Appendices

Appendix A. Analytical Data

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Part 1 – Analysis of unsaponifiable component in shea stearin and shea butter

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Part 3 – Monitoring of contaminants in representative samples of shea stearin: data summary

Part 1 – Analysis of unsaponifiable component

- Shea stearin
- Shea butter (for comparison)

Shea stearin

mylnefield
lipid analysis

James Hutton Limited, Errol Road, Invergowrie, Dundee DD2 5DA, UK
claire.traynor@huttonltd.com www.lipid.co.uk +44 (0) 1382 568876

Designation of Sample -	Shea Stearin
Batch -	164-86-A, 20D32084
Submitted By -	AAK USA
Our Number -	MRSLU/2021/022
Your Order Number -	N/A
Date Posted -	06/01/2021
Date Received -	08/01/2021
Report Ref/Issue Number -	1-1

Sterol	Normalised A%	mg Sterol/100g Sample
Unknown	4.9	23.1
β-Amyrin	10.5	49.9
Butyrospermol	20.9	99.0
α-Amyrin	35.3	167.8
Lupeol	18.7	89.0
Δ7-Stigmastenol	3.5	16.6
24-Methylene Cycloartenol	0.9	4.5
Taraxasterol	4.7	22.3
Psi-Taraxasterol	0.5	2.5
Total Sterol Content (mg/100g Sample)		474.6

Isolated sterol fraction following ATM011A, then prepared TMS derivatives followed by analysis by GC using a HP-5 column (30m x 0.32mm ID x 0.25mm Df) to quantify. Identities confirmed by GC-MS using same column and conditions.

		Signature	
		[redacted]	29/01/2021
		[redacted]	29/01/2021

mylnefield
lipid analysis

James Hutton Limited, Errol Road, Invergowrie, Dundee DD2 5DA, UK
claire.traynor@huttonltd.com www.lipid.co.uk +44 (0) 1382 568876

Designation of Sample -	Shea Stearin
Batch -	164-86-B, 20D32107
Submitted By -	AAK USA
Our Number -	MRSLU/2021/023
Your Order Number -	N/A
Date Posted -	06/01/2021
Date Received -	08/01/2021
Report Ref/Issue Number -	1-1

Sterol	Normalised A%	mg Sterol/100g Sample
Unknown	5.1	26.2
β-Amyrin	10.5	53.7
Butyrospermol	20.3	103.4
α-Amyrin	36.0	183.4
Lupeol	18.7	95.4
Δ7-Stigmastenol	3.2	16.2
24-Methylene Cycloartenol	0.8	4.3
Taraxasterol	4.9	24.9
Psi-Taraxasterol	0.4	1.8
Total Sterol Content (mg/100g Sample)		509.4

Isolated sterol fraction following ATM011A, then prepared TMS derivatives followed by analysis by GC using a HP-5 column (30m x 0.32mm ID x 0.25mm Df) to quantify. Identities confirmed by GC-MS using same column and conditions.

		Signature	
		[redacted]	1 1
		[redacted]	

mylnefield
lipid analysis

James Hutton Limited, Errol Road, Invergowrie, Dundee DD2 5DA, UK
claire.traynor@huttonltd.com www.lipid.co.uk +44 (0) 1382 568876

Designation of Sample -	Shea Stearin
Batch -	164-86-C, 20D32221
Submitted By -	AAK USA
Our Number -	MRSLU/2021/024
Your Order Number -	N/A
Date Posted -	06/01/2021
Date Received -	08/01/2021
Report Ref/Issue Number -	1-1

Sterol	Normalised A%	mg Sterol/100g Sample
Unknown	4.8	24.9
β-Amyrin	10.5	54.6
Butyrospermol	20.5	106.8
α-Amyrin	35.9	186.7
Lupeol	18.9	98.2
Δ7-Stigmastenol	3.4	17.8
24-Methylene Cycloartenol	0.9	4.9
Taraxasterol	4.9	25.7
Psi-Taraxasterol	0.2	1.0
Total Sterol Content (mg/100g Sample)		520.6

Isolated sterol fraction following ATM011A, then prepared TMS derivatives followed by analysis by GC using a HP-5 column (30m x 0.32mm ID x 0.25mm Df) to quantify. Identities confirmed by GC-MS using same column and conditions.

	Name	Signature	Date
Written by	Amy Stewart	[redacted]	29/01/2021
Approved by	Rachel Grossi	[redacted]	29/01/2021.

