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Fit for the Job: Proportion and the Portrayal of Cattle in Egyptian Old and Middle Kingdom Elite Tomb Imagery

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Abstract: Depictions of the natural world are an intrinsic feature of Egyptian visual culture, with the vast array of imagery documenting animals a testimony to the fundamental role they played. Despite the significance of animals in Egypt, an anthropocentric bias still exists in research on the methods used by practitioners during initial scene composition. To help bridge the divide, the author herein undertook an investigation to determine if proportional guides were in place when rendering animal figures in ancient Egyptian elite tomb imagery of the Old and Middle Kingdoms. A notable outcome of the proportional analysis was the identification of two distinct body-types for domestic cattle (*Bos taurus taurus*). The aim of the current paper is to further examine these proportional differences to explore if variations in physique (namely the distance between the chest floor and withers) were rendered by Egyptian practitioners to reflect the conditions in which they appeared by considering two overarching factors: (1) biological factors and (2) contextual factors. As such, the study will employ proportional analysis to challenge the prevailing perspective of a deregulated approach when illustrating fauna in elite tomb imagery, highlighting the significance of animals within ancient Egypt.

Keywords: ancient Egypt; animals; art; cattle; canon of proportion; tomb imagery; Old Kingdom; Middle Kingdom

Citation: Leary, Nicolle. 2021. Fit for the Job: Proportion and the Portrayal of Cattle in Egyptian Old and Middle Kingdom Elite Tomb Imagery. *Arts* 10: 13. https://doi.org/10.3390/arts10010013

Academic Editor: Branko F. van Oppen de Ruiter

Received: 5 December 2020
Accepted: 2 February 2021
Published: 7 February 2021

1. Introduction

Throughout ancient Egyptian history, elite members of society carved and painted the walls of their tombs with detailed scenes of the living and divine worlds. Elite tombs, conceptualised as a "house for eternity", were charged with a number of vital functions (Assmann 2002, p. 66; Bryan 2009, p. 19; Woods and Leary 2017, p. 77). Aside from providing protection for the body, tombs served as a ritual complex to ensure the regeneration and eternal well-being of the owner, and were a space where the identity of the deceased could be projected into the hereafter and commemorated by the living. Tomb architecture, text and imagery were organised to complement these functions and aid the transition from life to afterlife, with the owner portraying themselves as they desired through a chosen selection of culturally accepted scenes and accompanying inscriptions (Assmann 2002, p. 70; Hartwig 2004, pp. 1–5; Verma 2014, pp. 37, 112; Woods and Leary 2017, p. 77).

Elite tombs can be divided into two architecturally distinct areas: (1) the accessible offering place or chapel, also referred to as the superstructure; and (2) the burial chamber(s) which usually occupied the monument's substructure. Tomb imagery is predominately located in the superstructure, where scenes and their associated text acted as a point of contact enabling interaction between the living and the dead (Woods and Leary 2017, p. 77; Hartwig 2004, p. 8).[1] Decorative programmes of the Old and Middle Kingdoms (the focus of the current paper) centred on the activities and achievements that were representative of Egyptian high culture, acting as a scared space of permanence that ensured a perpetually idealised state of existence in the afterlife and in the memories of the living. Taken from a largely finite

[1] In periods of Egyptian history outside the focus of the current paper, elite tombs could also include further architectural divisions that primarily consisted of an additional level dedicated to the solar cult. See Hartwig (2004, p. 15 ff.).

repertoire of themes, scenes are frequently (but not always) situated within and around the environment of the tomb owner's estate(s) and show the relationships between the deceased and their extended household and/or lower ranking officials (Harpur 1987, pp. 175–77; Cherpion 1996, pp. 871–72; Baines 2015, p. 10; Woods and Leary 2017, p. 77). Representations include so-called scenes of 'daily life'[2] that concern the production, acquisition and provision of foodstuff through to the deceased seated before and offering table laden with food brought before them by their associates. We may view these images of people, places, things and texts as magical reinforcements that aided and provided for the tomb owner in the hereafter, not only reflecting the deceased's earthly life and daily needs, but also drawing upon a subset of symbols related to the ancient Egyptians' beliefs about this world and the next (Hartwig 2004, pp. 37–52, esp. pp. 51–52).

The depiction of the natural world was an intrinsic feature of elite tomb imagery, with the vast array of scene types documenting animals a testimony to the fundamental role they played within the ancient society. Animals were a part of almost every aspect of life, and their frequent appearance in the culture's visual records has been a continual source of evidence for those studying the Egyptian people and the environment they inhabited (Evans 2010, p. 1).[3] One of the most common forms of investigation conducted by scholars when examining how fauna was represented are those related to the natural sciences. The detailed renderings created by Egyptian practitioners have continually formed the basis of works grounded in the zoological identification and cataloguing of the wide range of species depicted, and are the backbone of more recent research on the portrayal of animal behaviour (Evans 2010, p. 2).[4] In studies of cultural and societal practices, animal motifs are often considered a source of information regarding the lives, philosophies and religious beliefs of the Egyptian people.[5] Art historical analyses have too turned to the animal world for evidence of visual archetypes when studying ancient Egyptian artistic principles and conventions. For example, research on colour conventions and use of texture(s) often cites how the physical attributes were illustrated, such as species-specific markings and observable differences in hides, plumage and scales, while spatial distribution is commonly examined using the lateral layering of animal groups (i.e., herds, flocks, etc.) to highlight the 'illusion' of depth (Schäfer 2002, pp. 177–89, esp. pp. 182–85; Smith 1978, pp. 267–70; Evans 2010, pp. 6–9, 63).

Despite animals having been examined for their visual context and aesthetic treatment, a systematic analysis of the techniques employed by Egyptian practitioners when drafting fauna in initial scene composition requires further academic attention, especially when compared to their human counterparts. While humans were the dominant subject represented in Egyptian imagery and thus require exhaustive artistic consideration, an anthropocentric bias still exists within art-historical studies.[6] This human-orientated bias has repeatedly prevented animals (among other subject matter) from being examined as independent figures in their own right, leaving our current understanding of the methods of representation employed for non-human forms relatively incomplete (Evans 2010, pp. 9–11; Leary Forthcoming).

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[2] The author uses the term 'daily life' with caution here as there is on-going dialogue surrounding the application of such a designation. As noted by Hartwig in her study of elite Theban tombs of the 18th Dynasty, the use of terms like 'daily life scenes' may reflect a modern bias in categorizing imagery that was not shared by the ancient Egyptians. For an extended discussion on the topic, see Hartwig (2004, pp. 49–50).

[3] For an extended overview of existing research on the animal world in ancient Egyptian wall scenes, see Evans (2010, pp. 1–12).

[4] Notable examples include: Hartmann (1864a, 1864b); Anderson (1902); Brewer et al. (1994); Osborn and Osbornová (1998); Houlihan (1986). For the most extensive evaluation of how animal behaviour was represented in Egyptian tomb imagery to date, see Evans (2010).

[5] For examples, see: Ikram (1995, 2005); Houlihan (1996); Germond and Livet (2001); Bailleul-LeSuer (2012) and Hartley et al. (2017) and Porcier et al. (2019).

[6] Human-orientated bias in art historical studies arguably stems from Platonism, which experienced a resurgence in the Renaissance period, where it was the enduring belief that 'man is the measure of all things' (Plat. *Theaet.* 152). It would appear that this mentality has continued to influence Western academia. In Egyptology, we see this idea prevail in texts such as Schäfer's influence work, *Principles of Egyptian Art,* where he states that 'the human form is the most important element in art' (Schäfer 2002, p. 290). For an example of a parallel discussion in the study of Ancient Greek art, see (Kitchell 2020).

