Sihan Ren
August 2, 2020

Dairy Industries are struggling for life

Introduction:

The latitude between North and South 40-50 degrees is called the golden dairy belt, which generates world-famous dairy industries across North America, Asia, Europe, and Australia. FAO and IFCN (2018) have conducted a study that 65% of the total amount of small-size dairy farms are distributed in the golden dairy belt (as cited in FAO, GDP, and IFCN 2018, 24). Dairy farms in this area have formed a natural cycle for hundreds of years. Temperate continental climates and suitable rain conditions are the main factors of pasture grown with rich nutrients that produce high-quality milk. These unique natural factors boost the rise of dairy industries and the local economy through trading. According to Stevens, Hodges, Mulkey, and Kilmer (2007), the gross value of dairy production rose to 421 million dollars in 2005 in Florida and provided more job opportunities related to the dairy industry (2). As some traditional milk factories keep their hand-made milk products, other new dairy factories devote themselves to developing new popular and diversified products to occupy the leading role. Since more dairy farms are established while the total number of consumers does not change tremendously, there exists an invisible competition among several dominating dairy companies in different countries.

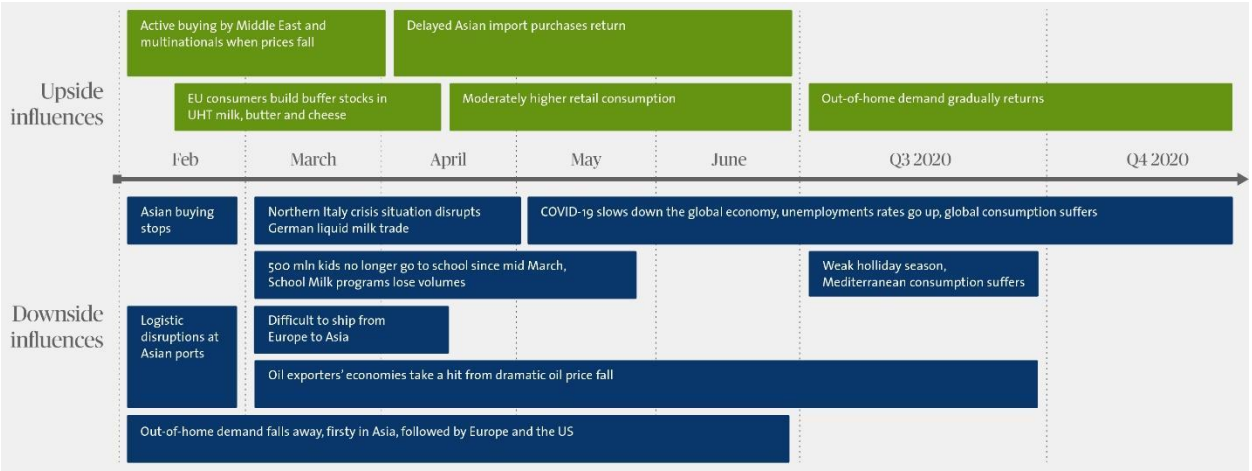
In this article, how dairy farm leaders operate their production systems properly when they encounter the pandemic of CoronaVirus, how dairy industries innovate their products, and how they guarantee the profits of dairy farmers are the primary three purposes of analyzing why dairy farms are struggling for life. The discussion would help more local dairy farmers establish the

directions of the development of their farms and build a relationship between food culture and natural land.

Fighting with COVID-19:

At the beginning of 2020, a new virus called COVID-19 broke out all over the world. In order to reduce the risk of inspection, governments published urgent policies to stop industrial production. However, the unexpected pandemic is a tragedy for the dairy industry. According to Barrett (2020), 25000 gallons of milk were disposed of on dairy farms in Wisconsin. Dairy farmers had no other options to store the milk because there is an enormous gap between the amount of production and the demand of consumers, and milk is hard to store. In America, 60% of butter is sold to restaurants (Undeniable Dairy, 2020). Over 10000 schools in America join the meal plan operated by the government to ensure the food supply for students (Guthrie & Ralston, 2019, USDA) These two large-scale consumers balance the supply and demand for American dairy industries rather than retailers. However, due to the virus, schools closed, and restaurants offered delivery services instead of dining. Although dairy products are still necessary for public consumers, it is based on a family unit. Sebastian, Goldman, Enns, and LaComb(2010) analyzed that the average consumption of milk of each adolescent is from 3/4 to 5/4 cups each day (1). That means, compared with a family containing four members who only consume 1460 cups of milk, the amount of milk that twenty thousand students consume in a year is 7.3 million cups in a college. A large-scale consumer acts as a centralized profit chain, but it broke down during the COVID-19 pandemic.

