Characterizations of the Production System and Breeding Practices of Surma Cattle Population in Bench Maji Zone, Southwest Ethiopia

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INTRODUCTION & AIM

Ethiopia, the most populous nation in Africa, holds one of the continent's largest livestock populations, yet the sector's economic contribution remains constrained by low productivity and traditional management systems. Cattle are central to rural livelihoods, supporting up to 70% of households through food, draught power, and cultural value. The country's diverse agro-ecological zones have fostered a rich reservoir of indigenous cattle genetic resources, well adapted to harsh environments and poor-quality feed. Safeguarding these genetic resources requires systematic characterization and informed conservation strategies aligned with global guidelines.

Among Ethiopia's lesser-known breeds, the Surma cattle population, kept mainly in the Bench Maji Zone, plays a vital role in pastoral and agro-pastoral systems. They are valued for their resilience, cultural significance, and contribution to household subsistence. However, limited documentation, environmental pressures, and weak institutional support pose risks to their sustainability. Despite their importance, scientific information on their production environment and breeding practices remains scarce.

This study aims to fill this gap by characterizing the Surma cattle production system and documenting prevailing breeding and management practices in the Bench Maji Zone.

METHOD

The study was conducted in the Bench Maji Zone of southwestern Ethiopia.

A purposive multistage stratified random sampling technique was used to select study sites and households.

Two districts, Meinit Shasha and Maji were selected based on the predominance of Surma cattle population.

Kebeles were stratified into pastoral and agropastoral production systems. A total of eight kebeles (two *kebeles* per production system) were purposively selected. From each *kebele*, 23 households owning more than five cattle were randomly selected, giving a total of 184 households, using the standard formula:

$$n = \frac{Z^2 \cdot p(1-p)}{d^2}$$

where Z is the Z-value for 95% confidence, $p = 0.5$, and $d = 0.07$–0.08.

Data were collected using semi-structured questionnaires, field observations, focus group discussions (FGDs), and secondary sources.

Descriptive statistics (IBM SPSS Statistics 25) were used to summarize variables. An index ranking method was applied to prioritize major production constraints:

$$\text{Index} = \frac{\sum(3 \times \text{Rank } 1 + 2 \times \text{Rank } 2 + 1 \times \text{Rank } 3)}{\sum(3 \times \text{Total Rank } 1 + 2 \times \text{Total Rank } 2 + 1 \times \text{Total Rank } 3)}$$

The effects of district and production system on selected variables were analyzed using the General Linear Model (GLM):

$$Y_{ij} = \mu + A_i + P_j + e_{ij}$$

where Y_{ij} is the observed value, μ the overall mean, A_i the fixed effect of production system (pastoral, agro-pastoral), P_j the fixed effect of district (Meinit Shasha, Maji), and e_{ij} the random error.

RESULTS

Factors	Feed source F (%)	Supplementary feed type F (%)		Mode of herding F (%)	Water source F (%)		
	Natural pasture	Salt	Fodder	Communal grazing	River	Seasonal Spring	Seasonal Pond
District	NS	NS		NS	NS	NS	NS
Maji	100	51.1	48.9	100	66.3	16.3	17.4
Meinit Shasha	100	43.5	56.5	100	82.6	10.9	6.5
Overall	100	47.3	52.7	100	74.45	13.6	11.95
Production system	NS	**	***	NS	NS	NS	NS
Agro pastoral	100	17.4	82.6	100	78.3	15.2	6.5
Pastoral	100	77.2	22.8	100	70.7	12.0	17.4
Overall	**100**	**47.3**	**52.7**	**100**	**74.4**	**13.6**	**12.0**

Variables	Production system			
Preferred breed	Agro pastoral (%)	Pastoral (%)	Overall	P-value
Local/Surma	92.5	95.7	94.0	ns
Exotic/cross	7.6	4.3	6.0	
Why Surma				
High Milk yield	33.7	85.9	59.8	***
Adaptation	7.5	1	4.3	
Reproduction	44.6	13.0	28.8	
Temperament	14.1	-	7.1	
Preferred color				
White	28.3	19.6	23.9	ns
Red	45.7	43.5	44.6	
Black	3.3	3.3	3.3	
Fawn(spotted)	22.8	33.7	28.3	
Color preference reason				
Adaptation	52.2	62.0	57.1	ns
Social value	47.8	38.0	42.9	

CONCLUSION

Surma cattle production is shaped by traditional management, strong cultural values, and environmental pressures that influence herd structure, feeding, and breeding practices. Strengthening breeding management, animal health services are essential to ensure the long-term sustainability of the system. Improving feed and water resources and enhancing animal health services are essential to ensure the long-term sustainability of the system.

FUTURE WORK

Breeding program, animal feed improvemnt and production shoud be started in the study areas. Furthermore genetic characterization that focused on the unique traits of the cattle popuation should be conducted