Shea butter (for comparison)

mylnefield
lipid analysis

James Hutton Limited, Errol Road, Invergowrie, Dundee DD2 5DA, UK
claire.traynor@huttonltd.com www.lipid.co.uk +44 (0) 1382 568876

Designation of Sample -	Lipex 102
Batch -	2129437
Submitted By -	AAK USA
Our Number -	MRSLU/2021/236
Your Order Number -	80840015
Date Posted -	03/05/2021
Date Received -	06/05/2021
Report Ref/Issue Number -	1-1

Sterol	Normalised A%	mg Sterol/100g Sample
Unknown	4.8	168.6
β-Amyrin	11.0	389.7
Butyrospermol	18.0	634.9
α-Amyrin	40.9	1443.0
Lupeol	15.7	554.2
Δ7-Stigmastenol	2.0	70.4
24-Methylene Cycloartenol	0.6	19.9
Taraxasterol	7.1	250.6
Psi-Taraxasterol	0.0	0.0
Total Sterol Content (mg/100g Sample)		3531.2

Isolated sterol fraction following ATM011A, then prepared TMS derivatives followed by analysis by GC using a HP-5 column (30m x 0.32mm ID x 0.25mm Df) to quantify. Identities confirmed by GC-MS using same column and conditions.

	Name	Signature	Date
Written by	Amy Stewart	[redacted]	14/05/2021
Approved by	Rachel Grossi	[redacted]	17/05/2021

CERTIFICATE OF ANALYSIS

To:

Attention: Quality Control

Product: Lipex 102-25Kg Solid
Lot #: 1869488 **Mfg. Date:** 11-Dec-17
Sample #: W180502-140418 **Ship Date:**
Order #: **Container #:**
Contract #:

Customer PO/Release:
Customer Product:

Label Ingredient Statement
USA: INCI:Butyrospermum Parkii (Shea) Butter (US)

Method - Test Parameter	Result	Units	Min	Max
Acid Value (IUPAC 2.201(m)) - Acid Value (mg KOH/g)	0.05	mg KOH/g		0.50
Color 5 1/4" Red (AOCS Cc 13j-97) - Color Red (Lovibond Tintometer)	1.2			2.0
Fatty Acid Composition (IUPAC 2.304) - C18:1	45.6	%	42.0	48.0
Fatty Acid Composition (IUPAC 2.304) - C18:2	6.0	%	5.0	8.0
Fatty Acid Composition (IUPAC 2.304) - C18:0	41.6	%	39.0	44.0
Fatty Acid Composition (IUPAC 2.304) - C16:0	4.5	%	3.0	6.0
Peroxide Value (AOCS Cd 8b-90(m)) - Peroxide Value (meq/kg)	0.1	meq/kg		1.0
Iodine Value (IUPAC 2.205(m)) - Iodine Value (Wijs)	66.4	wijs	60.0	70.0
Unsaponifiable Matter (AOCS Ca 6a-40) - Unsaponifiable matter (%)	6.60	%		

Shelf Life: When stored in unopened original container according to recommended storage conditions, the recommended shelf life is a minimum of two years from the production date but may be extended based on product re-test results.

Recommended Storage: Material should be stored in dark, dry and odour free conditions. Recommended storage temperature is 15-20°C or below.

Note: the reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

Lisa Washakowski

Print Date: 14-May-2018 13:49 CAT#: 19 Document #: CA-12153/1-1

CERTIFICATE OF ANALYSIS

To:

Attention: Quality Control

Product: Lipex 102-25Kg Solid
Lot #: 1895712 **Mfg. Date:** 12-Feb-18
Sample #: W180502-140701 **Ship Date:**
Order #: **Container #:**
Contract #:

Customer PO/Release:
Customer Product:

Label Ingredient Statement
USA: INCI:Butyrospermum Parkii (Shea) Butter (US)

Method - Test Parameter	Result	Units	Min	Max
Acid Value (IUPAC 2.201(m)) - Acid Value (mg KOH/g)	0.19	mg KOH/g		0.50
Color 5 1/4" Red (AOCS Cc 13j-97) - Color Red (Lovibond Tintometer)	1.4			2.0
Fatty Acid Composition (IUPAC 2.304) - C18:1	45.8	%	42.0	48.0
Fatty Acid Composition (IUPAC 2.304) - C18:2	6.0	%	5.0	8.0
Fatty Acid Composition (IUPAC 2.304) - C18:0	42.6	%	39.0	44.0
Fatty Acid Composition (IUPAC 2.304) - C16:0	3.3	%	3.0	6.0
Peroxide Value (AOCS Cd 8b-90(m)) - Peroxide Value (meq/kg)	0.2	meq/kg		1.0
Iodine Value (IUPAC 2.205(m)) - Iodine Value (Wijs)	65.8	wijs	60.0	70.0
Unsaponifiable Matter (AOCS Ca 6a-40) - Unsaponifiable matter (%)	6.20	%		

Shelf Life: When stored in unopened original container according to recommended storage conditions, the recommended shelf life is a minimum of two years from the production date but may be extended based on product re-test results.

