

# OzScientific Laboratory

Gel electrophoresis

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# Gel electrophoresis - Purpose

- To identify and quantify various proteins present in food products, such as milk , cheese, soy and plant proteins



# Gel electrophoresis - basics

- Electrophoresis is the migration of charged molecules in an electric field toward the electrode with the opposite charge
- Electrophoresis is commonly performed by placing a sample in a gel matrix of either polyacrylamide or agarose. The gel matrix acts as a molecular sieve, such that smaller molecules move through it more quickly than larger molecules. The degree of sieving can be controlled by selecting the appropriate gel substance, agarose or polyacrylamide, and by changing the concentration of the gel matrix.

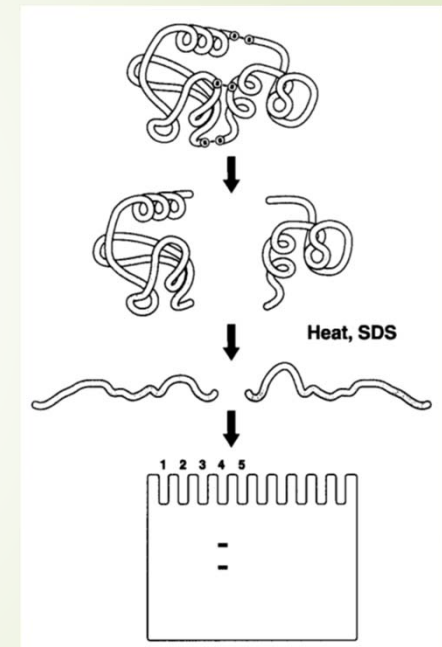


# Native vs SDS-PAGE

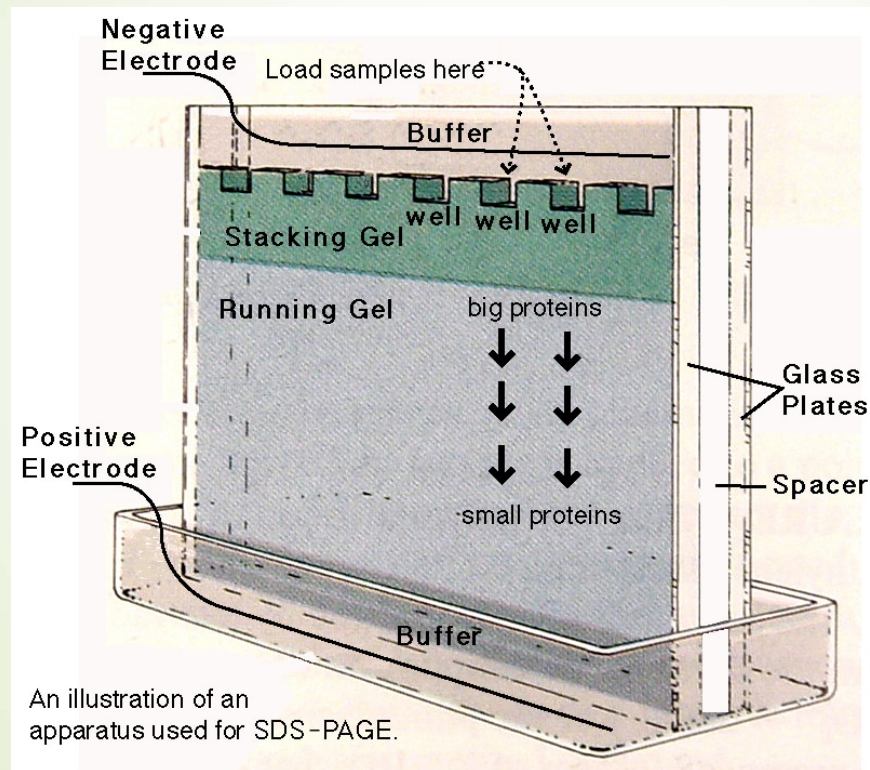
- ▶ One of the predominant uses of polyacrylamide gel electrophoresis is to determine the molecular weight of a protein.
- ▶ Untreated, or native, proteins will migrate in a gel at rates based on both their electrical charges and their masses.
- ▶ If we equalize the charge-to-mass ratios (charge densities) of all protein molecules, mass becomes the only factor determining the migration rate of each protein. This is accomplished by treating the proteins with the ionic detergent SDS, which is present in both the gel running buffer and the sample loading buffer. This technique is called SDS-polyacrylamide gel electrophoresis (SDS-PAGE).

