



INTERNATIONAL HONEY MARKET

by RON PHIPPS

***The door to the adulteration of honey must be closed
and the door to the positive and creative marketing of authentic honey
in its natural diversity and charm thrown open.***

The overall global honey market has received growing attention from the media, governments, scientific laboratories, legal professionals and beekeeping associations. The prestigious *Economist* magazine reported in August 2018, on “The Scourge of Honey Fraud.” A report from the Australian media came out on “Buying Fake Honey...” Leading news sources in India raised concerns about adulteration of honey in the Indian domestic market in their April 2018, article “Is your honey pure enough?”

Food authenticity is a subject of many media reports in America and Europe. The importance of bees to food security and ecological sustainability is often highlighted in American news reports and advertisements. The World Honey Congress is devoting attention to the problem of adulteration of honey and the future of beekeepers. All this media attention and policy awareness suggests a sea change is emerging.

Deepening the definition of authentic honey, analyzing the sophisticated modes of modern adulteration in the market, and reviewing more powerful methods of detecting honey adulteration are activities being vigorously undertaken by the US Pharmacopeia (USP). Professor Norberto Garcia will serve as chair of USP’s honey group and Prof. Dr. Stephan Schwarzinger will add his scientific expertise on the biochem-

istry of honey. Dr. Schwarzinger is the author of “Large-scale Screening of Food Products for Quality and Authenticity” which states that “NMR spectroscopy... has recently been introduced into food science for screening large sets of samples. ...NMR indeed may be regarded as one of the most important technologies for obtaining large-scale data sets of foods.”

We note that Prof. Michael Roberts of the Resnick Program for Food Law and Policy at the UCLA School of Law, an expert on food fraud, in his excellent paper “Recommended Strategies to Address Economic Adulteration of Honey” (2017), recommended that the honey industry

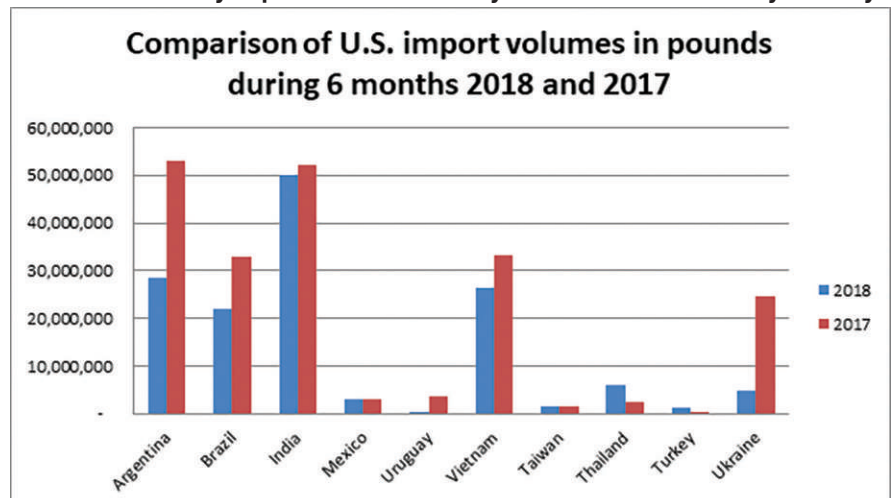
can “complement support of NMR by engaging with USP on standards development and testing strategy.”

1) US IMPORT TRENDS

US import volumes from all countries fell about 25% in the first half of 2018 to 177,340,025 lbs. compared to 237,224,927 during January to June 2017. Imports from India reached 50,000,000 lbs. for the first 6 months of 2018, occupying 28% of the market for that period, almost double the volume from Vietnam. Import volumes from Argentina and Brazil were reduced to 16% and 12% market shares, respectively, for the same period.

US commercial beekeepers have reported that in the Dakotas their

Chart 1. U.S. Honey Import Volumes January to June 2018 and 2017 by Country



2018 white clover honey crops were 25% lower, and in some areas 50% lower, than in 2017. Despite the significant reduction in the white clover crop, the prices offered by leading packers fell about 10% compared to 2017 prices. This anomaly reflects the continuing negative impact of the international honey market on domestic honey prices.