Recommended Storage: Material should be stored in dark, dry and odour free conditions. Recommended storage temperature is 15-20°C or below.

Note: the reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

Lisa Washakowski

Print Date: 14-May-2018 13:49 CAT#: 19 Document #: CA-12189/1-3

CERTIFICATE OF ANALYSIS

To:

Attention: Quality Control

Product: Lipex 102-25Kg Solid
Lot #: 1902883 **Mfg. Date:** 27-Feb-18
Sample #: W180529-141627 **Ship Date:**
Order #: **Container #:**
Contract #:

Customer PO/Release:
Customer Product:

Label Ingredient Statement
USA: INCI:Butyrospermum Parkii (Shea) Butter (US)

Method - Test Parameter	Result	Units	Min	Max
Acid Value (IUPAC 2.201(m)) - Acid Value (mg KOH/g)	0.15	mg KOH/g		0.50
Color 5 1/4" Red (AOCS Cc 13j-97) - Color Red (Lovibond Tintometer)	2.0			2.0
Fatty Acid Composition (IUPAC 2.304) - C18:1	46.2	%	42.0	48.0
Fatty Acid Composition (IUPAC 2.304) - C18:2	6.1	%	5.0	8.0
Fatty Acid Composition (IUPAC 2.304) - C18:0	42.0	%	39.0	44.0
Fatty Acid Composition (IUPAC 2.304) - C16:0	3.7	%	3.0	6.0
Peroxide Value (AOCS Cd 8b-90(m)) - Peroxide Value (meq/kg)	0.2	meq/kg		1.0
Iodine Value (IUPAC 2.205(m)) - Iodine Value (Wijs)	67.8	wijs	60.0	70.0
Unsaponifiable Matter (AOCS Ca 6a-40) - Unsaponifiable matter (%)	6.90	%		

Shelf Life: When stored in unopened original container according to recommended storage conditions, the recommended shelf life is a minimum of two years from the production date but may be extended based on product re-test results.

Recommended Storage: Material should be stored in dark, dry and odour free conditions. Recommended storage temperature is 15-20°C or below.

Note: the reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

Lisa Washakowski

Print Date: 30-May-2018 06:03 CAT#: 19 Document #: CA-12154/1-1

CERTIFICATE OF ANALYSIS

To:

Attention: Quality Control

Product: Lipex 102-25Kg Solid
Lot #: 1906520 **Mfg. Date:** 13-Mar-18
Sample #: W180716-100158 **Ship Date:**
Order #: **Container #:**
Contract #:

Customer PO/Release:
Customer Product:

Label Ingredient Statement
USA: INCI:Butyrospermum Parkii (Shea) Butter (US)

Method - Test Parameter	Result	Units	Min	Max
Acid Value (IUPAC 2.201(m)) - Acid Value (mg KOH/g)	0.11	mg KOH/g		0.50
Color 5 1/4" Red (AOCS Cc 13j-97) - Color Red (Lovibond Tintometer)	1.5			2.0
Fatty Acid Composition (IUPAC 2.304) - C18:1	45.6	%	42.0	48.0
Fatty Acid Composition (IUPAC 2.304) - C18:2	6.0	%	5.0	8.0
Fatty Acid Composition (IUPAC 2.304) - C18:0	42.6	%	39.0	44.0
Fatty Acid Composition (IUPAC 2.304) - C16:0	3.7	%	3.0	6.0
Peroxide Value (AOCS Cd 8b-90(m)) - Peroxide Value (meq/kg)	0.1	meq/kg		1.0
Iodine Value (IUPAC 2.205(m)) - Iodine Value (Wijs)	66.5	wijs	60.0	70.0
Unsaponifiable Matter (AOCS Ca 6a-40) - Unsaponifiable matter (%)	6.60	%		

Shelf Life: When stored in unopened original container according to recommended storage conditions, the recommended shelf life is a minimum of two years from the production date but may be extended based on product re-test results.

Recommended Storage: Material should be stored in dark, dry and odour free conditions. Recommended storage temperature is 15-20°C or below.