# SDS-PAGE

- ▶ A polyacrylamide gel is positioned in a buffer-filled chamber between two electrodes, treated protein samples are placed in wells at the top of the gel, and the electrodes are connected to a power supply that generates a voltage gradient across the gel. The negatively charged, SDS-coated proteins then move downward through the gel toward the positive electrode

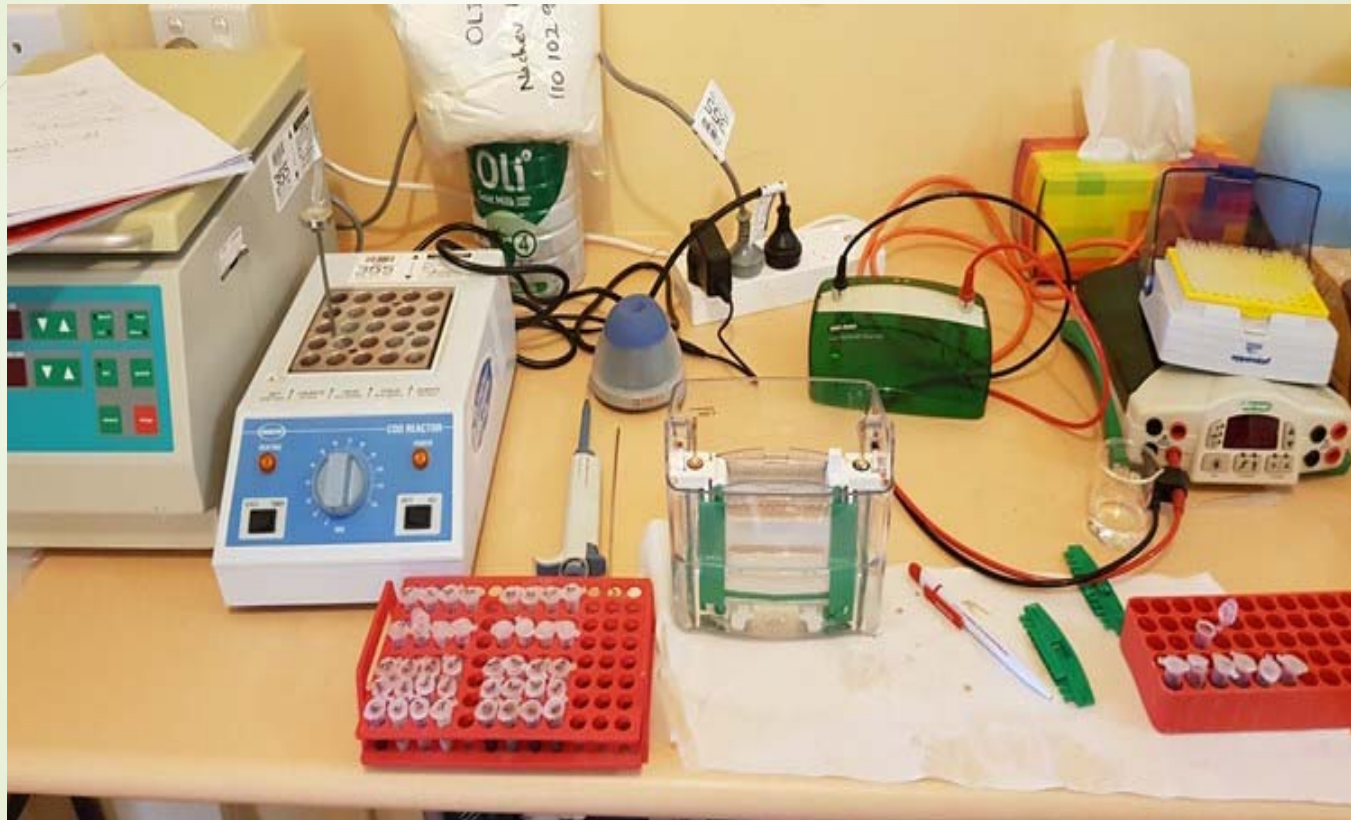


