



Verena Bongartz (Autor)

# Characterization of selected Polyphenol-Protein Interaction Products in alkaline-treated Sunflower Meal

The cover features a blue vertical bar on the right side with the text "Schriftenreihe der Professur für Molekulare Lebensmitteltechnologie". At the top right, there is a logo for "UNIVERSITÄT BONN" with the number "6". The author's name, "Verena Bongartz", is printed in the center. The title of the book is displayed below the author's name. At the bottom left, there is a small graphic of the Cuvillier logo followed by the publisher's name, "Cuvillier Verlag Göttingen Internationaler wissenschaftlicher Fachverlag".

<https://cuvillier.de/de/shop/publications/8203>

Copyright:

Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany

Telefon: +49 (0)551 54724-0, E-Mail: [info@cuvillier.de](mailto:info@cuvillier.de), Website: <https://cuvillier.de>

## Table of Contents

Chapter 1: General Introduction .....	1
1 The sunflower ( <i>Helianthus annuus</i> L) .....	1
1.1 Origin and proliferation .....	1
1.2 Botanic characteristics .....	2
1.3 Oil production .....	2
2 Solvent-extracted sunflower meal .....	5
2.1 Composition .....	6
2.2 Protein.....	6
2.3 Phenolic content.....	7
3 Polyphenols .....	9
3.1 General overview .....	9
3.2 Chlorogenic acid in SEM.....	11
4 Polyphenol-protein interactions.....	13
4.1 Non-covalent interactions.....	16
4.2 Covalent interactions.....	17
5 Trihydroxy benzacridine derivates .....	21
6 Aim .....	22
Chapter 2: Protection of protein from ruminal degradation by alkali-induced oxidation of chlorogenic acid in sunflower meal.....	31
1 Introduction .....	33
2 Materials and methods .....	35
2.1 Alkali treatment of sunflower meal .....	35
2.2 Chemical analysis .....	35
2.3 Crude protein fractionation and estimation of ruminally undegraded crude protein .....	36
2.4 Intestinal digestibility of ruminally undegraded crude protein .....	37
2.5 Data treatment and statistical analysis.....	38
3 Results.....	39
3.1 Chemical composition .....	39
3.2 Color development.....	39
3.3 Statistical relationships.....	39
3.4 Crude protein fractions .....	40
3.5 Ruminally undegraded crude protein .....	41



3.6 Optimization and verification of predictive models .....	42
3.7 Estimation of intestinal digestibility.....	43
4 Discussion .....	45
5 Conclusion .....	48
Chapter 3: Evidence for the Formation of Benzacridine Derivatives in Alkaline-Treated Sunflower Meal and Model Solutions .....	53
1 Introduction.....	54
2 Results and Discussion .....	56
2.1 Color Development in SEM Extract and Model Solutions.....	56
2.2 UHPLC-DAD-MS/MS Analysis .....	58
3 Experimental Section.....	65
3.1 Plant Material .....	65
3.2 Chemicals and Reagents .....	65
3.3 UHPLC-DAD-MS/MS .....	66
4 Conclusions .....	68
Chapter 4: Concluding remarks.....	71
List of abbreviations.....	81
Summary .....	83
Zusammenfassung .....	85