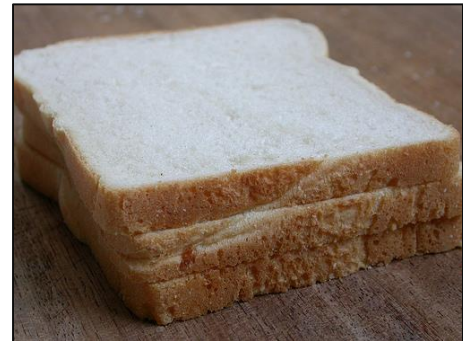


Hidden Hunger: The Irony of a Full Belly

An AGR Thought Piece

Introduction

In January of 2013, an AGR team member attended a Harvard Business School Agribusiness Seminar and was introduced to the Harvard Business School case study: “Royal DSM: Fighting Hidden Hunger.” The case study focuses on this unique form of malnutrition and its effect on global nutrition and the health of future generations.



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Approximately 2 billion people suffer from hidden hunger, a condition caused not by lack of sufficient food, but lack of essential nutrients. Many people are unaware of the condition, both on a global and domestic scale. Hidden hunger doesn't present itself by the gaunt figure of a human lacking food, but often hides within the figure of an obese individual who consumes substantial quantities of food that are virtually empty of the nutritional quality required to sustain a healthy life. To shed some light on this global and domestic problem, AGR Partners has researched the topic to provide important information about the roots of hidden hunger and advances in reducing its prevalence. AGR believes the issue has strong ties to the agriculture and food industries.

In this “thought piece,” we present an overview of hidden hunger and detail why it is important, what is being done to fight it, the essentials for a balanced diet, and information about how investors can allocate capital to companies developing solutions.

What is Hidden Hunger?

Hidden hunger affects one third of the world's population or as many as 2 billion people.¹ It is defined as “a nutritional deficiency caused by the lack of balance in an otherwise full diet,”² which means that people who suffer from hidden hunger are receiving enough calories, but the food they are consuming does not have nutritional value. The nutritional deficiency comes in the form of micronutrient deficiencies, or the lack of essential vitamins and minerals that the body needs to sustain life.³ There are thirteen vitamins that the human body does not naturally produce in adequate quantities: fat-soluble vitamins A, D, E, and K as well as water-soluble vitamins C, B₁, B₂, B₃, B₅, B₆, B₇, B₉, and B₁₂.⁴ Without a balanced diet, the body does not get

enough of these micronutrients and cannot function at optimal levels, which results in developmental issues and a host of diseases related to various vitamin deficiencies.

Because this type of hunger is related to the lack of nutrients, not the lack of calories or food intake, there are few visible signs of hidden hunger. But the health consequences for those who suffer from it can be dire, including irreversible mental and physical impairments. People suffering from hidden hunger do not resemble the typical image of a malnourished person because they are not starving or gaunt. Nonetheless, they are missing essential micronutrients that hinder development and health.⁵ DSM—a global science-based company active in health, nutrition and materials that is active in fighting hidden hunger—asserts that hidden hunger is a form of malnutrition and it *should* be defined as “poor overall quality of nutrition.”⁶

In order for this issue to take center stage as one of the most crucial issues today, the public perception of what hunger looks like needs to be altered. The discovery of hidden hunger was essential to the shift in how world leaders and scientists perceived hunger. It is now understood that hunger is not necessarily related to the *quantity* of food consumed, but the *quality* of food.⁷ This led to the alteration of the kinds of foods the United States and other developed countries provided to developing countries because it became clear that while meals high in carbohydrates relieved under-nutrition, it did not provide the health benefits to sustain a high quality of life. This knowledge has helped markedly improve the food being donated to the developing world through the World Food Programme (WFP) and other philanthropic organizations as people become more aware of the issue.⁸