# How does gel electrophoresis work?



<https://www.creative-proteomics.com/services/1d-sds-page-ief.htm>

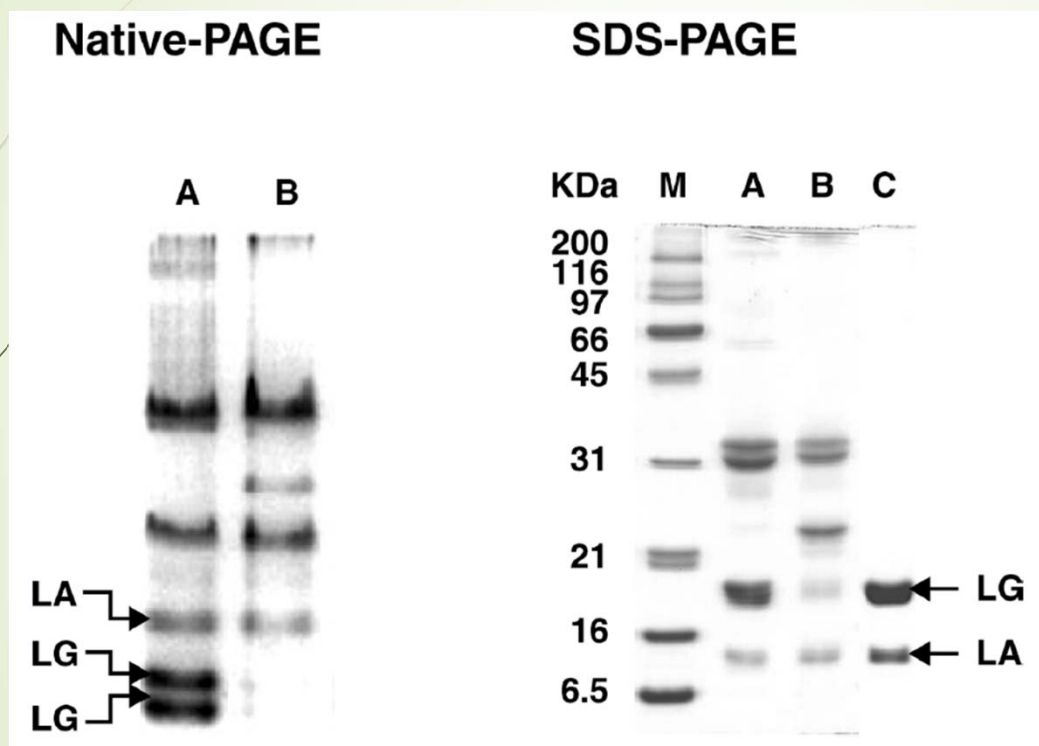
## SDS-PAGE set up at OzScientific



## SDS-PAGE set up at OzScientific



# Milk proteins - Native vs SDS- PAGE



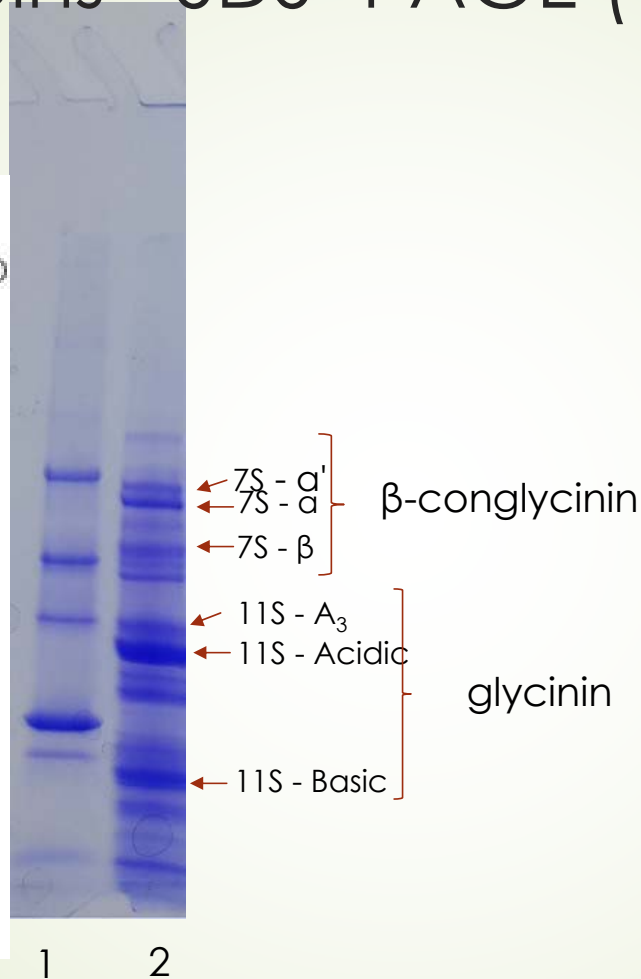
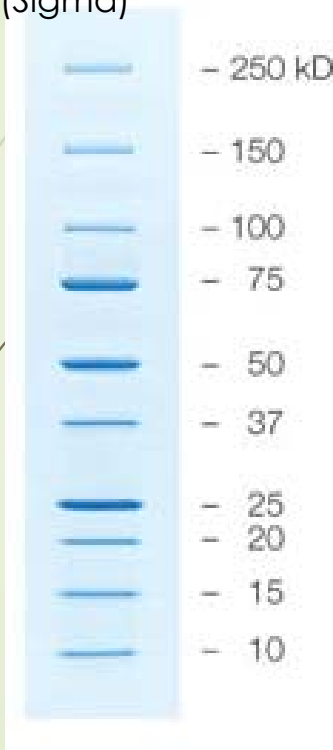
Gel electrophoresis of whey proteins obtained from raw and processed milk.

