

IT'S TIME TO DO MORE WITH LESS:

SQUEEZING MORE OUT OF CONVENTIONAL, ALTERNATIVE AND NOVEL PROTEIN INGREDIENTS FOR SUSTAINABLE ANIMAL NUTRITION

a Commercial Animal Nutrition Practitioner's Point of View

"Настало время получить больше при меньших затратах: как извлечь дополнительную пользу из обычных, альтернативных и новых белковых ингредиентов при устойчивом и прибыльном кормлении животных" (Точка зрения животноводапрактика).

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ASTI 4th SUMMIT:

"PROTEIN: YESTERDAY, TODAY, TOMORROW"

VDNH - Pavilion 75, Moscow, Russian Federation

October 11th, 2018

IT'S TIME TO DO MORE WITH LESS-Настало время получить больше при меньших затратах

Squeezing More out of Conventional, Alternative and Novel Protein Ingredients for Sustainable Animal Nutrition a Commercial Animal Nutrition Practitioner's Point of View

PRECISSION ANIMAL NUTRITION
FOR PROFITABLE AND SUSTAINABLE
ANIMAL PRODUCTION

CONVENTIONAL AND ALTERNATIVE PROTEIN INGREDIENTS FOR ANIMAL NUTRITION

OILSEEDS AND SOYBEAN FOR PROFITABLE AND SUSTAINABLE ANIMAL PROTEIN PRODUCTION

NOVEL PROTEIN INGREDIENTS:
PROMISES AND CHALLENGES FROM
NEXT GENERATION RAW MATERIALS

SEARCHING FOR PROTEIN:
A LONG STANDING PROBLEM
IN THE EU

KEY
TAKE AWAY
MESSAGE



PRECISSION ANIMAL NUTRITION FOR PROFITABLE AND SUSTAINABLE ANIMAL PRODUCTION \

ЦИФРОВЫЕ ТЕХНОЛОГИИ КОРМЛЕНИЯ ЖИВОТНЫХ ДЛЯПРИБЫЛЬНОГО И УСТОЙЧИВОГО ЖИВОТНОВОДСТВА

In modern animal production, nutrition is of primary importance to optimize animal performance, profitability and sustainability.

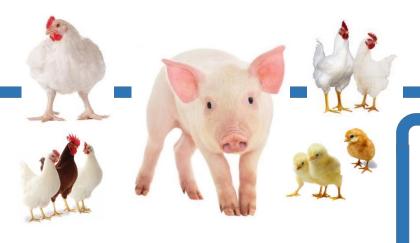
QUANTIFYING BIOLOGY AND HEALTH STATUS OF ANIMALS Determine & Adjust Requirements

FFFD	POULTRY	SWINE
FEED INTAKE	Start - Grow – Finisher Breeders / Layers	Start - Grow -Finisher Lactation
	POULTRY	SWINE
PRODUCTIVITY LEVEL	ADG in Broilers Carcass Quality /Fat dps	ADG in Fattening Lean Growth Rates
	 REARING PERIOD BW at 16 to 20 weeks Flock BW Uniformity 	■ GESTATION Sow Body Condition
	■ LAYING PERIOD Eggs Mass and per HH Feed / 100 chicks Bodyweight at 175 days	 LACTATION 21 day litter weight Weaning to Estrus (lactation weight loss)
	HATCHERYEarly hatchHatchability	NURSERYADGMortality / Morbidity

IMPROVE NON-NUTRITIONAL MANAGEMENT

- All in All Out Flocks
- Biosecurity Program
- Separate sex feeding

NUTRITIONIST'S TASKS IN DEVELOPING AND MANAGING PRECISION FEEDING PROGRAMS for profitable and sustainable poultry and swine production



MONITOR MANAGEMENT, PERFORMANCE AND COSTS

Compare to expected goals

MINIMIZE FEED WASTAGE

- Feeding Management
- Feeder Design & Adjustment

SELECT NUTRIENT SOURCES Ingredients & Feeding Program Options

- Ingredient Quality / Variability
- Nutrient Digestibility/ Bioavailability/FA
- Anti-Nutritional Factors
- Maximum Inclusion Rates / FA
- Phase Feeding / Diet Nutrient Density
- Price