Not all countries have advantages in dairy industries. They rely on importing dairy products to ensure the demand of consumers in their countries. However, Covid-19 cut down the world trade of importing dairy products. DMK, a leading company that devotes itself to producing high-quality dairy products in Germany, is negatively impacted by the coronavirus. On July 5th, DMK interviewed Mark Voorbergen, the founder and owner of the consulting company Voobergen Consultancy, about the circumstance the company is facing (DMK group 2020). According to Voorbergen(2020), in addition to the decrease in dairy consumption due to the changes in living conditions due to coronavirus, export trade to other European countries, the Middle East, and Asia is also intercepted, which causes a financial loss from February to April. It shows a chain reaction that the loss of trading opportunities leads to the unemployment rate rise, in which the company gains fewer profits than before.



(DMK Group COVID Market Events Timeline PDF JPG 2020)

Under the pandemic, reducing the economic loss of dairy companies, stabilizing the world dairy market, and protecting the safety of dairy products and workers have been difficult obstacles for experts and dairy farm managers. There are no other reliable solutions for dairy farmers in addition to reducing the excess supply, although it is a tough decision for them. In Wisconsin and

California, selling unnecessary cows and reducing the amount of fodder have been tried by dairy farmers (Mertens 2020). Another option for farmers is that part of the milk can be fed to calves, but there is still a large amount of milk to be disposed of (Gilles 2020). However, uncertain factors include the total budget, milk safety without sterilizing, and processing time. The solutions did not take into effect for the farms.

Currently, governments play a leading role in assisting dairy farms since they have a more robust power than farmers themselves. The United States Department of Agriculture (USDA) announced the Coronavirus Food Assistance Program (CFAP) to grant financial aid of 16 billion dollars totally to farms, including dairy farms, and help dairy farms solve the problem of redundant milk (Texas Wheat Producer News 2020). Also, the Dairy Cares Reimbursement Program operated by the Pennsylvania Department of Agriculture offers dairy farms that experience financial loss due to COVID-19 amount of allowance based on an assessment accordingly at least 1500 dollars (Center for Dairy Excellence 2020). The dairy system cannot be recovered in a short time. However, with such programs' support, dairy farms can reduce the stress under the depression of the market to some extent.

It cannot be imagined the recovery trend of dairy industries will develop after the pandemic of COVID-19. Food safety is one of the essential factors that consumers will consider, and management of export trade will be stricter than before. On July 27, 2020, I interviewed Hellenbrand, a Ph.D. student at Civil Society and Community Research School of Human Ecology, about the future of dairy farms in Wisconsin through email. According to Hellenbrand, the dairy industry in Wisconsin has been struggling for years, and the COVID-19 pandemic has

exacerbated that, which intercepts the direction of dairy development. In addition, Hellenbrand illustrated that dairy farmers are not supportive of other milk products, such as oat milk and rice milk, which can replace the original milk products. It restricted the opportunities to earn profits since, at the beginning of the pandemic, consumers bought more oat milk that is easy to store than fresh milk in America (Law 2020). Therefore, with the current situation and uncertain future factors, farmers' goals are broken up. Mr. Brown, a dairy farmer in Belleville, Wisconsin, stated that his son should have inherited the dairy farm he and his wife created. Still, efforts are disrupted by the unexpected pandemic (as cited in Mertens 2020). As a result, although the solution discussed above can support the farms currently, it will not go on for long. Coronavirus not only deprives human lives but also grasps the destiny of dairy farms. As a result, more practical methods should be published to save dairy farms struggling for life.

Being the winner of innovation:

The world-trading market is challenging and diversified, forcing dairy companies to bring out the fresh to avoid losing the race. Since dairy products, such as fresh milk, yogurt, and butter, are necessary daily consuming food, consumers prefer to choose unique and adaptive products for themselves. Therefore, from the production of original milk to the process and package, innovations should be considered by dairy companies' owners in order to conform to the trend of the times. Below are four aspects that dairy companies are trying their best to innovate their products.

