing at the *Casa de Fieras* of Buen Retiro,²⁴ behavioural observations on porcupines,²⁵ and detailed anatomical and physiological descriptions of species such as the *bubalus* brought from Tripoli in 1785 and kept first at Aranjuez and later at Buen Retiro.²⁶ He also referred to American bison or *cíbolos*, formerly kept in the royal collections, discussing their behaviour and failed domestication.²⁷ These additions show that the Spanish translation, in addition to reproducing Buffon's text, incorporated local empirical observations regarding the care, breeding and acclimatization of exotic animals at the royal court.²⁸

²² Antonio Cabral Chamorro, "El jardín botánico Príncipe de la Paz de Sanlúcar de Barrameda: una institución ilustrada al servicio de la producción agraria y forestal," *Revista de Estudios Andaluzes* 21 (1995): 165–188.

²³ Thomas Lecocq, "Insects: The Disregarded Domestication Histories," in *Animal Domestication*, ed. Fabrice Teletchea (London: IntechOpen, 2018), 1–34.

²⁴ Georges-Louis Leclerc, comte de Buffon, *Historia natural, general y particular*, vol. 16, trans. José Clavijo y Fajardo (Madrid: Viuda de Joaquín Ibarra, 1791), 145.

²⁵ Georges-Louis Leclerc, comte de Buffon, *Historia natural, general y particular*, vol. 17, trans. José Clavijo y Fajardo (Madrid: Viuda de Joaquín Ibarra, 1802), 86.

²⁶ Georges-Louis Leclerc, comte de Buffon, *Historia natural, general y particular*, vol. 14, trans. José Clavijo y Fajardo (Madrid: Viuda de Joaquín Ibarra, 1796), 74–79.

²⁷ Georges-Louis Leclerc, comte de Buffon, *Historia natural, general y particular*, vol. 8, trans. José Clavijo y Fajardo (Madrid: D. Joaquín Ibarra, Impresor de Cámara de S.M., 1789), 80; Georges-Louis Leclerc, comte de Buffon, *Historia natural, general y particular*, vol. 5, trans. José Clavijo y Fajardo (Madrid: Viuda de Joaquín Ibarra, 1796), 128.

²⁸ Georges-Louis Leclerc, comte de Buffon, *Historia natural, general y particular*, vol. 11, trans. José Clavijo y Fajardo (Madrid: D. Joaquín Ibarra, Impresor de Cámara de S.M., 1785–1805).

2.1. *Species for Labour, Meat and Milk Production: Camels, Buffalo and Bison*

Camels and dromedaries became acclimatized at the Spanish court through their constant presence in various *Reales Sitios*. Most of them came from North Africa as diplomatic gifts, through purchases or as part of royal collections. They were used in places such as Aranjuez, San Ildefonso and Buen Retiro, mainly for carrying loads and transport. Their endurance, ability to withstand shortages of water and food, and the advantage of not needing to be shod were some of the arguments used to consider them particularly useful animals for gardening work, as they could carry loads without damaging the flowerbeds.²⁹ On the one hand, in everyday life, they were managed like any other livestock belonging to the Royal Estates: “surplus,” “useless” or “unruly” animals were sold or sent to the slaughterhouse, and their meat was also used for human consumption. They had specific harnesses for handling and were cared for by the marshals and veterinarians of the stables.³⁰ Yet on the other hand, they never lost their value as collector’s items and exhibition animals for court entertainment. They were presented at the *Casa de Fieras* and participated in hunts, animal fights, parades and other shows.³¹

In the mid-nineteenth century, Queen Isabel II (reigned 1833–1868) had several camel herds, each with a different function: at the *Real Sitio* of Aranjuez, she kept around twenty camels for breeding, while at *El Pardo* and *El Retiro*, they were mainly used for transport.³² In 1871, a lack of resources to maintain the herds led to them being put up for sale, with some local farmers requesting free specimens for the purpose of conducting agricultural “trials”.

²⁹ Gómez-Centurión, “Exóticos pero útiles,” 171–172; José de Hidalgo Tablada, *Curso de economía rural española* (Madrid: Imprenta y Librería de la Señora Viuda e Hijos de D. José Cuesta, 1864–1865), 506.

³⁰ Nuria Benítez Prián, Manuel García-Espantaleón Artal, and Joaquín Sánchez de Lollano Prieto, “¿Curar a una fiera? La atención clínica y los cuidados del animal exótico en las primeras colecciones zoológicas de Madrid,” in *Ciencia, técnica y libertad en España. Proceedings of the XIV Congreso de la Sociedad Española de Historia de las Ciencias y de las Técnicas*, ed. Alba Lérica Jiménez, Miguel Ángel Puig-Samper, José M.^a López Sánchez, and Marcos Prados Martín (Madrid: Sociedad Española de Historia de las Ciencias y de las Técnicas [SEHCYT]; Doce Calles, 2024), 549–556, on 551.

³¹ Juan Álvarez de Quindós, *Descripción histórica del real bosque y casa de Aranjuez* (Madrid: Imprenta Real, 1804), 387.

³² *La Época*, 26 March 1856, n.º 2.156, p. 4.

This reflects the nineteenth-century interest in the possibility of incorporating exotic species to improve agricultural productivity.³³

Camel breeding at the *Reales Sitios* was eventually abandoned due to several limitations, above all the fact that their load capacity barely exceeded that of a donkey, which reduced their profitability compared to other working animals.³⁴ These disadvantages were compounded by the expansion of the railway network, which offered far more efficient means of transport and made animal labour appear increasingly obsolete.³⁵ Despite interruptions during their presence at court, including critical moments when no specimens remained, such as after an epizootic disease wiped out the entire camel population in Aranjuez at the mid of the eighteenth century,³⁶ camels nevertheless became one of the exotic species most consistently maintained within the *Reales Sitios*, with herds repeatedly re-established, bred over long periods, and exploited for transport and animal products across several decades.

Another long-lasting acclimatization experiment was carried out with the Asian buffalo (*Bubalus bubalis*), one of the bovine species introduced into the *Reales Sitios* following the examples of Naples and the Papal States, where it had been successfully established in the sixteenth century. Its documented presence in Spain dates back at least to the reign of Philip III (1598–1621), who in 1600 established a buffalo dairy in Aranjuez with specimens brought from Flanders.³⁷ Later, in 1711, during the War of Succession (1701–1714), at least seven buffaloes were transferred to the Casa de Campo under Philip V.³⁸

A new shipment arrived from Naples in 1762, by order of Carlos III, and was sent to the *Real Sitio* of Aranjuez,³⁹ specifically to Villamejor, where a

³³ Archivo General de Palacio (AGP), *Patrimonios Aranjuez*, C^a 14.432, Exp. 1, June 1871.

³⁴ *Memoria sobre los productos de la agricultura española reunidos en la Exposición general de 1857, presentada al Sr. Ministro de Fomento por la Junta Directiva de aquel concurso* (Madrid: Imprenta Nacional, 1859–1861), 932. A comparable limitation had already appeared in Peru, where camels introduced in 1522 initially reproduced but failed to spread beyond the archbishopric of Lima once horses and mules became sufficiently available for transport. See Bernabé Cobo, *Historia del Nuevo Mundo*, vol. 2, ed. Marcos Jiménez de la Espada (Sevilla: Imprenta de E. Rasco, 1891), 442–443.