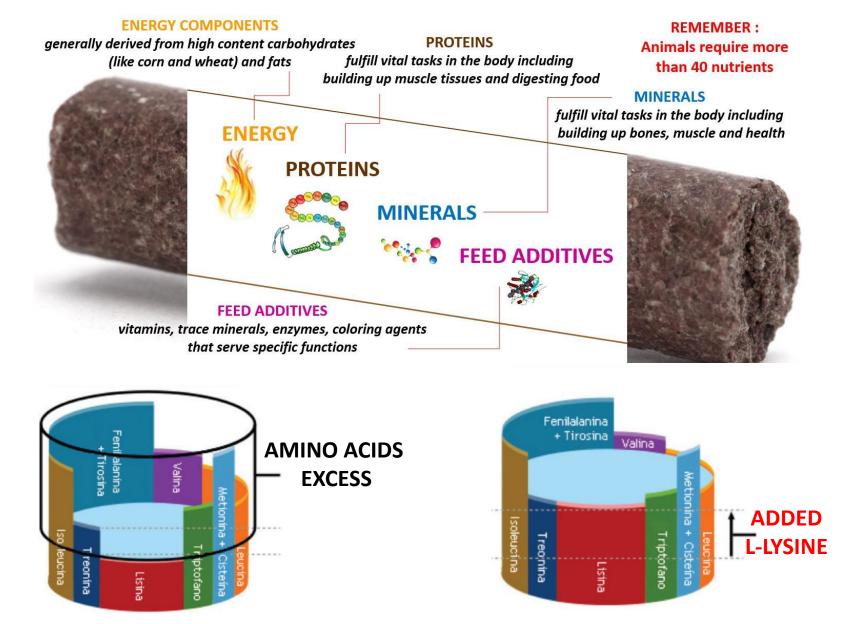
DESIGN FEEDING PROGRAMS FORMULATE FEEDS

MAXIMIZE QUALITY CONTROL IN FEED MANUFACTURING

- Ingredient QC Program
- Particle size
- Batching & Mixing
- Pelleting
- Accuracy of Nutrients in Final Diet
- Storage
- Delivery

U.S. SOY for a growing world

DESIGNING AND MANUFACTURING IDEAL FEED COMPOUNDS FOR PRECISSON NUTRITION\ СОСТАВЛЕНИЕ И производство ИДЕАЛЬНЫХ КОМПОНЕНТОВ КОРМА для точного ПИТАНИЯ

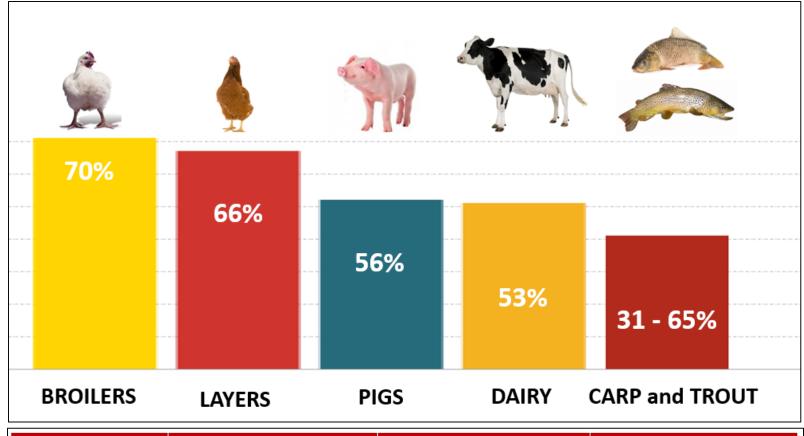


UNBALANCED DIET

BALANCED DIET

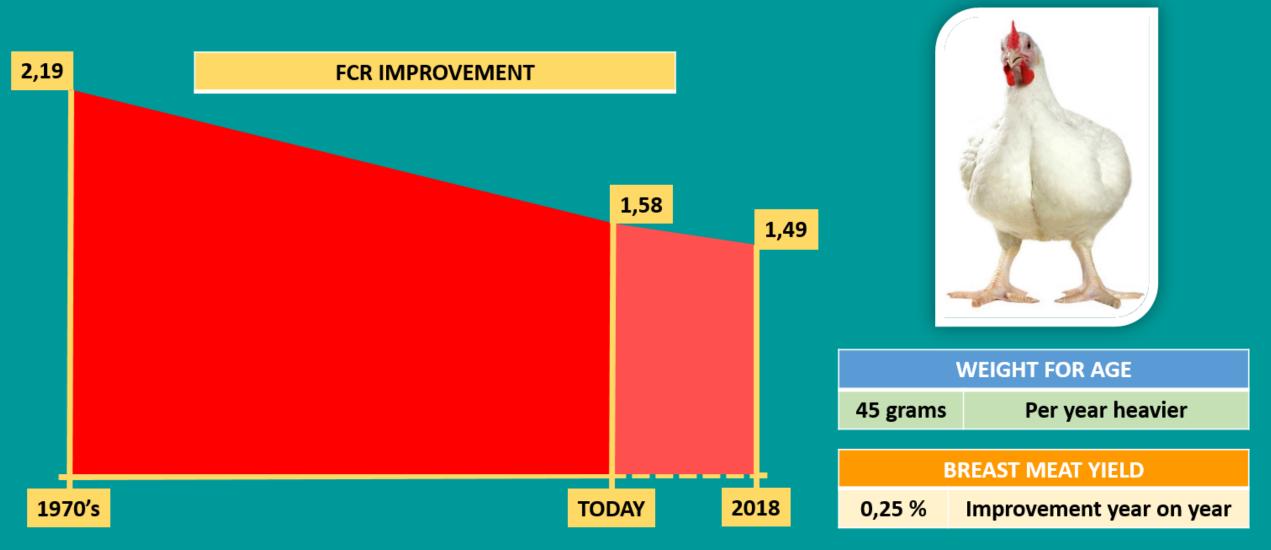
ECONOMICAL IMPORTANCE OF FEED FOR PROFITABLE AND SUSTAINABLE ANIMAL **PRODUCTION**