First and foremost, dairy products in each area should integrate their local traditional food culture with international communication. Food culture has been representative of this area,

which has a long history and should be well known by non-native people. However, the world is a global village building a tight relationship with each country. When local food collides with international experiences, products with local features are more likely to be accepted by consumers in different countries. For instance, Holstein, Jersey, and Brown Swiss are three famous cows in Japanese dairy farms that are species from Europe, including the Netherlands, Germany, Jersey island, and Switzerland. Still, they can grow up healthily and produce large amounts of milk (Japan Dairy Council 2010, 4) With the high quality of raw materials and the traditional delicate skills to make dairy desserts, such as pudding and biscuits, the fame of Hokkaido dairy industries is widely known. Such cases do not only happen in Japan. Dairy farmers also attempt to combine two traditional tastes in Germany and Britain to invent a new product. According to Cox (2018), Quike and Kraus, two cheese makers from Britain and Germany, worked together to integrate cheddar and Alpine cheese to produce a new hybrid cheese that has a mellow taste. As a historical attempt to innovate based on traditional appearance, the coordination is a success. Based on the two examples above, communication and learning do not mean plagiarism. Instead, those dairy farms that only focus on the traditional skills without finding why other competitors are stronger than themselves are the first losers in the competition.

Another option to innovate products is to accommodate the different demands of consumers. In a generation with an abundant food supply, original milk products can no longer catch fastidious consumers' eyes. Influenced by sustainable lifestyle advertisements, consumers pursue organic, simple, and nutrient milk products from the ingredients of products to the package. Research shows that mice late prestige, a natural organic ingredient extracted from superior milk by the

dairy company FrieslandCampina, has contributed to helping athletes recover their muscles effectively (International Dairy Industries 2018). In addition, for those who are controlling their weight, they choose fat-free milk; for parents who have infants, they choose non-additive milk powder that is beneficial to strengthen the growth; for chiefs in excellent restaurants, they choose pure butter. Dividing the consumers into several groups to find what they need is essential to surpass other competitors.

Peer pressure, a phrase that a student is familiar with, is also applied to the dairy industry. Substitutes of dairy products are more attractive to consumers rather than original milk products. Influenced by advertisements, new flavors and tastes prompt consumers to transfer their purchasing power, making the dairy industry prospect more challenging. Mintel conducted research showing that in the US and UK, substitutes of milk, including soybean and coconut milk, increased by 62% of their sales before (Whyte 2018). According to Whyte, nutrients in different kinds of plant milk, such as Omega-3 acids and amino which are lacking in original milk, are beneficial to human health. With attractive titles, plant milk owns the leading role in the market, and it is especially friendly to consumers with lactose intolerance. In this case, dairy industries not only need to resist the pressure of the interior competition, but they also have to open up a new path in the face of the threat from their peers.

Back to the essence of raw materials, if the milk quality cannot be guaranteed, dairy products made by it will be negatively evaluated. The main factors that affect the quality of milk are the health of cows and the security during the process. According to a survey by the author of the article, 93 percent of young consumers between 16 to 21 are more willing to learn that the food

they consume is from an organic farm with an integrated processing system and a clean growing environment. Certifications of the brand printed on the package also leave a perfect impression on these consumers. According to Vlad et al. (2018), Contesti village, a dairy farm, imported Spanish goats to produce goat milk with high protein and low fat compared with periods A and C in the research so that the price of goat milk has a direct proportion with its quality which are able to take the advantage of the whole market (212-214). Hence, the quality of herds has a crucial impact on that of milk. During the production process, the safety of the environment is also crucial to the food quality, especially dairy products which are initially from herds containing bacteria harmful to the human body. Advanced technologies can effectively kill microorganisms. Intense pulsed light (IPL) treatment is a new kind of technology that can effectively kill the Cronobacter Sakazakii, a fatal bacteria in milk powder, under a low level of water activity and at the same time keep the appearance and taste of the product to a large extent (Chen et al. 2018, 186). Without the technology, the product would have less competitiveness since it cannot keep both the safety and the appearance of food. Therefore, each detail of the possession cannot be ignored under peer competition and the supervision of the consumers.

