

https://dspace.org/

A comparison of selected nutritional parameters between wild and domestic meats

Fine, Lauri-Beth

2008-07-10T06:39:21Z
http://hdl.handle.net/10539/5019

Downloaded from a DSpace repository. https://dspace.org/

A COMPARISON OF SELECTED NUTRITIONAL PARAMETERS BETWEEN WILD AND DOMESTIC MEATS.

Lauri-Beth Fine

A dissertation submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science

Johannesburg, 2008

Abstract

Many dietary factors, especially fat, are likely to influence the risk of cardiovascular disease by, amongst others, their effects on blood cholesterol concentration. The aim of this study was to analyse the lipid, energy and protein concentrations of local South African game in comparison to domestic meats. Fatty acid profiles were determined by chloroform-methanol extraction and gas chromatographic analysis. Total protein concentrations were determined by the Lowry Method. Energy analysis was performed using bomb calorimetry. Although no consistent, distinct differences between all the wild and domestic South African meats were found, individual differences were noted within and between species. Therefore, no general consumption recommendations can be made, but some wild meats appear to be more in line with general health recommendations than domestic meats.

Declaration

I declare that this dissertation is my own, unaided work. It is being submitted for the Degree of Master of Science in the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination in any other university.

_____

Lauri-Beth Fine

(Signature of candidate)

_____ day of _____ 2008

Contents

Abstract ii

Declaration iii

Contents iv

List of Abbreviations viii

Description of References viii

List of Tables ix

Dedication xi

Acknowledgements xii

1. Introduction 1

    1.1 Dietary Lipid 1

    1.2 Dietary History 3

    1.3 Dietary Lipid Categories 5

        1.3.1 Total Fat 5

        1.3.2 Saturated Fat 6

        1.3.3 Monounsaturated Fat 7

        1.3.4 Trans-Unsaturated Fat 7

        1.3.5 Polyunsaturated Fat 7

            1.3.5.1 N9 PUFA 8

            1.3.5.2 N6 PUFA 8

            1.3.5.3 N3 PUFA 9

    1.4 Lipids of Meat 10

2. Materials and Methods 13

    2.1 Samples 13

2.2 Lipid Analysis 13
2.3 Protein and Energy Analysis 14
2.3.1 Protein Analysis 14
2.3.2 Energy Analysis 14
2.4 Data Analysis 15
2.4.1 Lipid 15
2.4.2 Protein and Energy 15
2.5 Ethics 16
3. Results and Discussion 17
3.1 Individual Domestic Species 17
3.1.1 Pig 17
3.1.1.1 Lipids 17
3.1.1.2 Protein 19
3.1.1.3 Energy 19
3.1.2 Rabbit 20
3.1.2.1 Lipids 20
3.1.2.2 Protein 21
3.1.2.3 Energy 22
3.1.3 Goat 22
3.1.3.1 Lipids 22
3.1.3.2 Protein 24
3.1.3.3 Energy 24
3.2 Comparison between Domestic Species 25
3.2.1 Lipids 25
a) Pig and Rabbit 25

b) Pig and Goat 26

c) Rabbit and Goat 26

3.2.2 Protein 27

3.2.3 Energy 28

3.3 Individual Wild Species 29

3.3.1 Impala 29

3.3.1.1 Lipids 29

3.3.1.2 Protein 31

3.3.1.3 Energy 32

3.3.2 Wildebeest 32

3.3.2.1 Lipids 32

3.3.2.2 Protein 34

3.3.2.3 Energy 35

3.3.3 Springbok 35

3.3.3.1 Lipids 35

3.3.3.2 Protein 36

3.3.3.3 Energy 37

3.4 Comparison between Wild Species 37

3.4.1 Lipids 37

a) Impala and Wildebeest 37

3.4.2 Protein 38

3.4.3 Energy 39

3.5 Comparison of Domestic and Wild Species 39

3.5.1 Lipids 39

3.5.2 Protein 40

3.5.3 Energy 41

4. General Discussion 43

5. Conclusion 48

6. References 49

List of Abbreviations

TS: total saturated fatty acids

TM: total monounsaturated fatty acids

18:2: linoleic acid (18:2n6)