ЭКОНОМИЧЕСКАЯ ЗНАЧИМОСТЬ КОРМОВ ДЛЯ ПРИБЫЛЬНОГО И УСТОЙЧИВОГО ЖИВОТНОВОДСТВА



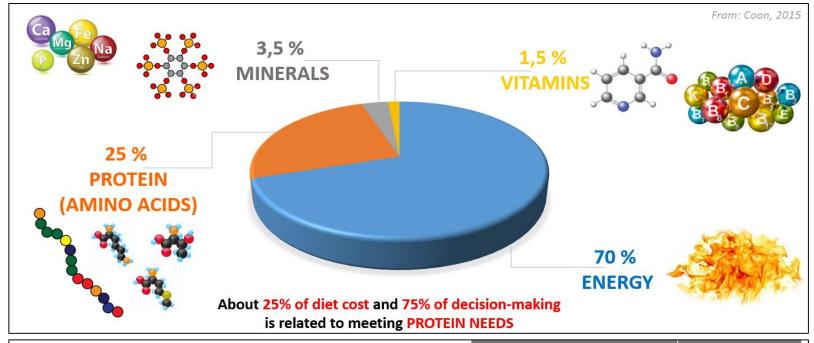
COSTS	RAW MATERIALS	MANUFACTURING	TRANSPORTATION
SHARE (%)	93,0 – 95,0	2,2 – 4,4	2,0 – 3,0
			Proinserga Proinserga → → → → → → → → → → → → → → → → → → →

50 YEARS OF CONSTANT PERFORMANCES EVOLUTION FOR MODERN BROILER

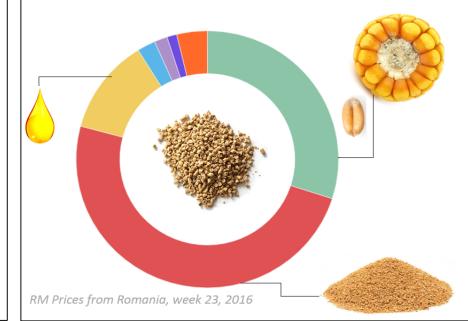


Source: AVIAGEN, 2015

CORN: SOY DIETS FOR BROILERS



INGREDIENTS COST
SHARE IN BROILER
FEEDS
4 PHASES FEEDING
PROGRAM / CORN: SOY
DIETS EXAMPLE



INGREDIENTS	Cost Share %
Corn and Wheat	29,717
SBM	48,784
Vegetal Oil	11,908
DL-Methionine	2,247
МСР	1,589
Premix <u>Vit</u> -Min*	2,031
Other Ingredients and Feed Additives	3,72

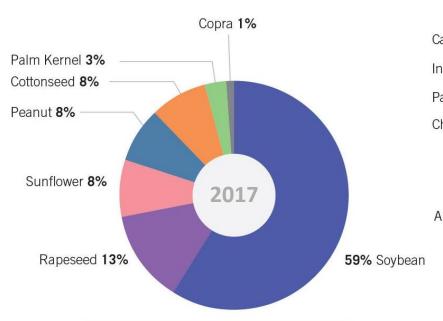
* Coccidiostat included

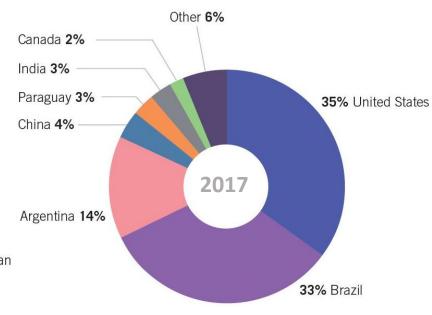


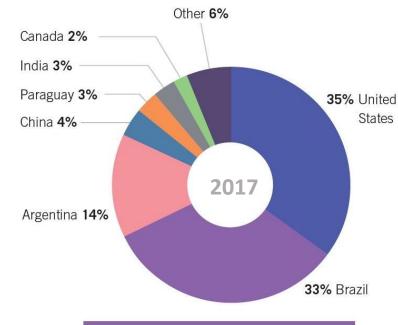
OILSEEDS AND PROTEIN MEALS PRODUCTION FOR PROFITABLE AND SUSTAINABLE ANIMAL PROTEIN PRODUCTION\ ПРОИЗВОДСТВО МАСЛИЧНЫХ СЕМЯН И БЕЛКОВЫХ ШРОТОВ ДЛЯ ПРИБЫЛЬНОГО И УСТОЙЧИВОГО ПРОИЗВОДСТВА ЖИВОТНОГО БЕЛКА

Competition between direct consumption of plant production and the feeding of livestock is key to global food availability

OILSEEDS AND SOY WORLD IN A NUTSHELL - 2017







Million Metric Tons
340.9
74.0
46.1
45.0
44.5
18.6
5.5
574.5

OILSEEDS PRODUCTION

SOYBEAN PRODUCTION

Country	Million Metric Tons
United States	119.5
Brazil	113.0
Argentina	47.0
China	14.2
India	9.5
Paraguay	9.2
Canada	8.0
Other	20.4
Total	340.9