An example of the existing divide between studies of human versus non-human forms is observed with a central principle of Egyptian art known as the canon of proportion—a work process employed by practitioners to assist in rendering the anatomically correct ratios of a figure in two- and three-dimensional visual culture (Schäfer 2002, p. 333; Robins 1994, p. 26). Since the beginning of the dynastic era, guiding and squared grid systems were fundamental tools that could be used by Egyptian practitioners during the initial stages of scene drafting and organisation. These systems provided a general aid for both the layout of a figure or figures and the wider composition of which it or they were a part of prior to painting or carving (Schäfer 2002, pp. 333–34; Robins 1994, p. 23; Peck 2015, pp. 370–71). Proportional systems were first identified as a series of guidelines, or *Achsenkreuz*, in the 5th Dynasty of Old Kingdom and commonly consisted of six horizontal lines intersected by a single vertical axial line for a standing human figure.[7] Alternatively, guidelines in the system could be replaced by a series of dots marking out key points of the body (Robins 1994, pp. 64–69; Kanawati 2011, pp. 490–91). The guidelines later evolved into a squared grid system in the early Middle Kingdom to enable further regulation of both height and width.[8] The guiding systems of the Middle Kingdom remained in place throughout the majority of the Pharaonic era though variations to the size of grid did occur on occasion, particularly in later periods of Egyptian history.[9]

Research into the canon of proportion and use of proportional guides by Egyptian practitioners has been dominated by analysis of the human form, namely the representation of standing, seated or kneeling figures (Iversen 1955, 1975; Robins 1994; Peck 2015, pp. 370–71). The animal world by comparison is commonly believed to have been rendered with greater freedom and not regulated by the same proportional standards that humans were (Davis 1989, pp. 39–40; Robins 1994, p. 23; Kanawati 2001, p. 83). Robins states that this difference was due to the 'distinction between formal and informal art, and between major and subsidiary scenes', and that the 'technique was more readily adapted to the static figures and compositions of formal art than to the diversity of poses found in informal art' (Robins 1994, p. 23). Some scholars do hint that animals may have been rendered with a parallel level of proportional accuracy or at least subjected to some form of standard, though the commentary does not often extend beyond a short and/or simple statement. Schäfer, for example, makes a passing remark on proportional guides being used for both humans and animals, but does not provide any further detail or explanation (Schäfer 2002, p. 334). In a later study, Kahl goes as far as identifying squared grid systems associated with animals in elite tombs at the Middle Egyptian cemetery of Asyut, yet the primary focus of his accompanying analysis is dedicated to those guides preserved with human figures at the site (Kahl 2013, pp. 141–6). Outside of Egyptological works, Panofsky acknowledges in *Meaning in the Visual Arts* that the Egyptians employed squared grid systems 'not only for the representation of human beings, but also for that of the animals which play so prominent a role in their art' (Panofsky 1955, p. 60).

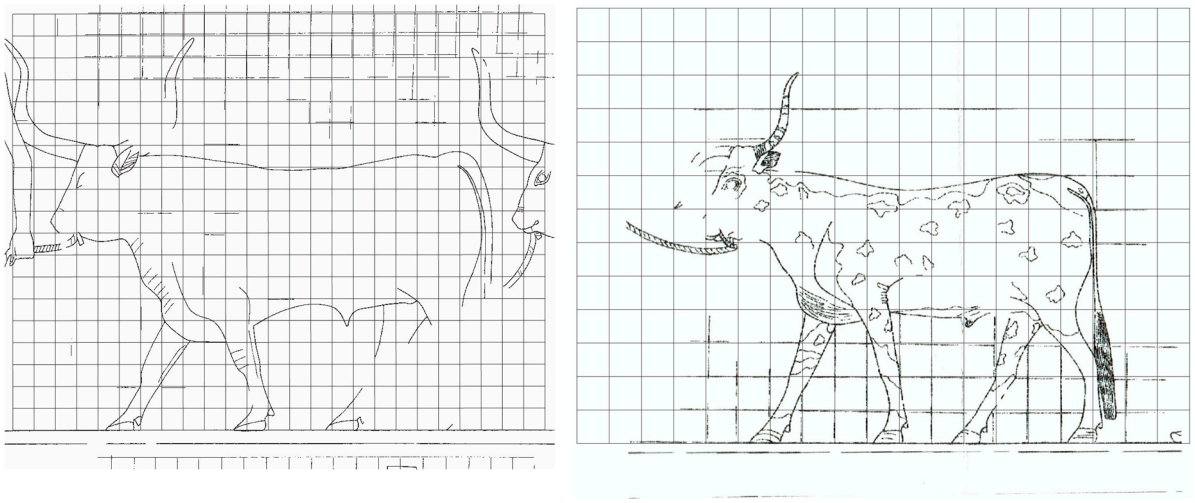
Based on the pre-conceived views that the natural world was depicted more 'freely' and a lack of existing systematic research to suggest otherwise, the author undertook the urgent task of investigating if proportional guides were in place when rendering animal figures in ancient Egypt (Leary 2014, 2019). The research focused on a case study of three species—standing cattle, standing and swimming ducks and standing oryx—in elite tomb imagery dating to the late Old Kingdom (5th and 6th Dynasties; c. 2458-2150 BCE) and the early Middle Kingdom (11th and 12th Dynasties; c. 2030-1840 BCE). Digital reconstructions

[7] Robins (1994, p. 64). Although the Old Kingdom *Achsenkreuz* commonly measured six horizontal lines in height, Robins notes that that guideline systems may contain up to eight horizontal lines in their construction.

[8] While the 12th Dynasty is usually noted as being the approximate starting point for the use of squared grids as proportional guides, Freed suggests that the new system was first used in Mentuhotep II's mortuary temple complex at Deir el-Bahari, which dates to the earlier 11th Dynasty. Based on the historical and political context of the time, the author believes that the canon being used earlier in the Middle Kingdom (i.e., the 11th Dynasty) is both a plausible and convincing argument. For Freed's commentary, see Freed (1984, pp. 83–84). For dating attributed to the later 12th Dynasty, see Robins (1994, p. 70).

[9] For a detailed analysis of the changes that occurred to the size and form of proportional guides over the course of Egyptian history, see Robins (1994).

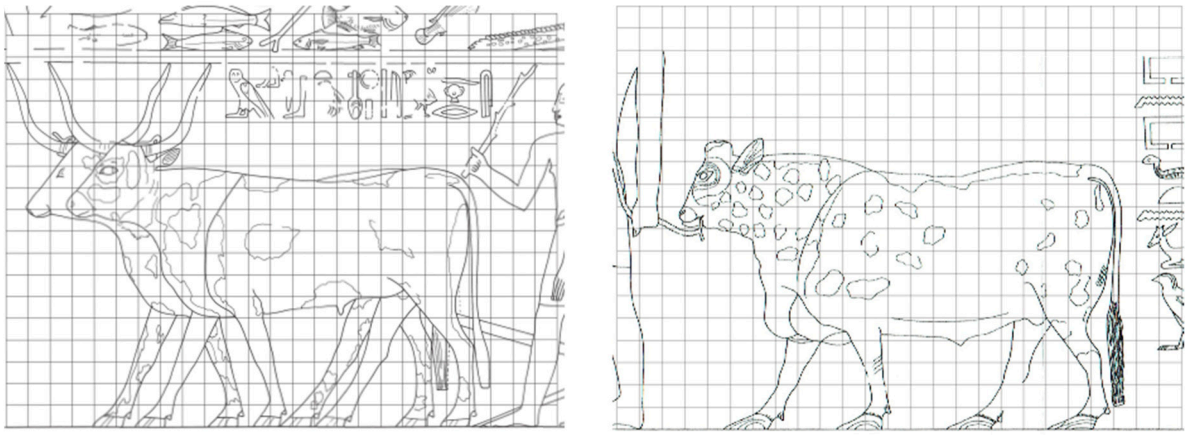
of surviving grid systems identified in the 12th Dynasty tombs of Wekh-hotep I (Tomb B2) at Meir and Amenemhat (Tomb 2) at Beni Hassan were applied to a wider corpus to trace spatial and temporal trends in figural proportions (Figure 1a,b) (Leary 2019, Forthcoming). Through the outcomes recorded at each stage of the analysis, the work demonstrated for the first time that proportional guides were used by practitioners when drafting the select species in elite tomb imagery, challenging the prevailing perspective of a laissez-faire approach being in place for illustrations of the animal world.