Note: the reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

Lisa Washakowski

Print Date: 16-Jul-2018 10:16 CAT#: 19 Document #: CA-12480/2-2

Part 2 – Analytical data demonstrating compliance with shea stearin specifications

CERTIFICATE OF ANALYSIS

Product: Shea Stearin
Lot: 20D32084
Mfg. Date: 11/21/2020

Kosher

Label Ingredient Statement

USA: Shea Oil

Canada: Modified Shea Oil

Test Parameter	Result	Units	Specification	Method of Analysis
Color, Lovibond Red	0.7		≤ 5	AOCS Cc 13e-92
Odor and Taste	Neutral		Neutral	Sensory
Peroxide Value	0	meq/kg	≤ 10	AOCS Cd 8-53
Free Fatty Acid as Oleic Acid	0.05	%	≤ 1.0	AOCS Ca 5a-40
Unsaponifiable Matter	1.1	%	≤ 3	DIN EN ISO 3596
Stearic Acid	55.77	%	≥ 50	AOCS Cd 16b-93
Oleic Acid	31.83	%	≤ 40	AOCS Cd 16b-93
Trans Fatty Acid	0.13	%	≤ 1.0	ISO 12966, mod
Iron	< 0.20	mg/kg	≤ 1.5	DIN EN 15763, mod
Copper	< 0.05	mg/kg	≤ 0.1	DIN EN 15763, mod
Lead	< 0.01	mg/kg	≤ 0.1	DIN EN 15763, mod
Arsenic	< 0.02	mg/kg	≤ 0.1	DIN EN 15763, mod

Note: The reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

AAK-USA Quality Assurance & Regulatory

CERTIFICATE OF ANALYSIS

Product: Shea Stearin
Lot: 20D32107
Mfg. Date: 11/26/2020

Kosher

Label Ingredient Statement

USA: Shea Oil

Canada: Modified Shea Oil

Test Parameter	Result	Units	Specification	Method of Analysis
Color, Lovibond Red	0.7		≤ 5	AOCS Cc 13e-92
Odor and Taste	Neutral		Neutral	Sensory
Peroxide Value	0	meq/kg	≤ 10	AOCS Cd 8-53
Free Fatty Acid as Oleic Acid	0.064	%	≤ 1.0	AOCS Ca 5a-40
Unsaponifiable Matter	1.0	%	≤ 3	DIN EN ISO 3596
Stearic Acid	57.11	%	≥ 50	AOCS Cd 16b-93
Oleic Acid	32.18	%	≤ 40	AOCS Cd 16b-93
Trans Fatty Acid	0.11	%	≤ 1.0	ISO 12966, mod
Iron	< 0.20	mg/kg	≤ 1.5	DIN EN 15763, mod
Copper	< 0.05	mg/kg	≤ 0.1	DIN EN 15763, mod
Lead	< 0.01	mg/kg	≤ 0.1	DIN EN 15763, mod
Arsenic	< 0.02	mg/kg	≤ 0.1	DIN EN 15763, mod

Note: The reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

AAK-USA Quality Assurance & Regulatory

CERTIFICATE OF ANALYSIS

Product: Shea Stearin
Lot: 20D32221
Mfg. Date: 12/11/2020

Kosher

Label Ingredient Statement

USA: Shea Oil

Canada: Modified Shea Oil

Test Parameter	Result	Units	Specification	Method of Analysis
Color, Lovibond Red	1.7		≤ 5	AOCS Cc 13e-92
Odor and Taste	Neutral		Neutral	Sensory
Peroxide Value	0	meq/kg	≤ 10	AOCS Cd 8-53
Free Fatty Acid as Oleic Acid	0.047	%	≤ 1.0	AOCS Ca 5a-40
Unsaponifiable Matter	1.1	%	≤ 3	DIN EN ISO 3596
Stearic Acid	57.84	%	≥ 50	AOCS Cd 16b-93
Oleic Acid	31.83	%	≤ 40	AOCS Cd 16b-93
Trans Fatty Acid	0.12	%	≤ 1.0	ISO 12966, mod
Iron	< 0.20	mg/kg	≤ 1.5	DIN EN 15763, mod
Copper	< 0.05	mg/kg	≤ 0.1	DIN EN 15763, mod
Lead	< 0.01	mg/kg	≤ 0.1	DIN EN 15763, mod
Arsenic	< 0.02	mg/kg	≤ 0.1	DIN EN 15763, mod

Note: The reported test results pertain to the sample submitted for analysis.
This certificate is produced electronically and is valid w/o a signature.

