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SHARI ROGGE-FIDLER
President & CEO
Farm Foundation
MEET FARM FOUNDATION

A 501(C)(3) NON-PROFIT AT THE INTERSECTION OF AGRICULTURE AND SOCIETY
Farm Foundation is an ACCELERATOR of practical solutions for agriculture.

We accelerate PEOPLE AND IDEAS into ACTION.
OUR MISSION AND VISION
GUIDE OUR WORK

MISSION:
To build trust and understanding at the intersections of agriculture and society.

VISION:
To build a future for farmers, our communities, and our world.
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Submit questions by clicking on the Q&A Button at the bottom of your screen.

Please include your name and company so questions may be contextually understood.

Due to time limits, we may not be able to ask all questions submitted.

This Forum is being recorded and will be posted on our website at farmfoundation.org as well as the Farm Foundation YouTube channel.

Please take the short survey at the conclusion of the Forum.

#FarmFoundationForum
FARM FOUNDATION® FORUM
2022 ECONOMIC OUTLOOK FOR AGRICULTURE
DECEMBER 16, 2021

#FarmFoundationForum
GREGG DOUD
Moderator
Vice President of Global Situational Awareness
And Chief Economist
Aimpoint Research
DR. AMANDA COUNTRYMAN
Associate Professor of Agricultural Economics
Colorado State University
AGRICULTURAL TRADE AND POLICY OVERVIEW

- U.S. Agricultural Trade Snapshot
- U.S.-China Trade
- Trade Policy Highlights
- Global Challenges and Uncertainty
OUTLOOK FOR U.S. AG TRADE

Ag Trade Forecast FY 2022
- Exports at Record $175.5 bn
- Imports at $165.0 bn
U.S. AG EXPORTS

U.S. exports by commodity

Value, billion dollars

Grains and feeds | Oilseeds and products | Horticultural products | Livestock, dairy, and poultry | Sugar and tropical products

Fiscal Year

FY21
FY22-Current forecast
FY22-Previous forecast

U.S.-CHINA PHASE 1 TRADE DEAL

- Tariffs
  - September 2020 Tariffs cut in half (previous tariff rounds remain)

Commitments by China:
- Purchases of U.S. Goods & Services: >$200bn over 2 years above 2017 levels
  - Agriculture, Manufacturing, Energy, Services
- Food Safety NTM Reductions
- Improved Foreign Investment
- Intellectual Property Protections
- Currency Commitments

Phase 2: Focus on SOEs

Source: Chad P. Bown (PIIE) January 21, 2020
a. US–China tariff rates toward each other and rest of world (ROW)
US-China phase one tracker: China’s purchases of US goods in 2020 and 2021

US exports and China’s imports of all goods covered by the phase one deal, January 2020 through October 2021

a. US exports and China’s imports of all covered goods, billions USD

- % of target (as of Oct 2021)
  - 62% (Chinese imports)
  - 60% (US exports)

- % of target (as of Dec 2020)
  - 58% (Chinese imports)
  - 59% (US exports)

- Total two-year purchase commitment, Chinese imports $380.5 billion
- Total two-year purchase commitment, US exports $352.2 billion
- October target, Chinese imports $334.8 billion
- October target, US exports $310.8 billion
- Actual purchases, (Chinese imports) $208.3 billion
- Actual purchases, (US exports) $186.2 billion
b. China’s imports by product type, billions USD

- **Agriculture**
  - 76% of target (as of Oct 2021)
  - 64% of target (as of Dec 2020)
  - 2020-21 commitment: $80.1 bn
  - Oct target: $68.9 bn
  - Actual purchases: $52.5 bn

- **Manufactured goods**
  - 61% of target
  - 60% of target
  - 2020-21 commitment: $129.9 bn
  - Oct target: $211.7 bn
  - Actual purchases: $234.4 bn

- **Energy**
  - 48% of target
  - 39% of target
  - 2020-21 commitment: $54.3 bn
  - Oct target: $25.9 bn
  - Actual purchases: $66.0 bn

- **Uncovered**
  - -17% growth
  - -23% growth
  - 2017 imports: 91.3
  - 2017 exports: 83.4
  - 2017 imports: 69.1
  - 2017 exports: 69.5