During the production process, mechanization is crucial to innovative dairy farms. Enhancing efficiency, ensuring food safety, and reducing manual work are three main advantages of a mechanized dairy farm. PCS100 Active Voltage Conditioner is a new product that can help machines in milk factories operate smoothly by reducing the risk of outage (ABB 2014, 1-2). With the assistance of the new machines, the economic loss of up to 50000 dollars is saved, and at the same time, 55000 tons of milk powder are produced in Fonterra, a dairy factory in Auckland (ABB 2014, 2). Although innovating the automatic machines produce is a considerable

cost, the profits it gives back should not be ignored. Especially under the pandemic of COVID-19, if the factory is automatic, the probability of being infected reduces for workers, and the reliability of safety of the products increases for consumers, so consumers prefer buying such food. The advanced technologies are a life-saving straw to save the dairy industry and contribute to the whole food system.

Connecting with local farmers:

Dairy farms in developing countries help local farmers shake off poverty. In general, a dairy farm's main purpose is to earn as much as possible. As the technologies develop fast, there are several convenient operations for dairy farmers to minimize their loss: using mobile apps to forecast the health of cows remotely in real-time, analyzing big data to record the details of income and expenses, and improving the feedstuff with a sustainable style. These ideas play a leading role in combining science with the agricultural economy.

Computer and data science make a significant contribution to the dairy industry. For those dairy farmers who lack professional knowledge of dairy science, websites and mobile applications provide them with comprehensive lists to teach them how to operate a dairy farm. Cabrera (2017) states that The University of Wisconsin Dairy management website is invented to offer a number of clearly classified lists of how to operate a dairy farm scientifically, which is reliable for dairy farmers to study (135). Academic knowledge is an essential tool for farmers to manage a more reasonable farm than others, which reduces unnecessary costs and manual work. What's more, rather than inspecting each cow and machine every day, dairy farmers only need to open their computers to check the dairy report about the situations on the farm with the new mobile

applications and websites which collect data and generate the report automatically. Data is shown in graphs that are easy to understand, and if there is an abnormal situation happening on the farm, farmers are able to receive the alert on time to deal with the emergency. Optigen Evaluator is a new electric tool used to analyze the quantity that Optigen material should be appropriately used to improve the nutrients in milk that could influence the final profits of milk (Cabrera 2017, 136). In this way, milk farmers are able to control the additives in the feeding stuff correctly to produce more high-quality milk at the same time, which is more efficient and reduces the loss than controlling by themselves.

Since the trade market is unstable, the risk is inevitable that dairy farms should be evaluated. If there is a tool that helps dairy farmers predict the financial risks in the current situation accurately, farmers will make much preparation in advance to prevent financial loss as much as possible. One of the valuable tools to reduce the risk is called Livestock Gross Margin Analyser, invented by Valvakar et al. (2010), which can organize the structure of income and compare the price of milk with feeding stuff to calculate the percent of money of production insurance to guarantee the minimum of profits (as cited in Cabrera 2017, 143). As calculating the risks by manual work is a waste of time and inaccurate, such a tool provides convenience to dairy farmers. Other tools, such as predicting the illness of dairy herds using conventional nongrazing systems (Richert et al. 2013, 5025), are also developed to assess the risks. Hence, using authentic tools to predict the hidden dangers and eliminate them is a right-hand man for a dairy farm of competitiveness.

A sustainable life is a kind of lifestyle that is not only proposed by consumers but also should be followed by producers. Sustainability is primarily shown in the environment of farms as well as the plants used to feed the dairy herds. Makkar (2014) illustrates the changes in sustainable feeding methods, including reducing the waste of feeding stuff, replacing the feeding resources with those which can coexist with human resources, and maximizing the utilization rate of the feeding resources (55-56). According to Makkar, crop waste can be reused to produce the feeding resources for herds through technology for making densified total mixed ration blocks (DTMRBs) and densified total mixed ration pellets (DTMRPs), which save the natural resources and the original costs for dairy farmers (56). Compared with other dairy farms, which might exhaust the limited resources in the local area, it is a win-win solution for farm management as well as the natural environment, reflecting a prospect of sustainable development on the strategic significance.

