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AN ASSESSMENT OF CAMEL MARKING AND CLAN IDENTIFICATION IN THE AFAR REGIONAL STATE, ETHIOPIA: THE CASE OF BERHALE WOREDA

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ABSTRACT

This study evaluated the indigenous protocols for camel recognition currently practiced within the Berhale district of Ethiopia's Afar Territory. By surveying 90 pastoralist units through a cross-sectional lens, the study established that phenotypic marking represents a ubiquitous norm, functioning as the cornerstone of local herd administration. Participants detailed how each primary lineage and sub-group locally designated as gosa deploys specific heraldic motifs on designated anatomical zones to validate communal ownership and deter illicit acquisition. Thermal cauterisation (fire-branding) was identified as the prevailing modality, generally administered once calves have achieved post-weaning maturity. Our spatial assessment of these branding sites indicated that a 60% majority (n=54) favours a dual-marking strategy involving the cervical and appendicular regions. Additionally, a focused neck-branding approach was recorded for 32.2% of the cohort (n=29). Peripheral identifiers were also noted on the cranial surface, pinnae, and occasionally the ventral region. The data suggests that fire-branding constitutes the fundamental ethno-legal framework for certifying property rights and fortifying the security of dromedary populations throughout Berhale Woreda.

Key words: Afar territory, cautery marks, dromedary recognition, herding strategies, Northeast Ethiopia

The camel transcends its role as a commodity, for the inhabitants of Ethiopia's arid lowlands, serving as a vital safeguard against total environmental collapse (Bekele *et al,* 2002; updated by Tefera, 2024).

In the contemporary agrarian landscape, animal labelling has evolved from ancestral tribal signatures into complex mechanisms for international biosecurity and trade participation. While historical classifications by Landais (2001) categorised marking as either ephemeral or indelible, current regulatory environment demand verifiable provenance to unlock global markets. As of 2025, the Ethiopian Ministry of Agriculture, in alliance with the African Union, has emphasised the Livestock Identification and Traceability System (LITS) to synchronise local practices with international phytosanitary protocols (MoA, 2025b). These digitised records are now fundamental for tracking disease outbreaks and managing hereditary breeding data.

Despite the proliferation of electronic alternatives, fire-branding persists as a cornerstone of Afar heritage. In Ethiopia's rangelands, these ocular symbols act as a decentralised registry to mitigate theft and simplify the retrieval of lost stock (Kassahun, 2011). However, this customary practice faces increasing scrutiny; by 2026, the World Organisation for Animal Health has intensified its advocacy for non-invasive labelling to reduce physiological trauma and preserve the commercial quality of hides. Typically, these markings are applied to yearlings, balancing biological maturity with the social imperative of property designation.

Currently, Berhale Woreda suffers from a deficit of formal documentation regarding its specific branding aesthetics and technical variations. Evaluating these ancestral protocols is crucial for safeguarding intangible cultural heritage and identifying strategies to minimise the permanent scarring that diminishes the export value of camel leather (MoA, 2025a). Consequently, this study was designed to chart the logic of traditional identification among Berhale's herders, aiming to align ancient cultural markers with the rigorous demands of the modern livestock economy.

Materials and Methods

Spatial and environmental context

The study was situated within the Berhale district, a prominent pastoral hub in the Afar Regional

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State of Ethiopia. This territory is geographically defined by the coordinates 13° 12′ to 14° 15′ North and 9° 54′ to 41° 06′ East. Positioned in Ethiopia's northeastern sector, Berhale is located approximately 647 km from the regional centre of Semera and 908 km from the national capital, Addis Ababa. The district is characterised by its proximity to the Danakil (Dallul) Depression, an area noted for its extreme environmental conditions. The administrative boundaries of Berhale include the Eritrean border to the northeast, Dallul to the north, the Tigray Region to the west, and the districts of Abala and Afdera to the south. With a mean altitude of 621 meters above sea level, the district's ecology is uniquely suited for dromedaries. Recent data (Afar BoFED, 2024) indicates that camel population in this region significantly exceed those of cattle and small ruminants, cementing Berhale's status as a vital location for camel-centric ethno-veterinary research.