---

c. US exports by product type, billions USD

- **Agriculture**
  - 83% of target (as of Oct 2021)
  - 82% of target (as of Dec 2020)
  - 2020-21 commitment: $73.9 bn
  - Oct target: $63.2 bn
  - Actual purchases: $52.2 bn

- **Manufactured goods**
  - 59% of target
  - 57% of target
  - 2020-21 commitment: $112.5 bn
  - Oct target: $189.2 bn
  - Actual purchases: $210.7 bn

- **Energy**
  - 37% of target
  - 37% of target
  - 2020-21 commitment: $58.5 bn
  - Oct target: $21.6 bn
  - Actual purchases: $67.7 bn

- **Uncovered**
  - -6% growth (as of Sep 2021)
  - -12% growth
  - 2017 exports: 69.5
  - 2017 imports: 60.0
  - 2017 exports: 56.5
b. China’s imports by product type, billions USD

c. US exports by product type, billions USD
Agricultural Trade Policy Overview

- U.S.-China Trade
  - What’s next?
- USMCA Highlights
  - Agriculture: Dairy and Wheat (modest improvements)
  - Manufacturing: Autos
  - Modernization
    - Intellectual Property (biotechnology)
    - Investment
    - Labor and environment
- Japan-U.S. “Mini” Trade Agreement
  - Market Access Focused
- Captured most TPP ag market access
- CPTPP
  - 11 Pacific-Rim Countries Continued without U.S.
- RCEP
  - 15 countries; 10 ASEAN nations, South Korea, China, Japan, Australia and New Zealand
- U.S. Lags on Trade Deals
  - EU Expanding trade and influence
  - China petition for CPTPP
Trade groupings involving Asia Pacific nations

- **RCEP**
  - China
  - South Korea
  - Cambodia
  - Indonesia
  - Laos
  - Myanmar
  - Philippines
  - Thailand

- **CPTPP**
  - Australia
  - Japan
  - New Zealand
  - Canada
  - Chile
  - Peru
  - Mexico

**ASEAN**
- Brunei
- Malaysia
- Singapore
- Vietnam

SOURCE: The Economist Intelligence Unit
POTENTIAL FOR NEW AGREEMENTS

- TTIP: U.S.-EU
  - Increased market access, focused on SMEs
  - Harmonize regulations for trade, labor, and environment
  - Binding TRQs limit US Market Access

**Nontariff Measures**

- Reduced restrictions on conventional US production practices seems unlikely
- Livestock, Meat, Feed and Food Crop Production
  - Livestock/meat production constraints
  - Biotech restrictions on corn, soy, rice
  - Fruits and vegetables: pesticide MRLs

- UK
- Kenya
- What about Southeast Asia?
- India remains a challenge
GLOBAL CHALLENGES AND UNCERTAINTY

- Uncertainty for U.S. trade policy: focus is on domestic policy & climate
  - U.S. lags as others move forward with trade agreements
- WTO future is uncertain
- Supply chain issues persist
- Unemployment remains puzzling
- Inflation is NOT transitory: 6.8% in November, highest in 39 years
- Fed is tapering; tightening monetary policy on the horizon
- COVID-19 continues
- Agriculture faring well relative to other sectors
  - Opportunities for innovation
  - Potential for shocks: AD/CVD, animal health, energy, geopolitical concerns
DAN BASSE
President
AgResource Company
Inflation/Climate Change Collide Peak US Farmland; Ag Super Cycle Ahead?
2022 Ag Market Themes

• A New Commodity Super Cycle should last for the next 2-3 years. Energy is the upside leader with inflation risks rising on underinvestment and the desire of politicians to be green and rebuild infrastructure. The world consumed more grain in 2021/22 than this year’s record crop produced. The marketplace must secure extra acres in South America/Black Sea in 2022. The US at peak farmland?

• Biden sees himself as a Champion for Biofuels. Their low carbon footprint is a steppingstone to the electrification of 20% of the US transportation fleet by 2030. Biden will politically push biofuels and raise the pressure on USDA to pay farmers to sequester carbon. USDA sees farmers as part of the carbon answer in the 2023/24 US Farm Bill.

