

International Protein-USA, LLC.



Address: 2516 Cone Drive
Birmingham, Alabama, 35217

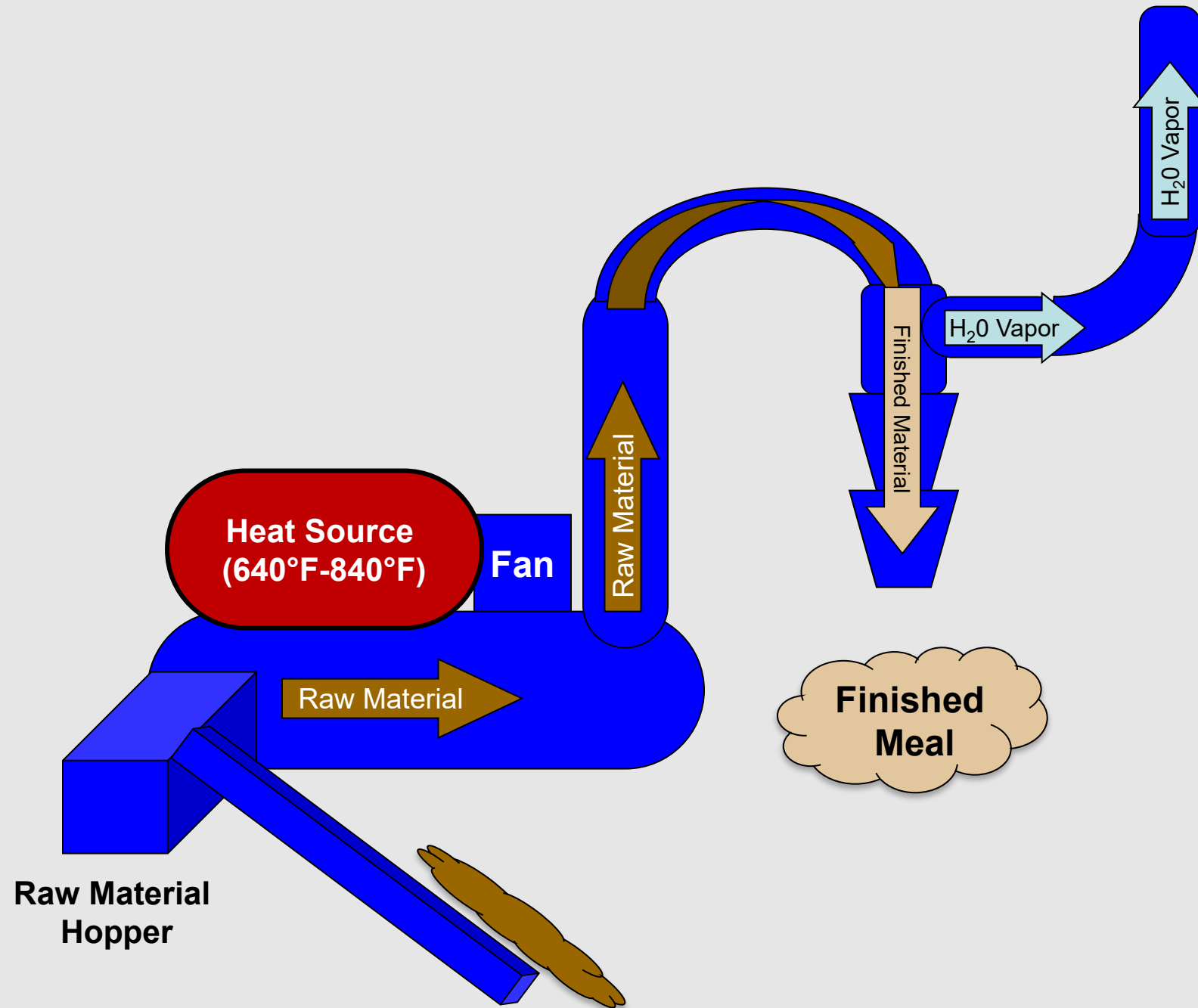
International Protein-USA, LLC.

- **History**

International Protein-USA, LLC. was formed for the purpose of commercially developing the Agricultural Byproduct Value Recovery System™ (ABVRS™) technology.

What is ABVRS™?

- **ABVRS™**
 - Technology that allows agricultural waste to be converted to marketable meals, oils and other value-added products in an environmentally preferential and cost-effective manner
- **ABVRS™ Technological Advantages**
 - Low Noxious Emissions and Low Odors
 - No Waste Water From Processing
 - Allows Plants to be Fully Integrated



Markets for ABVRS™

- Animal Waste from Processing (Offal)
 - Freshwater Fish (Catfish/Carp, etc), Marine Fish, Poultry and Other Meat Products
- WASTEWATER SOLIDS (SPN/DAF Skimmings)
- Hatchery Waste
- Liquid Egg Waste
- Whole Bird Disposal (Spent Hen Programs)
- Avian Influenza Remediation (Carcass Disposal)

Markets for ABVRS™

- Shrimp and Crab Waste
- Whole Fish
 - Marine, Fresh Water
- Others
 - Manure
 - Cattle Manure
 - Chicken Litter

ABVRS™ vs. Traditional Rendering of Offal

(Offal: Inedible Animal Byproducts from Processing)

Conventional Rendering

- Processing Creates Significant Waste Water
- Processing Creates A High Level of Noxious Odor
- Centralized Operations Required

**Slow
Cooking Process**

ABVRS™*

**Environmentally Friendly Process*

- Processing Creates No Waste Water
- Processing Creates A Low-Level of Noxious Odors
- Clean Stack Emissions
- Technology Can be Installed at each processing facility.