SOYBEAN EXPORTS

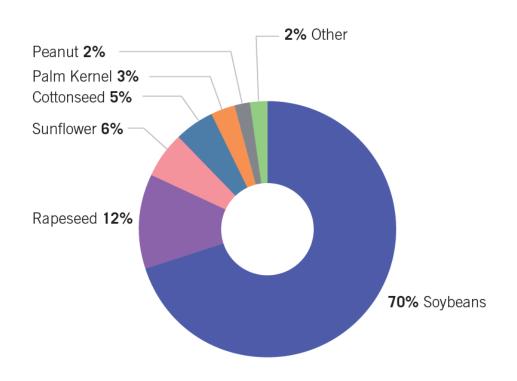
U.S. SOY for a growing world

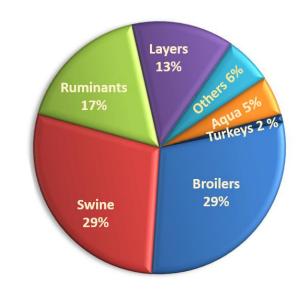
GLOBAL MARKET SNAPSHOT 2017

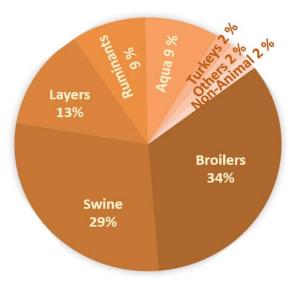
WORLD PROTEIN MEAL CONSUMPTION 332.1 MMT

GLOBAL FEED PRODUCTION 1.093.458 MMT

GLOBAL SOYBEAN MEAL USE 214.216 MMT















U.S. GRADES FOR SOYBEAN\

СОРТНОСТЬ СОИ ПО СТАНДАРТАМ США

Reference: www.nopa.org



GRADING FACTORS *	GRADE U.S. No					
GRADING FACTORS	1	2	3	4		
Minimum Test Weight (lbs/bushel)	56,0	54,0	52,0	49,0		
	Maximu	ım Percenta	ge Limits o	f		
Damaged Kernels Heat (part of total)						
	0,2	0,5	1,0	3,0		
Total	2,0	3,0	5,0	8,0		
Foreign Material	1,0	2,0	3,0	5,0		
Splits	10,0	20,0	30,0	40,0		
Soybeans of other colors	1,0	2,0	5,0	10,0		
	M	aximum Co	unts Limits	of		
Other materials	9	9	9	9		
Animal filth	1	1	1	1		
Castor beans	2	2	2	2		
Crotalaria seeds	0	0	0	0		
Glass	3	3	3	3		
Stones	3	3	3	3		
Unknown foreign substances	10	10	10	10		

VARIABILITY OF SBM BY ORIGIN: SBM QUALITY SURVEY IN ROMANIA 2013 – 2015

ВАРИАБЕЛЬНОСТЬ КАЧЕСТВА ШРОТА ПО ПРОИСХОЖДЕНИЮ:КАЧЕСТВО СОЕВОГО ШРОТА В РУМЫНИИ В 2013 2015 2016

ANAMIC.			СР	LYS	MET	CYS	M+C	THR	TRP	ARG	ILE	LEU	VAL	HIS	PHE
	ھے	2015	46.64	2.87	0.64	0.71	1.36	1.85	0.65	3.38	2.12	3.55	2.24	1.25	2.35
	YEAR	2014	46.40	2.87	0.64	0.70	1.36	1.85	0.65	3.34	2.10	3.53	2.23	1.25	2.33
Hom Val		2013	46.41	2.87	0.64	0.71	1.36	1.84	0.64	3.35	2.09	3.52	2.22	1.24	2.33
Low CV		2015	1.50	1.90	1.90	2.70	2.40	1.60	1.70	2.00	1.60	1.60	1.40	1.90	1.70
	2	2014	1.52	1.47	1.33	2.57	1.87	1.20	1.28	2.10	1.67	1.66	1.41	1.55	2.04
		2013	1.66	1.66	1.15	1.59	1.10	1.40	1.51	2.14	1.91	1.52	1.52	1.40	2.14
			СР	LYS	MET	CYS	M+C	THR	TRP	ARG	ILE	LEU	VAL	HIS	PHE
	~	2015	47.20	2.89	0.63	0.63	1.31	1.83	0.64	3.43	2.18	3.62	2.25	1.24	2.43
	YEAR	2014	47.41	2.88	0.63	0.70	1.34	1.84	0.64	3.44	2.14	3.60	2.23	1.26	2.41
■ High CP	⋝	2013	47.49	2.90	0.63	0.71	1.34	1.84	0.64	3.45	2.15	3.59	2.24	1.27	2.41
High CV		2015	1.95	2.26	2.35	4.46	3.06	2.19	2.38	2.50	3.51	2.72	2.57	2.57	3.60
	2	2014	2.43	2.75	2.65	3.31	2.84	2.34	2.59	2.71	2.51	2.49	2.42	2.45	2.61
		2013	2.68	2.90	2.77	3.01	2.85	2.47	2.53	2.86	2.76	2.70	2.59	2.68	2.95
			CD	IVC	DACT	CVC	NA. C	TUD	TDD	ADC	u e	1511	\/A1	LUC	DUE
*****		0045	CP	LYS	MET	CYS	M+C	THR	TRP	ARG	ILE	LEU	VAL	HIS	PHE
	œ	2015	46.51	2.87	0.63	0.68	1.31	1.81	0.64	3.41	2.12	3.56	2.21	1.22	2.37
* * * * * *	YEAR	2014	46.87	2.97	0.65	0.73	1.38	1.84	0.65	3.45	2.11	3.56	2.21	1.25	2.36
Harvest var	>	2013	48.04	3.03	0.65	0.75	1.41	1.87	0.66	3.54	2.14	3.65	2.26	1.28	2.43
■ Lower CP		2015	1.25	1.05	1.59	1.47	0.76	1.10	1.56	1.47	1.42	1.40	1.36	1.64	1.27
Better AA	5	2014	2.16	2.02	1.54	2.74	2.17	2.19	1.54	2.61	2.37	2.25	2.26	2.40	2.54
ı		2013	1.58	1.65	1.52	1.33	1.42	1.60	1.52	1.98	1.84	1.64	1.33	1.56	1.65