• Two New US Ag Demand Drivers: 1/China corn imports from the US/Ukraine and 2/US renewable diesel. Both will combine to raise farm profits to pull in an additional 15-20 Mil world crop acres into production by 2025. Most disruptive to American agriculture is renewable diesel. Like the US 2007 Energy Bill, renewable diesel will dramatically alter US crop acre mixtures in the coming years.

• US beef and dairy cow herds in liquidation. The decline in US protein supplies sets up a bullish dairy/beef outlook for 2022. The US dairy industry needs to play a more important role in US beef calf production. US cattle/beef prices to rise to record levels by 2023. Western US drought pushes forage prices to records as US hay acres fall to their lowest level since 1909.

• US farmland and farm incomes rise into 2024: China is the “demand pull” on world grain, meat and dairy demand. Yet China thru policy can reduce or increase food imports at will? One year they encourage massive grain/food imports while the next year they try to stamp out speculation. This adds to ag market volatility. China’s food import policy aside, a multi year ag bull market is ahead with adverse weather amplifying the need for demand rationing. Raw material markets shine!
World food price rises sharply on demand and supply chain breakdowns. Vegoils led the increase
Rising food prices produces new policy from world political leaders

Source: World Bank
Note: Expenditure figures are from 2017. Population and GDP per capita figures are from 2019 or the most recent year available from World Bank. A log10 scale is used on both axes.
US monthly inflation soars to the highest rate in nearly 40 Years; Commodities in vogue.
Per Capita Global Grain, Wheat & Oilseed Yield Stagnates
Climate change offsets yield technology increase?

MT/HA

- 0.50
- 1.00
- 1.50
- 2.00
- 2.50
- 3.00
- 3.50
- 4.00

Per Capita Grain & Oilseed Stocks Since 1970
Corn, Wheat, Barley, Sorghum, Soy, Canola Stocks Combined

Kgs

- 0.12
- 0.10
- 0.08
- 0.06
- 0.04
- 0.02

Peak US Farmland? CRP/Hay land grab ends (25 Mil acre shift since 2010) Yield gains importance!
Corn, fertilizer and natural gas price correlation; Corn is fertilizer over several years!
New Ag Demand Drivers: China corn imports/US Renewable Diesel
China to import 40-60 MMTs of world feed grain annually; China hog hotels multiply in
Reduced reserve sales of rice, wheat and corn leads to enlarged future China feed imports?
Renewable Diesel Doubles US Soyoil Demand by ’24

Existing and expected U.S. renewable diesel production capacity (2010–2024)

- Billion gallons per year
- Thousand barrels per day

Proposed or announced
Currently under construction
Existing capacity

US Soybean Oil Domestic Use (Mil Lbs)

- Domestic Food Use
- Domestic Industrial Use

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Dramatic new build in US soy crush capacity; US soybean harvested acres to rise 40 Mil? Impossible!
World Exporter Stock/Use Ratio in corn/soy & wheat - record low requires years to recover
The correlation between La Nina and Argentine corn yield; Is a 2022 Argentine drought pending?
Modeling projects corn price high of $6.40-7.20/Bu spot CBOT futures/$7.50 Gulf FOB
January G3 soybean stocks up 8.3%; Stock/Use ratio calls for $12.10-13.40 CBOT March soybeans
Even with near record 2021 US row crops; No room for 2022 yield loss on limited US stocks
EU policy forcing dairy cow numbers down/feed costs up; American dairy farmers well positioned
US dairy cow numbers drop below a year ago at 9.4 Mil head; 2022 US milk supply in decline
Plains cash cattle price nears December record. Beef/cash cattle margin dislocation started in 2018
2021 beef cow slaughter largest since 2012 (Jan-November); US retail beef price sets record
It’s not enough to know the news.
You need to trust the analysis.