Left panel: Native-PAGE. Lane A = raw milk; lane B = processed milk.

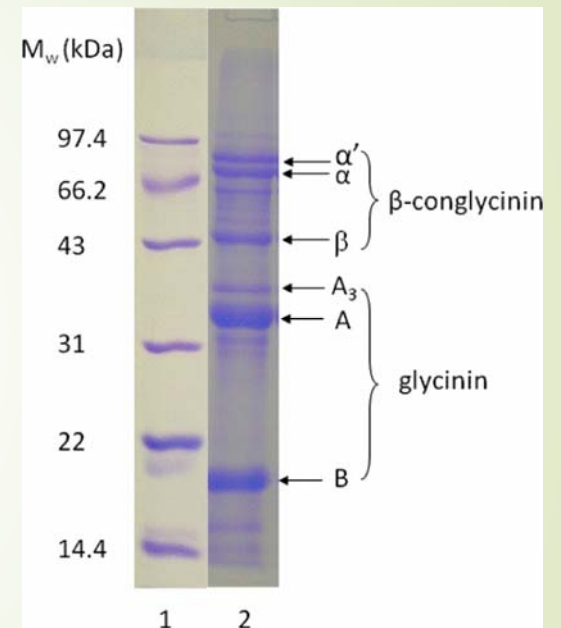
Right panel: SDS-PAGE. Lane A = raw milk; lane B = processed milk; lane C = purified  $\beta$ -lactoglobulin (LG) and  $\alpha$ -lactalbumin (LA) standard

# Soy proteins - SDS- PAGE (OzScientific)

MW Standard  
Guide  
(Sigma)

