KABARAK UNIVERSITY
6TH ANNUAL INTERNATIONAL RESEARCH CONFERENCE

Tensile Properties of Indigenous Kenyan Boran Pickled and Tanned Bovine Hide

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Introduction / Background

n cattle are predominant breeds in NE, a region that produces 70% livestock for me

pigmentation; black points-protection from sunburns; smooth, loose but motile
coat/skin-reflection solar radiation; reasonable large body, thick skin and well-ma
with even fat cover make this breed a promising source of beef and bovine hide fo
uction of quality leather.

her by-products can raise more revenue compared to beef itself (FAO, 2007).

ite the large potential in this area, the economic impact is not yet felt.

has been attributed to poor quality of Kenyan leather on the world market

gside animal breed & age, chemical modifications of processing also affects the qu

Statement of the problem

realization of the famous Kenya Vision 2030 is pegged on the possi
nlocking the country's untapped potential. Leather industry is on
e untapped potential areas, whose contribution to the global econ
asonable. This includes employment opportunities, contribution to
onal GDP from the foreign exchange and source of livelihoods
oralist farmers. However, the contribution is far below the expected
ate due to low quality of the leather. The leather quality has b
ciated with the numerous "do and undo" series of chemical proce
lved in the leather processing. The subjected processes alter
chanical and structural collagen matrix of the resulting leather
ce final quality. This study reports an investigation on the effect of
mical processes involved in leather making: pickling and chro
ning.

Study objectives

1. Determining tensile properties of Kenyan indigenous Boran cowhide
2. Effect of sampling on tensile properties
3. Effect of chrome-tanning on tensile properties

Brief literature review

Quality indicators include tensile properties.

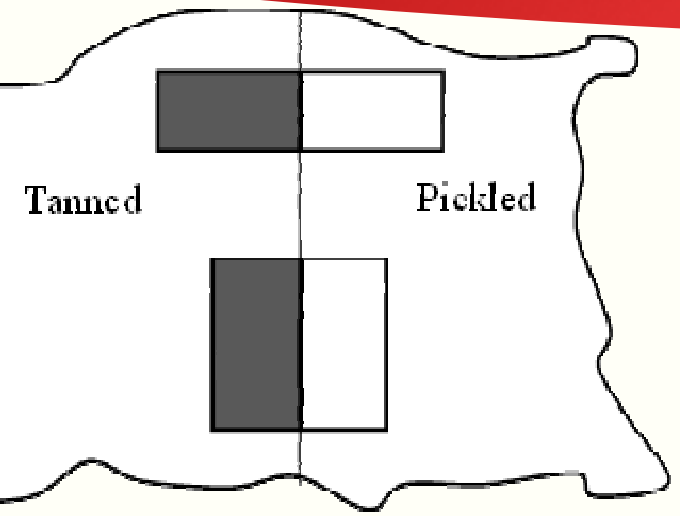
ensile strength determines the structural resistance of leather to tensile
nence its state and usability.

also informs the entire process of manufacturing goods from leat
consumers can determine both the routine quality and serviceability asse
of the material.

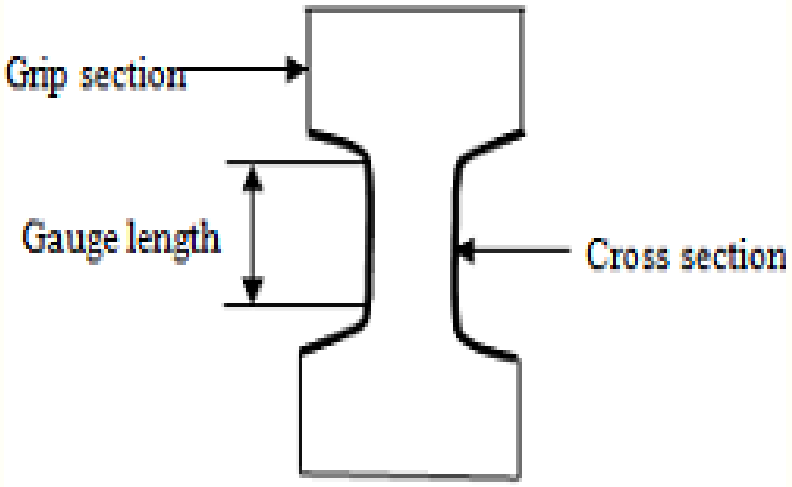
Percentage Elongation determines the elasticity of the material especially
eather and footwear upper should possess high flexibility to preve
appearance of cracks and tears in the ball area.