The people who are most affected by micronutrient deficiencies are young children (under the age of five) and women of child-bearing age. Micronutrient deficiencies impair mental development in 40-60 percent of children in developing countries and cause lack of energy and impairment of health in 500 million women, leading to the death of approximately 60,000 women during childbirth each year.⁹ In addition to these startling numbers, the individual micronutrient deficiencies affect large numbers of children globally and cause a variety of serious medical issues. For example, Vitamin A deficiency affects 40-60% of children under age five in developing countries and 5 million children worldwide suffer from Xerophthalmia, a serious eye condition caused by Vitamin A deficiency that puts children at risk for blindness.¹⁰ One of the most damaging deficiencies is that of Iodine, which lowers an individual’s average intellectual capacity by 10-15 IQ points and is the greatest cause of mental retardation and brain damage worldwide.¹¹

It should be noted that while this issue is more prevalent in developing countries, hidden hunger also affects people in developed countries who suffer from micronutrient deficiencies and stunted potential.¹² The prevalence of food deserts in the United States alone prevents about 9 percent of the U.S. population from consuming proper nutrition, adding to the malnutrition issue in the developed world.¹³ [*Food deserts are defined as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.*]

The main difference between hidden hunger in developing and developed countries is the accessibility of food for the two different populations. Hidden hunger prevalence in both developing and developed countries is caused by a lack of knowledge about food and nutrition, but there is an added element in developing countries, which is that nutritious food is not always available in terms of vicinity and affordability.¹⁴ The population in developed countries has access to nutritious foods, including animal protein and fresh vegetables, but many people do not understand the nutritious value—or lack thereof—of the food they choose to eat. Because of this, hidden hunger in developed countries often takes a different form than it does in developing countries. While stunted growth and diminished mental capacity are signs of hidden hunger in developing countries, obesity and being overweight are signs that essential nutrients are not being consumed in developed countries.¹⁵ Several of the diseases that can be caused by hidden hunger are also caused by obesity, thus the two conditions are highly correlated in the developed world. [See AGR's [Thought Piece on obesity](#).]

First 1000 Days of Life

In 2008, *The Lancet*, a U.K. medical journal discovered that the first 1000 days of a child's life are the most important days for a child to receive proper nutrition in order to avoid permanent brain damage.¹⁶ The implications of this are severe and affect not only the individual child, but also the surrounding society. Without proper nutrients in this crucial window of time, a child has a greater chance of not reaching his/her full potential. These children can place a burden on their communities, impacting the economic health and stability of a society as a whole, especially in the developed world.

The push to find viable solutions to malnutrition and hidden hunger was further incentivized as the potential benefits of eliminating under-nutrition in the first 1000 days greatly outweighs the cost of the solution.¹⁷ In general, enhancing nutrition within the first 1000 days for both mothers and children can help a child live a healthier and more productive life as well as break the perpetual cycle of poverty. Compelling evidence shows that with correct nutrition in this window of time, one million lives would be saved annually¹⁸, the effect of serious diseases like HIV/AIDS would be greatly reduced, the likelihood of developing diseases like diabetes would be reduced, and the educational and earning potential of individuals would increase.¹⁹ In the grand scheme of life, the first 1000 days is a relatively small window; however, it could prove to be the most important 1000 days of a person's life.

Economics of Hidden Hunger

Not only does hidden hunger and malnutrition affect global health, but also the economic health of developing countries. It is estimated that malnutrition can lower GDP by about 2-3

percent, hindering the developing world from reaching full potential.²⁰ With the major impacts on health and the economy, there is great incentive from both a humanitarian and business perspective to create and fund a solution to this growing issue.

The Copenhagen Consensus, made up of a panel of economic and scientific experts, determined that of all the world's pressing issues, solving hidden hunger is the best investment to make because the returns on are extremely high. In their research, they found that every \$1 USD invested would return \$17 USD as the result of a decrease in health spending and an increase in economic productivity and output in the countries receiving the aid.²¹ Such economic growth would stimulate the economies of developing nations, and therefore also increase the prosperity of the world.