During 2018, the market share of India increased from 22% to 28% and Vietnam from 14% to 15%; in contrast market shares for Argentina dropped from 22% to 16%, Brazil from 14% to 12%, and Ukraine dropped from 10% to 3%, respectively.

By mid-September, as the American honey crop was completed, offers appeared from India (Extra Light Amber at \$0.90-95/lb.), Ukraine (ELA at \$0.90-95/lb.), Vietnam (LA at \$0.70-75/lb.) and Thailand (ELA in the mid \$0.80 range).

2) THE ASIAN MODE OF HONEY PRODUCTION.

As cited in previous reports and meetings, some Asian exporters have indicated that they are following the “China Model” and extracting immature uncapped honey at high moisture. Some want to use the euphemism “industrial honey” to describe such honey. But honey must be authentic irrespective of its quality, color or use. In China, as has been witnessed by American and European beekeepers, honey is typically extracted at very high moisture and reduced in what Walter Haefeker, President of the European Beekeeping Association has aptly called “beehive factories.” Such honey is explicitly called “water honey” in China.

Vietnamese exporters have said that they could extract mature, capped honey, but it would take much longer, and it would result in significantly higher prices. The prices of mature honey would be higher than US importers and pack-

Chart 2. Percentage of moisture in harvested honey (laboratory data)

Zone	2013	2014	2015	2016
West	15.6-17 %	16-18%	15-17%	17%
Central	16-17%	18%-19.4%	19.4-18%	18.5%
Subtropical	16.6-18 %	18%-19%	17-18%	16-18%
East	17%	18%	16%-17%	18-19%

Source: PhD Thesis, Argentina

ers are willing to pay. Indian exporters have publicly said that all Indian honey is extracted immaturity. Some Asian exporters have erroneously argued that this is the only possible way to produce honey in countries that are close to the equator.

The South Korean Beekeeping Association explicitly distinguishes mature honey from immature honey in statements on their public website, indicating that “immature honey, which lacks vitamins and minerals, is harvested every 2-3 days, and the moisture level is decreased artificially, whereas bees fan the honey to evaporate extra moisture for mature honey.” They furthermore cite the fact that “mature honey has characteristics that are superior to those of immature honey and commands much higher prices.”

3) MODES OF HONEY PRODUCTION IN TROPICAL REGIONS

Prof. Enrique Bedascarrasbure of Argentina has studied the production of honey in tropical regions. The harvest of honey in tropical areas can occur within 7 days in some regions, and in equatorial Costa Rica, within 21 to 30 days. Data has been provided from a doctoral study on the production of honey from 2015 to 2017, indicating that the average moisture level of extracted honey in tropical regions of Argentina is 18.9%.

Dr. Bedascarrasbure advocates that honey meet the definition of the Codex, where nothing, including water may be added or subtracted: “Honey is the natural sweet substance produced by honey bees from the nectar

of plants or from secretions of living parts of plants or excretions of plant sucking insects.”

4) CONSEQUENCES OF ECONOMICALLY MOTIVATED ADULTERATION (EMA)

The extraction of immature honey vs. mature honey is not a matter of geography, but a matter of economics. To produce genuine authentic honey in certain regions requires additional time. The production of immature honey also occurs in areas at latitudes very far from the equator, including in China and South Korea, as cited above. The quantities of mature, authentic, fully capped honey that can be produced at tropical latitudes may be far less than the quantities produced at latitudes very far from the equator, in countries such as Canada, the US, Argentina, Germany, Hungary, etc. Just because it is harder does not give these countries a license to produce fake and adulterated honey. It is the prevalence of non-authentic honey sold as the genuine article that creates the glut of supply. This cheap “honey” has caused a tremendous collapse in honey prices, which in turn threatens the welfare and financial viability of beekeepers producing genuine honey around the world.