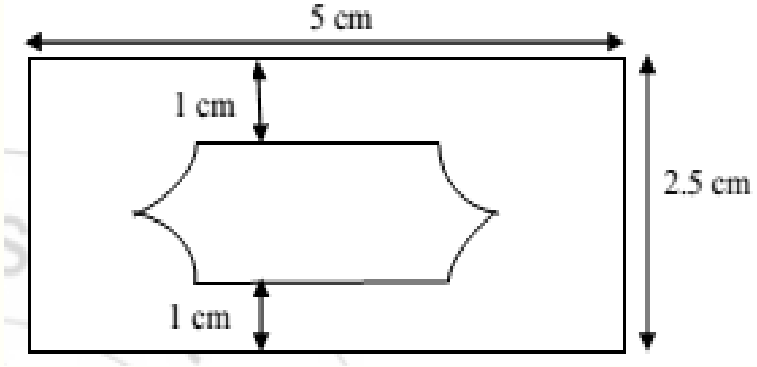
High elasticity allows the material to withstand the elongation stresses to wh
ubjected during footwear lasting, especially on the toe area

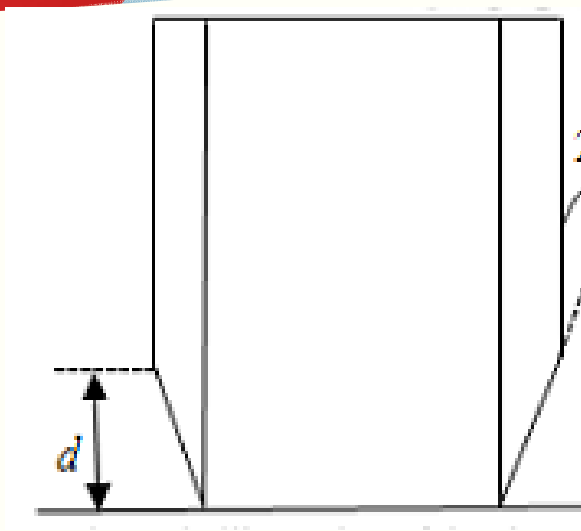
Methodology



Freshly flayed hide underwent conventional tanning procedure to pickling stage before cutting into two halves





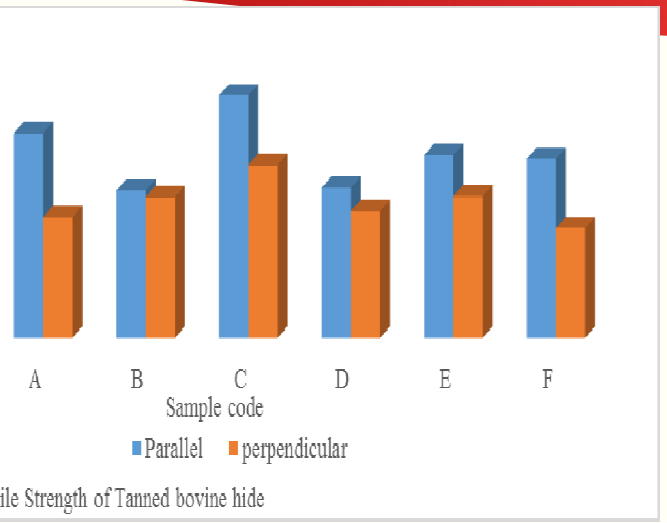


Samples were condition in standard atmosph of 23/50 (ISO 2418, 2002) for at least 48 hou

Methodology

Each sample was clamped at the cross-secti
area of the gauge in the grips. A uniform j
separation speed of 100mm/min was selec
with a GL=100mm. Machine was run
specimen was torn apart & highest breaking l
(force) reached during tearing was recorde
Elongation(mm) was recorded directly from sc
Few samples were disposed due to slip-fa
during testing. Absolute result was obtained
from the successful sample until maximum loa
applied. For tear stren
measurements, pneumatic grips were replace
the jaws of Instron testing machine & highest fa
recorded.