Conclusion and discussion：

Three aspects that influence the development of dairy farms in such a competitive market environment have been discussed. Generally speaking, in the unexpected situation of COVID-19, the dairy industry has encountered a hard hit since the virus broke the harmonious relationship with consumption concepts as a daily necessity. Unfortunately, current solutions, including establishing assistance programs supported by the government and controlling the amount of supply, are imperfect and should be improved to help small independent dairy farms pull through timely, which needs enough time for agricultural and economic experts to collect data and analyze. Even after the pandemic of coronavirus, uncertain factors, such as export trade, safety in transportation, and loss of manual power, still need a long period of time to recover. Some dairy

farms may close down, and some may resurrect, which corresponds to a phrase called "survival of the fittest."

The innovation of products and enlarging the profits of dairy farmers result in a causal relationship between food and people. In a long-time vision, it is essential for dairy companies to clarify their specific roles under the mainstream of consumer preferences and dare to cooperate with peers in communication in order to produce new popular products. With informational technologies' assistance, dairy farmers gain more knowledge to manage the farm and detect problems efficiently, achieving their profit maximization goals. It cannot be denied that dairy industries are struggling for life in such an intensely competitive environment, and the future contains uncertain factors unable to analyze whether they are beneficiaries of the development of dairy industries. However, the long race connects humans with the land more cohesively. It is necessary for humans to return to the natural environment to reconsider how the current trade market coexists in balance with the land and dairy herds that provide food resources ceaselessly.

References:

ABB. "ABB's technology saving Fonterra time and money by minimizing production downtime". November 4, 2014. https://www.automationworld.com/home/news/13312705/abbs-technology-saving-fonterra-time-and-money-by-minimizing-production-downtime

Barrett, Rick. "Wisconsin farmers forced to dump milk as coronavirus slams a fragile dairy economy." *Milwaukee Journal Sentinel*, April 2, 2020. https://www.jsonline.com/story/money/2020/04/01/coronavirus-forces-dairy-farmers-dump-milk-wisconsin-covid-19/5108609002/

Cabrera, V.E. "Invited review: Helping dairy farmers to improve economic performance utilizing data-driving decision support tools". Animal (2018), 12:1, 134–144, doi:10.1017/S1751731117001665. Received 6 April 2017; Accepted 1 June 2017; First published online 18 July 2017 https://pubmed.ncbi.nlm.nih.gov/28716166/

Center for Dairy Excellence. "COVID-19 Farm Resources". 2020. https://www.centerfordairyexcellence.org/covid-19-farm-resources/

Chen, Dongjie., Wiertzema, Justin., Peng, Peng., Cheng, Yanling., Liu, Juer., Mao, Qingqing., Ma, Yiwei., Anderson, Erik., Chen, Paul., Baumler, J. David., Chen, Chi., Vickers, Zata., Feirtag, Joellen., Lee, Laurence., Ruan, Roger. "Effects of intense pulsed light on Cronobacter sakazakii inoculated in non-fat dry milk". *Journal of Food Engineering*. Vol. 238, December 2018, 178-187 https://www.sciencedirect.com/science/article/abs/pii/S0260877418302723

Cox, David. "British and German cheesemakers combine to create pioneering

AlpenCheddar". International-Dairy.com July 21, 2020. https://www.international-dairy.com/news/home/british-and-german-cheesemakers-combine-to-create-pioneering-alpencheddar/

DMK Group. "COVID Market Events Timeline PDF JPG". July 5, 2020. https://www.dmk.de/en/what-excites-us/news-about-corona/article/?tx_news_pi1%5Bnews%5D=957&cHash=109e7e96d2267b1879ee1ca91242608b

FAO, GDP and IFCN. 2018. Dairy Development's Impact on Poverty Reduction. Chicago, Illinois, USA. Licence: CC BY-NC-SA 3.0 IGO, 1-53 http://www.fao.org/3/CA0289EN/ca0289en.pdf

Gilles, Maggie. "Milk can be fed instead of dumped". Hoard's Dairyman. April 8,2020. https://hoards.com/article-27579-milk-can-be-fed-instead-of-dumped.html

International Dairy Industries. "FrieslandCampina DMV announces latest innovation in dairy protein ingredients". Posted on February 14, 2018. https://www.dairyindustries.com/product_profile/23128/frieslandcampina-dmv-announces-latest-innovation-dairy-protein-ingredients/

Japan Dairy Council. "Japan Dairy Farming". 2010. https://www.dairy.co.jp/jp/engall.pdf

