Antonina V. Kalinichenko[1]

ECONOMIC AND ENVIRONMENTAL ASPECTS OF THE US DAIRY INDUSTRY (THE DEAN FOOD CASE STUDY)

Using the Dean Food Company as an example, the paper reviews the basic approaches to environmental protection in the successful US companies engaged in production, processing and marketing of milk and dairy products.

Keywords: *production and processing of milk; energy savings; waste management; USA.*

Антоніна В. Калініченко

ЕКОНОМІКО-ЕКОЛОГІЧНІ АСПЕКТИ АМЕРИКАНСЬКОЇ МОЛОЧНОЇ ГАЛУЗІ (НА ПРИКЛАДІ КОМПАНІЇ "DEAN FOOD")

У статті на прикладі компанії "Dean Food" представлено основні економічні підходи до охорони навколишнього середовища в успішних американських компаніях, що займаються виробництвом, переробкою та збутом молока й молочної продукції.

Ключові слова: *виробництво та переробка молока; збереження енергії; управління утилізацією відходів; США.*

Рис. 2. Табл. 4. Літ. 21.

Антонина В. Калиниченко

ЭКОНОМИКО-ЭКОЛОГИЧЕСКИЕ АСПЕКТЫ АМЕРИКАНСКОЙ МОЛОЧНОЙ ПРОМЫШЛЕННОСТИ (НА ПРИМЕРЕ КОМПАНИИ "DEAN FOOD")

В статье на примере компании "Dean Food" представлены основные экономические подходы к охране окружающей среды в успешных американских компаниях, занимающихся производством, переработкой и сбытом молока и молочной продукции.

Ключевые слова: *производство и переработка молока; сбережение энергии; управление утилизацией отходов; США.*

Introduction. In dairy industry as in any other industrial sector, ecological problems are of great importance. The United States is home to a mixture of large and small dairy farms – all contributing to local economies and tax budger (Juttner et al., 2005; Ebelle and Bryman, 2007; Gillham, 2008; Black and Scholes, 2012; Forslund et al., 2012; Horning and McCann, 2012; Jose et al., 2012; Kaplan, 2013). However, in addition to milk production, America's dairy industry also has a significant influence on jobs creation, supporting other local businesses and, importantly, environment.

Our research of environmental aspects of dairy industry is based on the analysis of data from Dean Food Company, which is a food and beverage company, occupying the 8th position by its activity in the world, and is the 2nd in the US (after Nestle). Dean Food is one of the nation's largest processors and direct-to-store distributors of fluid milk marketed under more than 50 local and regional dairy brands and private labels. It also distributes ice cream, juices, teas, bottled water and other products. Dean Foods has 100 facilities located in 35 US states as well as 5 manufacturing plants in the countries of Belgium, France, the United Kingdom, and the Netherlands (Annual Report, 2013; Muehlhoff et al., 2013).

[1] Poltava State Agrarian Academy, Ukraine; Opole University, Poland.

Research results. Dean Food is subject to various environmental regulations. Company's plants use a number of chemicals that are considered to be "extremely" hazardous substances pursuant to applicable environmental laws due to their toxicity, including ammonia, which is used extensively in food operations as a refrigerant. Such chemicals must be handled in accordance with certain environmental laws. Also, on occasion, some company's facilities discharge biodegradable wastewater into municipal waste treatment facilities in the levels allowed under local regulations. As a result, some of the company's facilities are required to pay wastewater surcharges or to construct wastewater pretreatment facilities.

Dean Food maintains above-ground and under-ground petroleum storage tanks at many of its facilities. The company periodically inspect these tanks to determine whether they are in compliance with applicable regulations and, as a result of such inspections, the managements plans expenditures to ensure these tanks remain in compliance. In addition, upon removal of these tanks, Dean Food is sometimes required to restore the site in accordance with applicable environmental laws.

The company believes it is in material compliance with all environmental regulations applicable to business. Dean Food does not expect the cost of company's continued compliance to have a material impact on company's capital expenditures, earnings, cash flows or competitive position in the foreseeable future.

The federal government establishes minimum prices that Dean Food must pay to producers in federally regulated areas for raw milk. Raw milk primarily contains raw skim milk, in addition to a small percentage of butterfat. Raw milk delivered to company's facilities is tested to determine the percentage of butterfat and other milk components, and Dean Food pays suppliers for raw milk according to the results of these tests (Annual Report, 2013; Bureau of Labor Statistics (U.S.), 2011–2013; Dean Food Corporation, 2014).