Research design and sampling protocol

A multi-stage sampling strategy was employed to ensure both data representativeness and logistical feasibility. Out of the nine administrative sub-units (kebeles) in the district, five were selected through purposive sampling, based on camel density and geographic accessibility. Within these selected kebeles, a randomised selection of households per unit was conducted, total 90 participating households. Primary data acquisition involved a combination of direct field observations and the administration of a systematic survey instrument. This approach allowed for the triangulation of self-reported identification practices with real-time evidence of branding marks observed on the livestock.

Data processing and quantitative analysis

The collected survey responses were categorised and coded for systematic evaluation. Quantitative data management was performed using contemporary versions of the Statistical Package for Social Sciences (SPSS). To interpret the field findings, the author utilised descriptive statistical models, focusing on the calculation of relative frequencies, percentages, and measures of central tendency. These metrics were employed to map the prevalence and spatial distribution of camel branding protocols across the study area.

Results and Discussion

Prevalence and methodology of traditional marking

The survey revealed a universal adherence to camel marking, with 100% of the sampled households confirming the utilisation of traditional identification systems (Table 1). The predominant technique identified across the Berhale Woreda is thermal cauterisation (hot-iron branding). This procedure is strategically performed during the post-weaning developmental stage, ensuring the calves have achieved sufficient physiological maturity to undergo the branding process. These results align with broader regional trends in the Afar state, where branding serves as both a cultural signature and a practical deterrent against livestock raiding (Afar Bureau of Agriculture, 2024; Mohammed *et al,* 2025).

Anatomical distribution of identity marks

Analysis of the branding locations demonstrated a clear preference for specific body regions to ensure visibility and ease of recognition. As illustrated in the data, the majority of respondents 60% (n=54) apply identifiers to both the cervical (neck) and appendicular (leg) regions. A significant secondary group, comprising 32.2% (n=29) of the households, utilises the neck area exclusively. While these areas represent the standard, a small minority of pastoralists utilise alternative sites, including the facial region, the ears, and the ventral (stomach) surface, though the latter remains an exceptional case (Table 1).

Table 1. Distribution of branding sites and selection rationale among pastoralists (N=90).

Variable Category	Frequency (n)	Percentage (%)
Prevalence and Methodology of Traditional Marking	90	100
Anatomical Site of Identification		
Combined Cervical and Appendicular (Neck and Leg)	54	60.0
Primary Cervical Only (Neck)	29	32.2
Cervical and Ventral (Neck and Stomach)	3	3.3
Primary Appendicular Only (Leg)	2	2.2
Multi-site (Neck, Leg, and Ear)	2	2.2
Rationale for Site Selection		
Traditional Clan Lineage (Gosa) Requirements	67	74.4
Visual Prominence/Ease of Recognition	19	21.1
Concurrent Cultural and Visibility Factors	4	4.4

N = number of respondents

This distribution pattern suggests a sophisticated indigenous knowledge system where

mark placement is dictated by the need for rapid identification in communal grazing lands (Tura *et al,* 2024). However, recent technical assessments indicate that such extensive branding on the neck and legs significantly degrades the industrial grade of the hide. Specifically, branding in these high-value zones can reduce the usable surface area of the leather by up to 25%, impacting the overall export market value (Ethiopian Leather Industry Development Institute [ELIDI], 2025). Consequently, there is an urgent need for "localised marking alternatives" that balance traditional lineage visibility with the preservation of hide integrity for the global leather value chain (Ministry of Industry, 2025).