³⁵ Hidalgo Tablada, *Curso de economía rural española*, 507.

³⁶ *Semanario de agricultura y artes dirigido á los párrocos*, n.º 264, 21 January 1802, 43.

³⁷ Álvarez de Quindós, *Descripción histórica del real bosque y casa de Aranjuez*, 227–228.

³⁸ AGP, *Patrimonios Aranjuez*, leg. 3, 1711.

³⁹ AGP, *Patrimonios Aranjuez*, C^a 14.219, Exp. 9, “Gastos de la conducción de búfalos de este Real Sitio,” 26 June 1762; Exp. 11; Exp. 12.

stud farm for mule breeding already existed.⁴⁰ Special stables were built for the buffaloes, and specialised personnel was hired: a foreman in charge of making lard and *provola* cheese, a herdsman responsible for grazing, and a supervisor with several labourers who worked with the animals already on site, described as the “old tame ones,” suggesting that there were already generations of domesticated buffaloes on site.⁴¹ The lard and cheese produced were destined for the royal table, and Carlos III gave advice on how to make them more buttery and tender.⁴² Their meat, however, was less appreciated than beef and was therefore sold at half price.⁴³ Experiences with these herds provided valuable insights into their feeding, milking and temperament, while also highlighted practical difficulties: longer gestation periods than cattle, the need to milk females in the presence of their calves,⁴⁴ more demanding care and a more violent and difficult-to-handle nature than oxen.⁴⁵

These drawbacks, coupled with the damage suffered during the War of Independence (1808–1814), were explanations for the decline in their breeding.⁴⁶ Around 1831, Queen María Cristina attempted to revive the initiative with new herds in Aranjuez, San Ildefonso and on an estate she acquired in Quitapesares.⁴⁷ At the same time, Princess María Luisa Carlota also kept buffaloes at the *Casa de Campo*.⁴⁸ However, by 1865, there were none left. According to a contemporary treatise on rural economics, their disappearance was due to three main factors: inadequate treatment, slaughter because of their wild nature, and replacement by oxen.⁴⁹ Nevertheless, the same source suggested that, had they been successfully crossbred with cattle, their main-

⁴⁰ Francisco de Paula Mellado, *Guía del viajero en España* (Madrid: Estab. Tip. calle del Sordo, 1842), 258.

⁴¹ AGP, *Patrimonios Aranjuez*, C^a 14.219, Exp. 9.

⁴² *Ibid.*

⁴³ François Rozier, *Curso completo ó Diccionario universal de agricultura teórica, práctica, económica, y de medicina rural y veterinaria*, vol. 4, trans. Juan Álvarez Guerra (Madrid: Imprenta Real, por D. Pedro Julián Pereyra, 1799), 204.

⁴⁴ Nicolás Casas de Mendoza, *Tratado de la cría del buey, oveja, cabra, cerdo, perro y conejos* (Madrid: Librería de los Sres. Viuda de Calleja e Hijos, 1844), 87.

⁴⁵ Francisco Fernández Villabril, *El universo o las obras de Dios: tratados completos de historia natural*, vol. 1 (Madrid: Establecimiento de Mellado, 1854), 169.

⁴⁶ Mellado, *Guía del viajero en España*, 258.

⁴⁷ *Diccionario geográfico universal*, vol. 7 (Barcelona: Imprenta de José Torner, 1832), 907.

⁴⁸ AGP, *Buen Retiro*, C^a 11.767, Exp. 6.

⁴⁹ Hidalgo Tablada, *Curso de economía rural española*, 409.

tenance would have been advantageous.⁵⁰ With intervals, the Asian buffalo remained present in the Spanish court for almost three centuries, making it one of the most representative cases of animal acclimatization in the *Reales Sitios*.

On the other hand, another member of the *Bovidae* family that attracted considerable attention in relation to acclimatization was the American bison (*Bison bison*). The species interested the Spanish court because of reports concerning its possible domestication and the wide range of products that Native Americans obtained from it, including leather, wool, milk, and meat, while at the time these animals were commonly referred to as “cíbolos,” a name associated with the mythical region of Cíbola, believed to be their place of origin.⁵¹ Contemporary accounts also suggested that they could potentially be employed in agricultural labour, based on reports of their occasional use for ploughing in North America.⁵² Later Carlos III showed interest in acclimatizing bison in the 1770s.⁵³ After receiving a pair of specimens as a gift from the viceroy of New Spain in 1770, the animals were shipped from Veracruz to Cádiz, but the male died during the journey and only the female was transferred to the buffalo herd in Villamejor.⁵⁴ Further specimens arrived in 1783, reportedly captured “400 leagues beyond Mexico”. Of the “four or five” animals embarked, only “two or three” survived the year-long voyage to Cádiz, although a calf was born on board during the journey. The surviving animals were later transported some 600 kilometres to Aranjuez, where they died shortly afterwards. The naturalist Clavijo y Fajardo, who observed at least some of these specimens personally, concluded that the species had never been fully domesticated because of its ferocity.⁵⁵ The engravings reproduced

⁵⁰ *Revista de la Ganadería Española*, n.º 15, August 1849, 236.

⁵¹ Jerry R. Craddock and John H. R. Polt, *Zaldívar and the Cattle of Cíbola: Vicente de Zaldívar's Report of His Expedition to the Buffalo Plains in 1598* (Dallas: Southern Methodist University, 1999); see also Francisco López de Gómara, *Historia de las Indias* (1552), ed. Monique Mustapha, Louise Bénat-Tachot, Marie-Cécile Bénassy-Berling, and Paul Roche, with the collaboration of María del Carmen Martínez Martínez, Marie-Laure Rieu Millán, and Mónica Zarza Roca (Madrid: Casa de Velázquez, 2021).

⁵² Joseph de Laporte y Pedro Estala, *El viajero universal*, vol. 26 (Madrid: Imprenta de Villalpando, 1799), 356.

⁵³ *Semanario de agricultura y artes dirigido á los párrocos*, vol. 11, n.º 276, 15 April 1802, 239.

⁵⁴ Gómez-Centurión, “Curiosidades vivas,” 201–202.

⁵⁵ Georges-Louis Leclerc, comte de Buffon, *Obras completas de Buffon. Cuadrúpedos*, vol. 9, trans. P.A.B.C.L. (Barcelona: Impr. de A. Bergnes y C^a, 1833), 63. The observation appears in a note at-

below probably represent some of these animals: a female and her male offspring.



Figure 1: “Tiene esta embra, 6 palmos y dos pulgadas de alto: de largo 8 palmos”
[“This female measures 6 spans and 2 inches in height, and 8 spans in length.”]

ANMCN iconographic collection 407 ACN100A/004/00407.