Law, Tara. "Americans Bought More Beans, Disinfectants and Oat Milk to Prepare for the Coronavirus Pandemic". Time.com. 3/28/2020, pN.PAG-N.PAG. 1p. http://web.b.ebscohost.com.ezproxy.library.wisc.edu/ehost/detail/detail?vid=4&sid=e0bb3196-7d71-4a2d-be56 fdca97a1bb98%40sessionmgr101&bdata=JkF1dGhUeXBlPWlwLHVpZCZzaXRlPWVob3N0LWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=142456610&db=aph

Makker, Harinder P.S. "Sustainable increase in livestock productivity in developing countries through efficient utilisation of feed resources". Cuban Journal of Agricultural Science, Vol. 48, Number 1, 2014. 55-58 https://cjascience.com/index.php/CJAS/article/viewFile/427/399

Mertens, Richard. "No one wants to dump milk. Here's why it's happening anyway". The Christian Science Monitor, April 30, 2020. https://www.csmonitor.com/Business/2020/0430/No-one-wants-to-dump-milk.-Here-s-why-it-s-happening-anyway

Richert, R.M., Cicconi, K.M., Gamroth, M.J., Schukken, Y.H., Stiglbauer, K.E., Ruegg, P.L. "Perceptions and risk factors for lameness on organic and small conventional dairy farms". Journal of Dairy Science Vol. 96, Issue 8, 5018-5026, June 17, 2013. https://www.journalofdairyscience.org/article/S0022-0302(13)00429-3/fulltext

Stevens, Thomas, Alan Hodges, William Mulkey, and Richard Kilmer. 2008. "Economic Contributions of the Dairy Farming and Dairy Product Manufacturing Industries in the Southeast United States in 2005". *EDIS* 2008 (6). https://journals.flvc.org/edis/article/view/117442

Sebastian RS, Goldman JD, Wilkinson Enns C, LaComb RP. "Fluid Milk Consumption in the United States: What We Eat In America, NHANES 2005-2006." Food Surveys Research Group Dietary Data Brief No. 3. September 2010. Available from: http://ars.usda.gov/Services/docs.htm?docid=19476

The Texas Wheat Producers Board & Association. "Coronavirus Food Assistance Program Leaves Many Wheat Farmers Behind". Texas Wheat Producers News, June, 2020. http://texaswheat.org/2020/06/

Undeniably Dairy. "Why Coronavirus is Causing Some Farmers To Dispose Of Their Milk." Accessed April 21, 2020. https://www.usdairy.com/news-articles/why-coronavirus-is-causing-some-farmers-to-dispose-of-their-milk

United States Department of Agriculture Economic Research Service. "National School Lunch Program." Last updated August 20, 2019. https://www.ers.usda.gov/topics/food-nutrition-assistance/child-nutrition-programs/national-school-lunch-program/

Voorbergen, Mark. "Guest article Mark Voorbergen: "What will Corona do to milk prices in the remainder of 2020?"" DMK group News about Corona, July 5, 2020. https://www.dmk.de/en/what-excites-us/news-about-corona/article/?tx_news_pi1%5Bnews%5D=957&cHash=109e7e96d2267b1879ee1ca91242608b

VLAD, Iulian., MAFTEI, Marius., POGURSCHI, Elena., DEFTA, Nicoleta., IANTCHI, Daniela., STANCIU, M. CĂRĂTUȘ., POPA, Smaranda., DRAGOMIR, Cătălin., VOICU, Ilie. "Partial Results Regarding Goat Milk Characteristics in Murciana Granadina Breed, and Modalities to Improve Milk Quality". Scientific Papers. Series D. Animal Science. Vol. LXI, Number 1, 2018 ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750 http://animalsciencejournal.usamv.ro/pdf/2018/issue_1/Art37.pdf

Whyte, Chelsea. "The White Stuff". New Scientist. September 22, 2018, Vol. 239 Issue 3196, p22-23. 2p. 1 Color Photograph.

http://web.b.ebscohost.com.ezproxy.library.wisc.edu/ehost/detail/detail?vid=5&sid=35fd5390-f594-4942-9a9d-b2df97227352%40pdc-v-sessmgr05&bdata=JkF1dGhUeXBlPWl

wLHVpZCZzaXRlPWVob3N0LWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#AN=132861260&db=aph