Thank You
HARRY VROOMEN
Vice President of Economic Services
The Fertilizer Institute
Global Consumers - 2019

Nitrogen

1. China: 22%
2. India: 18%
3. USA: 11%
4. Brazil: 4%

Nitrogen: 23.8% (China)

Phosphates

1. China: 24%
2. India: 17%
3. Brazil: 12%
4. USA: 9%

Phosphates: 27% (China)

Potash

1. China: 27%
2. Brazil: 17%
3. USA: 12%
4. India: 7%

Potash: 24% (China)

N + P₂O₅ + K₂O

1. China: 23.8%
2. India: 15.4%
3. USA: 10.7%
4. Brazil: 8.3%

USA is a Large Consumer; ≈ 90% of Global Nutrient Use is Outside the USA!

Source: International Fertilizer Association (IFA).
Global Nutrient Use by Crop, 2014/15

- Corn: 16%
- Wheat: 15%
- Rice: 14%
- Vegetables: 9%
- Fruits: 7%
- Soybeans: 5%
- Other Oilseeds: 5%
- Grassland: 4%
- Sugar crops: 4%
- Other Cereals: 4%
- Fibre crops: 4%
- Oil Palm: 3%
- Roots & Tubers: 2%
- Other: 8%

Source: International Fertilizer Association (IFA).
U.S. Fertilizer Nutrient Use By Crop: FY2013/14 - FY2015/16

- CORN, 49%
- WHEAT, 11%
- SOYBEANS, 10%
- COTTON, 3%
- OTHER, 28%

Source: Computed from data reported by NASS, USDA and AAPFCO. The Fertilizer Institute.
Corn, wheat, and soybean plantings drive U.S. fertilizer demand and it is this influence that results in crop and fertilizer prices being highly correlated! That is, when crop prices rise, fertilizer prices also generally rise as fertilizer demand increases!

Price Correlations:
- Fertilizer and 3-crops: 0.888
- Fertilizer and corn: 0.847
- Fertilizer and wheat: 0.858
- Fertilizer and soybeans: 0.861
However, despite the high correlation between crop and fertilizer prices, supply side factors are just as important and ultimately, it is both demand and supply factors which determine the market price of crops and fertilizer. Thus, as can be seen in the chart, crop and fertilizer price changes do not always track one another!

Price Correlations:
Fertilizer and 3-crops: 0.888
Fertilizer and corn: 0.847
Fertilizer and wheat: 0.858
Fertilizer and soybeans: 0.861
NITROGEN (N)
is a primary building block for all organisms. It is essential to making proteins, helps keep plants green and is a critical component of soil structure.

COMES FROM THE AIR

$\text{NH}_3$
(anhydrous ammonia)
Energy Requirements:

Electricity is used to power draglines, shovels, pumps, and other beneficiation equipment.

Draglines operate on electricity and account for about 80% of the total energy use per ton in surface phosphate mining.

Mining requires > 95% of the total energy used.

Beneficiation (testing, flotation, & washing) accounts for < 5%.
POTASH PRODUCTION

Energy Use by Type

- Natural Gas, 77%
- Electricity, 20%
- Other (diesel, propane, and fuel oil), 3%

Energy Benchmarking: Canadian Potash Production Facilities, Natural Resources Canada and the Canadian Fertilizer Institute, 2004.
## Fertilizer Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  P₂O₅  K₂O</td>
</tr>
<tr>
<td></td>
<td>percent</td>
</tr>
<tr>
<td>Anhydrous Ammonia</td>
<td>82  – 0  – 0</td>
</tr>
<tr>
<td>Urea</td>
<td>46  – 0  – 0</td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>34  – 0  – 0</td>
</tr>
<tr>
<td>Nitrogen Solutions</td>
<td>28-32  – 0  – 0</td>
</tr>
<tr>
<td>Ammonium Sulfate</td>
<td>21  – 0  – 0</td>
</tr>
<tr>
<td>Di-ammonium Phosphate</td>
<td>18  – 46  – 0</td>
</tr>
<tr>
<td>Mono-ammonium Phosphate</td>
<td>11  – 52  – 0</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>0  – 0  – 60-61</td>
</tr>
<tr>
<td>Potassium sulfate</td>
<td>0  – 0  – 50</td>
</tr>
<tr>
<td>Multiple-nutrient Grade</td>
<td>9  – 23  – 30</td>
</tr>
<tr>
<td>Multiple-nutrient Grade</td>
<td>10  – 10  – 10</td>
</tr>
</tbody>
</table>
Global Producers - 2020

**Ammonia**
1. China: 29%
2. Russia: 11%
3. USA: 9%

**Urea**
1. China: 31%
2. Russia: 14%
3. USA: 6%

**Processed Phosphates**
1. China: 41%
2. Morocco: 14%
3. USA: 11%

**Potash**
1. Canada: 32%
2. Russia: 19%
3. Belarus: 17%

1/ DAP, MAP, and TSP.