**Flash Evaporation
Process**

Wastewater Solids (SPN/DAF Skimmings)

DAF-SPN
Material



Finished Meal (DAF/SPN)

DAF/SPN
Material
mixed with
Soybean



Certificate Analysis



New Jersey Feed Laboratory, Inc.

Mailing Address:

PO Box 06650
Trenton, NJ 08650

Shipping Address:

1686 Fifth Street
Ewing, NJ 08638

CERTIFICATE OF ANALYSIS

I.P-USA
Rick Renninger
2516 Cone Drive
Birmingham, AL 35217

Order ID: 2207490
Received: 7/28/2022
Reported: 8/2/2022
NJFL ID : 0722-3004

Sludge

Moisture	66.76 %
Total Solids	33.24 %
Protein (crude)	8.5 %
.2% Pepsin Digestibility	85.3 %
.02% Pepsin Digestibility	84.4 %
Total Volatile Nitrogen	34.0 mg/100g
Fat (crude)	21.96 %
Ash	0.66 %
Calcium	0.13 %
Phosphorus	0.10 %
Sodium	0.024 %
FFA (% of sample)	19.10 % of sample
FFA (% of fat)	90.30 % of fat
Peroxide Value Initial	3.0 mep/kg of fat

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Order ID: 2207490
Received: 7/28/2022
Reported: 8/8/2022
NJFL ID : 0722-3004

Sludge

Amino Acid	% of sample
Methionine	0.15
Cystine	0.14
Lysine	0.57
Phenylalanine	0.41
Leucine	0.74
Isoleucine	0.32
Threonine	0.39
Valine	0.40
Histidine	0.25
Arginine	0.49
Glycine	0.44
Aspartic Acid	0.80
Serine	0.42
Glutamic Acid	0.99
Proline	0.33
Hydroxyproline	0.03
Alanine	0.55
Tyrosine	0.30
Tryptophan	0.11
Taurine	0.01
TOTAL:	7.84

Respectfully Submitted,

Ian Cartwright, vice pres.

Results are reported on as-received basis unless specified otherwise.

* indicates the marked result was carefully rechecked.

Phone: 609.882.6800 / Fax: 609.882.5530 / Web: www.njfl.com / Email: lab@njfl.com



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Attn: Rick Renninger
2516 Cone Drive
Birmingham, AL 35217

Order ID: 2207490

Sludge - SPN

7/28/2022

August 5, 2022

NJFL No. 0722-3004

Fatty Acid Profile	C# : Dbl. Bonds	Relative Basis %	Sample Basis %
Hexanoic	6:0	0.00	0.000
Caprylic	8:0	0.00	0.000
Capric	10:0	0.06	0.011
Lauric	12:0	0.08	0.015
Myristic	14:0	0.58	0.107
Myristoleic	14:1	0.10	0.019
Pentadecanoic	15:0	0.07	0.013
Palmitic	16:0	24.77	4.552
Palmitoleic	16:1	5.12	0.942
Hexadecadienoic	16:2	0.00	0.000
Hexadecatrenoic	16:3	0.00	0.000
Hexadecatetraenoic	16:4	0.00	0.000
Heptadecanoic	17:0	0.15	0.028
Heptadecenoic	17:1	0.00	0.000
Stearic	18:0	6.69	1.228
Oleic	18:1ω9	35.85	6.587
Oleic	18:1ω7	1.69	0.310
Linoleic	18:2ω6	21.72	3.991
Linoleic	18:2ω4	0.00	0.000
Linolenic	18:3ω6	0.16	0.030
Linolenic	18:3ω3	0.71	0.131
Octadecatetraenoic	18:4ω3	0.00	0.000
Arachidic	20:0	0.16	0.030
Eicosanoic	20:1ω11	0.08	0.015
Eicosanoic	20:1ω9	0.27	0.049
Eicosanoic	20:1ω7	0.00	0.000
Eicosadienoic	20:2ω6	0.12	0.021
Eicosatrienoic	20:3ω6	0.16	0.030
Eicosatrienoic	20:3ω3	0.00	0.000
Arachidonic	20:4ω6	0.42	0.077
Arachidonic	20:4ω3	0.00	0.000
Eicosapentaenoic (EPA)	20:5ω3	0.00	0.000
Behenic	22:0	0.06	0.011
Erucic	22:1ω11	0.00	0.000
Erucic	22:1ω9	0.00	0.000
Unicosapentaenoic	21:5ω3	0.00	0.000
Docosadienoic	22:2ω3	0.00	0.000
Docosatetraenoic	22:4ω6	0.09	0.017
Docosapentaenoic	22:5ω6	0.00	0.000
Docosapentaenoic	22:5ω3	0.00	0.000
Docosahexaenoic (DHA)	22:6ω3	0.00	0.000
Lignoceric	24:0	0.31	0.058
Nervonic	24:1	0.00	0.000
Other	n/a	0.56	0.103
		100.00	18.374
Total % ω3		0.71	0.131
Total % ω6		22.68	4.167