EXAMPLE OF BROILER LEAST COSTS FORMULATION ANALYSIS:

SBM QUALITY DIFFERENTIATION

TRANSLATED IN TO EUROS

ПРИМЕР АНАЛИЗА СОСТАВЛЕНИЯ РЕЦЕПТА ДЛЯ БРОЙЛЕРОВ ПО НАИМЕНЬШИМ ЗАТРАТАМ С УЧЕТОМ ДИФФЕРЕНЦИАЦИИ КАЧЕСТВА СОЕВОГО ШРОТА,

выраженный в евро

Courtesy: Evonik ® Romania, 2016

ARGENTINE vs BRAZIL

1,75 EUR/Ton

of SBM 47 % CP Standardized calculation based on lysine, methionine, threonine and tryptophan

June 2016 market prices



U.S.A vs BRAZIL

2,00 EUR/Ton

of SBM 47 % CP Standardized calculation based on lysine, methionine, threonine and tryptophan



June 2016 market prices



SEARCHING FOR PROTEIN INGREDIENTS: A LONG STANDING PROBLEM IN THE EU\ ПОИСК БЕЛКОВЫХ ИНГРЕДИЕНТОВ: ДАВНЯЯ ПРОБЛЕМА В ЕС

The most important source of proteins for the EU livestock sector are the locally produced cereals (40%), while soybean meal ranks as the second protein source and is largely imported (66%)

**EU FEED INGREDIENTS CONSUMPTION (%) EVOLUTION **

ЭВОЛЮЦИЯ ПОТРЕБЛЕНИЯ КОРМОВЫХ ИНГРЕДИЕНТОВ В ЕС, %

INGREDIENTS / REFERENCE YEAR	1990	2005	2014	2017
Cereals	32.0	47.0	48.0	50.0 👚
Meals and Cakes	25.0	27.0	27.5	26.5
By Products (Food and Bioethanol)	15.0	12.5	11.5	11.0 🖡
Animal Meals	3.0	0.0	0.0	0.00 🖡
All Others	6.5	4.5	4.5	4.0
Minerals, Vitamins, Additives	2.0	3.0	3.0	3.5
Oils and Fats	2.0	1.5	2.0	2.0
Dried Forages	3.0	1.5	1.5	1.5
Pulses	5.0	1.5	1.0	1.0 🖡
Dairy Products	1.0	1.0	1.0	0.5 🖡
Tapioca	5.5	0.5	0.0	0.0 🌲

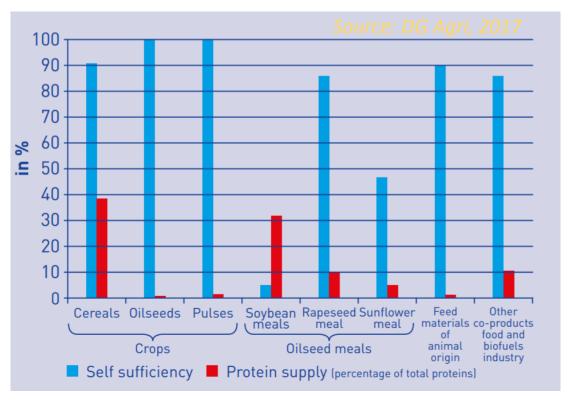
- Cereals and oil meals are the main categories of raw materials.
- The EU livestock is using 60 % of the EU produced cereals.
- Most of the protein raw materials are imported

Source: FEFAC

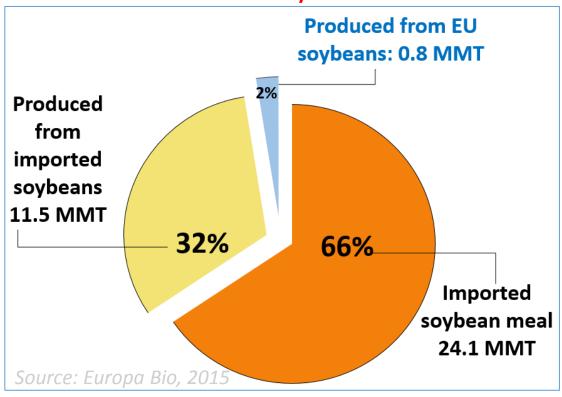
EU HEAVILY DEPENDENT ON IMPORTED PROTEIN