(**a**) (**b**)

Figure 1. (**a**,**b**) Oxen from the tomb of Wekh-hotep (Tomb B2) at Meir (left) and the tomb of Amenemhat (Tomb 2) at Beni Hassan with their surviving grid systems reconstructed. These two grid systems will hereby be referred to as the hypothetical Meir and Beni Hassan grids. Images: Kanawati and Evans (2017, pl. 90) and Kanawati and Evans (2016, pl. 105), respectively, with the grid systems reconstructed by the author.

The proportional analysis of standing cattle revealed an unexpected result, that being an overarching visual distinction between the bodies of various bovine figures based on the position of the chest floor on the grids in relation to the position of the withers (an indicator of overall height). When the chest floor sits lower on the grid, cattle are visually shorter through the legs and taller through the body (Figure 2a). By contrast, when the chest floor is higher on the grid, cattle are shorter through the body but longer through the legs (Figure 2b). The visual phenomenon was noted in the study, but as it was beyond the scope of the project's main goals, these distinctions were not extensively analysed (Leary 2019, pp. 272–4). As such, the aim of the current paper is to examine the proportional differences in cattle to explore if variations in physique were rendered by Egyptian practitioners in Old and Middle Kingdom elite tomb imagery to reflect the conditions in which they appear. These variations will be investigated by considering the influence of two overarching factors: (1) biological factors, namely sex and subspecies; and (2) contextual factors, in this instance the Egyptian labels associated with individual bovines and role of cattle within a scene. First, an overview of existing research on the origins of domestic cattle and their role(s) in ancient Egypt is presented to provide a foundation for any correlations that may appear between the influencing factors outlined above and outcomes recorded during the proceeding proportional analysis.



(**a**) (**b**)

Figure 2. (**a**,**b**) Cattle figures from the Meir tomb of Senbi (Tomb B1) (left) and tomb of Khnumhotep II (Tomb 3) at Beni Hassan (right) with the hypothetical Meir grid applied by the author to show the position of the chest floor in relation to height of the animal. The oxen from the tomb of Senbi (B1) are an example of working cattle, depicted ploughing the fields. The right image from Khnumhotep II (Tomb 3) provides an example of non-working cattle, with the animal being lead towards the deceased as an offering (to be discussed in Section 3.2.2 below). Images: Kanawati and Evans (2017, pl. 79) and Kanawati and Evans (2014, pl. 105), respectively.

2. Domestic Cattle and Their Role(s) in Ancient Egypt

2.1. The Origins and Domestication of Cattle in Ancient Egypt

The domestication of cattle in ancient Egypt and North Africa more generally remains the topic of on-going debate in academic circles, with a long history of controversy and uncertainty surrounding how and when the process unfolded on the continent. The largely unresolved discussion centres predominately on the issue of how and when domesticates (*Bos taurus taurus*) first appeared in the region, and the extent of the contribution made by Africa's wild cattle population (Stock and Gifford-Gonzalez 2013, pp. 52–53; Brass 2013, p. 65; Brass 2018, p. 82). While an extensive assessment of the existing research falls outside the scope of the current paper, interpretation of the data can be divided into three dominating theories: (a) the domestication of cattle occurred independently in Africa from indigenous stock; (b) that all early ovicaprid and cattle domesticates came to the region from the Near East; and (c) African taurine breeds emerged from introgression between local wild animals and incoming domestic cattle from the Levant.[10]

The independent African domestication model states that taurine cattle (*Bos taurus taurus*) were domesticated from indigenous wild aurochsen (*Bos primigenius*) from as early as the late 9th millennium BC to the early 8th millennium BC (Wendorf and Schild 1994, 1998, pp. 100–1). Central to the theory is the Combined Prehistoric Expedition's recovery of *Bos* remains in the Nabta Playa-Bir Kiseiba region of Egypt's Western Desert. Following Gautier, Wendorf and Schild concluded that the early bone fragments likely belonged to domestic cattle based on their reconstruction of the economic and ecological conditions in the area (Wendorf and Schild 1994, 1998, pp. 100–1; Gautier 1980, 1984). Later analysis of taurine mitochondrial DNA (mtDNA) by Bradley et al. supported this hypothesis, with studies revealing a late Pleistocene divergence between the mtDNA of African, Eurasian and Indian cattle. The data was interpreted as an indication of three separate centres for domestication, with one of these being in Africa (Bradley et al. 1996; Wendorf and Schild 1998, p. 101; Clutton-Brock 2012, p. 50).

An argument for independent domestication in North Africa has been deemed controversial due to a lack of conclusive evidence to support the early presence of domesticated

[10] For a more detailed review of the on-going debate(s) surrounding cattle domestication in Africa, see: Brass (2018); Stock and Gifford-Gonzalez (2013).

cattle on the continent (Brass 2018, pp. 86, 106, 109; Riemer 2007; Linseele et al. 2014). A re-examination of the ecological and morphological foundations of the premise in conjunction with increased research on taurine genetics has pointed scholars in an opposing direction. In place of a separate domestication process, it has been suggested that two waves of ovicaprid and cattle domesticates arrived in northern and north-eastern Africa starting from the late 7th or early 6th millennium BC from the Levant (Brass 2013, 2018; Smith 1986, 1992, pp. 126–8; 2005; Linseele et al. 2014, p. 17). These domesticates are said to be descended from Near Eastern stock, and were introduced to Africa via trade routes and/or with human migrations (Bonfiglio et al. 2012, pp. 7–8; Brass 2018, pp. 107–9).

Data from the growing body of research on *Bos* genetics has seen the development of a third domestication model which links the Levantine origins of taurine cattle outlined above to wild African aurochsen. Recent studies have shown that domestic African cattle have a higher diversity of haplotypes when compared to their Eurasian counterparts, including some variants that a found exclusively in African animals (Stock and Gifford-Gonzalez 2013, p. 67; Pérez-Pardal et al. 2010; Bonfiglio et al. 2012, p. 1). Advocates of the third model therefore claim that Africa taurine cattle emerged during a period or periods of introgression between indigenous aurochsen managed by hunter-gatherer communities of the Nabta Playa-Bir Kiseiba and domesticates arriving from the Near East from c. 6300 BC onwards (Brass 2013, p. 68; 2018, p. 109; Stock and Gifford-Gonzalez 2013, p. 67; Achilli et al. 2008; Bonfiglio et al. 2012; Ajmone-Marsan et al. 2010, p. 150). The theory does, however, remain speculative due to the current lack of genomes from African aurochsen being available for examination (Linseele et al. 2014, p. 16).

While the nature and timing of the domestication process remains contentious, it is generally agreed that taurine cattle in the earlier periods of Egyptian history relevant to the current study were members of two primary *forma*: long-horn *B. t. taurus* and short-horn *B. t. taurus*, with their division based on differences in cranial conformation and horn-type (Epstein 1971, p. 221; Ikram 1995, p. 12). On the basis of iconographic and skeletal evidence, long-horn *B. t. taurus* were the earliest of the ancient Egyptian breeds, distinguished by their long horns of varying shape (lyre, small or double horns) (Brewer 2001, p. 435; Ikram 1995, p. 12; Gifford-Gonzalez 2011, p. 6; Stock and Gifford-Gonzalez 2013, p. 61; Grigson 1991, p. 126). Within this group there was also a hornless type believed to have been bred from long-horned stock despite being phenotypically different (Ikram 1995, p. 12). Short-horn *B. t. taurus* had characteristic short horns that could be diverse in their direction, and polled varieties could be derived from this breed by manually removing the horns, thus making them distinct from the hornless *B. t. taurus* (Ikram 1995, p. 12; Brewer 2001, p. 435).