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CERTIFICATE OF ANALYSIS

Order ID: 2306218
Received: 6/12/2023
Reported: 6/14/2023

I.P-USA
Rick Renninger
2516 Cone Drive
Birmingham, AL 35217

NJFL ID :
0623-1135

2 to 1 Mix of Soybean Meal and SPN A

Moisture	8.46 %
Protein (crude)	46.0 %
.2% Pepsin Digestibility	93.3 %
Fat (crude)	8.31 %
Ash	5.87 %
Ethoxyquin	19.0 ppm
Peroxide Value 20 hr AOM	0.4 mep/kg of fat

0623-1136

2 to 1 Mix of Soybean Meal and SPN B

Moisture	5.47 %
Protein (crude)	47.1 %
.2% Pepsin Digestibility	94.2 %
Fat (crude)	8.64 %
Ash	5.79 %
Ethoxyquin	30.0 ppm
Peroxide Value 20 hr AOM	0.1 mep/kg of fat

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CERTIFICATE OF ANALYSIS

I.P-USA
Rick Renninger
2516 Cone Drive
Birmingham, AL 35217

Order ID: 2305062
Received: 5/3/2023
Reported: 5/5/2023

<u>Raw SPN 2A 5/1/23</u>		<u>2 to 1 Treated Processed SPN/Soy Meal Not Treated 3B 5/1/23</u>	
NJFL ID : 0523-0410		NJFL ID : 0523-0413	
Peroxide Value Initial	0.8 mep/kg of fat	Peroxide Value Initial	0.1 mep/kg of fat
Peroxide Value 4hr AOM	30.0 mep/kg of fat	Peroxide Value 4hr AOM	0.1 mep/kg of fat
Peroxide Value 20 hr AOM	40.0 mep/kg of fat	Peroxide Value 20 hr AOM	0.1 mep/kg of fat
<u>Treated Raw SPN (Santoquin) 2B 5/1/23</u>			
NJFL ID : 0523-0411			
Peroxide Value Initial	0.1 mep/kg of fat		
Peroxide Value 4hr AOM	0.1 mep/kg of fat		
Peroxide Value 20 hr AOM	0.1 mep/kg of fat		
<u>2 to 1 Treated Processed SPN/Soy Meal 3A 5/1/23</u>			
NJFL ID : 0523-0412			
Peroxide Value Initial	0.1 mep/kg of fat		
Peroxide Value 4hr AOM	0.1 mep/kg of fat		
Peroxide Value 20 hr AOM	0.1 mep/kg of fat		

ABVRS Sludge Processing Energy Costs

Electrical Cost - SPN Plant

Connected HP	900
VFD efficiency 65%	585
HP to KW required	436.41
Run Hours Per Week	80
Run hours times KWH	34,913
Cost Per KWH	\$ 0.095
Weekly electrical cost	\$ 3,316.72

Fuel Cost

Pounds of sludge per week	650,000	
Pounds of Soybean meal per week	1,300,000	Based on 2-1 mix
Pounds of moisture from sludge	455,000	
Pounds of moisture from soybean meal	91,000	
Total Moisture Evaporated	546,000	To achieve < 5% final moisture
BTUs required per pound of moisture	1500	
Total BTUs required	819,000,000	
Natural Gas cost per 1,000,000 Btu	\$ 7.00	
Total Fuel Cost	\$ 5,733.00	

Electrical Cost per week \$ 3,316.72

Natural Gas Cost \$ 5,733.00

Total Energy Cost per week \$ 9,049.72

Annual Energy Cost \$ 470,585.23

	Lbs in	Value	\$ in		Lbs in	Value	\$ in
SBM	1,300,000	0.248	\$ 322,400	Cost Redu	29,000,000	0.00173	\$ 50,170
Sludge	650,000	-0.025	\$ (16,250)	Sludge	650,000	0.025	\$ 16,250
Total cost in			\$ 306,150	Savings			\$ 66,420
Cost to convert			\$ 9,050	Extra Tons	52	\$ 496.00	\$ 25,792
Variable cost to operate			\$ 10,000				
Trucking			\$ 13,125	Cost to convert			\$ 9,050
				Variable cost to operate			\$ 10,000
Total Cost			\$ 338,325	Trucking			\$ 13,125
Lbs of new material			1,404,000	Total Savings			\$ 60,037
Cost per lb			0.24				
Cost per ton			\$ 481.94				
Feed Cost BE			\$ 138.06				
			702				
Savings per week			96,915				

ABVRS Sludge Processing Value Added

SPN Plant

Value of Sludge Processed

Sludge Processed	650000
Added Protein, fat, from sludge	195000

Tons of added volume to Soybean meal	97.5
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Soybean meal value	\$	496.00
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Added Value to Soy bean meal Per week	\$	48,360.00
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Value added Annually	\$	2,514,720.00
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Disposal Cost Offset

Sludge Hauler #1	\$	350.00	\$	3,500.00
Tipping fee	\$	250.00	\$	2,500.00
Sludge Hauler #2	\$	1,500.00	\$	6,000.00

Total disposal Savings per week	\$	12,000.00
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Annual disposal savings	\$	624,000.00
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Total of added value and cost reduction annually	\$	3,138,720.00
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ABVRS Sludge Processing Cost and Payback at Plant

