



Animal welfare, stress biomarkers and meat quality

10/10/2018

Pre-slaughter stress, animal-related factors, stress biomarkers, nanostructure and technological properties of beef

Industry Sector: Cattle And Small Stock

Research Focus Area: The Economics Of Red Meat Consumption And Production In South Africa

Research Institute: Fort Hare

Researcher: Dr. Voster Muchenje PhD

The Research Team

Title	Initials	Surname	Highest Qualificaion
Prof	A.	Hugo	PhD
Dr	A.Y.	Chulayo	Phd

Year Of Completion : 2018

Aims Of The Project

- To determine the expression of heat shock proteins, cortisol and glucose and the quality of beef in slaughtered bovine species.
- To determine the activities of stress enzymes in relation to carcass and physico-chemical characteristics of beef from cattle slaughtered under practical
- To determine the effects of pre-slaughter stress and inborn characteristics carcass of beef quality

Executive Summary

The main objective of the study was to determine the effects of transportation, distance travelled, lairage duration and animal-related factors on pre-slaughter stress indicators, carcass characteristics, nanostructure and technological properties of beef from six genotypes of cattle. Transportation and handling of slaughter animals is associated with a series of events that expose animals to stressful and unfavourable conditions, compromising their welfare and meat quality. Stress experienced by animals in unfavourable environmental conditions increases the synthesis of stress proteins. In a heat-shocked cell, the proteins begin to unfold and denature, resulting in the production of heat-shock proteins (HSP). HSPs are a subgroup of molecular chaperones, which are classified into five families (HSP100, HSP90, HSP70, HSP60 and small HSPs [sHSPs]) according to their molecular weights. During this process, HSPs may

bind to heat-sensitive proteins and protect them from degradation. Under normal growth, HSPs maintain homeostasis by regulating the folding quality control of proteins. It includes stressed and non-stressed proteins that accompany unfolded polypeptides.

The study showed that exposing cattle to longer hours of transportation with reduced lairage period did not only decrease glucose levels, but also increased the expression of heat shock proteins, cortisol, creatine kinase and lactate dehydrogenase which are good indicators of animal welfare. Furthermore, pre-slaughter stress negatively affected the beef nanostructure and technological properties, and heifers had the best muscle fibres, sarcomere length and visible intercalated discs with improved tenderness, colour and pH.

Popular Article

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Please contact the Primary Researcher if you need a copy of the comprehensive report of this project – Dr Voster Muchenje on vmuchenje@ufh.ac.za

- Cattle and Small Stock, Red Meat Consumption, Red Meat Production
- ◆ 2018, CSS, Muchenje, Online, UFH
- < Genetic study on wet carcass syndrome
- > Effects of growth enhancers on residues in lamb

DEADLINES for RESEARCHERS 2021

Proposals for 2021: TBC

Progress reports: 28 Jan 21

Final reports: 29 Jan 21 Final includes comprehensive report and popular article

COMMITTEE MEETINGS for 2021

RMRDSA CSS Planning - TBC

Project Committee - TBC

Pork Planning - TBC



Calendar

< > Apr 2021						
Sun	Mon	Tue	Wed	Tur	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

PORK Priority Areas

Cattle & Small Stock Programmes

1 Sustainable natural resource utilisation

2 Improvement of Livestock production and forage

3 Management of agricultural risk to create a resilient Red Meat sector

4 Sustainable health and welfare for the Red Meat sector

5 Enhancement of production and processing of Animal Products

6 Consumer and market development of the Red Meat sector

7 Commercialisation of the emerging sector

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