ЕС СИЛЬНО ЗАВИСИТ ОТ ИМПОРТНОГО ПРОТЕИНА

CONTRIBUTION OF DIFFERENT CATEGORIES OF FEED MATERIALS TO PROTEIN SUPPLY AND LEVEL OF EU DEPENDENCY



EU cereals are the most important source of proteins for the EU livestock sector, while soybean meal ranking second is imported to its large majority. EU 28 SOYBEAN and SOYBEAN MEAL IMPORTS AND DOMESTIC PRODUCTION 35 MMT / YEAR



400,000 ha soya EU grown today only represents around 3% of what EU needs

EU-28 BALANCE SHEET FOR PROTEIN RICH FEED MATERIALS IN 2016/17 БАЛАНС ИСТОЧНИКОВ КОРМОВОГО БЕЛКА В EC-28 В 2016\17

Source: DG Agri 2016

FEED		EU TOTAL USE	EU FEED USE OF EU ORIGIN	SELF
MATERIALS		(MMT PROTEINS)	(MMT PROTEINS)	SUFFICENCY (%)
	Wheat	5.76	5.4	94
	Barley	4.12	4.12	100
CDODS	Corn	4.22	3.24	77
CROPS	Oilseeds	0.5	0.5	100
	Pulses	0.77	0.71	92
	Total	18.3	16.6	91
	Soybean Meal	13.37	0.67	5
CO DRODUCTS	Rapeseed Meal	4.36	3.43	79
CO - PRODUCTS	Sunflower Meal	2.43	1.02	42
	Total	25.57	9.77	38
	Fishmeal	0.36	0.31	86
OTHER	Skimmed Milk Powder	0.06	0.06	100
	Total	0.92	0.86	93



ALTERNATIVE PROTEIN INGREDIENTS FOR ANIMAL NUTRITION \ АЛЬТЕРНАТИВНЫЕ БЕЛКОВЫЕ ИНГРЕДИЕНТЫ В ПИТАНИИ ЖИВОТНЫХ

Available as Another Possibility or Choice
Major Advantages and Challenges when Using Soy Alternative Vegetal Proteins Ingredients

UNDERSTANDING THE MAJOR CHALLENGES WHEN USING ALTERNATIVE INGREDIENTS





NEED TO COMPETE ECONOMICALLY



MAINTAIN ANIMAL'S PERFORMANCES



BRINGS INCREASED RISKS BUT ALSO INCREASED REWARDS WHEN MARKETS ARE RIGHT



WITHOUT REDUCING PRODUCT QUALITY AND VALUE



AVAILABILITY and LACK OF VOLUME IS A DISATVANTAGE FOR LARGE USERS

POTENTIAL SUPPLIERS and ALTERNATIVE INGREDIENTS\ ПОТЕНЦИАЛЬНЫЕ ПОСТАВЩИКИ И АЛЬТЕРНАТИВНЫЕ ИНГРЕДИЕНТЫ

MILLING INDUSTRY

Bran Products: Wheat, Corn, Rice

STARCH INDUSTRY

Corn Bran
Corn Gluten Meal

SUGAR INDUSTRY

Molasses
Sugar Beet Pulp

BREWERY INDUSTRY

Beer by-products Yeast by-products

ETHANOL INDUSTRY

DDGS Glutenol

LEGUMINOUS

Lupins Faba

OILSEEDS

Rapeseed Sunflower

OILSEEDS CRUSHING

Soap Stocks
Soy Hulls

NOVEL INGREDIENTS

Fermented, Enzymes Insects

CHEMICAL COMPOSITION OF SEEDS PROCESSED AS ALTERNATIVE PROTEIN INGREDIENTS











Component	SOYBEAN	RAPESEED	SUNFLOWER	LUPINS
Dry Matter (%)	87,0 - 90,0	92,0 - 94,0	88,0 - 90,0	81,8 - 84,99
Crude Protein (%)	34,7 - 39,8	20,5 - 23,3	19,6 - 23,5	25,5 - 37,17
Crude Fat (%)	16,8 - 20,2	35,0 - 45,0	44,0 - 45,5	4,24 - 9,80
Crude Fiber (%)	4,7 - 5,5	12,5 - 14,5	22,5 - 24,1	11,52 - 15,93
Crude Ash (%)	4,8 – 5,2	4,1 - 4,3	3,7 - 3,8	2,61 - 3,81

References: ¹Wang and Johnson, 2001; ²Thakor et.all,1995; ³Sunflower Technology and Production Agronomy No. 35 1997

*Canola Oil is generally expressed as a percentage of whole seed at 8.5% moisture, whereas protein is expressed as a percentage in the oil-free meal at 13% moisture

PROCESSING TO REDUCE ANFS CONCENTRATION TO ZERO OR BELOW CRITICAL LEVELS\ ПЕРЕРАБОТКА ДЛЯ СНИЖЕНИЯ КОНЦЕНТРАЦИИ АПФ ДО НУЛЯ ИЛИ НИЖЕ КРИТИЧЕСКОГО УРОВНЯ