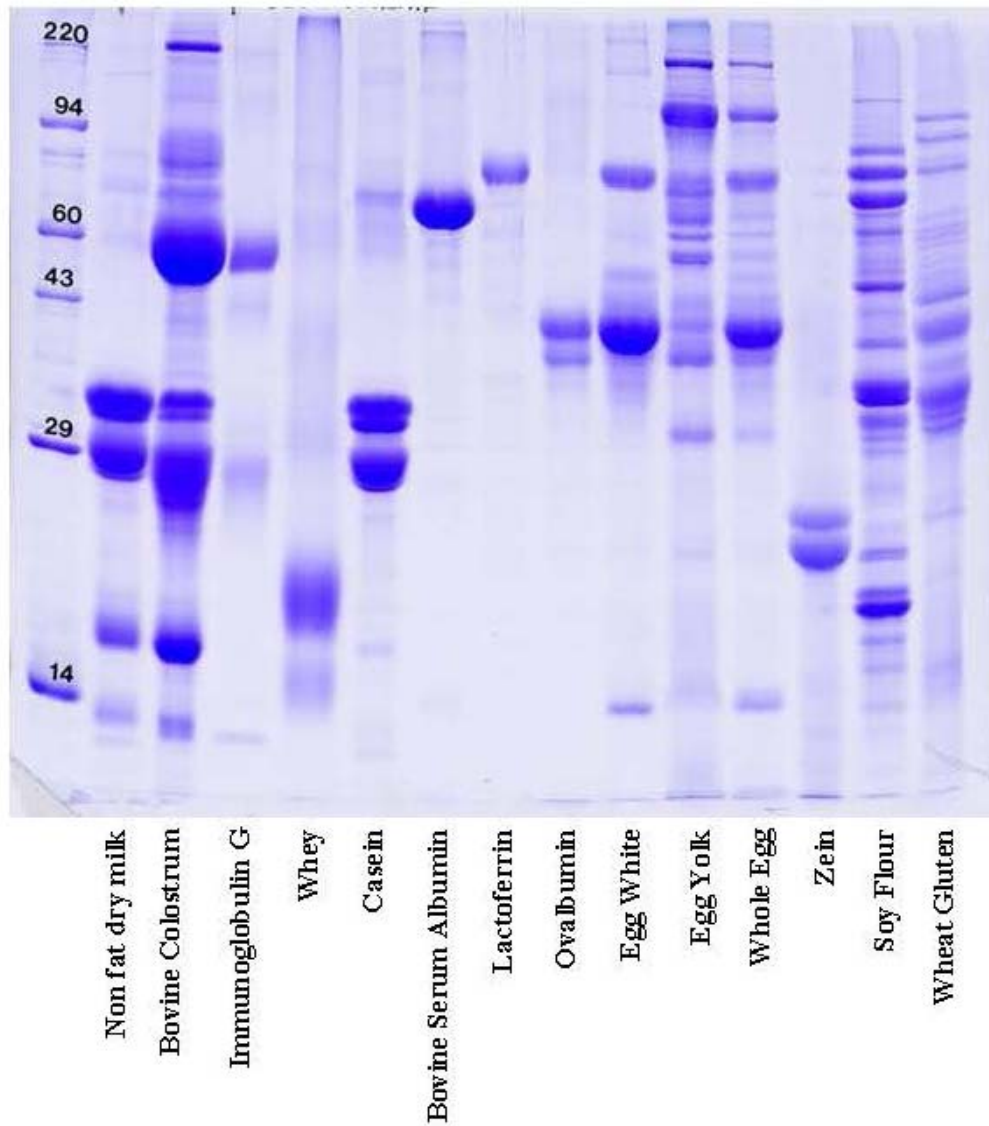


OzScientific samples: 1- MW standard, 2 – Defatted soy flour



<https://www.sciencedirect.com/science/article/pii/S2352340916306436>

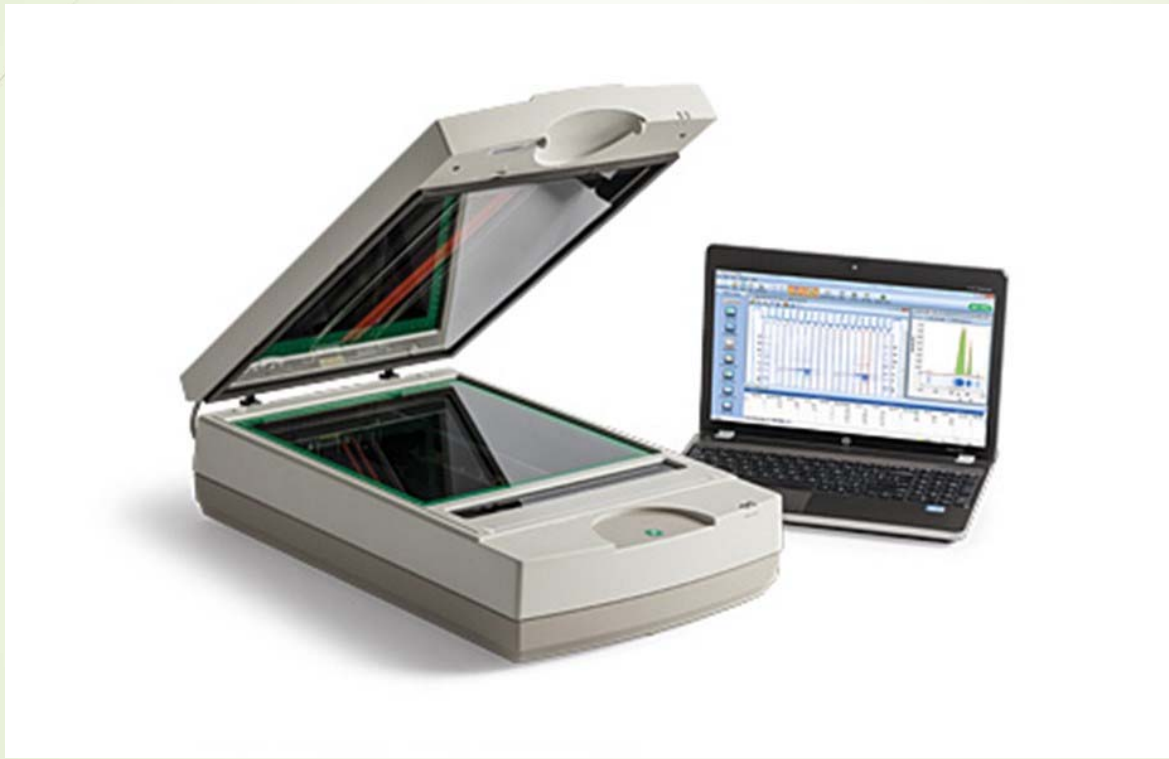
Published Example



## SDS-PAGE of various proteins

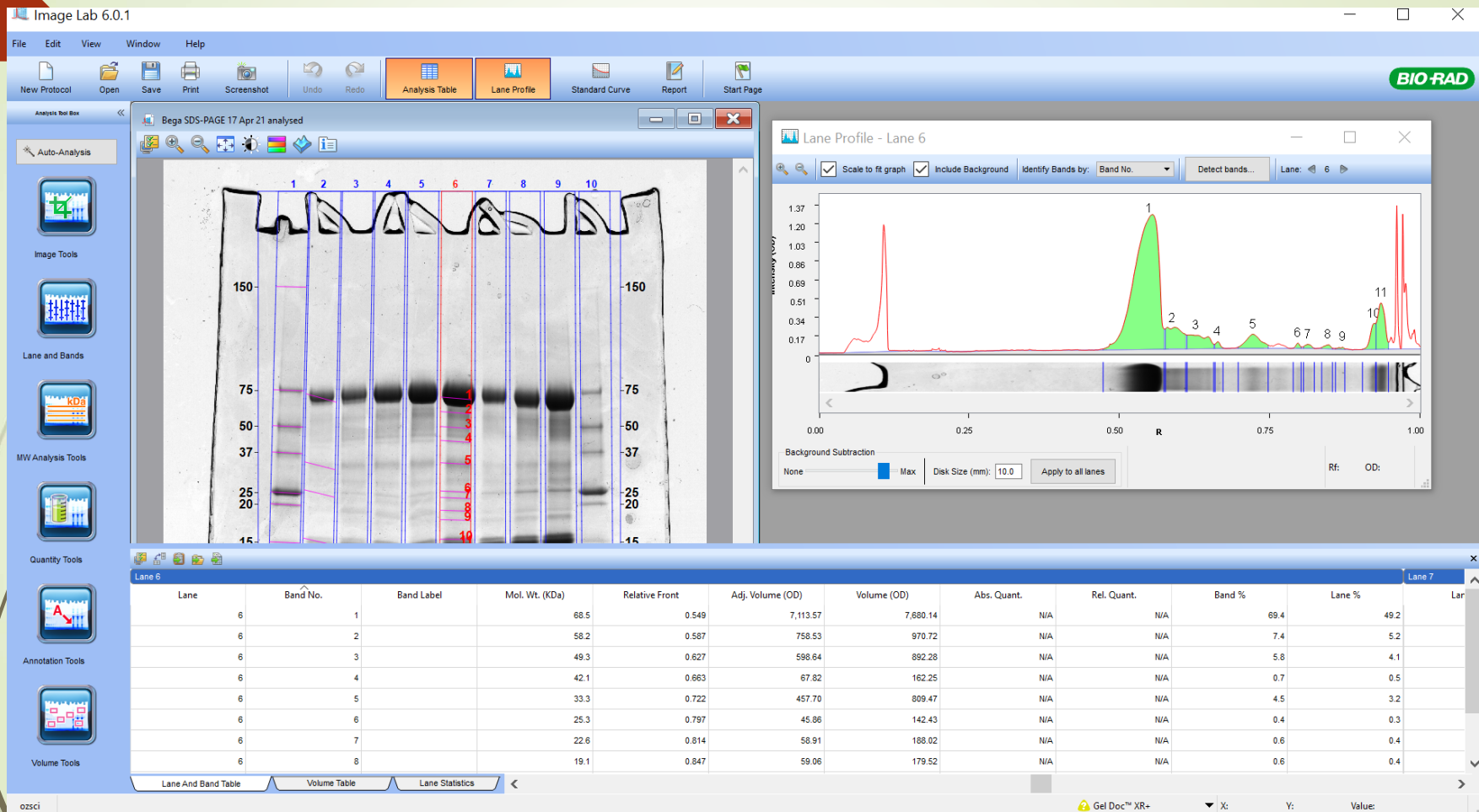
Source: <https://kendricklabs.com/food-nutrition/>

# Gel scanning & analysis at OzScientific



Bio-Rad GS-900 densitometer at OzScientific

# Gel scanning & analysis at OzScientific





Contact us



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