AAK-USA Quality Assurance & Regulatory

Part 3 – Monitoring of contaminants in representative samples of shea stearin

Trace Metals	Limit	Unit	20D32084	20D32107	20D32221
Lead	max. 0.10	mg/kg	<0.01	<0.01	<0.01
Cadmium	max. 0.02	mg/kg	<0.005	<0.005	<0.005
Mercury	max. 0.10	mg/kg	<0.01	<0.01	<0.01
Arsenic	max. 0.10	mg/kg	<0.02	<0.02	<0.02
Mycotoxins					
Aflatoxin B1	max. 2	ug/kg	<0.2	<0.2	<0.2
Aflatoxins B1+B2+G1+G2	max. 2	ug/kg	<0.2	<0.2	<0.2
Zearalenone	max. 35	ug/kg	<5.0	<5.0	<5.0
PCBs					
PCB28 + PCB52 + PCB101+PCB138 + PCB153 + PCB180	max. 40	ug/kg	0.6	0.6	0.6
Dioxins/Furans					
Sum of Dioxins and Furans (WHO-(PCDD/F-TEQ)	max. 0.75	pg/g	0.0902	0.0902	0.0902
Sum of dioxins, furans and dioxin like PCBs (WHO PCDD/F-PCB-TWQ)	max. 1.25	pg/g	0.1577	0.1577	0.1577
PAH					
Benzo(a)pyrene	max. 2.0	ug/kg	<0.2	<0.2	<0.2
PAH4: Sum od benzo(a)purene, benz(a)anthracene, benzo(b)fluoranthene and, chrysene	max.10.0	ug/kg	<0.2	<0.2	<0.2
OTHER					
Glycidol, bound in esters	max.1	mg/kg	<0.1	<0.1	0.13
Sum Free MCPD	2.5	mg/kg	0.15	0.13	0.14
Solvents					
Hexane	max. 1	mg/kg	<0.5	<0.5	<0.5
Acetone	max. 1	mg/kg	<0.5	<0.5	<0.5
Pesticides					
Spectrum 400 for fatty materials	(*)		<LOQ	<LOQ	<LOQ

*Individual MRLs are defined for each pesticide.

Appendix B. Quality Assurance Statements

MANAGEMENT SYSTEM CERTIFICATE

Certificate No:
197918-2016-FSMS-NLD-RvA

Initial date:
23 June 2011

Valid:
24 June 2020 - 23 June 2023

This is to certify that the management system of

AAK Denmark A/S

Slipvej 4, 8000 Aarhus, Denmark

has been assessed and determined to comply with the requirements of

FOOD SAFETY SYSTEM CERTIFICATION 22000

Certification scheme for food safety management systems consisting of the following elements: ISO 22000:2018, FSSC 22000 V5 - ISO TS 22002-1:2009 (Food) and additional FSSC 22000 requirements.

This certificate is applicable for the scope of:
Processing of shea kernels for shea oil and shea pellets and processing of vegetable oils for further processing prior to use in food applications. Cat. CIV

The certification system consists of a minimum annual audit of the food safety management systems and a minimum annual verification of the PRP elements and additional requirements as included in the scheme and applicable technical specification for sector PRPs. Validity of this certificate can be verified in the FSSC 22000 database of certified organizations available on www.fssc22000.com.

Date of Certification Decision:
23 June 2020

Place and date:
Barendrecht, 23 June 2020

FSSC 22000

MGMT. SYS.
RvA C 024

For the issuing office:
DNV GL - Business Assurance
Zwolseweg 1, 2994 LB Barendrecht, Netherlands

Erie Koek
Management Representative

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate No:
240644-2017-AQ-NLD-RvA

Initial certification date:
11 April 2008

Valid:
26 October 2020 - 31 May 2023

This is to certify that the management system of

AAK Denmark A/S

Slipvej 4, 8000 Aarhus, Denmark

has been found to conform to the Quality Management System standard:
ISO 9001:2015

This certificate is valid for the following scope:
Processing of oil seed to meal (biomass) and vegetable oil Processing of vegetable oil for: - further processing prior to use in food applications - use in feed, technical products and biofuel.

Place and date:
Barendrecht, 26 October 2020

The RvA is a signatory to the IAF MLA

For the issuing office:
DNV GL - Business Assurance
Zwolseweg 1, 2994 LB, Barendrecht, Netherlands

J.H.C.N. van Gijlswijk
Management Representative

Certificate of Conformity

Signed on behalf of
NSF Certification, LLC

Sarah Krol
Senior Managing Director,
Global Supply Chain

Fields of Audit:

NSF Certification, LLC
789 N. Dixboro Road, Ann Arbor, MI 48105 USA

If you would like to feed back comments on the BRC Global Standard or the audit process directly to the BRC Global Standards, please contact TellUS@brcglobalstandards.com.

To verify certificate validity, please visit www.brcdirectory.com.

ANSI ACCREDITED
ISO/IEC 17065
Product Certification Body
#1181

BRCGS
Certification Body
CERTIFICATED