Quality of the United States Soybean Crop: 2023

Seth Naeve and Jesse Christenson
14 November 2023
CRITICAL WEATHER EVENTS
QUALITY OF THE UNITED STATES SOYBEAN CROP: 2023
HISTORICAL PROTEIN AND OIL VARIATION
2023 SURVEY RESULTS
2023 Survey Methods

- In August, sample kits were mailed to 3,886 soybean producers based on soybean production by state.
- By 2 November, 2023, 1,169 samples were returned for analysis.
PROTEIN AND OIL
<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Samples</th>
<th>Protein (13%)</th>
<th>Change from 2022</th>
<th>Oil (13%)</th>
<th>Change from 2022</th>
<th>Seed Weight (g/100 seeds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Average</td>
<td>1,169</td>
<td>33.7</td>
<td></td>
<td>19.6</td>
<td></td>
<td>15.9</td>
</tr>
<tr>
<td>Average of 2023</td>
<td></td>
<td>33.7</td>
<td>-0.2</td>
<td>19.6</td>
<td>0.1</td>
<td>15.8</td>
</tr>
<tr>
<td>Crop†</td>
<td></td>
<td>33.7</td>
<td></td>
<td>19.6</td>
<td></td>
<td>15.8</td>
</tr>
<tr>
<td>US 2013-2022</td>
<td></td>
<td>34.2</td>
<td></td>
<td>19.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

†US average values weighted based on estimated production by state, as estimated by USDA, NASS Crop Production Report (October, 2023)
PHYSICAL CHARACTERISTICS
AMINO ACIDS ARE THE BUILDING BLOCKS OF PROTEINS IN LIVING ORGANISMS. THERE ARE OVER 500 AMINO ACIDS FOUND IN NATURE - HOWEVER, THE HUMAN GENETIC CODE ONLY DIRECTLY ENCODES 20 'ESSENTIAL' AMINO ACIDS WHICH CANNOT BE SYNTHESISED IN THE BODY.

**Chart Key:**
- **ALIPHATIC**
- **AROMATIC**
- **ACIDIC**
- **BASIC**
- **AMINO**
- **AMIDIC**
- **NON-ESSENTIAL**
- **ESSENTIAL**

**Chemical Structure**
- Single letter code
- Three letter code

**NAME**
- ALANINE
- GLYCINE
- ISOLEUCINE
- LEUCINE
- PROLINE
- VALINE
- PHENYLALANINE
- TRYPTOPHAN
- TYROSINE
- ASPARTIC ACID
- GLUTAMIC ACID
- ARGinine
- HISTIDINE
- LYSINE
- SERINE
- THREONINE
- CYSTEINE
- METHIONINE
- ASPARAGINE
- GLUTAMINE

**Note:** This chart only shows those amino acids for which the human genetic code directly codes for. Selenocysteine is often referred to as the 21st amino acid, but is encoded in a special manner. In some cases, distinguishing between asparagine/aspartic acid and glutamine/glutamic acid is difficult. In these cases, the codes asx (B) and glx (Z) are respectively used.
Better measures of the value of soybeans

• Soybean is a complex and variable product/commodity.
• Traditional grading systems do not correlate well with actual value.
• Soybeans & soybean meal have been valued primarily on an indirect measure of protein – ‘crude protein’
• Crude protein is probably not the best measure of a soybean (or a soybean meal’s) value
• The first purchasers who can find hidden value will capture additional profit.
CP (N) is an indirect measure of quality
Western Hemisphere quality and production capacity of soybean protein

Anibal Cerrudo\textsuperscript{1,2*}, Jill Miller-Garvin\textsuperscript{1} and Seth L. Naeve\textsuperscript{1}

\textsuperscript{1}Department of Agronomy and Plant Genetics, University of Minnesota, Saint Paul, MN, United States,
\textsuperscript{2}Ecofisiologia de cultivos, Unidad Integrada Balcarce (INTA-FCA), Balcarce, Argentina
BETTER MEASURES OF QUALITY: SOLUBLE SUGARS
2023 Summary

- A severe and chronic drought affected soybean production across most of the major soybean states in 2023.
- Despite exceedingly challenging production environments, U.S. farmers will still produce a crop that averages 3.3 MT per ha. (~50 bushels per acre).
- Average composition of the crop is very similar to 2022.
- One could consider this an ‘Oil Year.’
- Dryer than normal soybeans will increases both protein and oil yields per ton due to increased ‘as-is’ values.
- Protein is not a good indicator of soybean quality or value.
This work was made possible only through the generous support of the United Soybean Board