“Tiene esta macho, 6 palmos y tres pulgadas de alto: de largo 8 palmos”
[“This male measures 6 spans and 3 inches in height, and 8 spans in length.”]

ANMCN iconographic collection 406 ACN100A00400406

Although the deaths of the introduced specimens were attributed to the contrasting climate, it was believed that they would have survived better in Andalusia.⁵⁶ Attempts to acclimatize bison were nevertheless soon abandoned, probably due to the difficulties involved in transporting, maintaining, and reproducing the animals in captivity. Even so, their brief presence in Aranjuez attracted attention beyond Spain, since these animals had apparently never been seen before in Europe.⁵⁷

tributed to José Clavijo y Fajardo.

⁵⁶ Laporte y Estala, *El viajero universal*, vol. 26, 346.

⁵⁷ John Talbot Dillon, *Travels Through Spain, with a View to Illustrate the Natural History and Physical Geography of that Kingdom, in a Series of Letters. Including the Most Interesting Subjects Contained in the Memoirs of Don Guillermo Bowles, and Other Spanish Writers* (London: G. Robinson; Pearson and Rollason, 1780), 428; see also J. Pinkerton, S. F. Lacroix, and J. Pond, *Modern Geography. The Astronomical Introduction*, vol. 2 (London: T. Cadell & W. Davies; Longman, Hurst, Rees, Orme, Brown, 1811), 368.

2.2. *New Species for the Wool Industry: American Camelids and Angora Goats*

American camelids, such as the llama (*Lama glama*), alpaca (*Vicugna pacos*), guanaco (*Lama guanicoe*) and vicuña (*Vicugna vicugna*), were among the exotic species that Europeans were most interested in acclimatizing, because of the perceived wealth expected from selling their fine wool, which fetched high prices on textile markets.⁵⁸ The Spanish Crown enjoyed privileged access to the export of live camelids from Peru to Spain until the end of the eighteenth century, within the framework of the colonial trade restrictions of the Spanish Empire. Contemporary accounts emphasised that these transfers were undertaken “more for utility than for curiosity”.⁵⁹ Since the earliest descriptions of American fauna by Jesuit José de Acosta, Andean camelids had attracted considerable interest due to their high yield and low maintenance cost, their usefulness as pack animals that did not need to be shod or saddled, and the medicinal properties attributed to their bezoars⁶⁰, which attracted a great deal of attention of early colonisers.⁶¹ The dismantling of the Tawantinsuyu administration (union of the four territories ruled by the Inca empire from Cuzco), which had promoted and protected camelid herding and restricted indiscriminate hunting, contributed to the decline of these herds over time.⁶² Even so, Philip II was able to bring specimens to Spain, and small herds were kept at the *Casa de Campo*.⁶³

By the late 1760s, the Real Fábrica de Guadalajara had already begun experimenting with imported camelid wool to produce highly prized fabrics and luxury items, such as expensive caps and bonnets that were successfully marketed across Europe.⁶⁴ The factory processed this premium raw material into luxury cloths, caps, and bonnets that were highly prized in demanding European markets, such as France,⁶⁵ where their quality was frequently com-

⁵⁸ Gómez-Centurión, “Curiosidades vivas,” 202.

⁵⁹ *Boletín Oficial del Ministerio de Fomento* (Madrid: Ministerio de Fomento, 1855), 155.

⁶⁰ Elisabeth Eguía, Eugenio Fernández Sánchez, Javier M. Fernández Rico, Antonio Martínez Mozo and César J. Pollo Mateos, “Tres frailes naturalistas españoles en la América Virreinal,” *Sociedad Geográfica Española*, n.º 58 (2017): 110–122.

⁶¹ Helen Louise Cowie, *Victims of Fashion* (Cambridge: Cambridge University Press, 2021), 159.

⁶² *Ibid.*

⁶³ Juan de Arfe y Villafañe, *Varia Commensuración*, vol. 5 (Madrid: Imprenta Real, 1806), 16–18.

⁶⁴ Gómez-Centurión, “Curiosidades vivas,” 202.

pared to fine silk.⁶⁶ This continuous, state-enforced influx of colonial wool allowed the Spanish metropolis to sustain high-end manufacturing without having to rely on the immediate success of domestic animal acclimatization. Spain had a monopoly on wool from American camelids until the independence of the Viceroyalty of Peru in 1821, receiving large quantities of wool shipments without needing to rely on domestic wool production.⁶⁷ Carlos IV (reigned 1788–1808) also received vicuñas on several occasions, one of which came accompanied by “instructions for their care”.⁶⁸ Of the twelve animals sent by Viceroy of Peru in 1793, only one survived the journey, highlighting the difficulties involved in transporting them alive.

The difficulties of obtaining live camelids increased during the first decades of the nineteenth century, after the imperial routes were disrupted due to wars of independence in America. This was evident in the 1804 expedition, organised at the request of Josephine Bonaparte to Carlos IV, who asked for a herd for her gardens at Malmaison, near Paris. The king ordered the animals to be gathered in Lima, with specialised shepherds and a militia captain in charge. They were shipped to Buenos Aires, but the war with Britain delayed their transfer to the metropolis for several years. When they finally set sail for Cádiz, the ship was attacked, causing shortages of supplies and pasture on board. Of the 36 individuals that set sail, only nine survived the journey and reached the Sanlúcar Acclimatization Garden in poor condition, some suffered from rabies and died shortly afterwards, along with their offspring.⁶⁹ This episode was described in memoirs by the botanist Simón de Rojas Clemente and garden director Francisco de Terán,⁷⁰ who recorded births and successful crossbreeding, producing “alpa-vicuñas”. They also noted the quality

⁶⁵ Pierre Richelet, *Dictionnaire de la langue française, ancienne et moderne* (Paris: Chez les frères Duplain, 1759).

⁶⁶ Arfe y Villafañe, *Varia Comensuración*, vol. 5, 17.

⁶⁷ In Cádiz, on 16 August, the arrival of, among other cargoes, 619 arrobas of vicuña wool on the ship *Aguiles* and 329 arrobas on the Royal Navy urca *Sta. Florentina*, from Callao, was reported in *Mercurio de España*, August 1785, 383–384.

⁶⁸ AGP, C^a 11.763, Exp. 13, “Instrucción del Régimen que se le debe observar y cuidados a la vicuña que se puso a mi cargo,” 11 May 1794.

⁶⁹ Cabral Chamorro, “El jardín botánico Príncipe de la Paz,” 180.