Findings / Results and Discussion
1. Effect of sampling direction



ile Strength of Tanned bovine hide

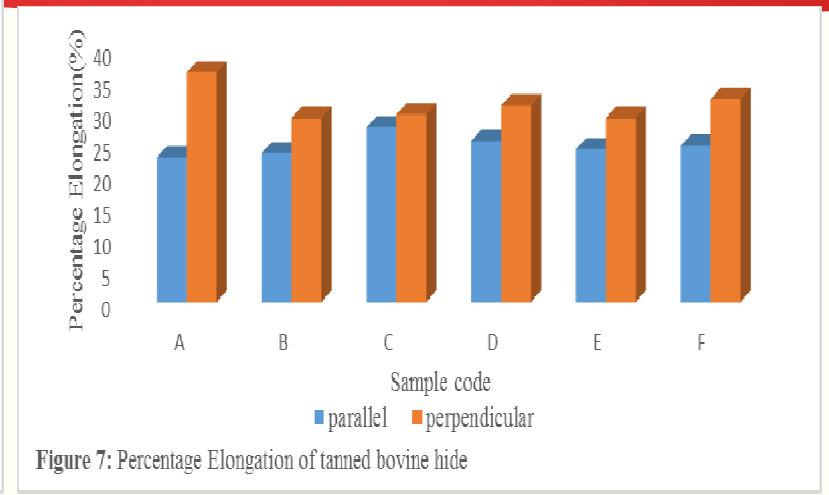


Figure 7: Percentage Elongation of tanned bovine hide

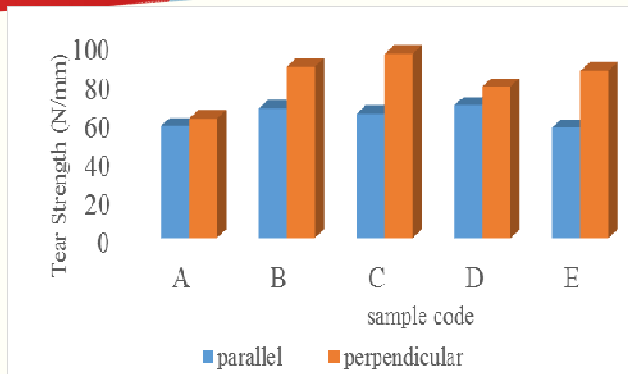


Figure 5: Tear strength of tanned hide

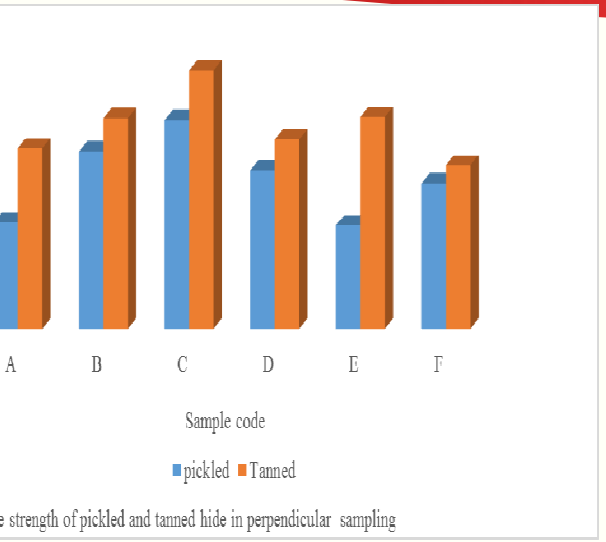
hen more fibres gned in a direction rmal to the stresses plied, tensile ength is low

A fact exploited in shoe-making, leather stretched perpend.

