

The A. J. Sackett & Sons Company, Baltimore, Maryland



Presentation by: Charles Formisani



Trends in Bulk Blending Worldwide

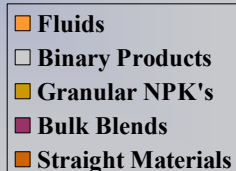
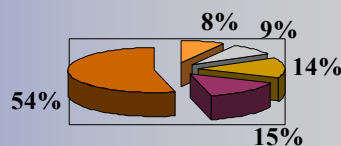




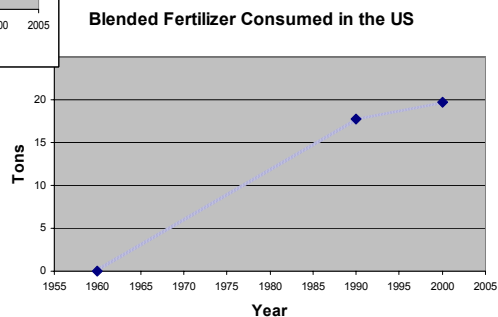
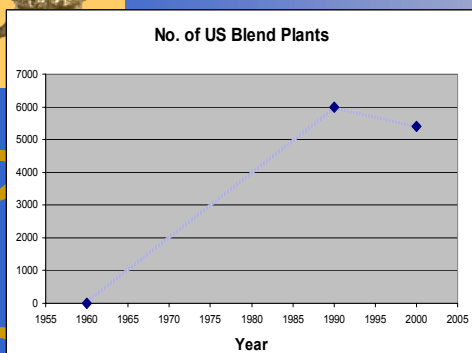
Estimated World Distribution Of Fertilizers By Product Type

★ The percentage of fertilizer delivered to the grower as a bulk blend has been increasing steadily over the past three decades.

★ Source: IFDC data file



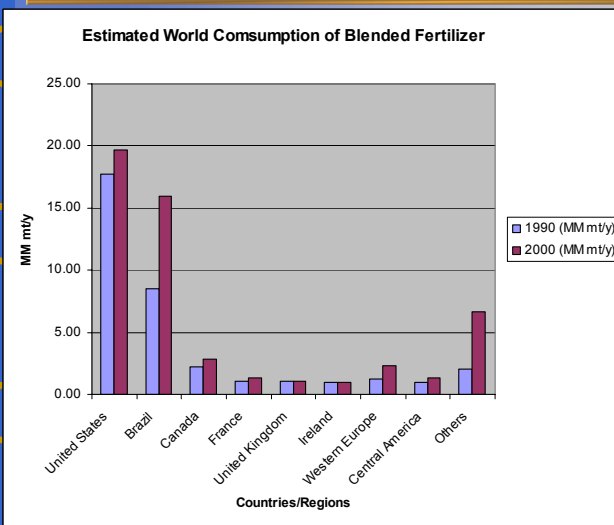
Increased Consumption in the US





Increased Consumption World Wide

Information Provided by IFDC



Others:

Australia	Philippines
Vietnam	Venezuela
Malaysia	Russia
Nigeria	Argentina
Thailand	Ecuador
Poland	Czech Republic
Sri Lanka	Lithuania
Chile	Ukraine
China	Benin
Republic of South Africa	Cameroon
Côte d'Ivoire	Egypt
Senegal	Syria
Zimbabwe	Togo
Colombia	Saudi Arabia



So why is bulk blending increasing?

- ★ Cost
- ★ Simplicity
- ★ Location
- ★ Quality
- ★ Product Flexibility





Capital Cost Comparison of NPK Production Methods

Estimated Fixed Capital Investment for Various NPK Production Processes

Information Provided by IFDC

	NPK Production Process				
	Dry Blends 120,000	Compaction Granulation 240,000	Steam Granulation 240,000	Chemical Granulation 240,000	Nitro- phosphates ^a 1,100,000
Installed Yearly Capacity, mtpy	(US \$ Million)				
Battery limits process unit (b)	0.41	7.10	9.10	14.50	384.93
Bulk and liquid storage (raw matrs/products)	1.63	2.47	2.47	4.17	22.12
Bagged product storage	0.60	0.77	0.77	0.77	1.62
Auxiliary and support facilities (c)	0.40	1.55	1.85	2.92	61.30
Total installed cost	3.04	11.89	14.19	22.36	469.97
Spare parts (d)	0.02	0.32	0.41	0.65	17.32
Preoperational and startup expenses (e)	0.03	0.48	0.61	0.98	25.98
Project management and start up cost (f)	0.15	0.59	0.71	1.12	23.50
Interest during construction (g)	0.24	0.95	1.14	1.79	37.60
Total fixed capital	3.48	14.23	17.06	26.90	574.37