⁷⁰ *Revue encyclopédique: ou Analyse raisonnée des productions les plus remarquables dans la littérature, les sciences et les arts*, vol. 15, 1822, 221–227.

of the hybrid wool, which was even used to make a hat whose quality surpassed those made from beaver hair.⁷¹

Despite these difficulties, some live camelids still reached Spain through alternative routes. In 1858, for example, the Ministerio de Fomento acquired a herd of vicuñas and alpacas via Cuba and donated it to the Real Sitio de Aranjuez.⁷² The herd subsequently became the subject of systematic zootechnical monitoring through technical questionnaires requested by Mariano de la Paz Graells and answered by the Administrator of the Real Sitio. These records documented births, mortality, lactation, nutrition, and even advanced veterinary interventions such as the surgical removal of a tumour, providing Graells with detailed information intended to evaluate the possibilities and limitations of acclimatization.⁷³

Angora goats also aroused the interest of the court because of their wool, leading to several attempts to acclimatize them. In 1762, Carlos III ordered a herd to be brought from Naples together with buffaloes, and the goats were settled in the *Casa de Campo*.⁷⁴ According to the keepers, however, acclimatization there was unsuccessful due to poor pastures and unsuitable temperature conditions, which reduced coat quality and caused high mortality.⁷⁵ Documents from this period nevertheless record the annual shearing of these animals; in 1796, the flock produced almost fourteen arrobas of wool, just over 150 kilograms.⁷⁶

A report published in 1802 indicates that the Angora goat flock, which at that time numbered 315 animals, had been transferred from the *Casa de Campo* to Boadilla del Monte in the early 1790s. There, detailed memoirs were

⁷¹ *Le Monde illustré*, n.º 62, 19 July 1858, 385.

⁷² AMNCN, 0325/004/003, “Mariano Domínguez informa a Graells sobre la aclimatación de 13 llamas y alpacas regaladas por la sociedad de fomento a S.M. con destino al Real Sitio de Aranjuez,” 30 January 1858.

⁷³ AMNCN 0325/005, Jardín Zoológico y Sociedad de Aclimatación, Dirección, “Expediente sobre las llamas o alpacas aclimatadas en los Reales Sitios de Aranjuez y La Granja de San Ildefonso,” 2 October 1863.

⁷⁴ Sarmiento, “Carta al Duque de Medinasidonia,” 219–220.

⁷⁵ AGP, *Casa de Campo*, C^a 55, Exp. 1, “Sobre la conveniencia de trasladar las cabras asiáticas a un paraje más templado,” 11 November 1795.

⁷⁶ AGP, *Casa de Campo*, C^a 55, Exp. 2, “Razón de la lana que ha producido el esquila de las cabras de Angora en el Real Bosque de la Casa de Campo,” 28 June 1786.

produced on its breeding and management.⁷⁷ These accounts described the animals' temperament, size, longevity, and sensitivity to heat, humidity, and wind, grazing habits, seasonal water consumption, and the transfer of pregnant females to the lambing pen. They also recorded gestation periods, offspring numbers, care during calving, shearing practices, and the production of wool, milk, and hides. Among the diseases affecting the flock, particular attention was given to "comalia," a disease affecting sheep, whose causes, treatments, and hygienic implications were carefully examined, including the effects of unsanitary environmental conditions.⁷⁸ Finally, the memoir recommended dispersing the flock across different locations in order to observe where the animals adapted best and to reduce the risk of contagion.⁷⁹

In 1818, Fernando VII had a herd of 350 Angora goats at the Casa de Campo. Finding it almost abandoned, he entrusted it to the Marquis of Monsalud, who transferred the animals, along with shepherds and dogs, to his pastures in Extremadura (a region in southwestern Spain) in order to test their acclimatization under better grazing conditions. The king reserved the wool for trails in factories in Mataró, Guadalajara and Ortiz de la Paz de Segovia. The animals remained there until 1823 and were managed like ordinary sheep. The wool sent to these factories was considered closer to hair than to wool, and therefore required special care in weaving, although it was noted that new machines might make it easier to process. During these years, the flock increased by seventy-two animals, returning to the king with 422 individuals. According to the shepherds, the goats were easy to raise, stronger and healthier than common sheep, produced milk of comparable quality, and they would have thrived even better in mountain areas than in the pastures.⁸⁰ In 1830, Fernando VII acquired another hundred goats, which were taken to the *Real Sitio* of Buen Retiro. They multiplied to such an extent that they had to be moved to the mountains of El Escorial, where they re-

⁷⁷ *Semanario de agricultura y artes dirigido á los párrocos*, n.º 264, 21 January 1802, 40–44.

⁷⁸ "Comalia" was a contemporary veterinary term associated with generalized dropsy in sheep. Real Academia Española, "comalia," *Diccionario de la lengua española*, from www.rae.es, accessed May 9, 2026.

⁷⁹ *Semanario de agricultura y artes dirigido á los párrocos*, n.º 264, 21 January 1802, 41.

⁸⁰ AMNCN, 0325/001, "Escrito anónimo sobre la aclimatación de cabras de Angora existentes en la Real Casa de Campo con el Rey Fernando VII en 1818 y encargando al Marqués de Monsalud su mantenimiento en dehesas de Extremadura en 1823."

mained until at least 1857, and to San Ildefonso, where they remained until 1866.⁸¹

Despite more than a century of presence, Angora goat breeding did not take root in the Spanish livestock sector. Contemporary authors argued that, although the herds could have been expanded, their development was slowed down by strict selection, which eliminated animals that did not meet the desired standards of breed purity, and by the lack of interest among industrialists, who neither understood the properties of the wool nor requested samples from the model farm.⁸² From 1881 onwards, the Ottoman ban on exporting specimens further restricted access to new animals,⁸³ while international competition intensified as large herds in the Cape Colony,⁸⁴ Australia and the United States,⁸⁵ ended up dominating the market. Even so, the dairy farm at the *Granja Central de Experimentación* (Central Experimental Farm) continued to work with this species.⁸⁶

Experiments were also carried out at the *Granja Modelo* (Model Farm) in the *Real Sitio* of Aranjuez with other exotic ovicaprids, this time aimed not at wool production but at achieving faster growth and greater meat yield in local wool breeds. One notable case involved a ram known as the Indian *Morueco*, abandoned on a Galician beach after a British skirmish in 1800. With hair instead of wool and presumed Eastern origins, it was crossed with local sheep, and produced offspring with greater meat weight than those usually obtained from local flocks.⁸⁷ Carefully recorded in contemporary sources, the case gave rise to the so-called ‘Indian breed’, characterized by a similar fleece but increased meat yield. The animals were subsequently distributed among small farmers, after which their later fate is no longer documented. The limited number of individuals involved (a single breeding male) conditioned the continuity of the initiative. Despite its disappearance from the record, the experiment was interpreted as evidence of the feasibility of this breeding prac-

⁸¹ Cayetano Rosell, *Crónica de la provincia de Madrid* (Madrid: Ronchi, 1866).

⁸² Hidalgo Tablada, *Curso de economía rural española*, 180–183.

⁸³ *Alrededor del Mundo*, 15 February 1906, 107.

⁸⁴ *El Progreso agrícola y pecuario*, n.º 292, 22 May 1902; see also *El Campo*, n.º 16, 16 July 1886.

⁸⁵ *El Progreso agrícola y pecuario*, n.º 319, 15 December 1902.

⁸⁶ *La Época*, n.º 14.441, 25 November 1892.

⁸⁷ *Semanario de agricultura y artes dirigido á los párrocos*, n.º 264, 3 January 1805, 38–48.

tice, reflecting both the techniques employed and the expertise of the livestock keepers working at the *Reales Sitios*.