DSM's Fight Against Hidden Hunger

With this discovery, several companies and organizations took it upon themselves to be a part of the solution to malnutrition in the first 1000 days of life. One such company is Royal DSM, a global health and nutrition company that has been active in the fight against hidden hunger, especially the Human Nutrition and Health division.

DSM was greatly impacted by the discovery of the importance of the first 1000 days of life. Stephan Tanda, DSM Managing Board member, noted "The significance of the first 1000 days was an epiphany for DSM... If you miss this window, a person is cursed for life. Once we knew this, it created a tremendous burden for us to act."²² As the world's largest supplier of vitamins, carotenoids, micronutrient premixes, and various other health ingredients²³, DSM is well equipped to provide much-needed solutions to micronutrient deficiencies suffered around the world.

To get involved, DSM partnered with the World Food Programme (WFP) and the United States Agency for International Development (USAID). In addition to these partnerships, DSM also has two unique groups within their Human Nutrition and Health division that are critical to finding solutions to hidden hunger: 1) the non-profit, Sight and Life, which is a research group that focuses on improving global nutrition, and 2) the Nutrition Improvement Program (NIP), which is a for-profit group that provides micronutrient solutions to the developing world.²⁴

When Feike Sijbesma, CEO of DSM, attended the World Economic Forum in 2006, he spoke with several African presidents who made it clear to him that the high level of carbohydrates in donated food was contributing to the issue of hidden hunger. Sijbesma realized then that DSM could assist the WFP provide more nutritious food to developing countries. And that's precisely what the partnership achieved.

With the use of DSM's products, the WFP was able to increase the nutritional value of the food donated to developing countries. The DSM-WFP partnership has benefited over 10 million

people²⁵ by providing micronutrient powder appropriations, specialized products for children under two, and a WFP nutrition policy. The nutrition policy ensured that the nutritional value of the food provided to developing countries by WFP was the same as that of the developed world.²⁶ These improvements have allowed DSM and WFP to make great strides towards preventing and reducing the prevalence of hidden hunger.

Balanced Diet

While hidden hunger affects the developing world more than the developed world, there are major issues with nutritional deficiencies seen in the 35.7 percent of people that are obese²⁷ and the 23 million people living in food deserts²⁸ in the United States alone. The issue of malnutrition, and especially hidden hunger, highlights the importance of eating a balanced diet. In order to achieve a balanced diet, however, a person must understand what types of foods they are consuming. There are three macronutrients present in food that provide calories and give energy to the human body: dietary fats, proteins, and carbohydrates.²⁹ In order to have a balanced diet, each of these macronutrients must be eaten in the correct amounts as the foods that contain these macronutrients also contain essential micronutrients that will prevent hidden hunger and malnutrition.

Through our research, AGR has found that few people truly understand the dietary value of the foods they consume. If a person were to use a mobile app like [DailyBurn Tracker](#) to record all foods they consumed over a week, they would likely be surprised with what they were putting in their body. Observations would probably include a recognition that they are getting too many “cheap” nutrients like carbohydrates and sodium, and not enough protein.

Dietary fat can be both helpful and harmful to the body, so people must be aware of the types of fat they are consuming as well as how much they are eating. The body needs some fat since four of the thirteen essential vitamins are fat-soluble, meaning that they must have fat to dissolve into the body.³⁰ There are two main types of harmful dietary fat—saturated and trans fats—and two types of helpful dietary fat—monounsaturated and polyunsaturated fats. Saturated fats are usually found in food from animals and are linked to a higher risk for cardiovascular disease and Type 2 Diabetes because they raise total blood cholesterol and low-density lipoprotein (LDL) cholesterol levels. While some trans fats occur naturally in foods, most trans fat is produced when food is processed through partial hydrogenation of unsaturated fats.³¹ Trans fats also increase the risk of cardiovascular disease and increase levels of unhealthy LDL and decrease High Density Lipoprotein (HDL), a healthy type of cholesterol. On the other hand, monounsaturated fats and polyunsaturated fats have potential benefits that can maintain one’s health. For example, monounsaturated fats can improve blood cholesterol levels, reduce the risk for heart disease, and help with blood sugar control and insulin levels that benefit people who suffer from diabetes. These potentially helpful fats are found in oils as well as various foods like nuts and poultry. In general, the USDA recommends that a person’s