Ethno-taxonomy of clan-based branding systems

The camel identification system in the Berhale Woreda operates through a sophisticated ethno-taxonomy, where specific branding motifs are inextricably linked to lineage identity (Table 2). The study observed that cervical (neck) branding is the most prevalent anatomical site for primary clan markers. For instance, lineages such as the Dahimila and Barkol utilise variations of vertical bar motifs, locally referred to as *Dal*. These symbols range from simple parallel bars to more complex arrangements, such as the *Dal kee dalfida* used by the Barkol or the *Dal kee kulfi* a vertical bar with distal curves—favoured by the *Daar bura*. The *Dahimila asela* further distinguish their stock by integrating cruciform elements (*Ambetiba*) alongside the standard vertical bars. Beyond the cervical region, other anatomical sites serve as secondary identifiers for specific sub-lineages. The *Mandita* and *Seka* clans prefer *appendicular* (*leg* and *thigh*) marking, utilising undulating or wave-like motifs known as *Dal or Selef nemaye*. In more distinct cases, the *Gediinto* utilise *cranio-facial* and *auricular* (*face* and *ear*) sites for their sigmoidal markers (*Gudinto kulfi*), while the Egemaqumer apply divergent strokes with a central focal point (*afdida*) on the neck. These indigenous branding protocols represent more than mere property marks; they are a vital component of the Afar customary law system. By providing immediate visual proof of origin, these marks facilitate community-based protection against theft and environmental predation. According to recent assessments by the Ethiopian Ministry of Agriculture (2025b), documenting these traditional *gosa* symbols is increasingly important for the National Livestock Traceability System (ET-LITS). As of 2026, there is a strategic move to digitise these indigenous "heraldic" marks, allowing pastoralists in the Berhale district to maintain their cultural heritage while participating in formal, high-value export markets that require verified proof of origin (Afar BoFED, 2024; Tefera *et al,* 2025).

The hierarchy of identifiers: main clans and sub-lineages

The identification system in the Afar Region reflects the complex socio-political structure of the community. Every primary ethnic lineage, or gosa, possesses a unique signature and a designated anatomical site for mark placement (Table 2). This system operates through a hierarchical branding protocol:

- **Primary Markers:** Sub-clans typically adopt the ancestral symbol of the main gosa.
- **Secondary Differentiation:** To distinguish sub-lineages, additional specific markers are applied in varying orientations or adjacent sites.
- **Individual Identifiers:** In specific instances, owners may append a tertiary personal mark to denote individual property within the broader communal herd.

This multi-layered approach ensures that any member of the community can readily identify a camel's lineage, thereby acting as a collective defense against predatory threats and unauthorised appropriation. The findings regarding dual clan and individual marking systems corroborate earlier foundational studies by Wilson (1998) and Ahmed (2002), who noted the importance of dual-brand ownership.

Dextral preference in marking and management

A significant finding of this study is the consistent dextral (right-side) orientation for both branding and general animal handling. Pastoralists in the Berhale district exhibit a strong preference for the right side of the dromedary, not only for the application of identity markers but also as the standard side for milking and routine husbandry (Gebremariam *et al,* 2024). This lateral consistency facilitates easier management in communal kraals and ensures that symbols are immediately recognisable during daily interactions (Afar Bureau of Agriculture [BoA], 2024). However, these traditional "right-side" marking habits are now being integrated into the National Livestock Identification and Traceability System (LITS). By aligning digital ear tags with the traditionally branded right side, regional agricultural offices in the Afar State are bridging the gap between indigenous knowledge and international export

Fig 1. Illustration of traditional thermal markers situated on the ventral (abdominal) region of the dromedary.

Fig 2. Distribution of traditional identity markers situated on the pelvic limb and femoral (round) regions of the dromedary.

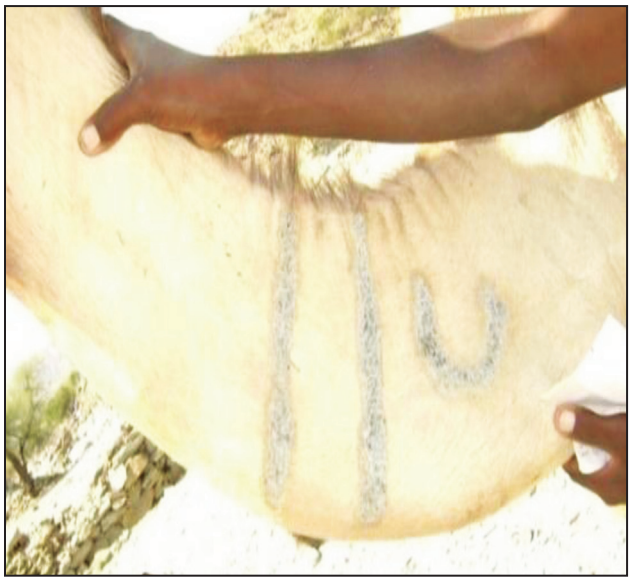

Fig 3. Visual representation of indigenous thermal branding applied to the cervical (neck) region of the dromedary.