2.3. Attempts to Acclimatize Ratites

Among exotic birds, ratites (ostriches, rheas and emus) aroused particular interest at the Spanish court. Their appeal was not solely ornamental: ostrich feathers formed part of a lucrative luxury trade, while their meat and eggs were also highly valued.⁸⁸ Ostriches were among the exotic species regularly found in the *Reales Sitios*, arriving as diplomatic gifts from the North African kingdoms, which usually sent them in pairs to encourage breeding.⁸⁹ From 1680 onwards, “ostrich pens” (*corralones*)⁹⁰ are documented in the Buen Retiro and other *Reales Sitios*, together with specialised keepers.⁹¹

The market value of ostrich feathers generated security and economic concerns.⁹² Persistent attempts to steal feathers by plucking them from live birds led to the reinforcement of fencing in Aranjuez in 1795 and to 1798 proposals to enclose the pens at Buen Retiro with masonry walls.⁹³ Naturalists from the *Real Gabinete de Historia Natural* (Royal Cabinet of Natural History) insisted that dead specimens arrive “intact” for taxidermic preparation, as these animals were intended for scientific study and public display within the royal collections.⁹⁴ Furthermore, egg production was subject to rigorous ad-

⁸⁸ *El monitor de la veterinaria*, n.º 70, 15 June 1861, 211–212.

⁸⁹ AGP, *Real Cámara*. Fernando VI, C^a 116, Exp. 13, “Expediente sobre el regalo realizado por el rey de Mequinez a Fernando VI consistente en tres parejas de fieras,” 1751; AGP, Buen Retiro, C^a 11.751, Exp. 4, “Sobre el envío hecho por el rey de Mequinez de un león, un tigre y un avestruz,” 1751.

⁹⁰ AGP, Buen Retiro, C^a 11.731, Exp. 22, October 1680, “Licencia de la Junta de Obras y Bosques para construir un corralón para los avestruces que hay en el Retiro”; AGP, Buen Retiro, C^a 11.756, Exp. 13, “Sobre construcción de un corral para avestruces,” 1762.

⁹¹ AGP, *Personal. Expedientes Personales*, C^a 11.811, Exp. 63, José Muñoz, “Cuidador del corralón de avestruces”.

⁹² The “excessive price” and scarcity of these luxury ornaments were discussed in contemporary specialized press. For instance, the *Semanario de agricultura y artes dirigido á los párrocos*, n.º 553, 6 August 1807, 82, highlighted the high cost of feathers imported from North Africa and explicitly advocated for the “connaturalization” (*connaturalizar*) of ostriches in Europe.

⁹³ AGP, *Buen Retiro*, C^a 11.761, Exp. 21, 2 July 1789, “El intendente propone se cierren con tapias el corralillo de las avestruces por un importe de 30.000 rls.”

⁹⁴ AGP, *Buen Retiro*, C^a 11.759, Exp. 46, 15 June 1795; C^a 11.761, Exp. 21, *Aves y Fieras*, 1792; C^a 11.761, Exp. 21, 2 July 1789. For more information on the public display and discourse surrounding taxidermy preparations in Madrid, see Santiago Aragón Albillos, *En la piel de un animal: el Museo de Ciencias Naturales y sus colecciones de taxidermia* (Madrid: Consejo Superior de Inves-

ministrative recording: employees maintained monthly lists, which the overseer reported to the Count of Floridablanca, who determined the quantities required for royal consumption.⁹⁵

The most detailed information on ostrich breeding and acclimatization comes from the *Casa de Fieras* of *Buen Retiro* during the reign of Isabel II (1833–1868). There, ostriches were usually kept in open-air enclosures together with kangaroos, gazelles, dromedaries, and emus, in conditions intended to resemble their natural environment more closely than conventional pens.⁹⁶ In 1852, Queen Isabel II received several pairs of ostriches from Algeria as gifts sent by the Marquis Péliissier of Oran.⁹⁷ In 1857, the first ostrich chick was born at *Buen Retiro*. The event is known through reports by Froilán Ayala, intendant of the *Real Sitio* of *Buen Retiro*, who provided Mariano de la Paz Graells with detailed information on courtship, laying, incubation, and chick's growth.⁹⁸ The ostriches were under the care of Francisco Brea, the keeper responsible for ostriches and emus, and the reports reveal highly specific care practices based on observation, trial and error, and knowledge gradually accumulated through daily experience. Shortly afterwards, the birth of another ostrich in the Demidoff Gardens in Florence attracted attention across Europe and prompted Graells to claim priority for the Madrid case in the press, arguing that the first ostrich born on the European continent had in fact hatched at the *Real Sitio*.⁹⁹ While Demidoff's ostrich reached a second generation, no further record of the Madrid specimen has been found. The same keeper at the *Buen Retiro* also succeeded in breeding emus (*Dromaius novaehollandiae*) in 1861, after more than a decade without reproduction.¹⁰⁰ These results highlight the importance of experienced keepers at the *Reales Sitios*, since successful breeding depended on forms of attention and care that went beyond routine animal management.

tigaciones Científicas, Doce Calles, 2014).

⁹⁵ AGP, *Buen Retiro*, C^a 11.761, Exp. 17, *Aves y Fieras*, 28 May 1789, 1792.

⁹⁶ *La América. Crónica Hispano Americana*, n.º 18, 24 November 1860, 8–9.

⁹⁷ AGP, *Buen Retiro*, C^a 11.795, 30 June 1852; C^a 10.691, Exp. 2, 27 August 1852.

⁹⁸ AMNCN, 0325/008/001, "Expediente sobre avestruces y emúes aclimatadas en el Real Sitio del Buen Retiro de Madrid," 22 March 1861.

⁹⁹ *La América. Crónica Hispano Americana*, n.º 18, 24 November 1860, 8–9.

¹⁰⁰ AMNCN, 0325/007, "Expediente sobre avestruces y emúes aclimatadas en el Real Sitio del Buen Retiro de Madrid," 22 March 1861.

2.4. *Acclimatization Attempts of Other Species at the Reales Sitios*

The monarchy also showed interest in acclimatizing exotic species that could be integrated into the natural landscapes of the *Reales Sitios*, either for their ornamental value or for possible use in hunting and meat consumption. Among these were gazelles (*Gazella dorcas*) and kangaroos (*Macropus giganteus*), both of which reproduced with some success, although they were never kept for economic purposes.¹⁰¹ The first known reference to kangaroos in Madrid's zoological collections dates back to 1826, when Fernando VII acquired one male and four females for the *Casa de Fieras*. It soon became apparent that they did not tolerate confined spaces: jumping caused them injuries, while lack of exercise led to illness and death. They were therefore moved to larger enclosures with bushes, which they shared with camels, gazelles and other herbivores, and where they reproduced successfully, at times forming herds of more than thirty individuals.¹⁰²

The *Reales Sitios* also generated abundant documentation on the breeding of exotic birds and the use of their eggs. Canaries, bred by the hundreds each year, were given to the royal children and courtiers for their song.¹⁰³ Golden and silver pheasants, guinea fowl, peacocks, swans, Muscovy ducks, turtle-doves, Conchinchina chickens and crossbred varieties were also known and appreciated at court. Their breeding involved specialised techniques, including artificial incubation and the rearing of exotic bird eggs under broody hens. Guinea fowl were bred by the dozen, while the documented reproduction of golden and silver pheasants have a documented tradition that reflects the effectiveness of these methods. The breeding of guinea pigs in the Buen Retiro was also recorded.¹⁰⁴

The scope of these experiments extended to insect acclimatization, as evidenced by an 1833 initiative to introduce fireflies into the Buen Retiro. At the request of Queen Maria Christina, Ferdinand VII commissioned a technical report from the Real Museo de Ciencias Naturales. Unlike other projects driven by economic productivity, this initiative was motivated by the aes-

¹⁰¹ *La Época*, n.º 2.156, 26 March 1856, 4.