2.2. The Role(s) of Domesticated Cattle in Egyptian Culture and Society

In line with a statement made by Evans, it is almost impossible to fully envisage ancient Egyptian culture and society without taking into account the important role that bovines played in the life and thought of the people (Evans 2017, p. 41). An abundance of visual, textual and physical evidence highlights the importance of the species to almost all facets of life, with one of their primary roles being to fulfil nutritional needs of the people (Ikram 1995, p. 8; Evans 2017, p. 41). Cattle were raised in large herds that grazed open fields or kept in stables to provide a steady supply of protein and other essential resources. If an animal was raised for its meat, its feed, exercise and quality of life could be regulated to enhance the final product (Brewer 2001, pp. 436, 444; Evans 2017, p. 44). Oxen (castrated males) and bulls were predominately kept for slaughter, with oxen being the favoured of the two due to their lack of reproductive capability. When bulls were consumed, it was likely at a stage when they were not longer required for stud. Additionally, the bodies of oxen were generally fatter than bulls and cows due to the physical side-effects of castration. If castration occurred before growth ceased, males could become larger in the body therefore producing more meat and valuable tallow (Clutton-Brock 1992, p. 33; Ikram 1995, p. 10; Brewer 2001, p. 436; Clutton-Brock 2012, p. 54). Cows were rarely consumed and in-

stead exploited for their milk along with their ability to breed (Evans 2017, pp. 47–48; Ikram 1995, p. 12; Brewer 2001, p. 436; Clutton-Brock 2012, p. 54).

Aside from the resources provided by the body itself, bovines were employed by the Egyptians as a source of labour. Visual records indicate that the physical strength of livestock was harnessed by farmers for agricultural activities, where cattle would participate in fieldwork including ploughing and threshing grain (Figure 3a,b). Oxen were largely preferred as draught animals as castration not only had the potential to affect physique, but also acted a behavioural aid to farmers. Castration assisted farmers in taming male bovines as it settled the temperament of otherwise fractious bulls—a practice which in some form has continued to the modern day (Clutton-Brock 1992, p. 33; Brewer 2001, p. 446; Stafford and Mellor 2005, p. 271). While bulls were not generally employed for agricultural labour due to the possibility of behavioural issues, tomb imagery shows that cows could also be used for ploughing and threshing (Evans 2017, p. 44).

(**a**) (**b**)

Figure 3. (**a**,**b**) Domesticated cattle (*Bos taurus*) ploughing the field from the 12th Dynasty tomb of Senbi (B1) at Meir (left), and modern Egyptian cattle in a parallel setting (right). Left image source: Kanawati and Evans (2017, pl. 32(b)). Right image source: Username, ttaty, 'Domestic cows', on iStock.

The varied functionality of cattle meant that in many ancient cultures people prized their herds above numerous other material possessions and measured their wealth by the number of bovines they owned (Ikram 1995, p. 8). The economic value of bovines is illustrated in the Egyptian context by the importance of the cattle census or cattle count (Ikram 1995, p. 8). Scenes showing the tomb owner 'viewing' the documentation of numerous cattle from their estate or towns which they governed were a frequent inclusion in tomb imagery, highlighting the person's prosperity in both their mortal and eternal life. Butchered cattle were also considered a choice cut for offerings presented as gifts to the gods and/or deceased members of elite families. Similar to food production, fattened oxen and even bulls were the most commonly slaughtered for this purpose, though cows do appear in offerings scenes and/or lists on rare occasions (Ikram 1995, p. 10; Clutton-Brock 1992, p. 33; Brewer 2001, p. 436; Clutton-Brock 2012, p. 54). The use of cattle as offerings to the gods was not their only role within ancient Egyptian religious contexts, with bovines also being associated with and worshipped as deities. Cows were linked to Hathor, the goddess of love and joy, due to their perceived embodiment with fertility (Evans 2017, p. 42; Ikram 1995, p. 8). A further notable example is the Apis Bull which was considered to be one of the most sacred animals in Egypt, acting as the living reincarnation of the god Ptah (Brewer et al. 1994, p. 89).

The ancient Egyptians had many names for cattle and while some correlations can be made with modern taxonomical classifications, there a number that do not align. Ikram states that Egyptian labels can be associated with an animal's purpose or role rather than always describing a particular genetic trait despite certain species or sexes frequently

being used for a specific activity (Ikram 1995, p. 14). Egyptian terms for cattle that are of particular interest for the current paper are as followed:[11]

- `iwA`: the label commonly associated with stabled cattle or animals fattened for slaughter, especially large-stomached animals.[12]
- `ngAw`: a variation of the term ng which is used to label wild bulls. It is believed that `ngAw` cattle were the working animal of choice, coming from long-horned stock derived from wild bovines (Ikram 1995, p. 15; Brewer 2001, p. 435).
- `kA`: the word for bull. As touched upon earlier, `kA` were generally not consumed by the Egyptians until they were no longer required namely as stud animals (Ikram 1995, p. 15).
- `jd.t`: the Egyptian term for cow, `jd.t`, could also relate to female genitalia (Evans 2017, p. 42).
- `wn-Dw`: generally reserved for short-horned or polled animals, though sources have suggested that this label may also be used for cows (Ikram 1995, p. 15; Brewer 2001, p. 435).

3. Results and Discussion

With the varying forms and roles of domestic cattle considered, the next stage of the study is to investigate the potential influence of biological and contextual factors on how practitioners rendered differences in bovine physique. These differences are traced by calculating the distance between the chest floor and withers using the number of grid squares in the hypothetical Meir and Beni Hassan guiding systems as the unit of measure (Figure 4). The cattle corpus used for the current paper has been taken from the author's prior study on the existence of proportional guides for animals in Old and Middle Kingdom elite tomb imagery, with a total of 150 figures examined from 13 cemeteries.[13] It must be noted that the number of figures examined in each category below fluctuates depending: (a) on the condition of the scene or individual figures, and (b) if the information needed is presented or recorded. For example, it may be possible to know the activity an animal is participating in within a scene, however, damage to the figure may hinder conclusive identification of its sex.

Instances in the data analysis where a common measurement is shared by most cattle in each corpus when the hypothetical grids are applied are labelled on the graphs to follow as majority figures. As the guiding systems that could be employed by Egyptian practitioners were indeed guides rather than a strict set of unwavering rules (Robins 1994, p. 259), these majority results are presented using what the author has termed an accepted range of similarity. Using an accepted range of similarity allows for minor discrepancies that may occur in the renderings to be acknowledged and accounted for. For example, the accepted range of similarity in one instance may be six to seven grid squares. This is due to the majority of cattle either measuring exactly six or seven squares in height from the chest floor and withers, or somewhere between the two. Those figures that are deemed to be outliers when compared to majority and fall outside of the accepted range of similarity are labelled as variables.

Outcomes recorded at each stage of the investigation will be viewed through the lens of the existing research outlined above to trace any correlations that occur between what has been stated by scholars studying domestic cattle in ancient Egypt versus what the proportional analysis reveals. By undertaking a detailed examination of proportional trends in cattle physique, the author hypothesises that the analysis will reveal that the

[11] For an extended list of common Egyptian labels used for cattle, see Ikram (1995, pp. 14–5).

[12] Ikram (1995, p. 15); Brewer (2001, p. 436). It is important to note that while most animals used in food production were likely to be oxen, there appears to be no distinct word for ox except in circumstances where castration is specified to distinguish the animals from bulls in contexts where they appear together. See Ikram (1995, p. 15).

[13] The Old Kingdom elite cemeteries included in the study were Giza, Saqqara, Deir el-Bersheh, Deir el-Gebrawi and El-Hawawish, while those dating to the Middle Kingdom were Asyut and Sheikh Abd el-Qurna. The final sites—Meir, Beni Hassan and Qubbet el-Hawa—had both Old Kingdom and Middle Kingdom cemeteries, hence the overall total of 13. For a complete breakdown of the tombs examined and their dating, see Volume II of Leary (2019).

differences in bovine body size were rendered by Old and Middle Kingdom practitioners in elite tomb imagery to reflect the conditions in which they appear as stated in Section 1.