a. Plus 577,500 mtpy (1,750 mtpd) of CAN as by-product.

b. Based on early 2002 costs at U.S. Gulf Coast location.

c. 15% of process unit and storage facilities.

d. 5% of process facilities.

e. 7% of process facilities.

f. 5% of total installed cost.

g. 8% of total installed cost.



Production Cost Comparison

Estimated Production Cost for 15-15-15 Using Various NPK Processes

Information Provided by IFDC

	NPK Production Process				
	Dry Blends 90,000	Compaction Granulation 180,000	Steam Granulation 180,000	Chemical Granulation 180,000	Nitro- phosphate 990,000
Yearly Production, mt product	(US \$/mt product)				
Fixed Cost					
Operating labor	1.96	2.66	2.66	3.19	2.73
Overhead and general expenses	1.96	2.66	2.66	3.19	0.82
Maintenance (labor and materials)	0.68	2.64	3.15	4.97	18.99
Insurance and taxes (b)	0.34	0.66	0.79	1.24	4.75
Fixed capital recovery (c)	5.08	10.39	12.46	19.65	76.28
Subtotal	10.02	19.01	21.72	32.24	103.57
Variable Cost					
Electricity	0.20	2.00	1.20	2.00	4.24
Steam	0.00	0.00	0.60	0.30	0.00
Water	0.00	0.00	0.50	1.00	2.50
Fuel	0.00	0.00	1.44	0.80	0.80
Bags	15.00	15.00	15.00	15.00	15.00
Contract labor	1.16	1.16	1.16	1.16	1.05
Catalysts and miscellaneous supplies	0.30	0.50	0.70	1.00	3.85
Subtotal	16.66	18.66	20.60	21.26	27.44
Raw Materials Cost	158.87	134.93	134.93	171.06	129.42
Credit for By-Product CAN	0.00	0.00	0.00	0.00	(54.38)
Total Production Cost	185.55	172.60	177.25	224.56	206.05

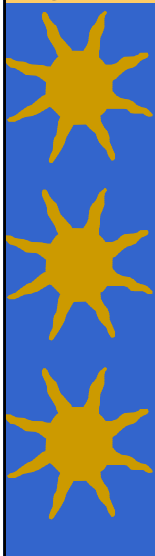
a. Plus 520,000 mtpy of CAN as by-product.

b. 1.0% of total installed cost.

c. 13.1% of total fixed capital investment (15 years at 10% annual interest rate).



Simple Operation for Multiple Formulations



Location-Why Bulk Blending Works In The U.S.A.





Quality Materials=Quality Blends
Size Matters!!

- ★ Fertilizer must be closely sized between types, and also of uniform size within its type.
- ★ Varied sizing causes the fertilizer to segregate after blending.

A photograph showing a funnel pouring a mixture of small and large granules into a container. The granules are visibly separating into distinct layers, demonstrating the effect of varied sizing on blending.



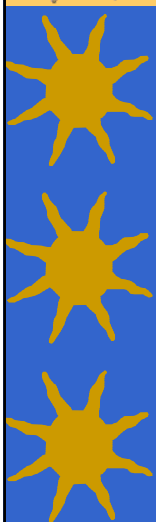
Size Uniformity Would Avoid This Problem



- ★ This photo illustrates how “fines”, or small granules, separate out from normal, larger size granules.
- ★ The fines tend to stay where discharged while the normal size granules travel out.