¹⁰² Mariano de la Paz Graells, *Fauna mastodológica ibérica* (España: Imprenta de D. Luis Aguado, 1897), 668–671.

¹⁰³ AGP, Cª 11.777, Exp. 34, 31 October 1838.

¹⁰⁴ Rosell, *Crónica de la provincia de Madrid*, 27.

thetic value these insects could bestow upon the royal gardens. The naturalist Tomás Villanova assessed the feasibility of the project, concluding that while Spain already possessed more luminous native species, the experiment remained viable. Villanova provided nine specific recommendations to ensure their successful acclimatization and management, reflecting the application of natural history knowledge to the ornamental enhancement of the *Reales Sitios*.¹⁰⁵

3. The 1857 General Exhibition of Agricultural Products: Public Visibility and the Decline of Acclimatization Projects in the *Reales Sitios*

The *Exposición General de Agricultura* was held in Madrid in 1857 at the initiative of the *Ministerio de Fomento* and with the support of Queen Isabel II.¹⁰⁶ This event should be situated within the broader European context of industrial, agricultural and universal exhibitions, which emerged in the mid-nineteenth century as major showcases for technical innovation, agricultural improvement, and national progress. These exhibitions, following the example set by the Great Exhibition of 1851 in London and subsequent world fairs, had a profound impact on the cultural and economic development of participating nations. The 1857 exhibition, as the first major national livestock exhibition in Spain, reflected the growing interest in modernizing agricultural practices, as well as an emphasis on industrial innovation.¹⁰⁷ *Patrimonio Real* played a prominent role exhibiting both domestic and exotic species.¹⁰⁸ Among the live specimens on display were llamas, Angora goats, guinea fowl (with their eggs), camels, kangaroos, pheasants and other exotic birds, as well

¹⁰⁵ AMNCN, 0143/439, “Oficio de Don Francisco de Zea Bermúdez al presidente de la Junta de Protección del Reino,” 16 April 1833.

¹⁰⁶ *Memoria sobre los productos de la agricultura española reunidos en la Exposición general de 1857*, 1.

¹⁰⁷ Horacio Capel Sáez, “Las exposiciones nacionales y locales en la España del siglo XIX: medio local, redes sociales y difusión de innovaciones,” in *Técnica e ingeniería en España. El Ochocientos: pensamiento, profesiones y sociedad*, coord. Manuel Silva Suárez, vol. 4 (Zaragoza: Real Academia de Ingeniería, Institución “Fernando el Católico,” Prensas Universitarias de Zaragoza, 2007).

¹⁰⁸ José Antonio Mendizábal Aizpuru, “La primera gran manifestación ganadera en España: La exposición de Madrid de 1857,” in *IX Congreso Iberoamericano de Historia de la Veterinaria: Santander (España), 4, 5 y 6 de octubre de 2012. XVIII Congreso Nacional* (Ilustre Colegio Oficial de Veterinarios de Cantabria, 2012), 168–172.

as a basket of ostrich eggs from the *Real Sitio* of Buen Retiro.¹⁰⁹ The display of these eggs underscored the commercial and sustenance value of such species, highlighting their potential role in enhancing food production and trade.

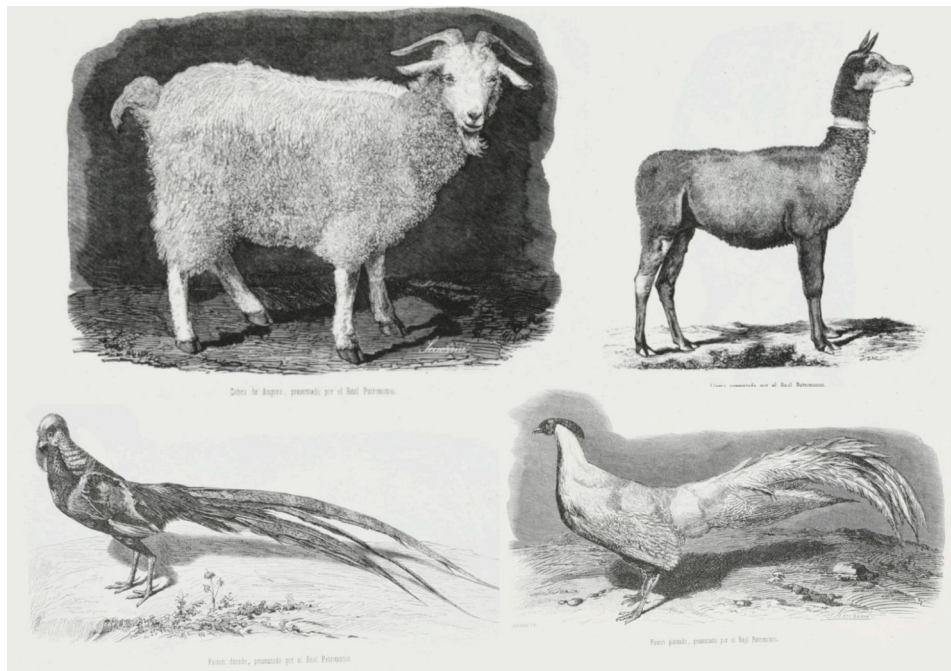


Figure 2: Illustrations of four of the award-winning specimens at the Exhibition of Agricultural Products belonging to the Royal Assets: Angora goat, llama, golden pheasant and silver pheasant. (Madrid-1857)

The exhibition had a considerable impact in both the general and specialised press. Within the broader context of European agricultural and industrial exhibitions, the 1857 Exhibition represented the moment of greatest public visibility for the practical knowledge accumulated in the *Reales Sitios* concerning exotic species, animal breeds and their productive possibilities. After 1857, however, no similar fair was organised during the remainder of Isabel II's reign, which ended with the Glorious Revolution of 1868. Shortly afterwards, the *Real Sitio* of Buen Retiro, including its animals and the *Casa de Fieras*, became public property.¹¹⁰ From then on, interest in the acclimatiza-

¹⁰⁹ *Memoria sobre los productos de la agricultura española reunidos en la Exposición general de 1857*, 962