Fig 4. Field demonstration by a local pastoralist depicting traditional clan motifs rendered on the ground surface.

requirements (Ministry of Agriculture [MoA], 2025b). This harmonisation is critical for ensuring that individual animal data correlates with clan-level ownership marks, a prerequisite for the 2026 Horn of Africa Livestock Trade Protocol (African Union-IBAR, 2025).

Conclusion and strategic implications

This investigation underscores that indigenous camel marking systems in the Berhale Woreda are foundational to the socio-cultural and economic stability of Afar pastoralists. A comprehensive analysis of these traditional identification protocols provides more than just ethnographic data; it offers a critical framework for modernising the livestock sector. By integrating this indigenous knowledge with contemporary veterinary standards, policymakers can develop targeted interventions that mitigate the adverse effects of thermal branding on animal physiology and hide integrity. Furthermore, optimising these identification strategies is essential for enhancing the marketability of camel by-products. Reducing the prevalence of deep-tissue scarring through refined marking techniques will directly improve the industrial grade of camel leather, thereby increasing the economic returns for local herders. Ultimately, bridging the gap between traditional gosa recognition systems and modern traceability frameworks will catalyse more resilient camel production cycles and strengthen the livelihood

Table 2. Taxonomic Inventory of Traditional Identity Markers and Anatomical Branding Sites in Berhale woreda.

Lineage Designation (Gosa)	Primary Anatomical Site	Geometric Motif Description	Symbol	Vernacular Designation
(Afar language)				
Dahimila	Cervical (Neck)	Parallel vertical bars	| |	Dal
Barkol	Cervical (Neck)	Discontinuous vertical strokes	| , |	Dal kee dalfida
Daar bura	Cervical (Neck)	Vertical bars with distal curves	u| | or | |u	Dal kee kulfi
Dahimila asela	Cervical (Neck)	Cruciform-integrated bars	+| | or | |×	Dal kee Ambetiba
Mandita	Appendicular (Leg)	Horizontal wave/ undulation	≈	Dal
Damohoyta	Cervical (Neck)	Inverted semi-circular arch	∩	Ogoyta
Seka	Femoral/Pelvic Limb (Thigh)	Double undulating stroke	≈	Selef nemaye
Gediinto	Cranio-facial/Auricular Face/ear/	Hooked or sigmoidal mark	?	Gudinto kulfi
Egemaqumer	Cervical (Neck)	Divergent strokes with central point	/ ▪ \	Egma oumer/Dal kee afdida
Ganento	Cervical (Neck)	Triple diagonal slash	/ //	Abur sidhu

security of pastoralist communities in the Afar Regional State.

Declarations

Availability of Data and Materials

To maintain academic transparency and accountability, the primary datasets generated and analysed during this study are available from the corresponding author upon reasonable request.

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Ethics Approval

This study was executed following the established ethical protocols for agricultural and social research. All participating pastoralist households provided informed verbal consent after being briefed on the study's purpose. Participants were assured of complete anonymity and the confidentiality of their responses prior to the data collection process.

Manuscript Status and Originality

The author certifies that this manuscript is an original work that has not been published elsewhere, in part or in full, and is not currently under consideration by any other journal. The author agrees to maintain exclusivity with JCPR until the editorial review process is finalised.

Conflict of Interest

The author declares that the research was conducted without any commercial, financial, or personal affiliations that could represent a potential conflict of interest. No external influence or funding impacted the objectivity of the presented findings.

Author's Contribution

The author was solely responsible for the end-to-end execution of the project, including the initial conceptualisation, study design, and field data acquisition. Additionally, the author performed all statistical analyses, interpreted the results, and was responsible for the drafting, critical revision, and final approval of the manuscript.

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