There are three modern modes of honey adulteration which have increased over recent years. All three have contributed to a collapse in the honey prices and decreased incentive to produce genuine honey. These three modes of adulteration are 1) the creation and blending of inexpensive bio-engineered sweeteners that mimic the sugar profile of genuine honeys, 2)

Chart 3. Non-Traceability

The major purveyor of resin technology, China’s Sunresin, proudly advertises their ability to both “get rid of the barriers from US” and apply technology to achieve “Non-Traceability in Processed Honey” as the screenshot highlighted below from their webpage demonstrates:

We Sunresin, are the China’s biggest special resin supplier, and also rank the No.1 resin solution provider for beverage and food processing, especially for Juice and Honey business.

For honey, our products can effectively remove the antibiotics in honey, so that honey product can be exported to US and EU. With our effort, many honey companies and juice producers of many countries are successfully getting rid of the barriers from US due to the restrictions on antibiotics.

the use of resin technology to remove or reduce illegal residues, pesticides, and antibiotics, to lighten the color of honey, and remove unattractive flavors and aromas and 3) the extraction under the “Chinese” or “Asian” model of immature, unripened honey, which is dehydrated to the correct consistency post-extraction. The price of these sweetener syrups advertised on Alibaba, the business website, is as low as \$500 per ton or \$0.23/lb., and they are specifically engineered to elude detection.

Resin technology is also advertised as being able to remove HMF, so that very low levels of heating appear to have been used, and the extraction of immature honey appears to be absent. The Sunresin claim that “the use of resin technology for honey has been approved by the US FDA” was refuted. As cited in the April 2016, issue of the ABJ, the FDA asserted “calling the product that has been treated with the resin technology simply “honey” would not accurately identify the food. ...The product should be labeled with a name that sufficiently describes its characterizing properties in a way that distinguished it from honey which has not been treated with resin technology.”

Statement regarding resin technology on Alibaba:

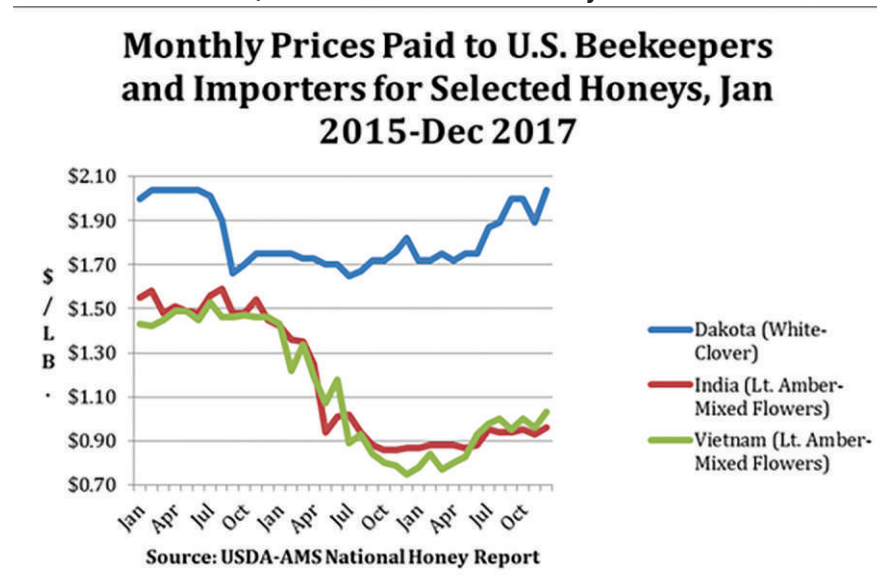
Seplite LSF941 adsorbent resin can effectively remove the HMF in honey, after treatment by our resins, the HMF level can be reduced to less than 10mg/kg Which makes the honey meet the food standard of USA and Europe market.

Seplite LSF941 adsorbent resin have been widely used in the honey processing industry in China, and it is also successfully applied in Asia, Europe, Africa and etc.

The consequences of the continued employment of the three modes of adulteration are: 1) there is no ceiling to available quantities for purchase, 2) no floor to the prices, with a downward rush apparent, 3) no limits to illicit profits for those who collude to adulterate honey, and 4) no future for honest beekeepers.