Building		Trucking per week				
10000 sqft building	\$ 1,500,000.00	Loads of soybean meal to the plant	30	\$ 175.00	\$ 5,250.00	
Utilities, gas, water, drains	\$ 250,000.00	Loads of processed sludge / soybean meal	45	\$ 175.00	\$ 7,875.00	
Electrical service	\$ 120,000.00					
	\$ 1,870,000.00					\$ 13,125.00
Equipment		Trucking per year				\$ 682,500.00
ABVRS equipment	\$ 3,000,000.00	Labor Per week				
New Bins for soybean meal at plant with live unloading, foundation included	\$ 585,000.00	Dayshift	2	\$ 55.00	40 \$ 4,400.00	
Unloading pit at plant	\$ 250,000.00	Off shift	2	\$ 55.00	40 \$ 4,400.00	
New drags needed at plant	\$ 250,000.00					
						\$ 8,800.00
New Bin at feed mill with live unloading, foundation included	\$ 585,000.00					
New unloading Pit at feed mill	\$ 250,000.00					
New drags needed at feed mill	\$ 250,000.00					
		Labor per year				\$ 457,600.00
Electrical Instalation	\$ 300,000.00					
	\$ 5,470,000.00					
Contingency	\$ 367,000.00					
Total	\$ 7,707,000.00					

ABVRS Sludge Processing Cost and Payback at Plant

SUMMARY- Based on Customer Evaluation

Trucking cost	\$	13,125.00
Labor	\$	8,800.00
Utility Cost	\$	9,049.72
M&R	\$	1,000
Cost per week		31,975
Extra tons	\$	25,792.00
Value Added		50,170
Disposal Savings	\$	12,000
Weekly Net Savings		55,987

PayBack

Capital Cost	\$	7,707,000.00
Savings Per Week	\$	55,987.28
Weeks Payback		138
Years Payback		2.6

ABVRS Sludge Processing Cost and Payback at Feedmill

Building

10000 sqft building	\$	1,500,000.00
Utilities, gas, water, drains	\$	250,000.00
Electrical service	\$	120,000.00
	\$	1,870,000.00

Equipment

ABVRS equipment	\$	3,000,000.00
New Bin at feed mill with live unloading, foundation included	\$	585,000.00
New unloading Pit at feed mill	\$	250,000.00
New drags needed at feed mill	\$	250,000.00
Electrical Instalation	\$	300,000.00
	\$	4,385,000.00
Contingency	\$	312,750.00

Total **\$ 6,567,750.00**

Trucking per week located at plant

Loads of soybean meal to the plant	15	\$ 175.00	\$	2,625.00
			\$	2,625.00

Trucking per year

\$ 136,500.00

Labor Per week

Dayshift	2	\$ 55.00	40	\$	4,400.00
Off shift	2	\$ 55.00	40	\$	4,400.00
				\$	8,800.00

