

Cairo University  
Faculty of Veterinary Medicine  
Department of Food Hygiene and Control



# Effect of Technological Properties of Buffalo Meat on Quality of Burger

A Thesis Presented

By

**Breen Fouad Zaki Abd El-Kawi**  
(B.V.Sc., Cairo University, 2012)

For Master Degree in  
Veterinary Medical Sciences, Meat Hygiene and Control

Under The Supervision of

**Prof. Dr.**  
**Nabil Abdel-Gaber Yassien**  
Professor of Meat Hygiene and Control  
Faculty of Veterinary Medicine,  
Cairo University

**Prof. Dr.**  
**Mohamed M.T. Emara**  
Professor of Meat Hygiene and Control  
Faculty of Veterinary Medicine,  
Cairo University

**Dr.**  
**Omayma M.A.L. Maghraby**  
Chief Researcher of Food Hygiene  
Animal Health Research Institute,  
Dokki

**2021**

**Cairo University**  
**Faculty of Veterinary Medicine**  
**Department of Food Hygiene and Control**

**Name** : Breen Fouad Zaki Abdel kawi  
**Date of birth** : 11/ 8/ 1990  
**Degree** : M.V.Sc.  
**Nationality** : Egyptian  
**Specification** : Hygiene and Control of Meat and its Products  
**Title of the thesis** : Effect of technological properties of buffalo meat on quality of Burger

**Supervision:**

*Dr. Nabil A.G. Yassien* Professor of Meat Hygiene, Faculty of Veterinary Medicine, Cairo University

*Dr. Mohamed M.T. Emar* Professor of Meat Hygiene, Faculty of Veterinary Medicine, Cairo University

*Dr. omayma M.A.L Maghraby* Chief Researcher of Food Hygiene, Animal Health Research Institute, Dokki-Giza

**Abstract**

The buffalo is an important beneficial domestic animal between farm animal in some countries for its benefit for producing meat, milk and considering as drought animal. The aim of current study was to analyze the buffalo meat cuts from hindquarter (semitendinosus) and from forequarter (biceps) and fats include (subcutaneous, mesenteric and kidney) from female fifteen carcasses which slaughtered at age above 5 years to evaluate their quality on manufacture of burger patty. Buffalo meat cuts were prepared for proximate chemical analysis soluble proteins, collagen content & solubility, total pigments, and myoglobin content and fats for fatty acid analysis, melting point, peroxide value and thiobarbituric acid (TBARS) test. The results showed that moisture content of the *Biceps* muscle was significantly ( $P < 0.05$ ) higher than that of the *Semitendinosus*

muscle. *Biceps* muscle was significantly ( $P < 0.05$ ) lower in fat, protein, ash, total soluble, and sarcoplasmic proteins than that of *Semitendinosus* muscle. Collagen content was significantly ( $P < 0.05$ ) lower while collagen solubility was significantly ( $P < 0.05$ ) higher than those of *Semitendinosus* muscle. The mean values for the total pigments were 6.24 and 7 mg/g for *Biceps* and *Semitendinosus* muscles respectively. The peroxide value of kidney fat was significantly ( $P < 0.05$ ) higher than those from mesenteric fat and subcutaneous fat. The mean values for TBARS (mg malonaldehyde/kg) were 0.35, 0.40 & 0.33 for kidney, subcutaneous and mesenteric fats respectively. The mean values of the melting point were non-significantly ( $P < 0.05$ ) differ between different investigated fats with mean values of 51.22, 32.67 and 44.27 respectively. The fatty acids profile revealed significant differences between examined fats. For investigation of the effect of mixing buffalo mesenteric fat with two buffalo meat cuts (*biceps* and *semitendinosus*) on quality attributes of experimentally produced buffalo burger. Three treatments based experiment with three independent replicates were performed to compare chemical, sensory quality attributes, cooking characteristics and physicochemical criteria of buffalo burger. The result of sensory characteristics showed significance higher score in appearance at 25<sup>th</sup>, 39<sup>th</sup> day and also in overall acceptability at 25<sup>th</sup> of storage in hindquarter raw burger but inverse significant higher score in overall acceptability at 53<sup>th</sup> and in binding at 53<sup>th</sup> and 81<sup>th</sup> of storage for forequarter raw burger. After cooking, the result of sensory characteristics showed significance higher in flavor at 67<sup>th</sup> of storage period

of forequarter cooked burger and significance higher in binding and tenderness at 25<sup>th</sup> of storage period for hindquarter cooked burger. forequarter burger showed significance higher in cooking yield and moisture retention but inversely that hind quarter showed significance higher in fat retention along storage .The chemical analysis of forequarter minced meat and raw burger showed significance higher in(fat and soluble collagen)but in hindquarter minced meat showed significance higher in (moisture ash),but in cooked forequarter burger showed significance higher in (moisture and soluble protein)and in cooked hindquarter showed significance higher in (fat and protein).the deterioration criteria of hind quarter burger showed significance higher in myoglobin. Finally, the produced buffalo burger from forequarter muscle is the choice for production of juicy burger and accepted to the consumers. **Keywords:** Buffalo meat, buffalo fat, quality, buffalo burger, technological properties

## Contents

	<b>Page</b>
<b>Introduction</b>	1
<b>Review Article</b>	5
<b>Research papers</b>	
1. The technological properties of buffalo meat and fat	17
2. The technological properties of buffalo burger	35
<b>Discussion</b>	67
<b>Conclusion</b>	74
<b>Recommendations</b>	76
<b>Summary</b>	77
<b>References</b>	80
الملخص العربي	

## List of Tables

<b>Table</b>	<b>page</b>
1.1 Chemical analysis of buffalo muscles from fore and hind quarters.	25
1.2 Physicochemical properties of buffalo fats.	27
1.3 Fatty acid analysis of buffalo fats.	27
2.1 Sensory characteristics of raw burger immediately after forming.	46
2.2 Sensory characteristics of raw burger during storage 3 months at -18°C.	47
2.3 Sensory characteristic of cooked burger during storage period.	49
2.4 Eating quality characteristics of burger during 3 months storage.	52
2.5 Chemical examinations of minced meat, raw burger and cooked burger.	55
2.6 Determination criteria of burger during storage at -18 °C in freezer along 3 months.	58

## List of Figures

<b>Figure</b>		<b>page</b>
1	Chemical analysis of meat.	33
2	Protein fractionation.	33
3	Chemical analysis of fat.	34

## **List of Abbreviations**

BMF	Buffalo meat fat
AOAC	Association of Official Analytical Chemists
AMSA	American Meat Science Association
POS	Palm oil stearin
PKOS	Palm kernel oil stearin
FFA	free fatty acid
TBA	Thiobarbituric acid
FAO	Food and Agriculture Organization
Mes.	Mesenteric fat
MUFA	Monounsaturated Fatty Acids
PUFA	Polyunsaturated Fatty Acids
TBARs	Thiobarbituric Acid Reactive Substances
TSFA	Total saturated Fatty Acids
TSP	Total soluble proteins
TUFA	Total unsaturated Fatty Acids
TVBN	Total Volatile Basic Nitrogen