If a person has a serious medical problem, few people would use the medical technology of 50 or 100 years ago to diagnose, understand the causes or craft the cure for that

Chart 4. Prices of U.S., Indian and Vietnamese honey 2015-2017



medical condition. Instead patients want doctors and hospitals which have the most modern and sophisticated technology and methodology for medical treatment. We should follow in the footsteps of the medical profession and embrace new technological advances for ensuring the purity of our product, as Prof. Roberts has described in his book *Food Law in the United States* (2016) and in lectures and conferences all over the world. The international food industry must employ the broadest range of expertise in order to overcome the epidemic of food fraud.

Dr. Schwarzinger states: “NMR indeed may be regarded as one of the most important technologies for obtaining large-scale data sets of foods. This has been attributed to technological advancements, which allow ease of operations, but most importantly, to novel analytical challenges in the food sector: food fraud – that is unlawful declaration of a product pretending a higher quality, extra purity, a specific variety, origin, method of production, etc. – which has been a growing threat in the industry... The loss in consumer confidence even affects producers and trade who produce in accordance with guidelines and regulation.”

Despite the prominence of the use of NMR in the food industry, efforts continue to disparage and delay implementation of NMR in the honey industry. This is not because of a weakness of NMR, but precisely because of its unprecedented power to expose illicit modes of production and sophisticated modes of adultera-

tion, which plagues and distorts the international honey markets.

The continuous availability of large quantities of adulterated honey in the international market manifests the failure of an industry to effectively police itself. Concurrently major retailers, food service and manufacturers using honey as an ingredient are concerned about their social responsibilities, which in the case of honey, extend far beyond the confines of the honey industry and into issues of Food Fraud, Food Security and Ecological Sustainability. These concerns exist within the demographic context of consumers demanding integrity and authenticity in respect to food, labeling, purity and safety.

5) HONEY MARKETS IN SEVERAL COUNTRIES

US Honey

Dr. Stan Daberkow, economist emeritus of the US Department of Agriculture has provided an economic analysis of US honey prices:

A Tale of Two Markets

American honey consumption in 2017 was estimated at nearly 600 million lbs. — a 22% increase over 2016. Greater honey consumption was made possible, not via domestic beekeepers, but from imports. These imports now account for 75 % of US consumption — up from about 60 % in 2010. In 2010, the difference between the imported price per lb. of honey from all countries and prices paid to beekeepers was about \$.40 per lb. but grew to around \$.90 by 2017.

India and Vietnam combined represented about 40% of all US imports and the CIF value per lb. of their honey is the cheapest source among all the major bulk exporters to the US. In 2017, beekeepers reported selling directly to retail customers for prices ranging from \$3.80. to \$6.24 per lb., depending on the honey's color class, compared to the average price for all honey sold at \$2.17. In 2010, the difference between domestic honey and Indian honey was \$.42 per lb., but by 2017 the spread had grown to \$1.23. Similarly, that spread for Vietnamese honey had more than doubled from \$.55 to \$1.36 per lb.

When market prices decline it can typically be traced to reduced costs of production or a decline in demand somewhere in the market chain. In the case of honey, we see a continued growth in demand as reflected in increased consumption. While US beekeepers recently received only modestly higher prices for their product and bulk import prices were near record lows, retail honey prices have shown steady increases since 2010.

India exported about 89 million lbs. of bulk light amber and extra light amber honey to the US in 2017. Let's assume that only 25% of that honey, or 22 million lbs., wound up on retail grocery shelves, a modest amount. If all the actors in the honey marketing chain were willing to accept Indian honey rather than US honey for their retail product (and retail prices did not reflect the cheaper honey source), the importer, packer, grocery outlet, or others in the marketing chain could have reaped a \$27 million windfall.

Over the last few years, prices paid to beekeepers have followed much different price patterns than that of imported honey, although there is some evidence that domestic prices have been adversely impacted by imports. Evidence of significant levels of imported adulterated honey leads to questions about whether one can legitimately compare imported and domestic honey prices when the two products are not equivalent in authenticity.