anisotropic arrangement of the collagen f Degree of alignment of collagen fibrils in plane determines tear strength. Majority of fibrils contained within parallel planes with or no crossover between the top and bo surfaces

ndings / Results and Discussion

Effect of chrome-tanning on tensile properties



e strength of pickled and tanned hide in perpendicular sampling

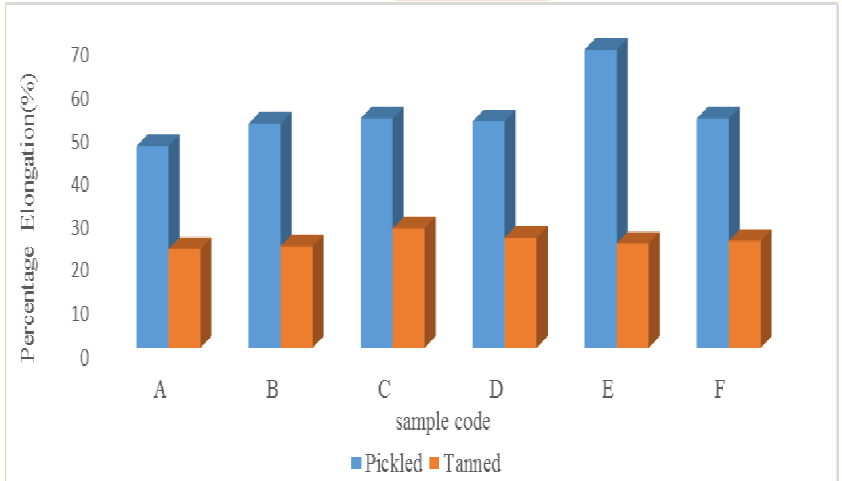


Figure 12: Percentage Elongation of pickled and Tanned hide in parallel sampling

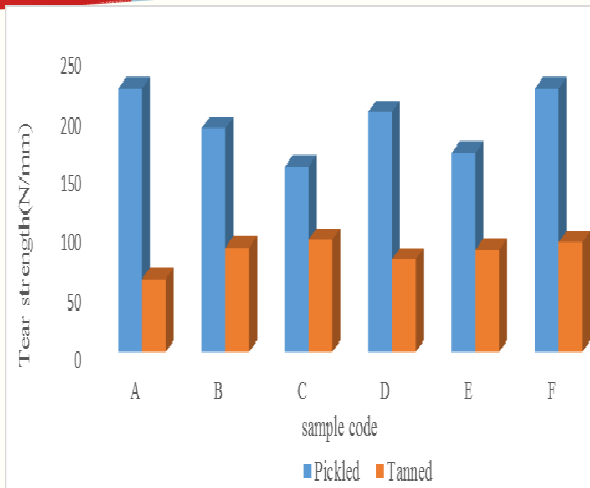


Figure 16: Tear strength of pickled and Tanned hide in perpendicular sampling

Pickling (osmotic swelling) loosens collagens decreasing oad bearing fibres per unit area

Swelling pushes collagen fibres apart increasing angle of weave decreasing load transfer

Tanning introduces crosslink that binds the active groups together hence resisting slippage. Increases tensile strength

Conclusions

anning increases tensile strength but significantly reduces both percentage elon
elasticity) and tear strength of bovine hide.

erpendicularly sampled leather have significantly higher percentage elongation an
trength.

lowever, tensile strength for samples cut perpendicularly is significantly lower th
amples cut parallel to the backline. This is due to geometry and alignment of samples
neasurement

he measured values of tear strength, tensile strength and percentage elongation
hown that indigenous Kenyan Boran bovine hide are of relatively good quality based
inimum quality standards by UNIDO and British Standards.

Recommendations

- Use of Chrome-tanning with careful monitoring environment
- Rearing of this breed to enhance a sustainable income the pastoralist communities
- More researches are needed to help overcome oth factors

Areas for further study

- Impact of other processing steps on the quali of the hide alongside tanning
- Effect of management practices carried o on cattle on the quality of the resulting hide

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