Labor per year

\$ 457,600.00

ABVRS Sludge Processing Cost and Payback at Feedmill

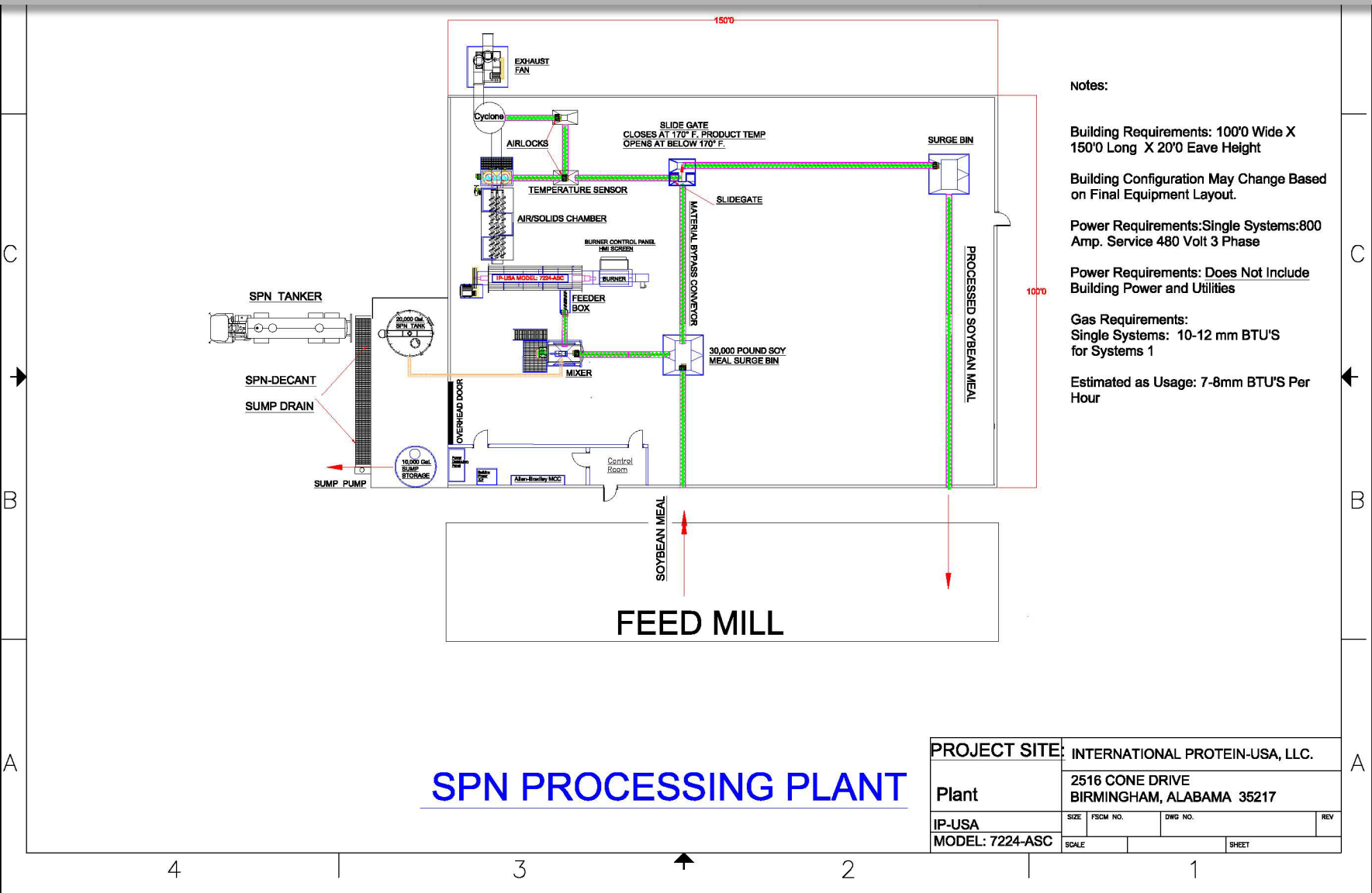
SUMMARY- Based on Customer Evaluation

Trucking cost	\$	2,625.00
Labor	\$	8,800.00
Utility Cost	\$	9,049.72
M&R	\$	1,000
Cost per week		21,475
Extra tons	\$	25,792.00
Value Added		50,170
Disposal Savings	\$	12,000
Weekly Net Savings		66,487

PayBack

Capital Cost	\$	6,567,750.00
Savings Per Week	\$	66,487.28
Weeks Payback		99
Years Payback		1.9

SPN Processing Plant



Notes:

Building Requirements: 100'0 Wide X 150'0 Long X 20'0 Eave Height

Building Configuration May Change Based on Final Equipment Layout.

Power Requirements: Single Systems: 800 Amp. Service 480 Volt 3 Phase

Power Requirements: Does Not Include Building Power and Utilities

Gas Requirements: Single Systems: 10-12 mm BTU'S for Systems 1

Estimated as Usage: 7-8mm BTU'S Per Hour

SPN PROCESSING PLANT

PROJECT SITE:		INTERNATIONAL PROTEIN-USA, LLC.			
Plant		2516 CONE DRIVE BIRMINGHAM, ALABAMA 35217			
IP-USA	SIZE	FSCM NO.	DWG NO.	REV	
MODEL: 7224-ASC	SCALE			SHEET	

United States Patent

(12) **United States Patent**
Mosley et al.

(10) **Patent No.:** **US 7,984,865 B2**
(45) **Date of Patent:** **Jul. 26, 2011**

(54) **APPARATUS AND METHOD OF
PROCESSING RAW MATERIALS**

(75) Inventors: **Ken Mosley**, Trussville, AL (US);
Kenneth T. Nickerson, Hueytown, AL
(US); **Rick Renninger**, Hoover, AL (US)

(73) Assignee: **Auburn University**, Auburn, AL (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/889,251**

(22) Filed: **Sep. 23, 2010**

(65) **Prior Publication Data**
US 2011/0011963 A1 Jan. 20, 2011

Related U.S. Application Data
(62) Division of application No. 11/517,759, filed on Sep.
8, 2006, now Pat. No. 7,823,811.
(60) Provisional application No. 60/715,408, filed on Sep.
9, 2005.

(51) **Int. Cl.**
B02C 23/08 (2006.01)
(52) **U.S. Cl.** **241/79.1; 241/97; 241/101.8**
(58) **Field of Classification Search** **241/21,**
241/22, 25, 19, 23, 24.11, 101.8, 79.1, 80,
241/97

See application file for complete search history.

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* cited by examiner

Primary Examiner — Bena Miller

(74) *Attorney, Agent, or Firm* — Haverstock & Owens LLP

(57) **ABSTRACT**

A method and apparatus for processing animal byproduct materials is disclosed. In some embodiments, the apparatus includes a grinder for grinding the byproduct materials; a mixer for mixing the ground byproduct materials with an oil absorbing material and a backmix material; and a dryer for drying the mixed materials. In some embodiments, the apparatus also includes a cyclone for separating an air stream from the dried materials. The dried materials are transported to one or more presses for pressing the dried materials, thereby reducing oil content. The one or more presses includes a first opening for delivering pressed oil to a centrifuge and a second opening for sending the pressed materials to a screener. A portion of the screened material is sent back to the mixer (and/or the grinder) and the balance of the screened material are sent to storage as a finished product.