ARGENTINA

Argentina's economy is in great turmoil, and the peso is down by nearly 50% since January 2018. Inflation estimates for 2018 have been readjusted to almost 40%. The International Monetary Fund has come to the rescue of Argentina, but at a great price. In early September, the Argentine

government imposed an export tax of 12% on many commodities, including honey. One prominent exporter asserted: "We were watching TV and suddenly the playing field changed!"

Estimates of the present crop are between 60,000 and 65,000 tons. Domestic prices have firmed up due to the lack of offers of honey for sale from producers and limited unsold supply of this crop. As of July, exports to the US represented 47% of all of Argentina's honey exports. Prices in the first half of 2018 were up over 20% on average compared to 2017, and with the abrupt imposition of the export tax, price increases of about 10% were projected for late 2018. Despite the price increases, demand from Japan is strong for very white honey, demand from Europe is stable and quality requirements are high.

BRAZIL

Exporters commented in September "the prices for organic honey could go up soon as there won't be much light amber organic available in the upcoming months since most suppliers have cleared their stocks with honey from previous crops." In June 2018, US imports of organic honey from Brazil reached 9,015,821 kilos, and Brazil's total exports of honey from January to August 2018, were nearly 39,000,000 lbs. (17,664,233 kilos).

Brazilian honey exporters remain concerned that the temptation in other nations to adulterate organic honey with conventional honey remains, though that temptation has diminished as the price differential between organic and conventional honey has collapsed.

MEXICO

US imports from Mexico were 3,153,000 lbs. in the first half of 2018, up from 2,913,000 in the first half of 2017. Colors were primarily white and extra light amber, with some volume of organic.

Mexican beekeepers are hoping to reduce or eliminate planting of GMO crops in Mexico. This is in direct response to demand from Europe, which is Mexico's largest and most lucrative market. European consumers are concerned about potential negative health impacts of genetically modified crops and so are demanding more organic and GMO-free foods.

After working with numerous scientists, leaders of beekeeping in Mexico have become very concerned about the inability of the LC-IRMS

C3/C4 test to reveal adulteration under 49% and have expressed a strong preference for NMR testing.

AUSTRALIA

- STRIKING DEVELOPMENTS -

The Australian honey market has received unexpected and dramatic attention because of widespread publicity centered on the country's largest supermarket chains facing accusations of "unwittingly selling fake honey" (*Fairfax Media*, Sept. 3, 2018). "Testing at a leading international honey lab specializing in honey fraud detection, analyzed that almost half of the samples collected from supermarket shelves were adulterated." The Australian packer involved "strongly denied any issues with its products and criticized the type of test - known as Nuclear Magnetic Resonance."

Philip McCabe, the President of Apimondia, believes that "the NMR test is the most accurate available and thinks consumers are not getting what they paid for."

"QSI lab was commissioned by the law firm King, Woods and Mallesons, to conduct 2 types of test of the sampled honey. One used NMR screening and the second used the official C4 sugar test. ...Using the NMR testing the results showed that 12 of the 28 samples tested were not 100% pure honey. The same 28 samples were then tested using the official Australian test, C4, and all passed. ...QSI's managing director, Gudrun Beckh, who has been testing honey for almost 30 years, said she was confident in the NMR test findings. ...Fake honey always existed, but in the past years it is a growing problem because of the people who adulterate using more and more sophisticated methods. ...In the tested samples, it was the Chinese aspect of the honey that was adulterated, not the Australian honey. ...There is a groundswell of international experts, academics and private companies increasingly relying on NMR as the test of choice for detecting fake honey. Apimondia, the peak body for the sector internationally, recently said it would use NMR screening as part of its new honey competition rules. ...the Australian Bee Industry Council wrote to the Australian Department of Agriculture and Water Resources in July, requesting the review of the way it tests honey, ditching the old C4 test and moving to NMR."

Leading Australian brands that were previously dismissive of NMR

have been forced to recognize its efficacy as Australian retailers and consumers are now demanding more rigorous testing methodologies with NMR at the forefront.

Since about 70% of Australian food production depends upon pollination of crops by bees, the impact of Australian beekeepers competing against adulterated honey is significant. The honey from the Australian retail market, which was tested as adulterated was said to contain 70% Chinese honey.