The federal government's minimum prices vary depending on geographic location or sales area and the type of a product. Federal minimum prices change monthly. Class I butterfat and raw skim milk prices (which are the minimum prices Dean Food are required to pay for raw milk which is processed into Class I products such as fluid milk) and Class II raw skim milk prices (which are the prices Dean Food are required to pay for raw milk processed into Class II products such as cottage cheese, creams, creamers, ice cream and sour cream) for each month are announced by the federal government (WSL, 2002; LII, 2014). Some states have established their own rules for determining minimum prices for raw milk. In addition to the federal or state minimum prices, Dean Food also may pay producer premiums, procurement costs and other related charges that vary by location and supplier.

Additionally, the US Farm Bill, the primary tool regulating federal dairy policy, was reauthorized by the US Congress in January 2014 and was signed into law by President Obama in February 2014 (FarmPolicy.com, 2014; U.S. Farm Bill, 2014). While there were some important changes made to the US dairy farm policy, the immediate implications to company's business appear to be minimal. For example, the legislation does not directly address dairy producer pricing policy as it relates to federal orders; so the way raw milk is priced does not change. Among the significant outcomes for company's business was that the final bill does not contain supply management provisions for dairy, which would have resulted in governmental control of

milk production. Although Dean Food does not expect to see any practical impact from the bill for several months, the enactment of the new farm bill may result in changes to the dairy industry that Dean Food cannot control and that may have a negative effect on the company's business.

Dean Food is subject to various labeling requirements with respect to company's products at the federal, state and local levels (Annual Report, 2013; Bureau of Labor Statistics (U.S.), 2011–2013; Dean Food Corporation, 2014; Piatak, 2014). At the federal level, the FDA has the authority to review product labeling, and the US Federal Trade Commission (FTC) may review labeling and advertising materials, including online and television advertisements to determine whether advertising materials are misleading or not. Similarly, many states review dairy product labels to determine whether they comply with applicable state laws. Dean Food believes it is in compliance with all labeling laws and regulations applicable to business.

Dean Food also has some environment issues:

1) carbon emissions;
2) energy consumption;
3) water solid;
4) recycling.

Dean Foods sets its first greenhouse gas reduction goal in 2008, aiming to reduce emissions per gallon produced 20% by 2013. After completing a thorough examination of reduction methods and timelines, Dean Food revised the company's GHG reduction goal in 2012 to a 25% reduction per gallon produced by 2020. The company's new timing aligns with the comprehensive dairy industry goal, also 25% by 2020, established by the Innovation Center for the US Dairy in 2010.

Dean Food can also see how much emissions were released over 5 years by it (Table 1). Over the 5 years Dean Food had improvement by 11.38%. It means they reduced emissions over 5 years on 184050 metric tons, on average by 2% per year. It's not much change, but it cares much, it's one the way to reduce tax impact (Annual Report, 2013; Bureau of Labor Statistics (U.S.), 2011–2013; Dean Food Corporation, 2014).

Table 1. **CO_2 emissions by Dean Food,** *adapted from the* Annual Reports of Dean Food Corporation

CO_2 emissions	2009 (baseline)	2010	2011	2012	2013
Absolute (metric tons)	1616810	1585539	1538563	1478608	1432760
Intensity (lbs per gallon produced)	0.982	0.964	0.959	0.929	0.895
Absolute improvement vs. baseline, %	–	1.93	4.84	8.54	11.38
Intensity improvement vs. baseline, %	–	1.83	2.34	5.40	8.86

These emissions were taken from the following sources of Dean Food: purchased electricity, transportation fuels, on-site fuels, mobile refrigerants, agricultural. Let's see which part of emissions every source took in 2013 in Figure 1.

In 2013 Dean Foods has met the requirements for the US Environmental Protection Agency's (EPA's) "Energy Star Challenge for Industry" by reducing its energy intensity by 10% or more at 18 manufacturing locations nationwide (Petrie, 2011; Australian Government, 2014; U.S. with MEF, 2013; International Energy Agency, 2013).

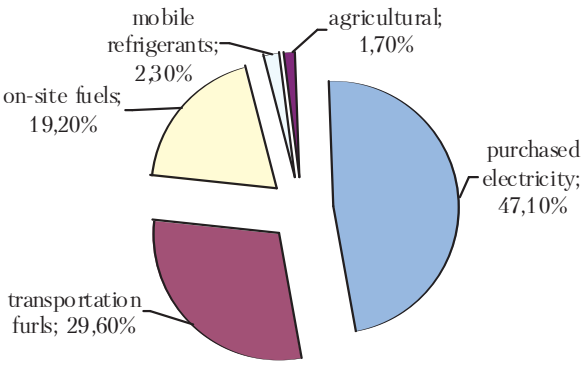

Figure 1. **Emissions by source,** *adapted from the* Annual Reports of Dean Food Corporation

Dean Food is part of the Energy Star Challenge (ESC, 2014). In its efforts to meet the Energy Star Challenge, Dean Foods has employed a number of environmentally friendly initiatives ranging from the use of high efficiency lighting and controls to solar heating and thermal recovery and re-use.