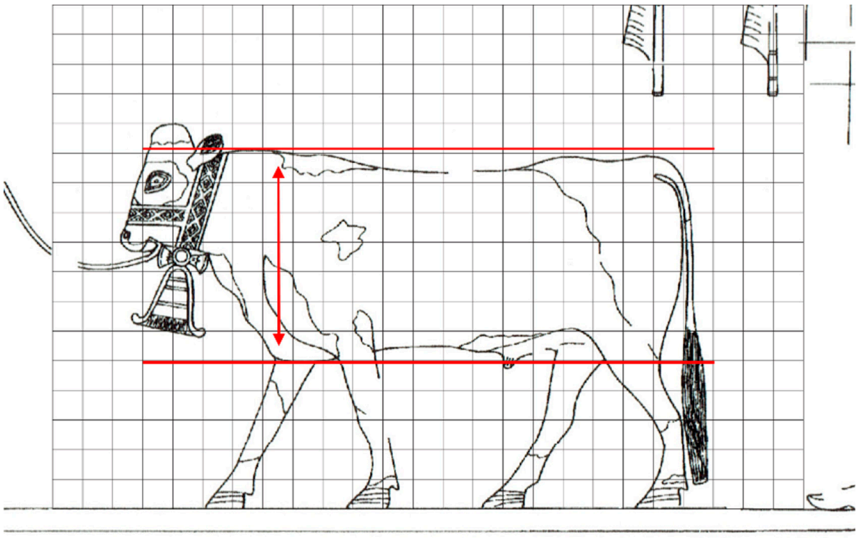


Figure 4. An ox from the tomb of Amenemhat (Tomb 2) with the hypothetical Meir grid applied Table 2016. pl. 108) with a grid system applied by the author.

3.1. Biological Factors

3.1.1. Sex

The first biological factor that was tested to examine its potential influence on the physique(s) of cattle in elite tomb imagery was sex. Based on how sex is discussed in literature on bovines, figures were divided using three classifications: bulls (male cattle), oxen (castrated male cattle) and cows (female cattle). A sample group of 124 figures were analysed, with 92 identified as oxen, 24 as cows and eight as bulls.

When the hypothetical Meir grid was applied to the corpus of cattle (Figure 5), oxen were the largest through the body overall, with the majority of animals measuring approximately eight squares in height from the chest floor to the top of the withers. As the oxen group had the highest number of figures examined, there is a greater range in size when compared to bulls and cows, with the test subjects being as short as six squares in bodily height through to ten squares. Bulls were the next largest, measuring approximately seven to eight squares through the trunk of the body, while cows were the leanest being approximately six to seven squares in high between the two control points. Parallel results were observed with the hypothetical Beni Hassan system (Figure 6). Once more, oxen were the tallest through the body. The majority of oxen measured approximately five to six squares in height, with a wider range of just below three to over six squares. Bulls and cows were similar in size (approximately five squares high), however the similarity recorded here when compared to the Meir grid may be due to the larger divisions of hypothetical Beni Hassan system. The smaller divisions of the Meir guide make slight differences in height from the chest floor to the withers more apparent due to there being less space between each intersecting line.

The results recorded with application of the hypothetical Meir and Beni Hassan grids align with existing research on the influence of sex on physique as outlined above. As was suggested, oxen were the largest on average through the trunk of the body regardless of which system was examined. This outcome may be a reflection of the noted side-effects that castration and diet had the body. The larger oxen are likely to be those that were fattened for food production and/or eventual use as offerings, with the animals possibly stable raised as a means for increasing their mass. While most oxen were indeed larger in the body, there were figures outside of the majority that were leaner and of a size more in line with bulls and cows. Oxen that are leaner may be those animals that were employed

for labour. These outcomes and the conditions in which they appear will be explored in further detail below when investigating the influence of contextual factors, namely the role of an animal within a scene or activity they are shown partaking in. The results for bulls and cows were as one might anticipate based on the literature. As bulls and cows were not the favoured sex when it came to food production and slaughter due to their need for breeding, maximising their body mass may not have been as high a priority as it may have been with oxen. Overall, the results recorded allows for the argument to be made that ancient Egyptian practitioners had knowledge of and represented the differences in bovine physique (or perhaps an idealised physique) based on their sex when rendering cattle in Old and Middle Kingdom elite tomb imagery.

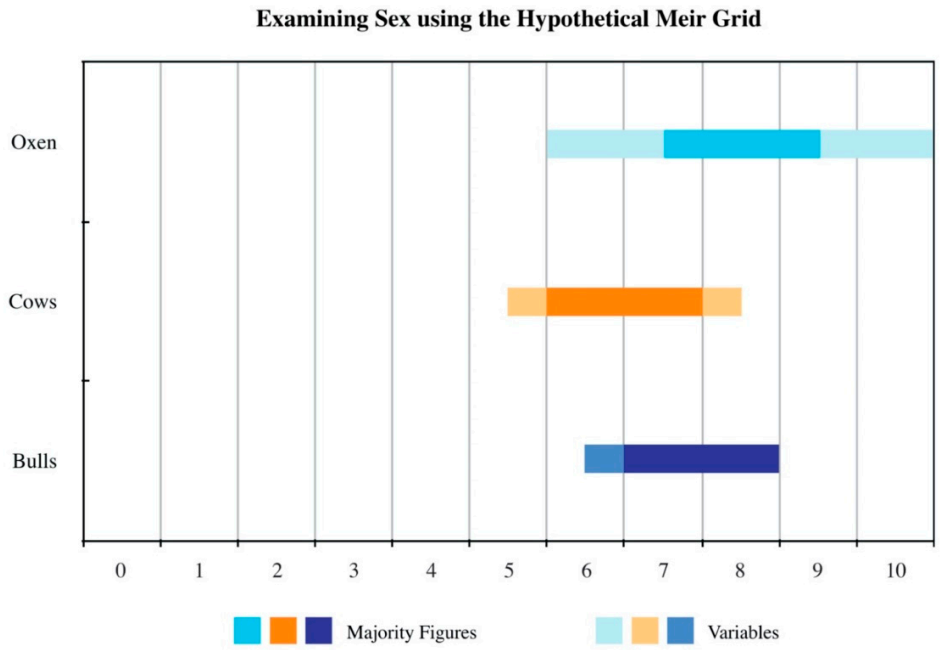


Figure 5. Examining sex using the hypothetical Meir grid.

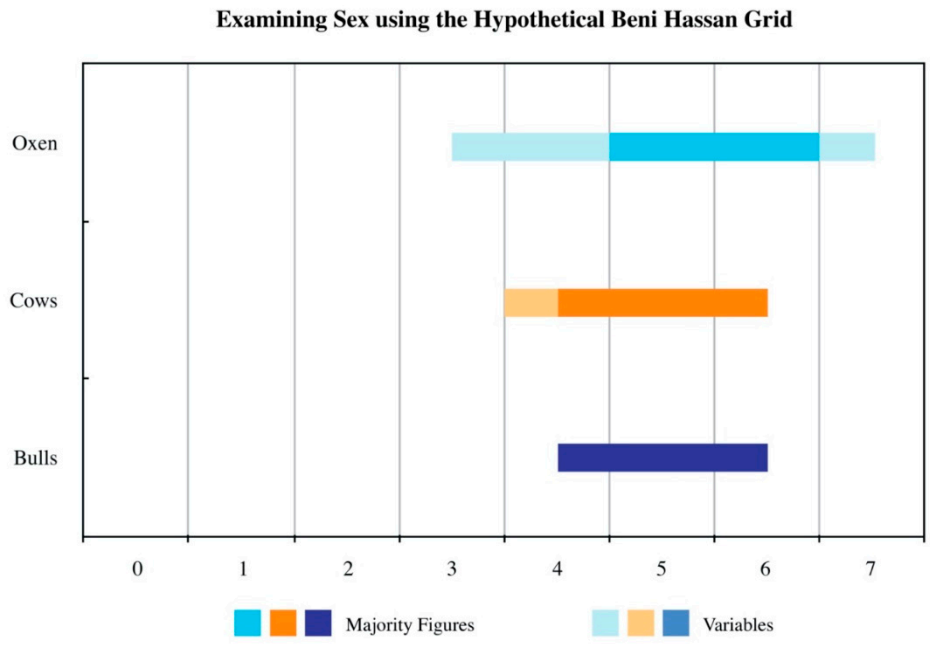


Figure 6. Examining sex using the hypothetical Beni Hassan grid.