¹¹⁰ See Miguel Ángel Jiménez Cisneros y Baudín, *El Parque Zoológico de Madrid, 1774–1994* (Madrid: Cyan, 1994); Luis Miguel Aparisi Laporta, *Madrid en sus animales* (Madrid: Rubiños-1860,

tion of exotic animals gradually declined. The *Real Sitio* of Buen Retiro was renamed *Parque de Madrid* (Madrid Park), and the *Casa de Fieras*, closer to a menagerie than to a modern zoo, became Spain's first public zoo. During its early years, commercial and institutional initiatives sought to exploit the surplus of ovicaprids and exotic birds through auctions, the sale of eggs to private individuals,¹¹¹ and the creation of an adjoining "zoological park" with animals and objects from the closed of the Acclimatization Zoological Garden of the *Museo de Ciencias Naturales*.¹¹² However, these efforts did not prosper: like many nineteenth-century public zoos, the *Casa de Fieras* increasingly functioned as a space of recreation and leisure, rather than as a centre for acclimatization of exotic fauna or zootechnical research.¹¹³

Documentary evidence for these forms of experimentation becomes far more fragmentary after 1868, suggesting a decline in the scale and continuity of acclimatization projects within the *Reales Sitios*, although such practices did not disappear entirely. The monarchy continued to promote occasional attempts to breed and acclimatize exotic species into the early twentieth century. Alfonso XIII, for example, attempted to acclimatize rheas (*Rhea americana*), at *La Torrejilla*, in the *Casa de Campo*, and later sought to expand their breeding by giving a group of rheas to General José María de Casanova, a military officer known for his writings on agriculture, so that he could conduct his own experiment.¹¹⁴

4. Constraints on Exotic Animal Acclimatization in Spain

Acclimatization projects in Spain were limited by several factors. Although political instability affected many nineteenth-century European countries, in Spain the succession of invasion, civil wars, *pronunciamientos*,¹¹⁵ revolution-

1999).

¹¹¹ Archivo de la Villa de Madrid, AV(S) 5-99-60, "Subasta para la venta de las aves excedentes del Jardín Zoológico en el Parque de Madrid"; AV(S) 6-442-24, 1884, "Relativo a subasta de aves del Parque Zoológico y rumiantes del mismo".

¹¹² ANMCN 0324/021 "Expediente sobre la supresión del jardín zoológico del Museo y su traslado al ayuntamiento de Madrid".

¹¹³ Oliver Hochadel, "Science at the Zoo. An Introduction," *Centaurus* 64, no. 3 (2022): 561-589.

¹¹⁴ *El Debate*, n.º 2.003, 7 May 1917, 3; *El Universo*, n.º 3024, 12 April 1910, 2; see also José María de Casanova, *La explotación de la riqueza de los avestruces en España* (Madrid: Imp. López del Horno, 1913).

¹¹⁵ A form of military coup or political uprising characteristic of nineteenth-century Spain.

ary episodes, and colonial crises repeatedly disrupted state institutions and reform projects.¹¹⁶ The closure of the *Zoologico de Aclimatación* of the *Museo de Ciencias Naturales* after the Revolution of 1868 was framed by Graells in terms of popular disorder and destructive political unrest.¹¹⁷ This interpretation echoed earlier arguments used by Isidore Geoffroy Saint-Hilaire when referring to the destruction of the Sanlúcar Acclimatization Garden in the early nineteenth century.¹¹⁸ However, the available evidence suggests that these episodes were closely linked to political upheaval, institutional crisis, and the symbolic association of these projects with the Bourbon court and figures such as Godoy, rather than to any specific or organized popular opposition to acclimatization itself.¹¹⁹ By borrowing Geoffroy's arguments, Graells reflected broader European discourses that framed social conflict in terms of civilization and progress, projecting hierarchical, class-based assumptions onto popular groups, thereby deflecting from the structural vulnerability and courtly isolation of these scientific infrastructures. Crucially, this narrative of failure and popular ignorance was also strategically deployed to convince the government of the urgent need for state intervention and centralized financial support for their own scientific initiatives.¹²⁰

Opinions expressed in the mid-nineteenth century regarding why American camelids had failed to establish themselves in Spain since the conquest of America generally pointed to two main causes: on the one hand, unsuitable climatic and environmental conditions and, on the other, supposed popular “barbarism” or apathy. The climatic explanation, however, already appeared in much earlier sources. In *Varia commensuración* (1585), Juan de Arfe y Villafañe observed that the vicuñas transferred to the Casa de Campo in Madrid had failed to propagate because the temperate environment differed greatly from the snowy Andean regions where they naturally lived, suggesting that mountainous areas would have been more appropriate for their es-

¹¹⁶ See, for example, Mark Lawrence, *Nineteenth-Century Spain: A New History* (London: Routledge, 2019).

¹¹⁷ Ramón Llorente y Lázaro, *Zoología aplicada, principalmente en sus relaciones con los animales domésticos*, with a response by Mariano de la Paz Graells (Madrid: Academia de Ciencias Exactas, Físicas y Naturales, 1875), 59–98.

¹¹⁸ *Boletín Oficial del Ministerio de Fomento* (Madrid: Ministerio de Fomento, 1855), 156.

¹¹⁹ Cabral Chamorro, “El jardín botánico Príncipe de la Paz,” 180.

¹²⁰ *Boletín Oficial del Ministerio de Fomento* (Madrid: Ministerio de Fomento, 1855), 156.

tablishment.¹²¹ Likewise, a French commercial dictionary published in 1770 stated that these animals invariably died in Spain because of inadequate pastures and an unsuitable climate, also noting that previous Spanish attempts to introduce them had eventually been abandoned.¹²² In this sense, contemporary observers developed concrete ecological explanations based on adaptation, altitude, and microclimate.

The venture to acclimatize vicuñas, llamas and alpacas was not prioritized for several reasons (the same reasons apply to the acclimatization of Angora goats): firstly, camelid wool was already being brought to the metropolis for processing, and Spain was already producing high-quality merino wool, which was well valued and exported. This reason was already pointed out by the military agronomist José de Hidalgo Tablada, who argued in 1898, that such efforts were unnecessary as long as the wool could be exported directly from its place of origin.¹²³ The other cause the independence movements in the American continent conducted to a loss of Spanish control of that market, the subsequent ban on the export of live camelids and Angora goats, further aggravated the difficulty of importing live animals from America, eliminating at the beginning of the nineteenth century one of the advantages attributed to Spain in the European context of acclimatization.

A decisive factor in the failure of acclimatization was the limited distribution of animals among livestock farmers. For exotic species to benefit the economy, they had to leave the royal estates and spread first to the agricultural nobility (with resources and infrastructure for breeding and absorbing the potential losses) and then to small livestock farmers. However, the plan involved only a few nobles close to the crown, and the knowledge acquired was disseminated in a limited way, mainly through the *Semanario de Agricultura y Artes dirigido a los párrocos* (“Weekly Journal of Agriculture and Arts for Parish Priests”; 1797–1808). As most peasants were illiterate, the newspaper was aimed at parish priests, often the only literate people in the villages,

¹²¹ Arfe y Villafañe, *Varia Commensuración*, vol. 5, 16–18.

