Measurement and Determination of the Protein Composition of Beyond Raw Hydrolyzed Whey Protein Powder

Lyndsey R. Buren#, Dr. Davis Jose#

#Department of Chemistry & Physics, Monmouth University, West Long Branch, NJ 07764

Overview

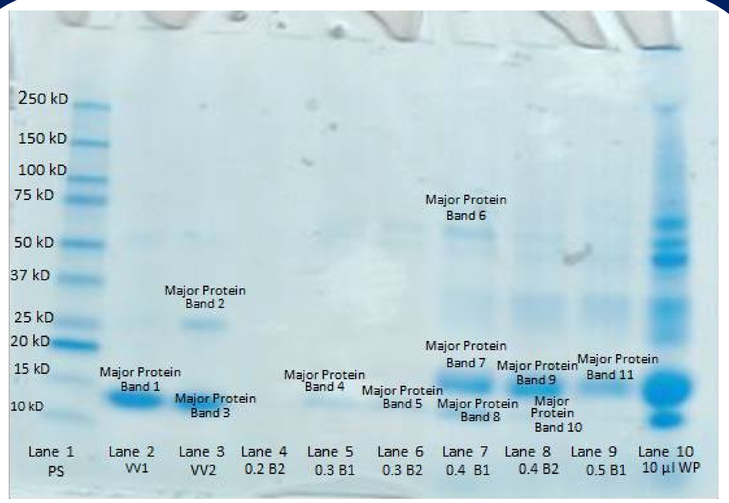
This study tests the veracity of Beyond Raw's claim that their protein powder is a vegetarian protein alternative that provides athletes the freedom to remain vegetarian while able to consume protein. We tested the authenticity of Beyond Raw's claim that their protein powder indeed contains the seven major proteins that compose whey protein (WP).

The cheesemaking process separates WP into a liquid that is an excellent source of high-quality protein. WP extract is a great protein source for resistance-trained athletes due to its good supply of essential amino acids.

We performed several biochemical analyses to identify different WPs present in Beyond Raw. Ion Exchange Chromatography (IEC) separated different proteins based on their charges, whereas the individual components were identified by SDS-PAGE and Western blot.

Whey Protein Composition

- Beta-lactoglobulin (BLG)
- Alpha-lactalbumin (ALA)
- Bovine serum albumin (BSA)
- Lactoperoxidase (LP)
- Immunoglobulins
- Glycomacropeptide
- Lactoferrin (LF)



SDS-PAGE of Beyond Raw Whey IEC fractions prepared at different salt concentrations from Nuvia Q column. Lanes 4-9 contain the buffer with various salt concentrations, which include 0.2 M NaCl, 0.3 M NaCl, 0.4 M NaCl, and 0.5 M NaCl. Lane 10 contained 10 µl Whey protein (WP) and 10 µl 2X LSB.

Fraction Number	Salt Concentrations of Fractions	Absorbance at 595 nm
1	VV1	0.405
2	VV2	0.376
3	0.2 B2	0.068
4	0.3 B1	0.074
5	0.3 B2	0.107
6	0.4 B1	0.215
7	0.4 B2	0.123
8	0.5 B1	0.093

Table 1. Absorbance Values at 595 nm of Beyond Raw Whey IEC Fractions from Nuvia Q Column. The buffer was increased to a high ionic strength, so the bound molecules then eluted in order of their charge.

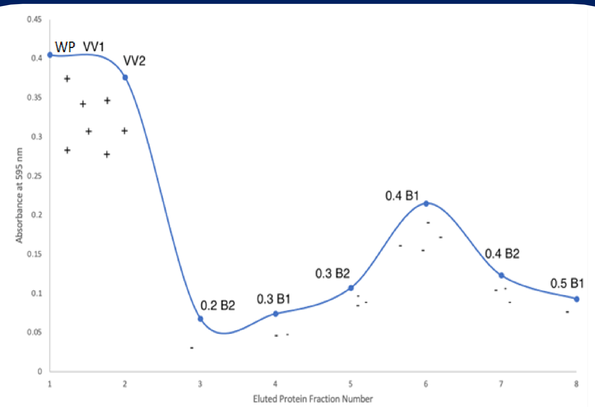


Figure 1. Elution Profile of the Absorbance Values of Beyond Raw Whey IEC Fractions from Nuvia Q Column. The proteins in Whey Protein Isolate (WPI) were separated by anion exchange chromatography in the Nuvia Q column.