3.1.2. Subspecies of Cattle Based on Horn-Type

The second biological factor examined was the subspecies or *forma* of *B. t. taurus* as indicated by the type of horns present in the imagery. The potential influence of *forma* based on horns was selected for investigation based on the discussion of four main varieties of taurine cattle being identified in ancient Egypt (see Section 2.1). While the literature does not explicitly state that any differences in physique may appear based on subspecies alone as it does with sex, the author felt that it would be a worthwhile experiment to conduct in the event that any notable proportional variations or trends arise. Of the cattle whose represented horns were able to be assigned a type, 125 were long-horned bovines and five identified as short-horned animals. The third group of animals tested were those classified by the author as cattle with no visible horns, which numbered 20 figures in total. As it was not always clear whether an animal shown with no horns was a hornless or polled variant, the decision was made to group these figures together as one.

The outcomes of examining cattle physique based on horn-type did not lead to the same enlightening nor conclusive results that sex did, with the majority of figures from each group being similar in size regardless of which guiding system was applied. Application of the hypothetical Meir system (Figure 7) saw the majority of long-horned cattle being some of the leanest through the trunk of the body, with most measuring between six and seven grid squares high between the chest floor and withers. This group did, however, have the greatest spread of results (ranging from less than five squares to nine squares in height), which was expected since long-horned animals largely outnumbered the other two. For short-horned cattle there was distance of approximately seven squares between the two points tested (with one variable at nine squares), while most cattle with no visible horns measured between seven and eight squares in height. When the Beni Hassan grid was applied, the majority of cattle figures were parallel in size regardless of horn-type or lack thereof (Figure 8). Based on these results, one might conclude that the *forma* of *B. t. taurus* did not influence how physique or cattle size was rendered by Egyptian practitioners as much as other factors such as sex did.

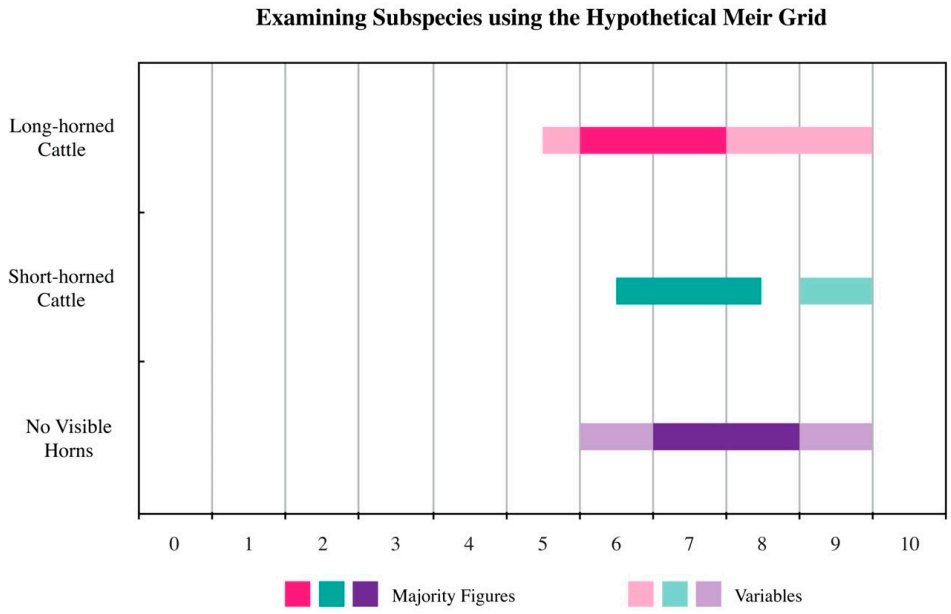


Figure 7. Examining subspecies using the hypothetical Meir grid.

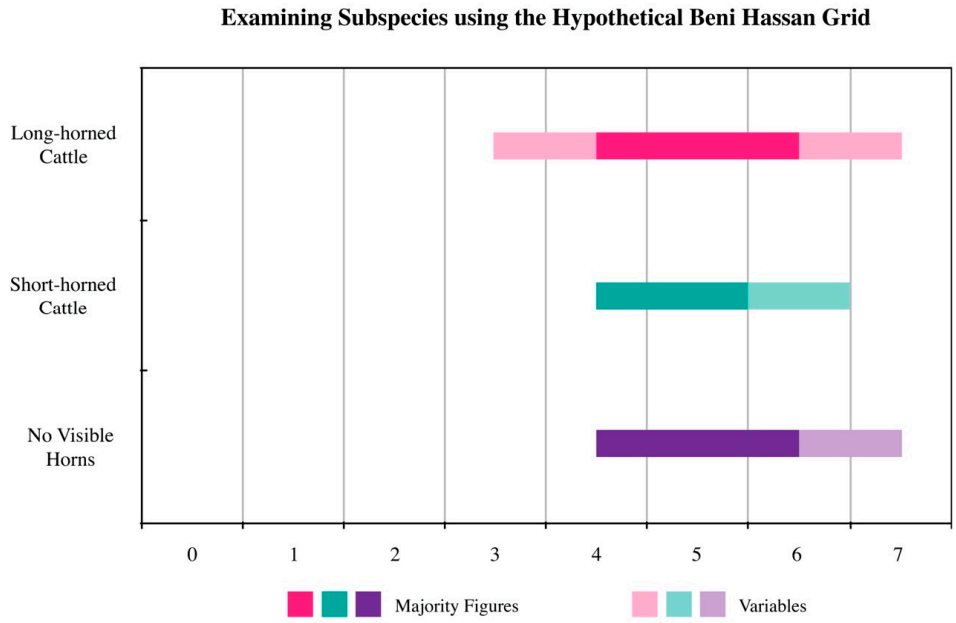


Figure 8. Examining subspecies using the hypothetical Beni Hassan grid.

3.2. Contextual Factors

3.2.1. Egyptian Label

The first of the contextual factors analysed was the Egyptian label or term associated with a cattle figure or figures within a scene. As it has been stated that Egyptian names for cattle were often associated with their role and on occasion their specific species or sex, it is anticipated that bovine physique may reflect the ancient label given to an animal. Five labels were conclusively identified with 83 cattle in the wider corpus used for the current study, with these terms discussed in detail in Section 2.2. above. The term `iwA` had the highest frequency among the group, appearing with 67 figures in total—all of which were oxen. The remaining terms or names isolated were associated with comparatively small sample groups. Six figures were identified as ngA.w with the group consisting of three bulls, two oxen and one animal of unknown sex. Four oxen were identified as `wn-Dw`, four bulls as `kA` and two cows were labelled `jd.t`.

The results of applying both the hypothetical Meir and Beni Hassan grids to examine correlations between bovine physique and the name or label associated with a figure proved interesting as they did not align with the literature as closely as other factors tested. One outcome that was expected was that `iwA` were some of the largest figures between the chest floor and withers on both the hypothetical Meir and Beni Hassan grids (Figures 9 and 10, respectively). When the Meir grid was applied, the majority of figures measured approximately eight squares in height, while on the Beni Hassan grid the common distance was five to six squares. This observation ties in with the notion that `iwA` were likely to be fattened for the purpose of consumption or use as sacrificial offerings. Furthermore, all `iwA` tested were oxen—the larger of the sexes when this biological factor was examined. What must be noted is that three oxen labelled `iwA` were shown in the act of ploughing (i.e., they did not appear to be animals fattened for slaughter), with these animals being some of the shorter variables recorded.