Dean Foods enrolled 72 of its plants in the EPA's Energy Star Challenge. Across the entire dairy industry, 148 dairy plants have taken the challenge, but only 7 other non-Dean plants have met the goal so far.

The Energy Star Challenge is a national call-to-action to improve energy efficiency of America's commercial and industrial buildings. The US manufacturing industry is responsible for nearly 30% of greenhouse gas emissions in the United States and spends almost 100 bln USD-annually on energy. Under the umbrella of the Energy Star Challenge for Industry, EPA is working with Dean Foods and other companies to fight climate change through improvements in energy efficiency.

Energy Star was introduced by EPA in 1992 as a voluntary, market-based partnership to reduce greenhouse gas emissions through energy efficiency. Today, the Energy Star label can be found on more than 60 different kinds of products as well as new homes and buildings. Products that have earned the Energy Star designation prevent greenhouse gas emissions by meeting strict energy-efficiency specifications set by the government. In 2009 alone, Americans, with the help of Energy Star, prevented 45 mln metric tons of greenhouse gas emissions – equivalent to the annual emissions from 30 mln vehicles – and saved nearly 17 bln USD on their utility bills (UNIDO, 2010).

Dean Foods is an Energy Star Partner and is ranked as one of the top consumer products companies on the Carbon Disclosure Project's Leadership Index for 3 of the past 4 years. The company first published environmental sustainability goals in 2009. Later, it released the update till 2020. Let see how much Dean Food use energy over 5 years in the Table 2 below. Generally speaking, Dean Food has low intensity of energy for such area. For example, average energy consumption for dairy production equal 0.09527 MMBtu for 2013 (UNIDO, 2010). So from the last year Dean Food's efficiency is more than average consumption in 23 times. Let us analyze how much Dean Food has saved over 5 years (Table 3).

Table 2. **Energy consumption of Dean Food,** *adapted from the* Annual Reports of Dean Food Corporation

Energy usage	Years					Total
	2009	2010	2011	2012	2013	
Absolute, MMBtu	16323551	16056036	15642253	14843579	14406956	77272375
Intensity, MMBtu per gallon produced	0.00458	0.00451	0.00451	0.00436	0.00408	–

Table 3. **Savings of energy consumption,** *adapted from the* Annual Reports of Dean Food Corporation

Index	Years ratio				
	2010/2009	2011/2010	2012/2011	2013/2012	Total
	Percentage change, %				
Absolute improvement	1.64	2.58	5.11	2.94	11.74
Intensity improvement	1.53	0.00	3.33	6.42	10.92

10.92% is a good score over the 5 years if Dean Food has a new goal to reduce energy use by 20% from 2009 before 2020. If the calculated average improvement is approximately equal to 2%, it means over 6 years they will have 13%. Ceteris paribus they would have approximately 24% in score over 2009–2020.

We could propose some methods to improve energy consumption as shown in Table 4.

Table 4. **Energy reduction,** *adapted from the* Annual Reports of Dean Food Corporation

#	Electricity	Thermal	Other
1	Upgrade lighting fluorescent or LED, install motion sensors where possible	Minimize/eliminate air leaks and steam leaks	Proper use of compressed air and steam
2	Installation or variable frequency drivers for motors	Maintain cooler doors and dock seals to avoid cold air loss	Increased steam condensate return
3	Compressor sequencing for air compressors	Upgrade installation to reduce thermal loss	Drive employee awareness and encourage behaviors that reduce electricity and thermal demands
4	Retrofit/replace inefficient equipment	Boiler blow-down heat recovery	
5	Install alternative energy sources where feasible	Steam trap monitor and repair	

Understanding how efficiently Dean Food use water is at the heart of company's water conservation efforts, which include both reducing water usage and finding ways to return clean water to ecosystems.

Since 2008, Dean Food has conducted thorough audits of water usage in company's plants to:

- identify and document all water systems;
- observe, measure and record operating conditions;
- identify best practices for asset protection and improved efficiency as much as it's possible.

With these audits, Dean Food has identified more than 250 water efficiency projects that are being evaluated for implementation, and Dean Food has completed more than half of these projects to reduce company's usage across the company.

Additionally, each manufacturing plant has a monthly water efficiency performance target that is connected to the company's overall water reduction goal.

Dean Food set the first water use reduction goal in 2008, aiming to reduce the non-ingredient water used per gallon of product produced (intensity) by 30% till 2013. After completing a thorough examination of reduction methods and timelines, Dean Food revised its water use reduction goal in 2013 to a 35% intensity reduction by 2020. Since 2009, Dean Food has reduced its absolute water consumption by 16% and water use intensity by 13.5%.