16 Claims, 3 Drawing Sheets

United States Patent

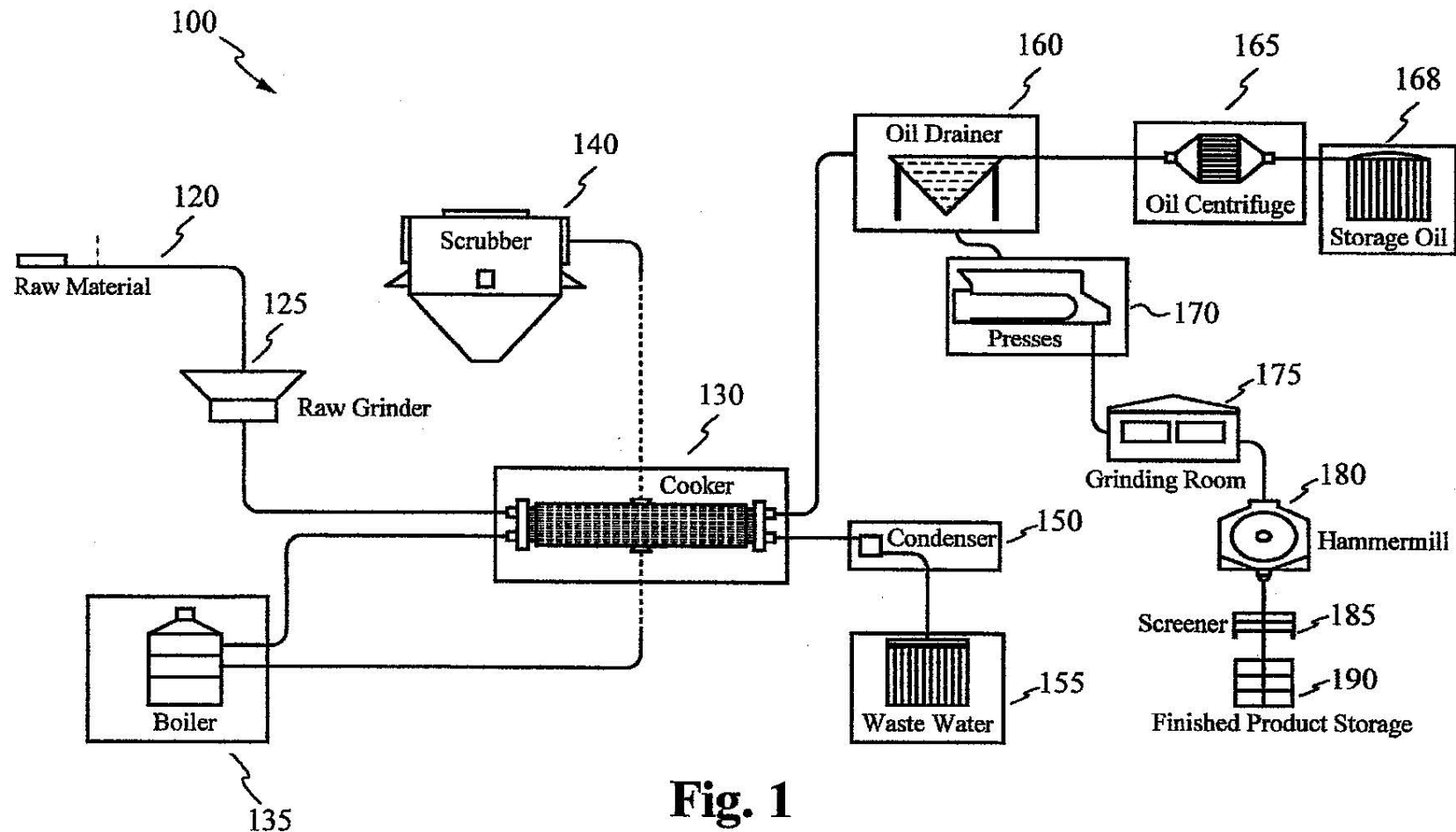