Salt Concentrations of the Fractions (M NaCl)	Major Protein Bands	Approximate Protein Size (kD)	Identity of Protein
VV1	1	12	Cytochrome C
VV2	2	26	Unidentified Protein
VV2	3	12	Cytochrome C
0.3 B1	4	14	Alpha-lactalbumin (ALA)
0.3 B2	5	14	Alpha-lactalbumin (ALA)
0.4 B1	6	65	Bovine Serum Albumin (BSA)
0.4 B1	7	18	Beta-lactoglobulin (BLG)
0.4 B1	8	14	Alpha-lactalbumin (ALA)
0.4 B2	9	18	Beta-lactoglobulin (BLG)
0.4 B2	10	14	Alpha-lactalbumin (ALA)
0.5 B1	11	18	Beta-lactoglobulin (BLG)

Table 2. Major protein bands and molecular weights (kD) of SDS-PAGE of Beyond Raw Whey IEC fractions prepared at different salt concentrations from Nuvia Q column.

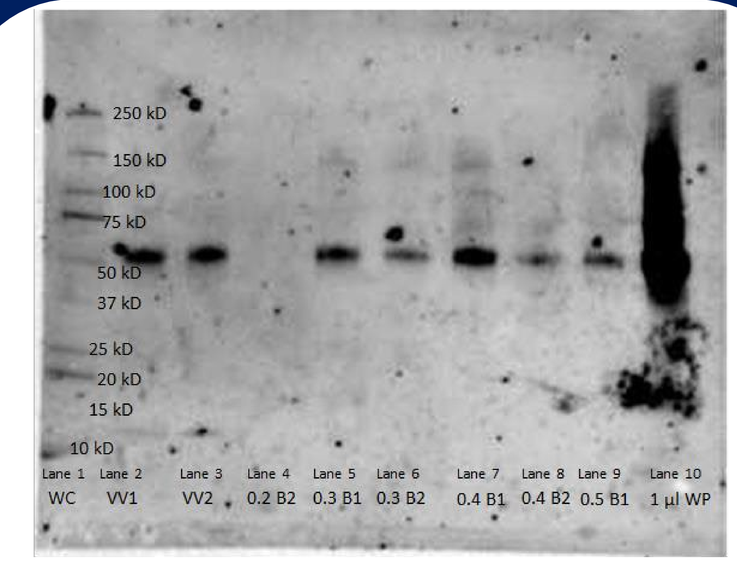


Figure 4. Western Blot of Beyond Raw Whey IEC fractions with different salt concentrations from Nuvia Q column with Lactoferrin (LF) primary antibody.

Results

- The study's overall findings do not confirm Beyond Raw's nutritional claim.
- IEC: Negatively charged proteins stayed bound to the column longer.
- Bradford Assay: Fractions with higher salt conc. had decreasing absorbance values until the 0.3 B2 fraction eluted.
- SDS-PAGE: Certain proteins did not elute from the column in their predicted order.
- LP and LF did not elute in the VV because these proteins are not represented by any visible protein band with a MW of 78 kD.
- The most abundant WPs present in Beyond Raw are ALA, BLG and BSA.
- Western Blot: It cannot be concluded that LF was detected because it is not visible in a band with the correct corresponding size.

Acknowledgements

Dr. Jose – Thesis First Reader

Dean Ross – Monmouth University's Honors School

Monmouth University Department of Chemistry and Physics

Please direct all feedback to: Lyndsey Buren

Monmouth University: s1231681@monmouth.edu