In 2012, Dean Food set its first recycling goal, aiming to increase the material recycle by 80% till 2020. This reduction is on the absolute basis from the 2009 baseline.

However, since setting the goal, the verification audit of the company's recycled materials found that Dean Food have recycled significantly more waste materials than previously since setting the company's baseline. By the end of 2013, Dean Food had already increased the amount of materials recycled by more than 90%. In 2013, Dean Food divides its utilization in the way shown in Figure 2 (Annual Report, 2013; Bureau of Labor Statistics (U.S.), 2011–2013; Dean Food Corporation, 2014).

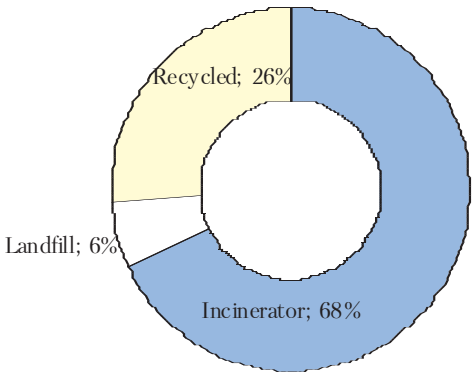

Figure 2. **Division of utilization ways in 2013,** *adapted from the* Annual Reports of Dean Food Corporation

Dean Food is setting its new approach to measure recycling as a component of company's landfill diversion, rather than simply on the absolute basis. By 2020, Dean Food will reduce the amount of waste sent to landfills by increasing the volume recycles from 26 to 50%.

Conclusions. In conclusion we could state that Dean Food has 4 environment areas to manage: carbon emissions, energy consumption, water solid and recycling. Emissions were taken from the following sources: purchased electricity, transportation fuels, on-site fuels, mobile refrigerants, agriculture. We propose several methods to improve energy consumption: upgrade lighting fluorescent or LED, install motion sensors where possible, minimize/eliminate air leaks and steam leaks, proper use of compressed air and steam etc. Dean Food is setting a new approach to measure recycling as a component of company's landfill diversion, rather than on the absolute basis. By 2020, Dean Food will significantly reduce the amount of wastes sent to landfills.

References:

Agricultural Act of 2014 (2014 U.S. Farm Bill) // en.wikipedia.org.

Annual Report 2013. Shaun P. Mara. Dallas, TX: Dean Food Corp., 2014. 61 p.

Black, F., Scholes, M. (2012). The valuation of option contracts and a test of market efficiency. Journal of finance, 36: 29–36.

Ebelle, E., Bryman, A. (2007). Business research methods. NY: Oxford University Press. 144 p.

Energy Star Challenge (ESC), 04.08.2014 // www.energystar.gov.

Forslund, H., Jonsson, P., Mattsson, S. (2012). Order-to-delivery process performance in delivery schedule environments. International journal of productivity and performance management, 58: 41–53.

Gillham, B. (2008). Case study research methods. London: Continuum International Publishing. 366 p.

Global Industrial Energy Efficiency Benchmarking. USA: UNIDO, 2010. 76 p.

Horning, F., McCann, D. (2012). Cycle time reduction find out what's slowing down the process from order to delivery and speed things up. Pittsburgh Post, 12: 5–11.

Jose, M., Lancaster, C., Stevens, J. (2012). Corporate returns and cash conversion cycles. Journal of economics and finance, 20: 33–47.

Juttner, U., Christopher, M., Baker, S. (2005). Demand chain management: integrating marketing and supply chain management. NW: IMM. 392 p.

Kaplan, S. (2013). Corporate governance and corporate performance, a comparison of German, Japan and the United States. Journal of Applied Corporate Finance, 9: 86–93.

Legal Information Institute (LII). 7 CFR 1000.44 – Classification of producer milk // www.law.cornell.edu.

Milk and human nutrition in dairy products. By E. Muehlhoff. Rome: KLI, 2013. 404 p.

Petrie, A. (2011). Developing products with a holistic process. Design management review, 19: 68–90.

Piatak, O.I. (2014). The diagnostics of financial condition of the company and the factors of his stabilization (master's thesis). Poltava: Poltava State Agrarian Academy. 152 p.

President Obama Signs 2014 Farm Bill Into Law, 7.02.2014 // farmpolicy.com.

Saving energy on dairy farms. Australia: Australian Government, 2014. 24 p.

Technology action plan: Industrial sector energy efficiency. By the United States in consultation with MEF partners Major economies forum on energy and climate. USA: ISEE, 2013. 51 p.

Washington State Legislature (WSL). RCW 15.44.087. Class I and class II milk defined // apps.leg.wa.gov.

Worldwide trends in energy use and efficiency. International Energy Agency. USA: OECD, 2013. 94 p.

Стаття надійшла до редакції 5.08.2014.