Source: International Fertilizer Association (IFA).
A Look Back...
From mid-2019 to mid-2020 fertilizer prices were at some of their lowest levels in many years!

Source: Green Markets.
Fertilizers

The World Bank’s Fertilizer Price Index dropped 4.5 percent in the first quarter of 2020 (q/q), the seventh consecutive quarterly decline. A fall in potash and urea prices, owing to a slump in demand, pushed the index lower. However, phosphate prices increased as the COVID-19 outbreak in China severely hampered production and disrupted supply chains. In 2020, the index is projected to fall by 9.9 percent as global fertilizer supply remains plentiful. Risks to this outlook are broadly balanced. Upside risks include prolonged widespread supply disruptions, while downside risks include a slower-than-expected recovery in demand.
Production Planning

IFA GLOBAL FERTILIZER DEMAND FORECASTS

Outlook Declines Significantly!

Report Released December 2019

Report Released July 2020

Source: International Fertilizer Association (IFA)
Production Planning

IFA GLOBAL FERTILIZER DEMAND FORECASTS

Outlook Improves Significantly!

Report Released July 2020

Report Released November 2020

Source: International Fertilizer Association (IFA)
Corn – Season Average Price Forecast by USDA

Lowest S.A. Price Since 2006/07

$3.36  $3.61  $3.56  $3.20  $3.20  $3.35  $3.10

17/18  18/19  19/20  20/21  20/21  20/21  20/21  20/21  20/21  20/21  20/21  20/21  20/21  20/21

Source: WASDE, USDA.
Corn – Season Average Price Forecast by USDA

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Price / bushel</th>
</tr>
</thead>
<tbody>
<tr>
<td>17/18</td>
<td>May</td>
<td>$3.36</td>
</tr>
<tr>
<td>18/19</td>
<td>Jun</td>
<td>$3.61</td>
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<tr>
<td>19/20</td>
<td>Jul</td>
<td>$3.56</td>
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<tr>
<td>20/21</td>
<td>Aug</td>
<td>$3.20</td>
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<tr>
<td></td>
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<td>$3.35</td>
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<td></td>
<td>Nov</td>
<td>$3.50</td>
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<td>$3.60</td>
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<td>Jan</td>
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<tr>
<td></td>
<td>Mar</td>
<td>$4.00</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
<td>$4.00</td>
</tr>
</tbody>
</table>

Source: WASDE, USDA.
USDA Forecasts Higher Crop Prices for Second Year!

Season Average Crop Prices

Source: WASDE, USDA.
PRODUCING FERTILIZER TAKES ENERGY!
• Source of the nitrogen in fertilizer => **FEED the WORLD!**
• Grade/analysis: 82-0-0 => 82 % N; 1 short ton NH₃ = 1,640 lbs. N
• Haber-Bosch process (Fritz Haber-1909/Carl Bosch–1913-Oppau, Germany)
• ~ 33 MMBtu’s natural gas per material ton of ammonia
Natural Gas as a Share of Ammonia Production Cost

~33 MMBtu per material ton ammonia

~40% for fuel
~60% for feedstock

Source: TFI Production Cost Surveys
Number of U.S. Ammonia Plants vs. Price of Natural Gas

U.S. Ammonia Production

- 44% or nearly 7.7 million tons of ammonia

U.S. Nitrogen Sources - Ammonia Production and Total N Imports

Number of U.S. Ammonia Plants vs. Price of Natural Gas

U.S. Nitrogen Sources - Ammonia Production and Total N Imports

Ammonia Production
Nitrogen Imports
Imports as share of Total

Share of World Crop (2020/21) and Fertilizer Products (2020) Traded

Average = 22%
604 MMT Crops

- Rice: 10%
- Corn: 16%
- Wheat: 26%
- Cotton: 43%
- Soybeans: 45%

Averages computed as total exports (crop or fertilizer material) divided by total production.
Share of World Crop (2020/21) and Fertilizer Products (2020) Traded