McCabe, also President of the Irish Federation of Beekeepers, has estimated that at least 30% of the products sold as "honey" in the international honey market are adulterated in multiple forms, which is fraud. There is a video on YouTube from the Australian Broadcasting Corporation (www.youtube.com/watch?v=gafNOtcShyl) about the economically motivated adulteration of honey in Australia which includes the assertion: "the consumers are completely blind to what is happening as a race to the bottom proceeds."

"Honey fraud has become a phenomenon that is nearly out of control" stated Norberto L. García (2018) in his articles *The Current Situation on the International Honey Market*, *Bee World*.

The internationally acclaimed documentary on honey available on Netflix, "Rotten", released in 2018, opens with the calm assertion: "It is fraud, and it is a crime." President McCabe, during his public comment to the Australian media, indicated that the phenomena of economically motivated adulteration is so pervasive that it is being referred to Interpol.

INDIA

In 2017, total US honey imports from India reached nearly 100,000,000 lbs., far exceeding imports from India in any previous year. Exporters report that demand for honey from the US for the first quarter of 2019 is up, and the monsoon is favorable for a good crop. Indian government authorities reported honey production in the financial year 2016-2017 at 94,500 metric tons (www.zeebiz.com, April 10, 2018).

In August 2018, the Indian press had a major article by a leading Indian authority, Bibek Debroy, on the problem of adulteration of honey within the Indian domestic honey market (*Financial Express*, Aug 9, 2018.) He states: "Apiculture is still so informal

and unorganized that we don't have credible numbers on the number of bee colonies and beekeepers, or the honey produced."

"For that matter, we aren't clear about what we mean by honey, though consumption is increasing because of health reasons." In a general way, everyone knows what honey means. For example, in the Prevention of Food Adulteration Rules (1955), "honey means [a] natural sweet substance produced by honey bees from the nectar of blossoms or from secretions of plants which honey bees collect, transform, and store in honey combs for ripening."

"We are also clear about prohibiting contaminants, adulterants, insecticides and pesticides, although Indian exports have sometimes been banned because exporters violate these norms. There has been a growing concern amongst the public of honey being adulterated with corn or sugar syrup."

"Earlier, the FSSAI didn't have testing methods and parameters to figure out if the honey was authentic or not. ...The revised standard restricts heating or processing of honey to an extent that its essential composition is changed or its quality is impaired."

The solution to the growing concern about adulteration of honey entering the Indian domestic and export markets will inevitably require India's production of honey to conform to international norms, strictly adhere to proper modes of production, and to pass the most sophisticated methods of detection of adulteration.

CHINA

China's honey exports to the world were valued at \$270,000,000 in 2017, making it the largest direct exporter of honey. In some markets, China has created an explicitly 2-tiered market, selling honey that will not pass NMR at a much lower price and in bigger quantities than honey that will pass NMR and other tests.

China's role in the international honey market is more complex than it appears on the surface, since China's acquisition of other honey companies, whether open and direct or hidden through surrogates, allows China to participate more aggressively in the international honey market. As indicated in section 2 & 4, Chinese companies are also involved in exporting sophisticated modes of adulteration. Beekeepers have direct evidence that Chinese companies have exported

resin technology to large honey exporting countries active in the North American market.

"Buying fake honey is as simple as a google search" stated an article in the *Sydney Morning Herald*, which led to an Alibaba page for a Chinese company advertising "Bulk liquid Rice syrup Pass C3 C4." The price of sweetener syrups on Alibaba, the business website, is as low as \$500 per ton or \$0.23/lb. An entire sub-industry focused on promoting sophisticated tools of honey adulteration is clearly active and largely being held unaccountable.

The trade war between the US and China, which includes increased tariffs on \$200 billion of Chinese exports, as the US China Business Council reports, has created a freight frenzy to ship Chinese products into the US before the imposition of import duties on September 23, 2018. "Vessels leaving China for the US are full, deliveries to California ports are surging, and cargo rates are at a 4-year high." If and when the current trade war eases, the underlying tensions between the two economies will remain and undoubtedly flare up. The fundamental reason concerns increased competition as China's economy grows in size and sophistication. These tensions have been exacerbated by food fraud, customs fraud, circumvention and numerous forms of intellectual property rights violations by Chinese companies.