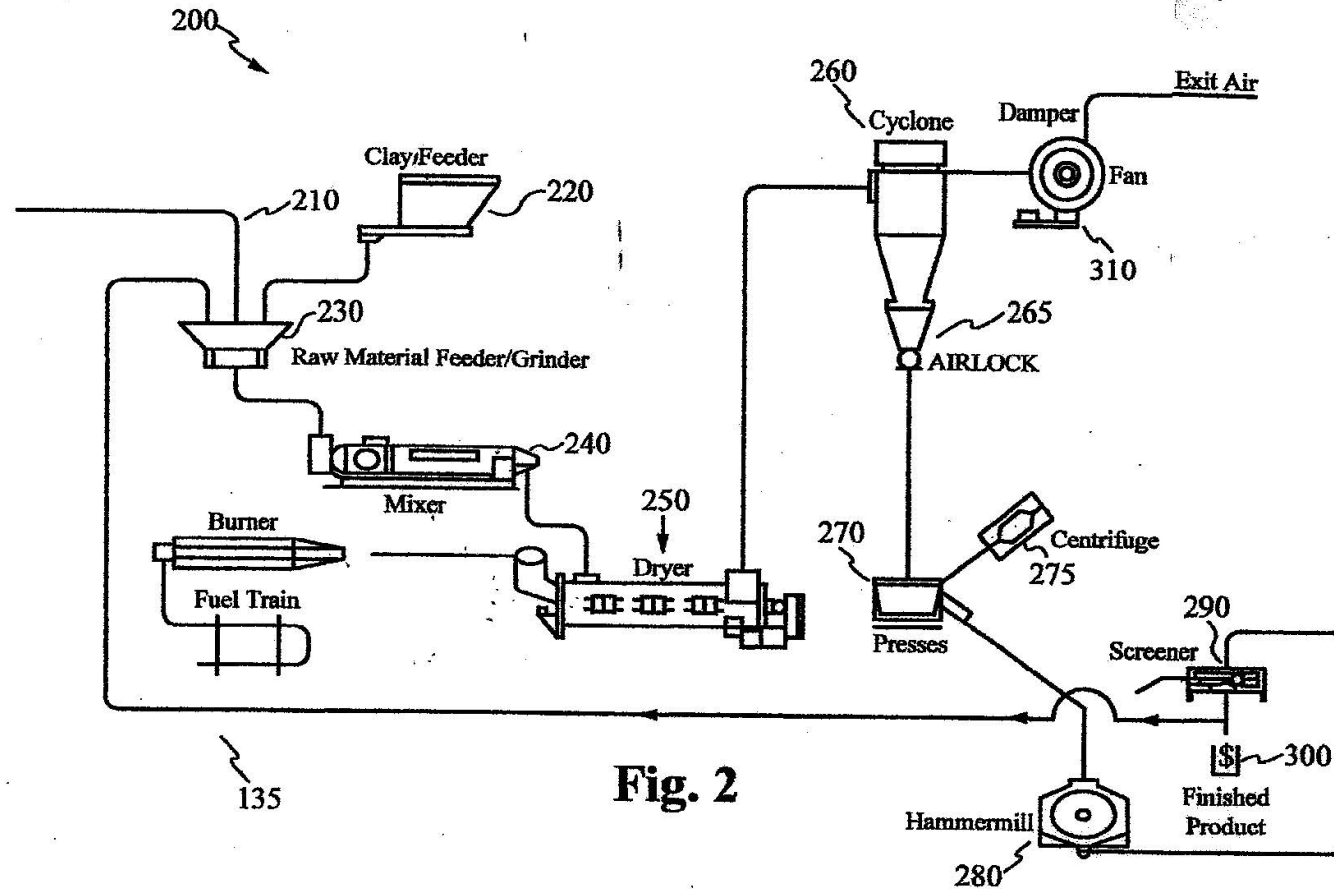
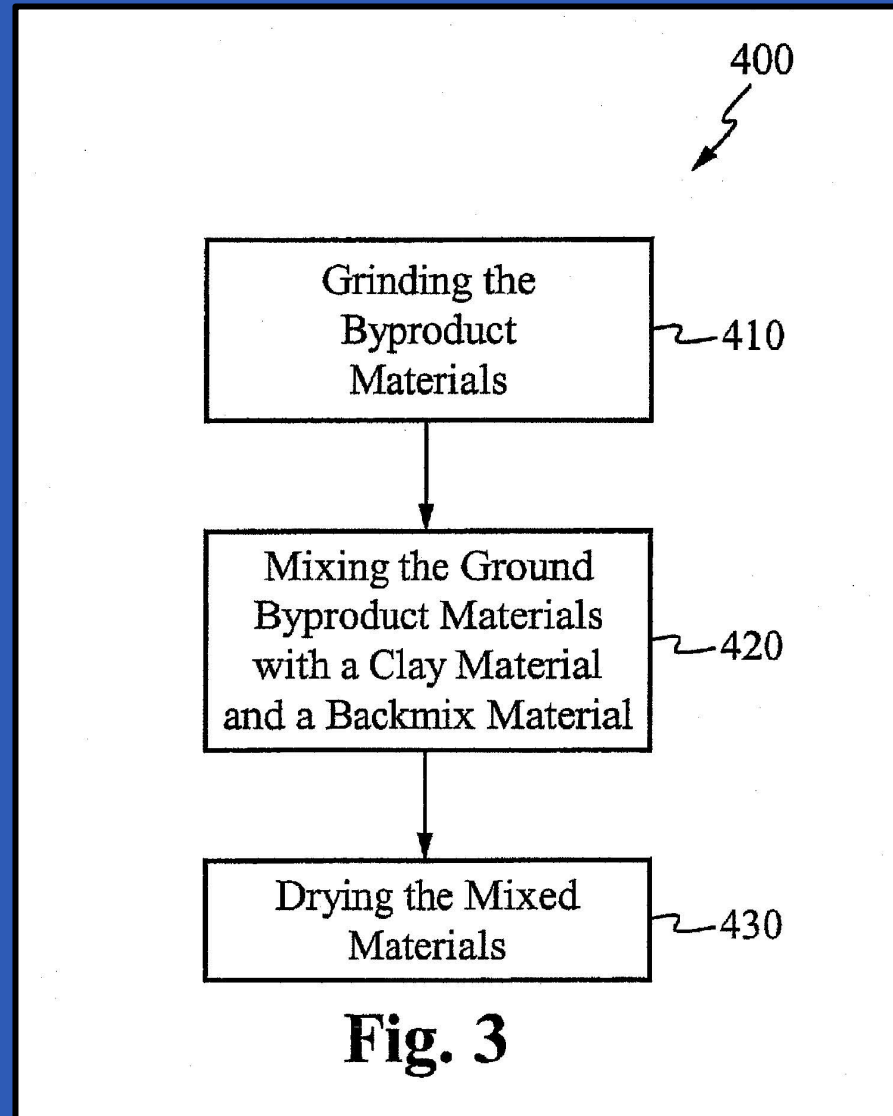