- **604 MMT Crop Exports**
  - Average = 22%

- **176 MMT Fertilizer Exports**
  - Average = 44%

### Share of Global Production Exported

<table>
<thead>
<tr>
<th>Crop</th>
<th>Rice</th>
<th>Corn</th>
<th>Wheat</th>
<th>Cotton</th>
<th>Soybeans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exported</td>
<td>10%</td>
<td>16%</td>
<td>26%</td>
<td>43%</td>
<td>45%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fertilizer Products</th>
<th>Ammonium Nitrate</th>
<th>Urea</th>
<th>Nitrogen Solutions</th>
<th>Ammonium Phosphates</th>
<th>Ammonium Sulfate</th>
<th>TSP</th>
<th>Potash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exported</td>
<td>18%</td>
<td>29%</td>
<td>31%</td>
<td>48%</td>
<td>52%</td>
<td>69%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Averages computed as total exports (crop or fertilizer material) divided by total production.
Transportation Costs
- Ocean freight rates
- Rail rates
- Barge rate
- Truck rates

Source: International Fertilizer Association (IFA)
Global Importers - 2020

Ammonia
1. India 14%
2. USA 13%
3. Morocco 10%

Processed Phosphates¹/
1. Brazil 20%
2. India 16%
3. USA 6%

Urea
1. India 20%
2. Brazil 14%
3. USA 9%

Potash
1. Brazil 20%
2. USA 17%
3. India 9%

¹/ DAP, MAP, and TSP.

The USA is a Large Importer of fertilizer, particularly Nitrogen and Potash!

Source: International Fertilizer Association (IFA).
Commodity prices, like fertilizer, tend to converge globally!

Source: Monthly averages computed from weekly prices reported in Green Markets (A Bloomberg Company).
Global Fertilizer Prices, December 10, 2021

Urea

<table>
<thead>
<tr>
<th>Region</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Gulf NOLA</td>
<td>$700.00</td>
</tr>
<tr>
<td>Brazil</td>
<td>$720.00</td>
</tr>
<tr>
<td>Black Sea Prill</td>
<td>$740.00</td>
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<tr>
<td>Middle East</td>
<td>$760.00</td>
</tr>
<tr>
<td>China</td>
<td>$800.00</td>
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</table>

DAP

<table>
<thead>
<tr>
<th>Region</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Cornbelt</td>
<td>$740.00</td>
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<tr>
<td>Brazil</td>
<td>$760.00</td>
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<tr>
<td>Morocco</td>
<td>$780.00</td>
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<tr>
<td>India</td>
<td>$800.00</td>
</tr>
<tr>
<td>China FOB</td>
<td>$840.00</td>
</tr>
</tbody>
</table>

Potash

<table>
<thead>
<tr>
<th>Region</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Cornbelt</td>
<td>$820.00</td>
</tr>
<tr>
<td>Brazil Bulk CFR</td>
<td>$840.00</td>
</tr>
<tr>
<td>Rondonopolis, BR</td>
<td>$860.00</td>
</tr>
</tbody>
</table>

Source: GreenMarkets
Henry Hub Natural Gas Spot Price
Monthly Average, June 2020 - Nov. 2021

Domestic Natural Gas Prices Triple Since mid-2020!

Source: Energy Information Administration.
European Natural Gas Prices Hit New Record on December 14th!
Up > 6-fold in 2021!

Source: NY Mercantile Exchange.
Cost of Major Inputs into DAP Production

- Cost of Major inputs > triple!
- Excludes all other costs!

<table>
<thead>
<tr>
<th>Input</th>
<th>June 2020</th>
<th>December 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphate rock</td>
<td>$117</td>
<td>$274</td>
</tr>
<tr>
<td>Sulfur</td>
<td>$21</td>
<td>$70</td>
</tr>
<tr>
<td>Anhydrous ammonia</td>
<td>$43</td>
<td>$226</td>
</tr>
</tbody>
</table>

$50 $100 $150 $200 $250 $300 $350 $400 $450 $500 $550 $600 $650

June 2020

December 2021
Turnarounds

Delays pandemic related!