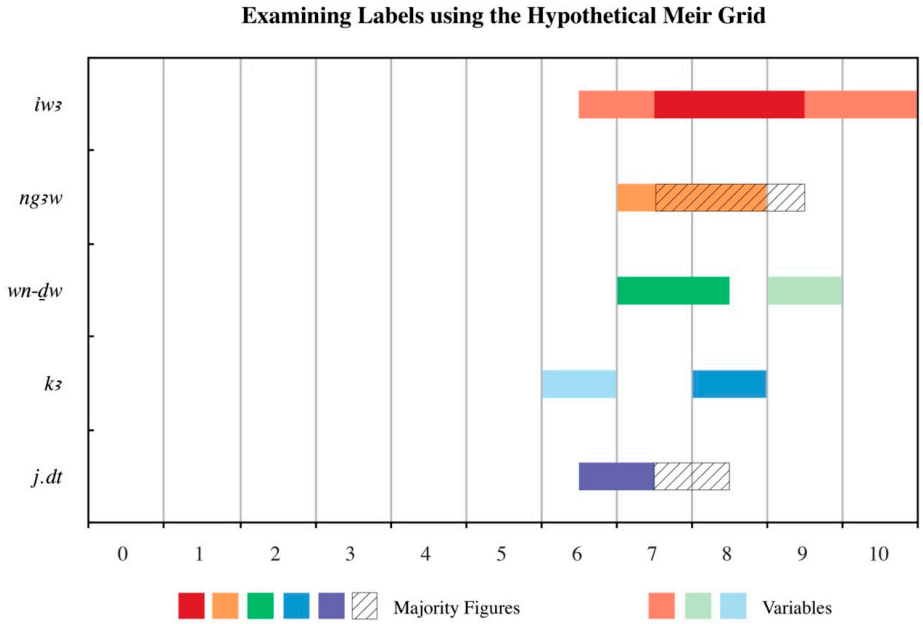


Figure 9. Examining ancient Egyptian labels using the hypothetical Meir grid.

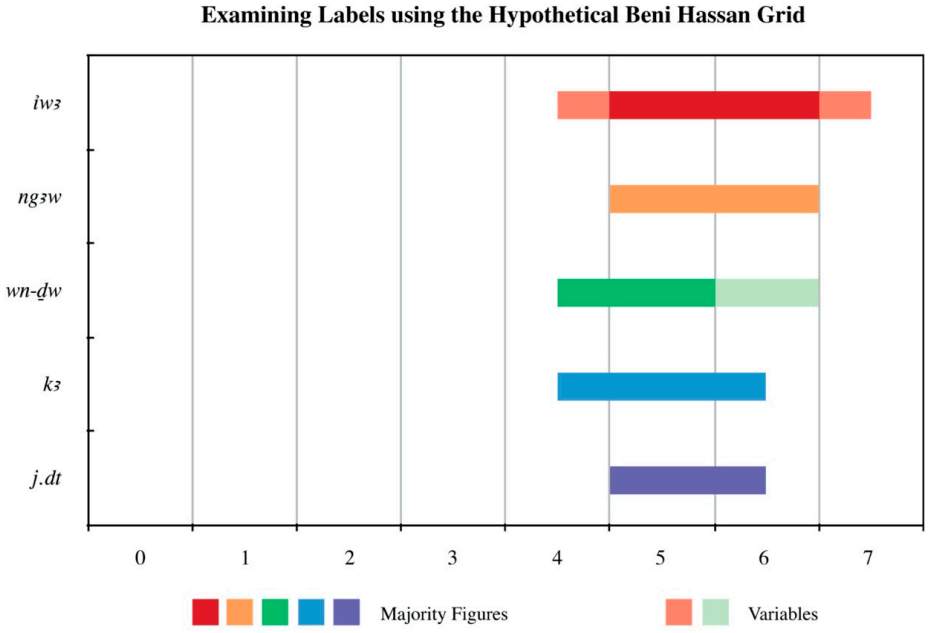


Figure 10. Examining ancient Egyptian labels using the hypothetical Beni Hassan grid.

Close correlation between the literature and remaining results fluctuated, though one must consider the disparity in the sample sizes and the possible impact this may have (as with other factors examined). Contrary to what has been suggested in the existing literature, proportional analysis revealed that ngA.w cattle were not some of the leanest but were parallel or even the same size between the chest floor and withers as `iwA` across both guiding systems. The five cattle labelled ngA.w were also not rendered actively working in any scenes, but rather appeared in cattle count scenes or those showing tomb owner viewing livestock. The majority of bulls, or `kA`, were parallel in size to both `iwA` and ngA.w when looking at the Meir grid. With the Beni Hassan grid, bulls were neither significantly larger nor leaner than others. Based on the outcomes recorded when analysing sex, this result is unsurprising. The majority of cattle in the remaining two groups—`wn-Dw` and `j.dt`—were all relatively similar in size when examined using both hypothetical systems. When the Meir grid was applied, consistent cattle measured approximately six to seven

squares in height, while on the Beni Hassan grid, distance between the chest floor and withers was approximately five or so squares in height.

As such, the results recorded when investigating potential links between cattle physique and their associated labels did not reveal any significant differences in body size despite research on the topic suggesting otherwise. Rather, proportional analysis seemed to uncover some conflicts in what is claimed in the existing literature versus how bovines were rendered by Egyptian practitioners as outlined in the paragraph above. The author believes that such an analysis (i.e., one exploring the relationship(s) between depictions of cattle and their given label) would be a topic that would benefit from further research.

3.2.2. Activity or Role within a Scene

The second contextual and final influencing factor examined was the role of cattle within a scene and/or the activity they are depicted partaking in. As outlined above, research indicates that the physique of cattle may vary depending on their role or purpose, mainly if they were used as a source of labour or if they were raised and fattened for slaughter. Based on these distinctions, the corpus of cattle was divided into two overarching classifications:

1. Working cattle (Figure 3): defined here as bovines, shown in a specific, active role, i.e., those employed as a source of labour or for their physical strength. Working cattle in the current study all appear in the context of agricultural pursuits—i.e., they are either shown assisting farmers with ploughing fields or threshing grain.[14] A total of 18 working cattle were examined, 12 of which were oxen and the remaining six being cows.
2. Non-working cattle (Figure 4): figures that appear in offering scenes, procession scenes, cattle counts and in images of the tomb owner viewing livestock from their estate/town have been categorised as non-working cattle. The author does note that there may be some limitation with the terminology chosen, however all figures in this group are shown in passive poses and are not being used for physical labour within the scene. Non-working cattle were the larger of the two corpora, with 97 subjects tested. Oxen largely outnumbered the other two sexes at a total of 70 figures, followed by 24 cows and eight bulls.

When the hypothetical Meir grid was applied to measure the distance between the chest floor and withers, working cattle were notably leaner when compared to the majority of non-working cattle (Figure 11). Working cattle were approximately six to seven squares in height through the trunk of the body while most non-working figures measured approximately eight squares in height. When the corpus was examined using the Beni Hassan system (Figure 12), the wider grid divisions appear to influence the results once more, with differences in physique still apparent but not to the same extent as they were with the Meir system. The gap between the two control points in the majority of working cattle was approximately five grid spaces, whereas non-working frequently measured five to six squares in height.

The results of testing the potential relationship between the role(s) of cattle and how their physique was rendered by Egyptian practitioners display close connections with the existing scholarship outlined in Section 2.2. Proportional analysis revealed that cattle employed for laborious tasks such as ploughing and threshing were indeed leaner on average than those animals who were nurtured for their meat. The effects of diet on physique may also be considered here. As noted earlier, if an animal was raised for its meat, the nature of the product could be altered by regulating its feed, exercise and quality of life. Cattle kept in stables and (hand-)fed grain or dough, many of whom were destined for the butcher, most likely had a greater body mass than those who were put to pasture and worked the land.