¹²² *Dictionnaire portatif de commerce*, vol. 4 (Bouillon and Liège: Société Typographique; C. Plomteux, 1770), 117.

¹²³ Hidalgo Tablada, *Curso de economía rural española*, 114.

and members of provincial economic societies, therefore responsible for promoting agricultural development in Spain.¹²⁴

Even if knowledge produced in courtly experimental settings had circulated more widely among farmers, its adoption would still have been constrained by economic calculation and speculation, expressed in contemporary jargon as “zooristics,” a term referring to the assessment of economic viability in animal breeding practices and more broadly to the routine evaluation of livestock profitability.¹²⁵ This framework helps explain why, despite occasional successes in acclimatizing exotic species (as mentioned previously) and the potential advantages that hybridisation could offer in terms of productivity and the quality of marketable products, such initiatives rarely led to large-scale exploitation. The economic risks associated with these ventures were considered too high, and decisions ultimately depended on profitability calculations that discouraged adoption by most livestock farmers, particularly smallholders, while restricting experimentation largely to wealthy landowners capable of absorbing potential losses, traditional species offered less risk and greater benefits, which made it difficult to justify the effort and uncertainty of introducing exotic animals.¹²⁶ Furthermore, some agronomists, breeders and veterinarians considered it more practical and economically advantageous to improve native breeds, which were often presented as a source of national pride and as resources capable of sustaining domestic production without reliance on foreign imports.¹²⁷ In this sense, economic pragmatism frequently converged with broader discourses of agricultural self-sufficiency and national improvement.

¹²⁴ Yanet Acosta Meneses, “La información agraria en España: desde sus orígenes hasta la agenda 2000” (PhD Diss., Universidad Complutense de Madrid, 2008), 94.

¹²⁵ Hidalgo Tablada, *Curso de economía rural española*, 12.

¹²⁶ For examples, see Nicolás Casas de Mendoza, *Tratado de Zootecnia* (Madrid: Librería de Pablo Calleja y Compañía, 1871), or Hidalgo Tablada, *Curso de economía rural Española*. On veterinary perspectives that linked the acclimatization of exotic species with broader programmes of animal improvement and selective breeding, see Nuria Benítez Prián, Manuel García-Espantaleón Artal, and Joaquín Sánchez de Lollano Prieto, “Aclimatación y búsqueda de utilidades de las colecciones de animales exóticos del Madrid del s. XIX: Implicación de los veterinarios,” in *XXVIII Congreso Nacional, XIX Congreso Iberoamericano de Historia de la Veterinaria: 6–7–8 October 2023, Ourense*, ed. Alberto Manuel Portela Vázquez and Antonio A. Oropesa de Cáceres (Asociación Historia Veterinaria Galega, 2023), 423–432.

¹²⁷ Cabral Chamorro, “El jardín botánico Príncipe de la Paz,” 172.

These constraints did not operate in isolation; rather, they formed a feedback loop where political instability disrupted the economic maintenance of infrastructures, while the dynastic monopoly over animal management hindered the transfer of technical expertise to the wider rural economy.

5. Conclusions

Although Madrid was home to a formal acclimatization zoo only briefly in the mid-nineteenth century, the *Reales Sitios* had long functioned as spaces for the management, breeding, and evaluation of exotic species. Before the institutionalization of acclimatization societies, the Spanish Crown promoted experiments with animals from Africa, Asia, and the Americas in courtly settings such as *Aranjuez*, *Casa de Campo*, *Buen Retiro*, and *La Granja de San Ildefonso*. Their results were heterogeneous: camels, buffaloes, and Angora goats were maintained and reproduced over long periods and exploited for wool, hair, meat, milk, and labour, whereas Andean camelids, ostriches, gazelles, and kangaroos revealed the limits imposed by climate, captivity, reproduction, and economic viability. These experiments depended on practical expertise and infrastructure. The keepers, shepherds, veterinarians, and other personnel were not uneducated laborers, but technical intermediaries who translated the Crown's productive objectives into daily practice. Through trial and error, they recorded observations, adjusted feeding and breeding practices, and contributed to the survival and reproduction of exotic animals. Species already domesticated or semi-domesticated in their places of origin adapted more easily than wild species, while the extensive lands of the *Reales Sitios* allowed for relocation, grazing, and long-term management in ways that more restricted institutions could not reproduce.

At the same time, these practices had clear limitations. Contemporary expectations regarding the rapid economic utility of exotic animals often contrasted with the slow and uncertain processes of adaptation and breeding. Much of the knowledge generated in the *Reales Sitios* circulated in courtly spaces through memoirs, administrative records, or restricted courtly networks; and beyond these spaces through natural history translations, agricultural manuals, veterinary publications, and the *Semanario de agricultura y artes dirigido á los párrocos*. However, the actual social reach of this information appears to have been uneven and difficult to measure. Although these

publications contributed to the diffusion of agricultural and zoological knowledge, much of the expertise generated within the *Reales Sitios* remained dependent on courtly infrastructures, specialized personnel, and administrative networks that limited its practical adoption beyond elite or institutional circles. As a result, these experiences did not substantially transform livestock practices among small farmers.

These practices need to be understood within the imperial and colonial framework of the Spanish Monarchy. The circulation of Andean camelids, African ratites, Angora goats, and other exotic animals depended on diplomatic, colonial, and commercial networks that allowed the Crown to obtain species, products, and practical information from distant territories. The *Reales Sitios* were therefore not isolated courtly spaces, but nodes within wider circuits of animals, materials, and knowledge. Only in the mid-nineteenth century were these experiences increasingly reframed in terms of public utility, agricultural improvement, and scientific transfer.

Recognizing these precedents allows for a reassessment of the nineteenth-century “rhetoric of failure.” Naturalists such as Graells emphasized discontinuity and the need for professional scientific management, sometimes attributing limited results to popular “ignorance” or institutional neglect. Yet, the documentary evidence reveals a more complex reality: the Crown maintained long-term projects, generated practical knowledge, and occasionally attempted to transfer results through livestock exhibitions, breeding stock, and later support for acclimatization initiatives. The Spanish case therefore does not show a linear path from courtly experiment to public science, but a discontinuous history of animal acclimatization shaped by courtly infrastructures, imperial networks, practical expertise, and fragile forms of dissemination.

In conclusion, this study shows that, during the late Spanish Enlightenment, the older biological flows associated with the Columbian Exchange were partially reframed through new forms of observation, management, and economic evaluation. Rather than remaining only a matter of curiosity, display, or largely unintended circulation, some exotic species were incorporated into practical programmes concerned with breeding, productivity, adaptation, and usefulness. Through technical questionnaires, systematic animal husbandry practices, and veterinary interventions, the *Reales Sitios* func-

tioned as experimental spaces where court-appointed naturalists and administrative staff actively monitored exotic fauna for productive and economic purposes. These institutionalized practices prove that, long before the mid-nineteenth-century European acclimatization rise, Spain had already established a functional precursor that bridged dynastic sovereignty with modern useful science.

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Competing Interests

The authors declare that there are no conflicts of interest regarding the publication of this paper.