SGN (Size Guide Number)

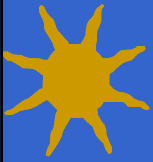
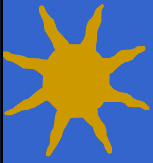
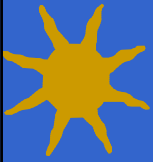


- ★ The SGN sizing system was invented in the last ten years in Canada.
- ★ The SGN is that particle size which divides the mass of all particles in two equal halves.
- ★ “UI” Uniformity Index, is the ratio of particle sizes, small to large, in the product.





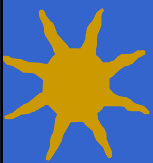
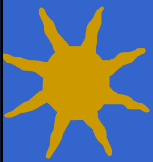
Other Factors Influencing Blend Quality.....



1. Chemical Compatibility
2. Accurate Weighing
3. Good Mixing
4. Post Production Handling



1. Chemical Compatibility

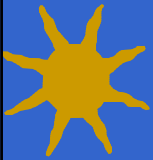
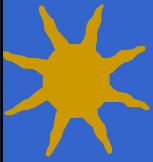
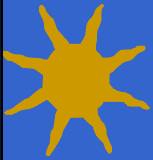


- ★ Certain fertilizers react negatively when combined.
- ★ Urea and ammonium nitrate, when combined, become mushy.
- ★ Fertilizer dealers avoid handling them with the same equipment.





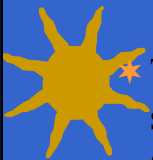
2. Accurate Weighing



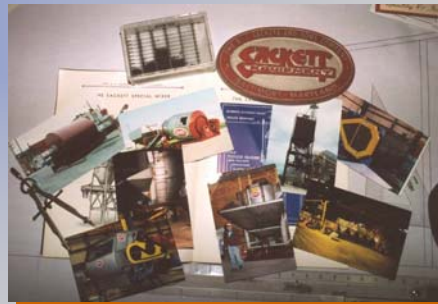
- ★ Each ingredient must be carefully weighed.
- ★ No matter how careful you are, a mistake in this step ruins your blend and costs you money.
- ★ Load cells are more accurate than mechanical scales.



3. Good Mixing



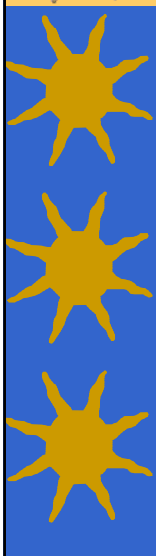
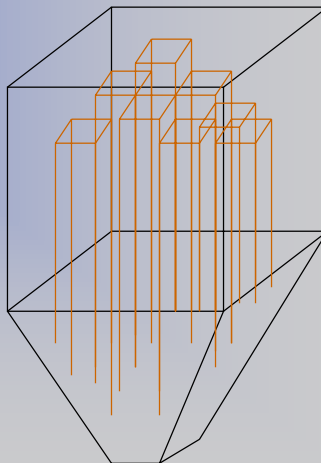
- ★ There are over seven styles of bulk mixers (blenders) available.
- ★ Select one with documented blend test results.
- ★ Coefficient of Variation (CV) is the blend benchmark.



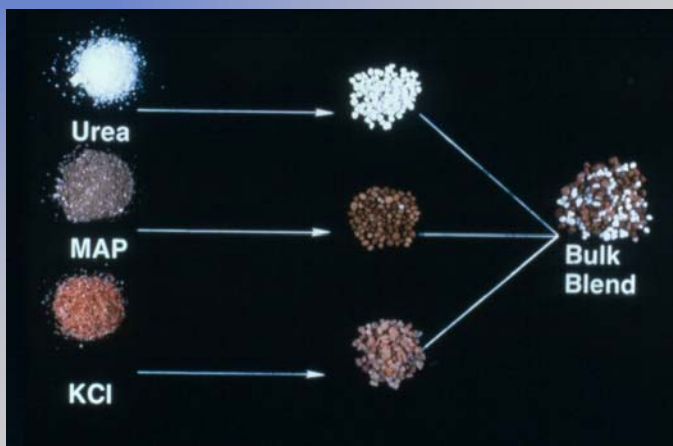


4. Careful Post Production Handling

- ★ Before granule sizing became more uniform, post-blending handling caused segregation.
- ★ It is still important to carefully handle blended fertilizers to keep them blended.
- ★ Bagging bins should have internal compartments to stop segregation.