PROTEASE INHIBITORS

Heat Treatment Fermentation

LECTINS

Heat Treatment

SINAPINS

Genetic selection

CONDENSED TANNINS

Dehulling

SAPONINS

Alcohol Extraction Fermentation

CHLOROGENIC COMPOUNDS

Heat Treatment

ALKALOIDS

Hydration

GLUCOSINOLATES

Heat Treatment

ANTIGENIC COMPOUNDS

Ethanol/Aqueous extraction

KEY COMPONENTS and METABOLIZABLE ENERGY OILSEEDS AND LUPIN MEALS

Ingredient	Crude Protein Crude Fat C		Crude Fiber	ME Kcal/Kg		
ingredient	%	%	%	POULTRY	SWINE	
SOYBEAN MEAL	44,0	1,90	5,90	2.240	3.070	
	48,0	1,90	4,00 👢	2.360	3.265	
RAPESEED MEAL	34,0	2,20	12,40 【	1.700	2.550	
SUNFLOWER MEAL	36,0	1,80	18,00 🖠	1.730	2.470	
	46,0	1,00	8,00 👤	2.070	2.750	
LUPIN SEEDS LUPIN MEAL	32,0	5,20	15,00 🖠	1.870	3.080	
	40,0	6,00	8,70	2.040*	2.720	

Adapted from: FEDNA, Schrothorst, INRA and *Ravindran

AMINO ACIDS TOTAL AND DIGESTIBILITY COEFFICIENTS

Amino Acid	SBM		RSM		SFM 46		LPM					
	Total	Р	S	Total	Р	S	Total	Р	S	Total	Р	S
Lysine	2,90	90	89	1,81	80	74	1,48	87	79	1,66	87	88
Methionine	0,63	91	90	0,68	84	81	0,93	92	88	0,21	89	82
Threonine	2,49	85	86	2,12	73	71	1,58	82	80	1,20	83	86
Tryptophan	0,64	89	87	0,46	80	71	0,62	87	83	0,26	82	87
Arginine	3,49	93	93	2,12	94	84	4,14	93	92	10,96*	91	95

From: AMINODat® 4.0 EVONIK



RAPESEED and CANOLA MEAL AS ALTERNATIVE TO SBM\ РАПСОВЫЙ ШРОТ КАК АЛЬТЕРНАТИВА СОЕВОМУ ШРОТУ

LOWER METABOLISABLE ENERGY

1.700 Kcal Poultry 2.550 Kcal Swine

5 to 8 % LOWER
DIGESTIBLE AMINO ACIDS



RAPESEED MEAL
2-3% IN STARTER
UP TO 5% IN
GROWER AND FINISHER

HIGH GLUCOSINOLATES CONTENT

Canola = less than 30 μ mol/g Rapeseed = 50–100 μ mol/g

HIGHER METHIONINE
BUT LOWER DIGEST LYSINE



CANOLA MEAL
LIMIT INCLUSION TO NO MORE
THAN 25-50%
OF SOYBEAN MEAL LEVELS

HIGHER FIBER CONTENT

12,0 % Crude Fiber 28,9% ADF

HIGH SULPHUR CONTENT



OF ORIGIN
BEFORE PURCHASING
AND USING



DOUBLE DEHULLED SUNFLOWER MEAL AS ALTERNATIVE TO SBM\ ПОДСОЛНЕЧНЫЙ ШРОТ ДВОЙНОГО ОБРУШИВАНИЯ КАК АЛЬТЕРНАТИВА СШ

LOWER
METABOLIZABLE ENERGY

HIGHER FIBER CONTENT

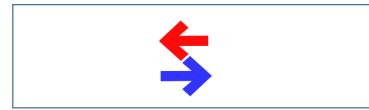
HIGH ARGININE CONTENT

CHLOROGENIC COMPOUNDS

HIGHER METHIONINE
BUT LOWER LYSINE CONTENT

BULKINESS / FLOWABILITY
OF THE PRODUCT







SOMETIME
THE PRODUCT
SHOULD
BE RANCID



DOUBLE DEHULLED
SUNFLOWER MEAL
LIMIT INCLUSION TO
NO MORE THAN 10 %

THE QUALITY
FOR POSSIBLE
ADULTERATION



LUPINS WHOLE SEEDS AND LUPIN MEAL

ALTERNATIVE TO SBM\ семена люпина и люпиновый

ШРОТ КАК АЛЬТЕРНАТИВА СШ

LOWER
METABOLISABLE ENERGY

ALKALOIDS LEVEL
SHOULD BE BELOW 0.28 g/kg



CONSISTENCY
OF THE PRODUCT
AND
CONSTANT SUPPLY

HIGHER FIBER CONTENT

LOWEST METHIONINE
AND LOWER LYSINE CONTENT



to no more than
5 for LUPINS WHOLE
10 for LUPINS MEAL

HIGH ARGININE CONTENT

HIGH MANGANESE CONTENT 364 to 3.375 PPM (L.Albus)



USE PECTINASES ENZYMES
TO REDUCE VISCOSITY
AND
IMPROVE NSP UTILISATION

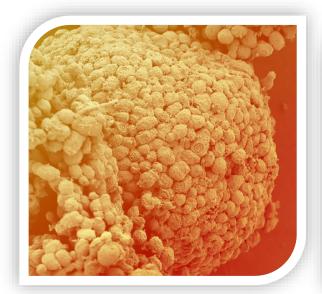


NOVEL PROTEIN INGREDIENTS\ HOBЫЕ БЕЛКОВЫЕ ИНГРЕДИЕНТЫ

Ingredients never used before
Promises and Challenges from Next Generation Raw Materials