Fig. 1

United States Patent

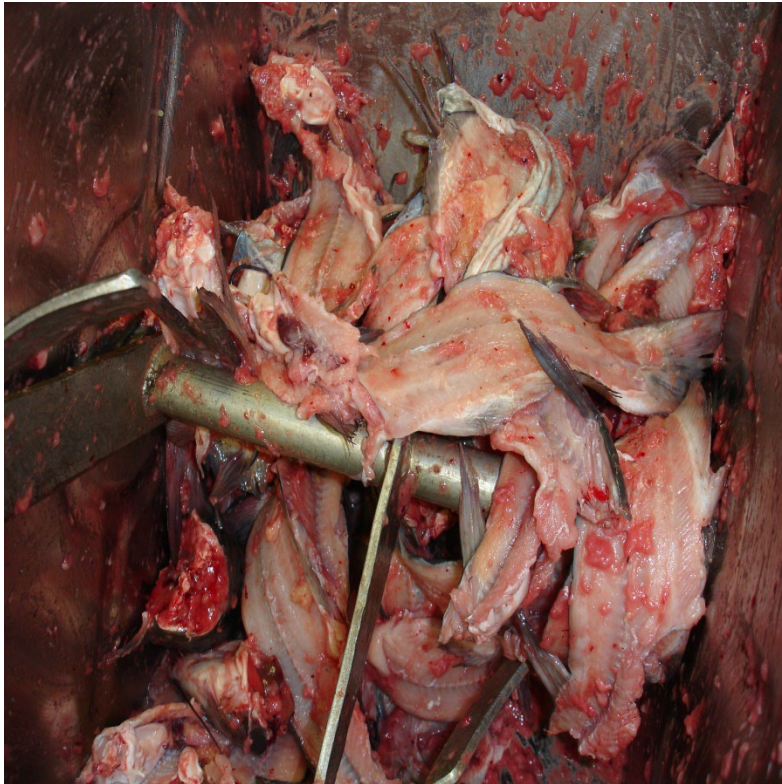


United States Patent



Catfish Offal

Raw Catfish Offal



ABVRS™ Produced
Catfish Meal



ABVRS™ Catfish Meal Analysis

Analysis	Un-pressed	Pressed
Moisture	10.88 %	9.25 %
Fat	13.74 %	9.87 %
Fiber	0.62%	0.72 %
Ash	30.53 %	26.40 %
Calcium	9.60 %	7.37 %
Phosphorus	4.88 %	3.83 %
Sodium	0.48 %	0.55 %
Crude Protein	42.3 %	52.1 %
Pepsin Indigestible Protein	4.5 %	7.0 %
Pepsin Digestible Protein	37.8 %	45.1%
Digestible Crude Protein	89.39 %	85.56 %

Source: New Jersey Feed Lab, Inc.

Asian Carp

Whole Asian Carp



ABVRS™ Produced
Carp Meal



ABVRS™ Carp Meal Analysis

Analysis	Un-pressed	Pressed
Moisture	5.38 %	2.79 %
Fat	14.02 %	6.34 %
Fiber	0.65%	1.03 %
Ash	22.52 %	27.22 %
Crude Protein	56.6 %	60.8 %
Pepsin Indigestible Protein	7.0 %	6.2 %
Pepsin Digestible Protein	49.6 %	54.6%
Digestible Crude Protein	87.63 %	89.80 %

Illinois River Carp
August 2007

Source: New Jersey Feed Lab, Inc.

Hatchery Waste

Raw Hatchery
Waste



ABVRS™ Produced
Hatchery Waste Meal



ABVRS™ Hatchery Waste Analysis

Analysis	Raw (avg)	Finished (avg)
Moisture	51.70 %	4.63 %
Fat	6.85 %	10.90 %
Fiber	0.92 %	0.49 %
Ash	28.64 %	61.14 %
Calcium	8.40 %	23.80 %
Phosphorus	0.19 %	0.40 %
Sodium	0.11 %	0.28 %
Crude Protein	13.98 %	24.65 %
Pepsin Indigestible Protein	2.28 %	4.73 %
Pepsin Digestible Protein	11.70 %	19.93 %
Digestible Crude Protein	83.49 %	80.74 %

Source: New Jersey Feed Lab, Inc.

Avian Influenza Remediation

Advantages of Incorporating ABVRS™ into Avian Influenza Remediation Project Plans

- Unit is mobile and can be brought to the site thereby eliminating the need to move the birds from the quarantine area
- Whole birds can be processed, including feathers
- Infected litter can be processed with the whole birds
- ABVRS™ high heat kills the virus resulting in a clean meal
- Resulting meal can be used as a fuel source to fuel the ABVRS burner or for other uses

Avian Influenza Remediation

Advantages of Incorporating ABVRS™ into Avian Influenza Remediation Project Plans

- As a result of ABVRS™ processing, the total biomass of original birds and litter can be reduced by 60% resulting in a clean meal that can be disposed safely in a landfill
- If the meal is used as a fuel source, the biomass can be reduced to 10% sterile ash which can be safely disposed in a landfill
- ABVRS™ equipment is mobile and can be moved from outbreak site to outbreak site as needed

Shrimp & Crab

Current Method

- Require Transportation
- Landfill Disposal
- Processing Creates Odor & Waste Water
- Processing Creates Low Value Fertilizer Product

- Disposal Costs = \$120.00/T
- Fertilizer Value = \$75.00/T

ABVRS™*

- No Transportation Required
- Can Be Processed into Value Added Shrimp/Crab Meal
- Process Creates No Waste Water
- Eliminates Landfill Use
- Meal Value
 - Animal Food Supplement
 - Industrial Raw Material

- Disposal Costs = \$0.00
- Shrimp/Crab Meal Value = \$300.00/T
(Less cost of equipment amortization and operating costs)

Pathogen Analysis

- Listeria – Negative
- Salmonella – Negative
- E. coli – <3 MPN/g
- Water Activity – 0.24

Source: Hatchery Waste Meal - NP Analytical Laboratories

VOC Testing-AU, 2/19/08

- Whole birds mixed with litter
- Ion Science PhoCheck 5000 Photo Ionization Detector (PID)
- VOC concentrations were consistently under 0.2ppm, but high as 10.3ppm
- VOC calculation based on 10.3ppm, 365 days/yr, 24 hrs/day = 14.06 tons/yr
- Well below the 100 tons/yr limit for Title V permitting

Stick water is eliminated with the AVBRS™ process, which results in a discharge of clean steam.