total daily fat intake should be approximately 20-35 percent of their daily caloric intake—based on a 2,000-calorie diet—which is about 44-78 grams of fat daily.³² (For a detailed list, see chart in appendix.) If individuals become more aware of the types of fat they are consuming and limit the intake of unhealthy fat, they will become healthier and more balanced.

While carbohydrates typically have a negative connotation, they are an essential part of maintaining a balanced diet and not all carbohydrates should be viewed as dangerous. Carbohydrates provide needed energy for the body and help maintain proper organ function.³³ Much like fats and proteins, carbohydrates are not all one in the same and some are more beneficial than others. The best carbohydrates to consume are found in whole grains, fruits, vegetables, and beans. These “good” carbs provide essential vitamins, fiber, and phytonutrients, which all play a major role in the health of an individual. The most common forms of carbohydrates are sugars, fibers, and starches that can be found in various foods.³⁴ Using the Glycemic Index, the difference between “good” and “bad” carbs is defined by how quickly the body processes the carbs into blood sugar and how much blood sugar is boosted due to this process. The faster a carb is processed into sugar and enters the blood stream, the worse it is for the person (high glycemic). The slower the carb is processed, the better (low glycemic). Large increases in blood sugar levels can lead to diseases, such as diabetes and heart disease. In general, the more processed a food is—like soft drinks—the worse it will be for a person.³⁵ According to the USDA, an individual should eat between 225 and 325 grams of carbs per day, which is about 45-65 percent of a 2000-calorie diet.³⁶ The Harvard School of Public Health recommends five tips to incorporate “good” carbs into a diet: 1) Eat whole grains with breakfast, 2) Eat whole grain breads for lunch and snacks, 3) Stop eating potatoes and replace them with whole grains, like brown rice, for dinner, 4) Eat whole fruit instead of fruit juice (more fiber and less sugar), 5) Eat more beans (slow digesting carb and high in protein).³⁷ Various diets today would suggest a more aggressive switch to slow carbs and dramatic reduction of empty carbs like crackers, chips, breads, potatoes and white rice.

When pursuing a balanced diet, protein is an important part of maintaining balance and health. Protein is found in meat, fish, eggs, and nuts.³⁸ According to the Institute of Medicine, adults should get a minimum of 8 grams of protein per 20 pounds of weight.³⁹ For example, if an adult weighs 120 pounds, the minimum amount of protein for that individual would be 48 grams. Some proteins are a “complete protein,” which mean that it contains all essential amino acids needed to build new proteins, while others are “incomplete proteins,” lacking at least one of the essential amino acids. Most animal proteins are considered complete proteins, while protein in fruits, vegetables, grains, and nuts are usually incomplete. Because not all proteins are the same, people must be aware of what types of protein they are consuming and the protein package, which refers to what else the food contains, like fats and carbohydrates.⁴⁰ For example, red meat, while a good source of protein, is also high in saturated fat, which can be harmful to a person’s health, thus it must be eaten in moderation. It is healthier to consume more eggs, poultry and fish, which are generally leaner proteins and provide a good source of healthy fats.⁴¹

Another type of protein that AGR is particularly interested in is called a “specialty protein,” which is a supplement that can be added to foods and beverages to enhance nutrient benefits to the consumer. If you recorded your daily diet via DB Tracker or a similar app, you will have probably discovered that getting healthy proteins on the go can be a challenge. And some diets suggest 20 grams of protein should be consumed within the first 30 minutes of waking up. Specialty proteins added to breakfast bars and shakes are a good way to satisfy the body’s protein needs on the go. And we expect to see a rise in the use of these protein supplements as consumers become more educated about balanced nutrition and the importance of proteins. Specialty proteins can come from refined fractions of milk, fish, and rice, also known as whey protein isolates, fish protein peptides or isolates, and rice protein. Recently, pea proteins have become one of the new foods to watch because of their high nutritional value and sustainable nature.⁴²

