AMERICAN SHEA INSTITUTE
CERTIFICATE OF ANALYSIS

Quality Grade
B
Shea Butter

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Methodology: *American Oil Chemist's Society, FDA Pesticide Analytical Manual, Association of Official Analytical Chemists* The sample analyzed and studied here is owned or controlled by the company named above. The parental batch was prepared in 2009, by the traditional method in Tamale Ghana.

Test	Physical Properties	Rating
Color	Yellow	Excellent
Physical Character	Semi-solid cream	Excellent
Spread ability	Soft and smooth	Excellent
Insoluble debris	<1%w/w	Excellent
Moisture Content	0.4% w/w	Excellent
Odor	Characteristic	Excellent
Melting range	31.9– 38.3 C	Excellent
Test	**Chemical Properties Result**	**Rating**
FFA	0.23%	Excellent
Peroxide	7.30 meg/Kg	Poor
Bioactive Nutrients	3.29%	Low
Total sterols	N/A	Poor
Iron	1.20 mg/kg	Fair
Lead	Not detected	Excellent
Mercury	Not detected	Excellent
Cinnamic Acid value	0.90 %	Fair
Protein	N/A	N/A
Rancidity value	9.97	Poor
Est. shelf life	One year	Excellent
Vitamin A	N/A	Poor
Vitamin E	N/A	N/A
Test	**Microbiological Properties**	**Rating**
Mold	None detected	Excellent
Yeast	None detected	Excellent
Coli form Count	None detected	Excellent
Test	**Fatty Acid Profile**	**Rating**
Oleic	45.82 %	Excellent
Stearic	43.33 %	Excellent
Linoleic	5.20%	Excellent
Palmitic	4.88%	Excellent
Vaccenic	0.44%	Excellent
Arachidic	1.24%	Excellent
Eicosenoic	0.25%	Excellent
Alpha Linolenic	0.13%	Excellent
Behenic	0.13%	Excellent
Lignoceric	0.17%	Excellent
Unknown	0.12%	Excellent
C-2 thru C-15 acids	Not detected	Excellent
Adulteration	Not detected	Excellent

Samuel Hunter, PhD, MD. Date
Clinical Director and Chief Laboratory Service **07/31/09**

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Discussion

The information provided below will assist in the understanding of the laboratory results presented in the certificate of analysis above. The analysis explains the lab test results in simpler, easy to understand terms. In addition, we outline recommendations to help maintain and improve the quality of future productions. This information is most valuable for your production team. Your production team can improve the quality of your butter by adopting recommendations provided herein. For further assistance, please contact the American Shea Butter Institute.

MICROBIOLOGICAL ANALYSIS

- Contamination, by Coli form organisms (E.coli, Salmonella, Shigella, etc), is indicative of unsanitary conditions during preparation. Your Shea butter do not contained coli form contaminates.
- Microbial analysis revealed no mold or yeast growth. This is excellent.
- Microbial Contamination can be potentially harmful to the end use; therefore, the personal skin care industry strongly opposes the use of microbial contaminated Shea butter. Any shea butter found to contain microbial Contamination automatically receives a quality Grade of F. Furthermore , such shea butter is not recommended for human use.

II. PHYSICAL ANALYSIS

Physical analysis reveals excellent results for the butter knife test. When your shea butter was maintained at 27 degrees centigrade and examined with a butter knife, the butter was found to be soft smooth and spreads evenly without lumping clumping or crumbling.

Moisture content

Your sample showed moisture content at 0.4%. We recommend the moisture content is kept below 1%, at all times. Moisture content above 1% promotes microbial growth, promotes peroxide formation, and facilitates Triglyceride breakdown and increase free fatty acids.

Product Color:
Your sample color is yellow; this is an acceptable color.

Insoluble debris:
The insoluble debris was less then 1.0 %, this value excellent.

The melting range
The melting range for this butter is between 30-38°C. This melting range is acceptable.

The odor
The odor of your shea butter is characteristic. Characteristic odor associated with natural Shea is excellent.

III. FREE FATTY ACID (FFA)

The Free Fatty Acid (FFA) content of your shea butter is 0.23%. This is excellent. Free fatty acid above 2%, is indicative of destruction and breakdown of important ingredients within the shea butter, especially triglycerides.

III (A). FATTY ACID PROFILE

Your sample Fatty Acid profile is within acceptable limits.
No evidence of adulteration with other vegetable oils identified.
Furthermore, the Oleic acid / Stearic acid ratio was within normal limits. The Palmitic acid/ Oleic acid ratio was within normal limits. To that end, there was no indication for Triglyceride profile; therefore, test not conducted.

IV IRON MERCURY AND LEAD

We test for metal content in shea butter for a number of reasons:

- Metal contaminant of any kind promotes rancidity, and reduces shelf life.
- Heavy metals such as lead and mercury can be potentially harmful to the end user, therefore any shea butter found to contain either lead or mercury or both should never be allowed within the personal care

industry. Any shea butter containing lead or mercury will automatically receive F grading.

When we tested your shea butter, we did not find any lead, or mercury. Iron was detected at 1.2 mg/Kg, this is fair.