3 - 4 year maintenance schedule:
=> 25-33% of industry down for some time annually
• Down for 30 – 60 days
• Pipes and other parts, which can burst, need to be replaced
• Safety/prevent loss of life – high pressure/temp. - explosions
• Shortages of parts, labor, and engineers
  - many engineering firms in Europe
  - most parts from Italy, China, etc.
• Jan 2020 – ammonia/urea plant – Namrup, India (10+ miles!)
Weather Events
Nitrogen production down 2% in FY2020/21 compared to FY2019/20

250,000 less short tons N in February vs. the average of 2017-2020.

Source: The Fertilizer Institute (TFI).
Hurricane Ida - August 26 – September 4

FOR IMMEDIATE RELEASE
September 8, 2021

EIA expects higher natural gas prices as production reductions remain following Hurricane Ida

Hurricane Ida contributes to higher natural gas prices
by Jeff Delia Rosa (JDeliaRosa@nvwaaj.com)  September 8, 2021 1:39 pm  191 views

Hurricane Ida Hit An Important Oil And Gas Hub, Which Will Likely Drive Up Gas Prices
September 1, 2021 - 4:40 PM ET
Heard on All Things Considered

U.S. farmers face supply shortages, higher costs after Hurricane Ida
By P.J. Huffstutter and Mark Weinraub
Trade Disruptions
### Phosphate Countervailing Duty Calendar of Events

**Investigations Nos. 701-TA-650-651 (Final Countervailing Duty-CVD)**
Phosphate Fertilizers from Morocco and Russia

<table>
<thead>
<tr>
<th>Effective date</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 26, 2020</td>
<td>Petitions filed with Commerce and the Commission; institution of Commission investigations (85 FR 40319, July 6, 2020)¹</td>
</tr>
<tr>
<td>July 16, 2020</td>
<td>Commerce’s notice of initiation of CVD investigations (85 FR 44505, July 23, 2020)</td>
</tr>
<tr>
<td>August 10, 2020</td>
<td>Commission’s preliminary affirmative determinations (85 FR 49394, August 13, 2020)²</td>
</tr>
<tr>
<td>November 23, 2020</td>
<td>Scheduling of final phase of Commission investigations (85 FR 79033, December 8, 2020)</td>
</tr>
<tr>
<td>November 30, 2020</td>
<td>Commerce’s preliminary affirmative CVD determinations (85 FR 76522 and 85 FR 76524)³</td>
</tr>
<tr>
<td>February 9, 2021</td>
<td>Commission’s hearing</td>
</tr>
<tr>
<td>February 16, 2021</td>
<td>Commerce’s final affirmative CVD determinations (86 FR 9479 and 86 FR 9482)⁴</td>
</tr>
<tr>
<td>March 11, 2021</td>
<td>Commission’s affirmative vote</td>
</tr>
<tr>
<td>March 31, 2021</td>
<td>Commission’s views to Commerce (86 FR 17642, April 5, 2021)⁵</td>
</tr>
<tr>
<td>April 7, 2021</td>
<td>Commerce’s final CVD duty orders (86 FR 18037)⁶</td>
</tr>
</tbody>
</table>

¹ Petition filed by Mosaic Company, Plymouth, Minnesota.
² Commission determination of reasonable indication of material injury.
⁵ Commission determination of material injury to the U.S. industry.

U.S. DAP and MAP Imports, 2013 – 2021 Q3

U.S. P2O5 Imports:
Q1-Q3 2021 vs. Q1-Q3 2020 = up 43%

2021Q4 - 2021Q3
U.S. imports from:
- Saudi Arabia
- Jordan
- Australia
- Mexico
- Lithuania
- Egypt
Belarus Sanctions

EU sanctions expected to hit Belarus's potash, oil and finance
By Victoria Walden and Robin Emmott

UPDATE 1-Belarus potash exporter says sanctions will increase global prices
By Reuters Staff

Belaruskali Named in Biden Sanctions
China Curbs Exports

**Global Phosphate Exports**
- China: 25%
- Rest of the World: 75%

**Global Urea Exports**
- China: 10%
- Rest of the World: 90%

---

**Producers Face Fertilizer Price Squeeze**

China Phosphate Fertilizer Export Freeze Adds to Global Supply Challenges

Published date: 30 Oct 2021

China's General Administration of Customs will start inspections on fertilizer exports from 15 October, according to an official notice published today.