Conclusion

If we all become more aware of the nutritional value of our foods, then we can better address the hidden hunger issues prevalent in both developing countries and developed countries, help rectify our obesity epidemic in the USA, and live healthier, longer lives with less burden on our health care system. Now that is a worthwhile goal we can all strive for. AGR seeks to find companies that are positioned in the food and ag value chain to provide nutritional foods that help alleviate hidden hunger.

About AGR Partners

AGR Partners is a private equity firm that cultivates long-term growth in companies seen as indispensable assets of the agriculture and food value-chain. AGR facilitates late-stage growth, strategic acquisitions, and ownership transitions via non-controlling investments in private and public companies. AGR targets mature companies in investment grade countries, equity or convertible debt structures, and an investment target size of \$10-75 million. The firm is headquartered in Visalia, California, but its team and Advisory Board are represented across the globe.

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Recommendations for Dietary Fat and Cholesterol Intake

Type of Fat	Recommendation	Major Food Source
Total Fat	This includes all types of dietary fat. Limit total fat intake to 20 to 35 percent of your daily calories. Based on a 2,000-calorie-a-day diet, this amounts to about 44 to 78 grams of total fat a day.	Plant- and animal-based foods.
Monounsaturated Fat	While no specific amount is recommended, the guidelines recommend eating foods rich in this healthy fat while staying within your total fat allowance.	Olive oil, peanut oil, canola oil, avocados, poultry, nuts and seeds.
Polyunsaturated Fat	While no specific amount is recommended, the guidelines recommend eating foods rich in this healthy fat while staying within your total fat allowance.	Vegetable oils (such as safflower, corn, sunflower, soy and cottonseed oils), nut oils (such as peanut oil), poultry, nuts and seeds.
Omega-3 Fatty Acids	While no specific amount is recommended, the guidelines recommend eating foods rich in this healthy fat while staying within your total fat allowance.	Fatty, cold-water fish (such as salmon, mackerel and herring), ground flaxseed, flax oil and walnuts.
Saturated Fat	Limit saturated fat to no more than 10 percent of your total calories. Limit to 7 percent to further reduce your risk of heart disease. Based on a 2,000-calorie-a-day diet, a 10 percent limit amounts to about 22 grams of saturated fat a day, while 7 percent is about 15 grams. Saturated fat intake counts toward your total daily allowance of fat.	Cheese, pizza, grain-based desserts, and animal products, such as chicken dishes, sausage, hot dogs, bacon and ribs. Other sources: lard, butter, and coconut, palm and other tropical oils.
Trans Fat	No specific amount is recommended, but the guidelines say the lower the better. Avoid trans fat from synthetic (processed) sources. It's difficult to eliminate all trans fats because of their presence in meat and dairy foods. The American Heart Association recommends limiting trans fat to no more than 1 percent of your total daily calories. For most people, this is less than 2 grams a day.	Margarines, snack foods and prepared desserts, such as cookies and cakes. Naturally occurring sources include meat and dairy products.
Cholesterol	Less than 300 milligrams a day. Less than 200 milligrams a day if you're at high risk of cardiovascular disease.	Eggs and egg dishes, chicken dishes, beef dishes and hamburgers. Other sources: Seafood, dairy products, lard and butter.

Source: USDA and Mayo Clinic

Disclosure

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Additional Resources

<http://www.micronutrient.org/English/View.asp?x=573>

http://www.unitedcalltoaction.org/documents/Investing_in_the_future.pdf

<http://reliefweb.int/report/world/global-hidden-hunger-indices-and-maps-advocacy-tool-action>

https://www.dsm.com/content/dam/dsm/cworld/en_US/documents/hidden-hunger.pdf

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