Again- Quality Material = Quality Blends





Maximum Flexibility

Examples of Grades of Bulk Blended Material

Nominal Nutrient Ratio	Maximum Grade Wt %			Quantity of Material Required Per Metric Ton of Product, kg*		
	N	P ₂ O ₅	K ₂ O	Urea	DAP	KCl
1:1:1	19	19	19	261	418	321
1:1:3	11	11	35	159	255	586
1:2:1	15	30	15	75	669	256
2:1:1	26	13	13	482	293	225
2:2:1	22	22	11	310	499	191
3:1:1	31	10	10	601	226	173
4:1:1	33	8	8	676	184	140

A Material Analysis Urea 45% N DAP 18% N and 46% P₂O₅ and KCl 60 K₂O



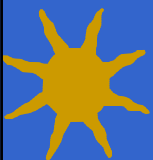
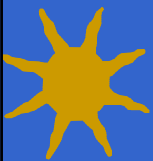
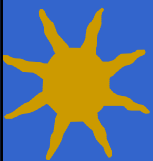
Soil Testing Calls For Prescription Blends



- ★ Growers are having their soil tested annually for nutrient levels.
- ★ The results of those tests help the grower and blend plant manager decide what blend to apply.
- ★ Regulations on over application of nutrients



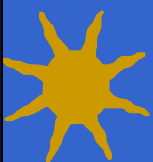
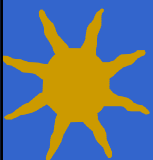
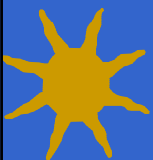
Bulk Application Equipment With Variable Rate Technology



- ★ American growers are more often having the blending company “custom apply” the blended fertilizer onto their fields.
- ★ VRT or variable rate technology allows for nutrient levels to match soil tests.



5 Easy Steps to a Good Blend



1. Closely Matched Particle Size
2. Chemically Compatible Materials
3. Accurate Weighing
4. Good Mixing
5. Careful Post Production Handling





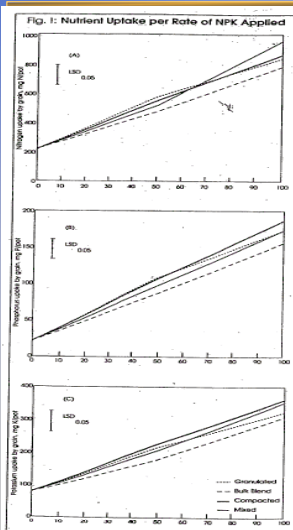
Granular (Homogenous) Producers Compete In U.S.



★ Leading manufacturers of homogeneous fertilizers argue that plant food is jeopardized with blends.



Bulk Blends Stand Up to Traditional Processes!

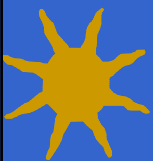


“The studies indicate that the manufacturing process has little influence on the effectiveness of NPK fertilizers if they are prepared from the same raw materials and have the same amount of soluble nutrients in the final product”

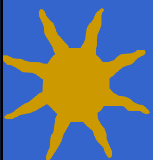
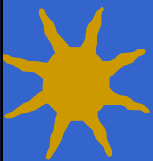
•Source: IFDC “The Answer is in the Economics”



Typical New U. S. Blend Plant



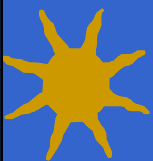
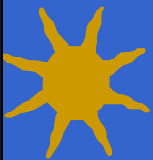
- ★ Over 60% of fertilizer comes in by truck, the rest by rail.
- ★ There is a trend for enclosed receiving and bulk load-out areas.
- ★ Bins are typically 12' (3.66 m) wide and 40' (12.2 m) deep.
- ★ A total of 8 bins is common.
- ★ Building size is getting larger as consolidations occur.



Bulk Blending Will Continue To Grow Worldwide



- ★ Increased use of soil sampling will make prescription blends more sought after.
- ★ The favorable economics of bulk blending will increase its popularity.
- ★ Environmental issues favor bulk blending.





*Thank You, From The Sackett
Company*