20:4: arachidonic acid (20:4n6)

22:4: adrenic acid (22:4n6)

22:5: gamma-docosapentaenoic acid (22:5n6)

TN6: total omega-6 fatty acids

18:3: alpha-linolenic acid (18:3n3)

20:5: eicosapentaenoic acid (20:5n3)

22:5: alpha-docosapentaenoic acid (22:5n3)

22:6: docosahexaenoic acid (22:6n3)

TN3: total omega-3 fatty acids

TP: total polyunsaturated fatty acids

Dry: lipid dry weight

S:P: saturated fatty acid to polyunsaturated fatty acid ratio

N6:N3: omega-6 fatty acid to omega-3 fatty acid ratio

Description of References

First mention of reference uses all author's names, subsequently only first author and *et al* is stated.

List of Tables

Table 1: Modifications in American Dietary Guidelines from 1980 to 2000

Table 2: Equations used to estimate cholesterol change resulting from dietary fat and cholesterol modifications

Table 3: Fatty acid profile of various muscle sites of pig

Table 4: Protein concentrations of various muscle sites of pig

Table 5: Energy concentrations of various muscle sites of pig

Table 6: Fatty acid profile of various muscle sites of rabbit

Table 7: Protein concentrations of various muscle sites of rabbit

Table 8: Energy concentrations of various muscle sites of rabbit

Table 9: Fatty acid profile of various muscle sites of goat

Table 10: Protein concentrations of various muscle sites of goat

Table 11: Energy concentrations of various muscle sites of goat

Table 12: Fatty acid profile of domestic species

Table 13: Protein concentrations of various muscle sites of domestic species

Table 14: Comparison of the statistical variation between protein concentrations in domestic species

Table 15: Energy concentrations of various muscle sites of domestic species

Table 16: Comparison of the statistical variation between energy concentrations in domestic species

Table 17: Fatty acid profile of various muscle sites of impala

Table 18: Protein concentrations of various muscle sites of impala

Table 19: Energy concentrations of various muscle sites of impala

Table 20: Fatty acid profile of various muscle sites of wildebeest

Table 21: Protein concentrations of various muscle sites of wildebeest

Table 22: Energy concentrations of various muscle sites of wildebeest

Table 23: Fatty acid profile of various muscle sites of springbok

Table 24: Protein concentrations of various muscle sites of springbok

Table 25: Energy concentrations of various muscle sites of springbok

Table 26: Fatty acid profile of wild species

Table 27: Protein concentrations of various muscle sites of wild species

Table 28: Comparison of the statistical variation between protein concentrations in wild species

Table 29: Comparison of the statistical variation between protein concentrations in domestic and wild species

Table 30: Energy concentrations of various muscle sites of wild species

Table 31: Comparison of the statistical variation between energy concentrations in wild species

Table 32: Fatty acid profile of domestic and wild species

Table 33: Protein analysis of domestic and wild species

Table 34: Energy analysis of domestic and wild species

Table 35: Comparison of the statistical variation between energy concentrations in domestic and wild species

This Dissertation is dedicated to my Parents

MOM AND DAD

With all my love and appreciation

Acknowledgements

I would like to express my sincere thanks to my supervisor, Professor Bruce Davidson, for mentoring me, for his patience in addressing my endless barrage of questions, his support and encouragement. Thank you for refining my skills as a competent researcher.

Thank you to the School of Physiology for their support structure. I would especially like to thank Avonne Pickering, Margaret Badenhorst and Kennedy Erlwanger for their assistance, patience and encouragement.

I would like to acknowledge the staff of the Central Animal Services, particularly Peter Dawson, for their services.

I gratefully acknowledge funding from the Medical Faculty Research Endowment Fund.

To my parents, my husband, Ashley, and my sister, Kelli, this dissertation would never have been completed without your unconditional love, understanding, encouragement and support. Thank you, I could never have done this without you all!