Through both direct investments and the use of surrogates, Chinese companies are acquiring strategic resources, including in the global honey industry. The acquisitions, including in North America, create horizontal and vertical integration. China's heralded New Silk Road has led to huge infrastructure projects in numerous countries and as the recipient countries have become unable to repay their loans, there have been "debt for equity swaps" allowing Chinese entities to acquire ports and airports in Asia and Africa. Public protests have been reported in countries including France, Russia, Vietnam, Australia and New Zealand.

6) MACRO-ECONOMIC PERSPECTIVES

This year the significance of the evolving geopolitical and macroeconomic climate on the international honey market has forcefully asserted itself. The impact is expressed in the volatility of currency fluctuations and the inability to service national and international debt.

International debt levels have reached \$247 trillion (318% of GDP), an increase of more than \$96 trillion compared to a decade ago. The two largest economies, the US and China, have adopted highly accommodative policies in order to sustain growth. In the US, government and corporate debt levels have ballooned to unprecedented levels, in which US government debt has doubled from \$9 trillion in 2007 to \$21.5 trillion in 2018, exceeding 100% of GDP for the first time since WWII. China, which has accounted for 50% of global growth over the last ten years, has achieved this remarkable growth through the issuance of tens of trillions of dollars of debt. According to the Institute for International Finance, between the fourth quarter of 2008 and the first quarter of 2018 China's gross debt exploded from 171 to 299% of GDP.

Unprecedented levels of accommodation afforded by the global debt bubble have begun to recede, declining availability of US dollar liquidity globally has led to contagion in emerging markets, which is most powerfully expressed in dramatic drops in the value of their currencies.

Major honey exporters have experienced significant currency declines, namely Argentina (-50%), Brazil (-21%) and India (-10%).

CONCLUSION

The offer prices cited earlier illustrate the fact that, as 2018 races to its chaotic conclusion, the two-tiered honey market persists. A market persistently involving both authentic and adulterated honey has deep implications to American agriculture, global food security, and ecological sustainability. This situation will not elude notice by retailers, who believe in social responsibilities and consumers, who demand food safety and an end to food fraud.

With discussions started by Dr. Joseph Bowden, Prof. Vaughan Bryan, and others, it has become clear that due to the diversity of the chemical and physical profiles of honey, the industry needs a very vigorous and more comprehensive traceability system. A system which goes beyond mere geographic movements in the buying and selling of honey. Those enhanced traceability systems require reference to floral sources, regions of production, modes of extraction, modes of processing, climate and other variables. These variables must be open and readily available.

Food manufacturers are becoming increasingly concerned about their social responsibilities with respect to growers and small producers. For example, the candy company Mars announced in September 2018, that the cocoa industry's current approach to sustainability has drawn criticism in recent months, as years of scattered actions have done little to improve the lives of farmers and prevent environmental degradation. Under the new sustainability scheme - which will cost the company \$1 billion over 10 years - all the cocoa it buys will be responsibly sourced by 2025.

In earlier writings, Prof. Garcia and I have shown the inexplicable contradictions among 1) huge increases in exports of honey, 2) relative stability of the numbers of beehives, and 3) decline in productivity per hive. These inexplicable contradictions lead to the conclusion that economically motivated adulteration continues to haunt the international honey market. As individuals involved in the beekeeping industry, we must become vocal advocates for better regulations to protect honey's purity.

Mr. Phipps is President and founder of CPNA International, Ltd. He is a former member of the National Honey Board and Co-Chairman of the Committee for the Promotion of Honey and Health. He was a recipient of a National Science Foundation Fellowship in the Philosophy of Theoretical Physics. In 2017 he was appointed Vice President of the Apimondia Scientific Commission on Beekeeping Economy. He has worked with FDA to develop a research protocol for the global diversity of honey. e-mail: info@cpnaglobal.com