The water used in shea butter production is an often over looked as the villain contributing to poor quality shea butter. The number one undesirable agent in water is not, debris, or the various types of contamination, instead the metallic content of the water is the primary agent in the water that contributes to poor quality shea butter deionized water is the best water for production of high quality shea butter. Unfortunately deionized water is not readily available in those communities where shea butter is made. The major sources of water in the communities where shea butter is made are river water and ground water. Obviously, in those communities, ground water is preferred over river water. However, when using ground water, it is always wise and highly recommended to send a sample for metallic analysis. If metallic content is too high, it is wise to identify another source with less metal content or consider a filtration system to reduce metal content.

Below are some of the metals found in ground water. All of them will promote and increase peroxide formation in your shea butter

Aluminum
Calcium
Manganese
Magnesium
Iron
Lead
Copper
Zinc
Cadmium

V. PEROXIDE LEVEL

The peroxide level in your Shea butter was 7.30meg/kg. This value is poor. In the highest quality shea butter, the peroxide value is always below 2meg/kg. Thus, your butter cannot qualify as Certified Premium grade A.

On the day of extraction, the peroxide level is always zero or close to zero. For the peroxide level to rapidly rise from zero on the day of preparation to 7.30meg/kg within a few months after preparation implies some serious post extraction issues that demand attention. Your post extraction management team should routinely audit, review, and re-evaluate the peroxide levels.

Peroxide level serves as an extremely important and inexpensive means of post-extraction quality management.

Recommendations for Post Extraction Management

1. Use only non-contaminating materials such as, plastic, wood or stainless steel during production, packaging, storage and shipping of your Shea product. All equipment, utensils, pots and bowls must be plastic, wood or stainless steel; all others are unacceptable for production of high quality shea butter.

2. Never mix old shea butter with new freshly prepared shea butter. One bad apple will spoil the barrel.

3. The post extraction environment is a major contributor to peroxide value over time. An inappropriate post extraction environment promotes high peroxide values. Once shea butter extraction is completed, make every effort to keep the butter in airtight containers in a dark, cool, dry area. Heat, moisture, light, and air, are the four environmental factors that promotes peroxide formation.

4. Storage and shipping temperature should never exceed 70 F.

VI. SHELF LIFE

Shelf life predictions are based on rancidity value. This butter has a rancidity value of 9.97. This score is poor.

Studies at ASBI have shown that shea butter with a rancidity value greater than 10 has a shelf life of less than 1 year. While shea butter with rancidity value less than 10 has a shelf life greater than 1 year. For shea butter to qualify as **Certified Premium Grade A**, the shelf life must be greater than one year, thus the rancidity value must be less than (10).

VII. BIOACTIVE INGREDIENT

Bioactive nutrients, formerly called the nonsaponifiable fraction, or the healing fraction.
As you already know, the bioactive ingredients in shea butter are extremely important for shea butter use in the personal care industry. The larger the bioactive fraction the more valuable the butter for personal care purposes. In Premium Grade A, Shea Butter of West African origin, the most preferred shea butter for personal care. We would like to see the bioactive fraction of 6% or higher. When we analyzed your butter for its Bioactive Fraction, we found it was 3.29% of the butter. This is low.

The Size of The Bioactive Fraction For Various Oils

Oil	Amount			Rank		
Certified Premium Grade A	6%	---	10 %	High	---	High
Unrefined	2.5%	---	10 %	Low	---	High
Sekaf Ghana Ltd	3.29%	---	N/A	Moderate	---	N/A
Wheat Germ Oil	3.5 %	---	4.7%	Moderate	---	Moderate
Refined Shea Butter	1.0%	---	2.2 %	Very Low	---	Low
Avocado	2.0 %	---	6.0 %	Low	---	High
Argan oil	1.5 %	---	3.5 %	Very Low	---	Moderate
Maize Germ Oil	0.8 %	---	2.9 %	Very Low	---	Moderate
Soy Oil	0.5 %	---	1.5 %	Very Low	---	Low
Sesame Oil	1.0 %	---	1.5 %	Very Low	---	Low
Olive Oil	0.6 %	---	1.5 %	Very Low		Low
Baby Oil	0.00%	---	0.00%	Absent	---	Absent

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The bioactive fraction is small this shea butter. The elevated, peroxide level suggests oxidative sensitive elements in the bioactive fraction have already been lost, thus studies were not performed for vitamin A and E.

VIII. SUMMARY

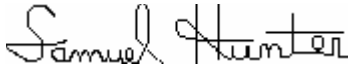
This butter has many excellent parameters (Please refer to your certificate of analysis). Unfortunately, several factors negatively affected the quality grade of this butter. These are as follows:

1. Elevated peroxide level
2. Small bioactive fraction

IX. RECOMMENDATIONS

The quality Grade for this Shea Butter is Grade (B), primarily because of the negative factors mentioned above. . We recommend you look for causes responsible for rapid rise in peroxide and small bioactive fraction.

When this butter is compared to your butter-dated 04.23.09 Most parameters are very close. We are unable to identify profound differences save peroxide and the bioactive fraction.



Samuel Hunter, PhD, MD. 07/31/09

. Clinical Director, and Chief investigator for Laboratory Services Date