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Chinese urea futures slide from record highs on new export measures

Emily Chiew — Reuters

OCT 14, 2021 6:55AM EDT
Russia Restricts Exports

Global Ammonia Exports
- Russia: 23%
- Rest of the World: 77%

Global Urea Exports
- Russia: 14%
- Rest of the World: 86%

Global Phosphate Exports
- Russia: 10%
- Rest of the World: 90%

Global Potash Exports
- Russia: 21%
- Rest of the World: 79%

03 Nov 2021

Russia to impose export quotas on nitrogen, complex fertilizers

November 3, 2021

Russia to Impose Nitrogen, Complex Export Quotas

November 3, 2021

Russia halts nitrogen, phosphate fertilizer exports to support local farmers

Market

Russia sets 6 month quotas for fertilizer exports from Dec. 1

3 Nov 2021 | Masha Belikova
Additional Market Impacts

India Approves $3.8 B Increase in Fert Subsidy

India will provide an additional 286.55 billion rupees ($3.8 billion) to fertilizer companies as compensation for selling products at lower than market prices to farmers, according to Bloomberg citing a government statement said.

A cabinet meeting chaired by Prime Minister Narendra Modi approved the enhanced subsidy for winter-sown crops late Tuesday. The subsidy on DAP is being raised by 438 rupees per bag and 100 rupees per bag for nitrogen, phosphorus and potassium fertilizers.

=> Artificially holds up demand!  => Supply Disruption!

Egypt: Tighter regulations imposed on fertilizer producers

Fresh regulations have been imposed on Egyptian fertilizer producers to ensure domestic supply, according to local sources.

Global Urea Exports

- Egypt: 9%
- Rest of the World: 91%

→ Market tightens further!
KANLAYA BARR
Senior Economist
John Deere
Supply Chain and Machinery Demand in 2022

Kanlaya Barr, Ph.D.
Lead Economist
Supply Chain and Machinery Demand in 2022

- General economic recovery continues, but slower pace
- Supply chain disruption continues, some relief starting H2
- Ag machinery demand remains strong
- Path of the virus and weather remain crucial
High frequency indicators shows a pickup in mobility

Source: Cleveland research, 20 November 2021
Resurgence of COVID-19 in various geographies could impact supply chain and global recovery throughout 2022
U.S. economic recovery continues in 2022 at a slower pace
Consumers: Household income and saving rate decline as stimulus impact wanes and the economy reopens

Source: FRED, Nov 24, 2020
Labor market: Wage growth still has further room to run. Labor supply should improve throughout 2022.

Source: IHS Markit forecast, 15 November 2021
Input cost growth remains well above trend amid tight material and labor availability
Inflation and interest rate: Persistent inflation could force Fed to raise interest rate sooner

Source: Capital Economics, Refinitiv, 20 November, 2021

Source: IHS Markits, 15 November, 2021
Used equipment market remains tight

Year Over Year Auction Price and Volume Trends
Jan. – Nov. 2020 vs Jan. – Nov. 2021

- Compact: -12%
- Utility: -18%
- Row Crop: 27%
- 4WD: 7%
- 300+ HP: 12%
- Planters: 6%
- SP Sprayers: 16%
- Combines: 10%

% Change Price  % Change Volume

TractorZoom
WHERE DATA MEETS REALITY

121  Farm Foundation: Supply Chain and Machinery Demand in 2022
Ag industry looking strong in 2022

Source: Deere and company earnings call, November 2021
Supply Chain and Machinery Demand in 2022

- General economic recovery continues, but slower pace
- Supply chain disruption continues, some relief starting H2
- Ag machinery demand remains strong
- Path of the virus and weather remain crucial
THANK YOU!

Support our Mission
- Become a Friend of Farm Foundation
- See the link in the chat function

We hope to see you at a future event!

#FarmFoundationForum