[14] Although no examples of cattle in large herding or river crossing scenes are included in the corpus as a result of damage to the image or a key point of the body not being visible, it may be possible to extend the definition of working cattle to include these figures in future studies.

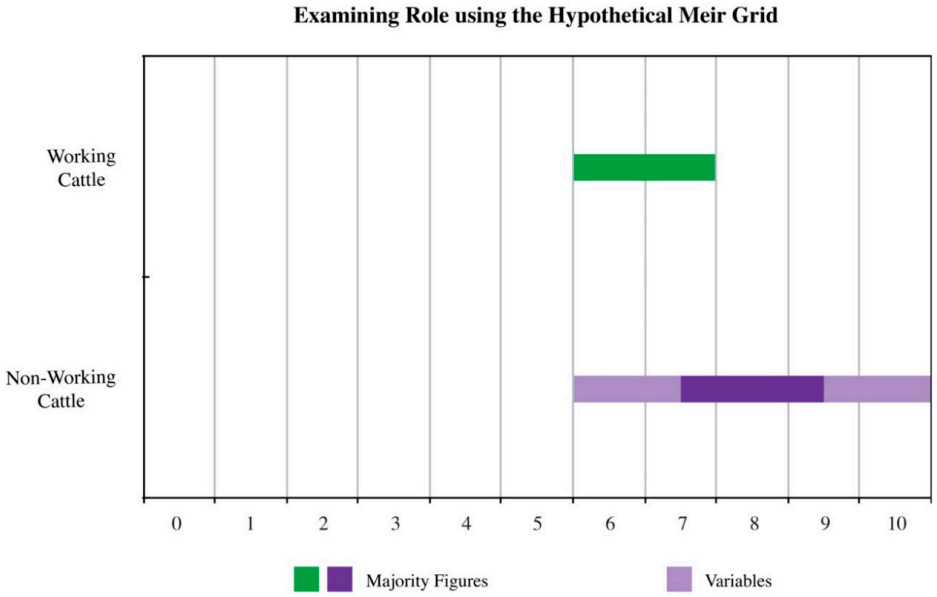


Figure 11. Examining the role of cattle using the hypothetical Meir grid.

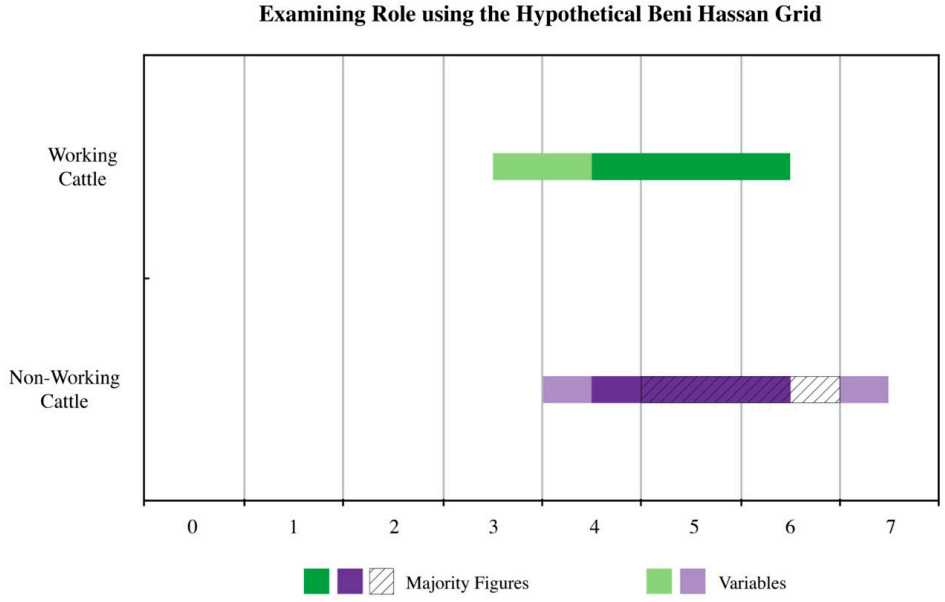


Figure 12. Examining the role of cattle using the hypothetical Beni Hassan grid.

Sex as a biological influence on physique can be viewed in conjunction with the role and purpose of bovines in ancient Egyptian society. Working oxen were marginally larger through the trunk of the body compared to cows, but still noticeably leaner than their non-working counterparts. With the Meir grid, the distance between the chest floor and withers for oxen was six to seven squares, while the average for cows was six grid spaces. Application of the Beni Hassan system saw working oxen and cows being much the same size. The slight difference in physique here (namely with the hypothetical Meir grid) may not only be the result of natural variations between male and female animals, but also a reflection of the effects that castration had on the body. As suggested in the discussion of the results in Section 3.1.1., the majority of leaner oxen in the sex corpus that were considered variables were indeed those that appeared in working contexts.

Links between sex and function can also be observed in non-working cattle. In this group, oxen were again noticeably larger in the body than bulls and cows, particularly in offering and procession scenes. In scenes of offering or procession, the space between the

chest floor and withers could be as great as 10 grid squares for oxen when the hypothetical Meir system was applied, though the majority measured eight to nine squares in height. By comparison, bulls ranged from being just over six squares high to a maximum of eight, while the distance for most cows was six to seven grid space. Proportional analysis using the Beni Hassan grid resulted in the bulk of oxen figures being five to six squares in height compared to four to five grid spaces for bulls and cows. In viewing or cattle count scenes, the gap between the two control points was around eight squares for Meir grid and five to six spaces for the Beni Hassan system. Bulls and cows were much the same size as they were in offering and/or procession scenes. These observations align with two major comments raised in the existing literature: (a) that castration caused physical changes in males, making them fatter than bulls and cows, and (b) as oxen were favoured for slaughter due to a lack of reproductive capability, it was likely that these animals were nurtured in a way that ultimately increased their body mass. Regardless of whether the role of cattle or the activity they are shown partaking in is viewed alone or in tandem with additional factors such as sex, it is possible to suggest that there was some influence on or correlation between context in this regard and the rendered physique of bovines in Old and Middle Kingdom elite tomb imagery.

4. Conclusions

Through the use of proportional analysis, the study has revealed that variations in the physiques of cattle as rendered by ancient Egyptian practitioners in elite tomb imagery do often reflect the conditions in which they appear. What may be argued as an intention to visualise natural variations in bovines (albeit potentially idealised) was most apparent when looking at an animal's sex, their role within a scene and/or the activity in which they are shown participating in. The outcomes recorded demonstrate that illustrations of cattle physique were not random nor were they held to a generic species-wide standard, but rather mirrored myriad external factors that surrounded the individual figure.

The landscape inhabited by the ancient Egyptians brought them in close contact with fauna that shared the same space, with visual records demonstrating that animals were closely watched by the people (Evans 2010, p. 1). As it is often noted that practitioners worked within a high level of accuracy when portraying faunal details such plumage, hides and even behaviour, it is unsurprising to see parallel consideration and treatment applied when illustrating the physique of individual cattle figures based on their connection to biological and/or contextual factors. We must therefore reconsider the prevailing perspective that animals were simply minor figures in elite tomb imagery governed by few to no rules when drafted by Egyptian practitioners during initial scene composition. Through further examination of artisan practices and the methods and techniques employed by practitioners when visualising the natural world, we may begin to truly gauge the value and importance of animals in ancient Egyptian culture and society.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: I would like to thank Naguib Kanawati, Linda Evans and the Australian Centre for Egyptology for allowing me to access epigraphic material from the Meir and Beni Hassan expeditions, and for their permission to have images from the subsequent tomb reports published here. I also wish to thank the editors and reviewers for their close reading of the manuscript and generous guidance to additional bibliographical resources which were extremely helpful.

Conflicts of Interest: The author declares no conflict of interest.

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