NOVEL FEED INGREDIENTS

are feeds that might not approved as livestock feed in a country and/or contain a novel trait



Fermentation products such yeasts, silage inoculants



PRODUCTS AND
BY-PRODUCTS
OF BIOTECHNOLOGY
Enzymes, SCP,
commercial amino acids etc



INGREDIENTS
WITH NO HISTORY
OF USE AS FEED
Insects, new by products
from food industry



PLANTS WITH
NOVEL TRAITS
New soy, rapeseed
and corn varieties

NEW TECHNOLOGIES FOR NOVEL FEED INGREDIENTS PRODUCTION EXAMPLES:

BIOTECHOLOGY TO PRODUCE NOVEL MICROBIAL FA: NEW GLUCANASE ENZYME

NEW FERMENTATION PROCESS TO REDUCE OR ELIMINATE ANFs: **FERMENTED SBM**

NEW PROTEIN FROM YEAST **FERMENTATION**

ASPERGILLUS ORYZAE

strain developed by mutagenesis or by recombinant DNA (rDNA) techniques

New GLUCANASE









SOLVENT EXTRACTED

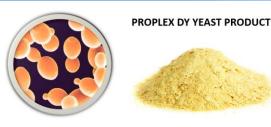




LACTOBACILLUS SPP

ASPERGILLUS ORYZAE

Components	Un fermented	Fungal	Bacterial	
Crude Protein (%)	34,5	37,4	37,5	
Soluble Protein(%)	20	24	33	
Peptides (<15KD)	5	35	63	
TIs (mg/g)	3,5	0,17	0,65	
Sucrose (g/100 g)	7,8	-	-	
Stachyose(g/100 g)	5,2	-	-	
Raffinose (g/100 g)	5,2	-	-	



COMPONETS	%
Moisture	6 -10
Crude Protein	35 - 65
Lipids	2 - 10
Carbohydrates	10 - 90
Crude Ash	2 - 10

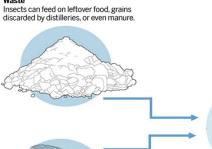
FARMING INSECTS AS ALTERNATIVE PROTEIN SOURCE FOR ANIMAL FEED

COMPARISON OF INSECT MEALS AS ALTERNATIVE SOURCES TO SOYBEAN MEAL











The eggs develop into larvae. Some of them are allowed to grow into flies to lay more eggs.

Insect meal could replace fish meal or soy meal.





Adult flies are kept in a room; their eggs are collected.





SPECIFICATIONS		BSF LARVE MEAL	HOUSEFLY MAGGOT MEAL	SBM 48
Dry matter	%	91.30	92.40	88.00
Crude Protein	%	38.44	46.57	47.50
Crude Fiber	%	6.39	5.27	3.20
Crude Fat (EE)	%	23.74	17.46	1.90
Crude Ash	%	18.81	9.33	6.20
Gross Energy	Kcal/Kg	4.822	5.057	4.180

Amino Acids		BSF LARVE MEAL	HOUSEFLY MAGGOT MEAL	SBM 48
Lysine	%	6.60	5.50	2.99
Methionine	%	2.10	2.00	0.71
Cysteine	%	0.10	0.40	0.69
Threonine	%	3.70	3.20	1.92
Tryptophan	%	0.50	0.35	0.64
Arginine	%	5.60	4.90	3.49
Valine	%	8.20	4.20	2.26

PLANTS WITH NOVEL TRAITS RAPESEED, CORN AND SOY VARIETIES\

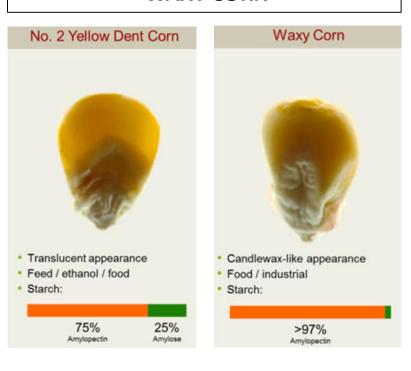
РАСТЕНИЯ С НОВЫМИ СВОЙСТВАМИ - СОРТА РАПСА, КУКУРУЗЫ И СОИ

PROPOUND CANOLA MEAL



Source: Dow, Pioneer and USDA

NEXT GENERATION WAXY CORN



DROUGHT AND SALT TOLERANT SOYBEAN





KEY TAKE AWAY MESSAGES ЗАКЛЮЧИТЕЛЬНЫЕ НАПУТСТВИЯ

Our mission is to make a profit

TAKE AWAY MESSAGES



SOY REMAINS THE GOLD STANDARD OF VEGELTAL PROTEINS IN ANIMAL NUTRITION



BETTER NUTRITIONAL VALUE FOR POULTRY AND SWINE, SUSTAINABLE AND RELIABLE SUPPLY



AVAILABLE AS A
POSSIBILITY OR CHOICE
AND NEED TO COMPETE
ECONOMICALLY



INVESTMENT IN
FUTURE AND
SUSTAINABLE
LIVESTOCK
PRODUCTION





