



19/30
Extended essay cover

Candidates must complete this page and then give this cover and their final version of the extended essay to their supervisor.

Candidate session number

Candidate name

School number

School name

Examination session (May or November)

May

Year

2012

Diploma Programme subject in which this extended essay is registered: Environmental Sciences

(For an extended essay in the area of languages, state the language and whether it is group 1 or group 2.)

Title of the extended essay: Does the production of dairy and meat from dairy cows in the United States affect the environment and well being of animals and humans?

Candidate's declaration

This declaration must be signed by the candidate; otherwise a grade may not be issued.

The extended essay I am submitting is my own work (apart from guidance allowed by the International Baccalaureate).

I have acknowledged each use of the words, graphics or ideas of another person, whether written, oral or visual.

I am aware that the word limit for all extended essays is 4000 words and that examiners are not required to read beyond this limit.

This is the final version of my extended essay.

Candidate's signature: _____

Date: 22/05/11

Supervisor's report and declaration

The supervisor must complete this report, sign the declaration and then give the final version of the extended essay, with this cover attached, to the Diploma Programme coordinator.

Name of supervisor (CAPITAL letters) _____

Please comment, as appropriate, on the candidate's performance, the context in which the candidate undertook the research for the extended essay, any difficulties encountered and how these were overcome (see page 13 of the extended essay guide). The concluding interview (viva voce) may provide useful information. These comments can help the examiner award a level for criterion K (holistic judgment). Do not comment on any adverse personal circumstances that may have affected the candidate. If the amount of time spent with the candidate was zero, you must explain this, in particular how it was then possible to authenticate the essay as the candidate's own work. You may attach an additional sheet if there is insufficient space here.

Animal rights is a subject dear to Grace's heart. After many discussions, she determined a way to incorporate this subject into her new budding love of the environment. Grace spent a significant time seeking out the source of ideas during the research process. After getting into the heart of her research, she was surprised to learn that she is now more concerned with the environmental impacts than animal cruelty. She was also surprised by the powerful campaigns led by the dairy industry to promote the "positive" (Continued)

This declaration must be signed by the supervisor; otherwise a grade may not be issued.

I have read the final version of the extended essay that will be submitted to the examiner.

To the best of my knowledge, the extended essay is the authentic work of the candidate.

I spent hours with the candidate discussing the progress of the extended essay.

Supervisor's signature: _____

Date: June 1, 2011

Assessment form (for examiner use only)

Candidate session number

Achievement level

Criteria

	Examiner 1	maximum	Examiner 2	maximum	Examiner 3
A research question	1	2	1	2	
B introduction	2	2	2	2	
C investigation	2	4	2	4	
D knowledge and understanding	3	4	3	4	
E reasoned argument	2	4	2	4	
F analysis and evaluation	0	4	0	4	
G use of subject language	3	4	3	4	
H conclusion	2	2	1	2	
I formal presentation	3	4	3	4	
J abstract	0	2	0	2	
K holistic judgment	2	4	2	4	
Total out of 36	20		19		

Signature of examiner 1: _____
(ITAL letters)

Examiner number: _____

Signature of examiner 2: _____
(ITAL letters)

Examiner number: _____

Signature of examiner 3: _____
(ITAL letters)

Examiner number: _____

IB Cardiff use only: B: ☒

IB Cardiff use only: A: C9609

Date: 2/5

Does the production of dairy and meat from dairy cows in the United States affect the environment and well being of animals and humans?

Candidate Number:
Environmental Systems and Societies
Extended Essay
May 2012
Word Count: 3774

Abstract

The American agrarian farm is no longer the farming norm. Farms with cattle and sheep grazing in pastures, chickens in coops and pigs in sties, no longer provide the main source of food in America. The majority of American food now comes from industrial factory farms. Since the 1940's industrial farms and agribusinesses have become the standard, farmers grow one crop or raise one animal on their premises. Traditional, sustainable farms with biodiversity are rare. To understand the impacts of industrial farming practices one can ask: Does the production of dairy and meat from dairy cows in the United States affect the environment and well being of animals and humans? ✓ RQ given

Virtually every aspect relating to the production of milk and meat has been altered to make production rates, bigger, faster and cheaper. The innovative approaches used by agribusinesses examine food production primarily through one lens – profits. However, there is a hidden cost to low priced dairy and meat products. The new methods of production directly affect the air, water and soil quality in the United States. There are also ramifications for the well being of the dairy cows, and the people who consume and work to produce the food. Although on the surface, the inexpensive cost for food seems like a bargain, the consequences are adding up.

Through awareness and access to clear presentation of facts the American people will be able to make informed choices around food and the way it is produced. Ideally, the American people will lobby for better legislation to protect the environment and regulate food production. Through awareness there will be a shift in the food industry towards a sustainable and eco-friendly method of production. Additionally, there will be a shift away from the standard American diet to a healthier diet of less meat.

aspects of improved
legislation & regulation
are not fully
discussed within
this report

How was this investigation
undertaken?
J-O

Word Count: 299

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Introduction

The method in which food is produced in the United States has changed more in the last fifty years than in the previous ten thousand years (*Food Inc*). The production of dairy and meat products have strayed away from sustainable and organic farming practices. In 1919, one in every four Americans were farmers, and the average farmer could produce enough food for approximately twelve people. Today, out of the 300 million Americans, an estimated two million are farmers. This means a farmer can produce enough food for an estimated 140 people. (Pollan 21). This has been an enormous feat for America as a nation, however the increased production has been made possible through industrial farming techniques that include the use of growth hormones, antibiotics, chemical fertilizer, herbicides, pesticides, genetically modified seeds and advanced machinery, which have serious implications on the environment not just in the United States, but on a global scale. The number of local and sustainable farms is diminishing at an increasing rate, because they do not have the technology or money to compete with the major corporations. "Typically dairies entering business today require between 1,000 and 3,000 cows to be financially viable " (Marcus125). Ultimately, this means major corporations control the food the American public consumes. These major corporations dominate the food industry and are able to sell their products for cheap prices across the country. Since the dairy and meat industry are primarily concerned with achieving the highest possible revenues, they have found the most cost and time efficient means of production. Although this has led to cheaper and more affordable food for the public, the impacts of these means of production have far reaching consequences on the environment, animals or even consumers of the dairy and meat products. The American

food industry is enormous and discussing all the environmental and social impacts they have on a global scale would be too extensive for a four thousand-word essay. However, the products deriving from a dairy cow represents a segment of the food industry but still clearly illustrates the extent to which these new means of increased production negatively impacts the environment, and the well-being of both animals and humans.

-RQ

Clearly links how farming practices may affect the env B-2
Research question is too broad on scope to be effectively
dealt with here A-1

Impacts

The dairy industry has nearly doubled in a five-year span in between the years 2002 and 2007 (Factory Farm Nation). The United States dairy industry produces an estimated output of 20 billion gallons of milk annually ("Dairy"), along with tens of billions of pounds of beef ("U.S. Meat"). This increase of production has been made possible through industrial farming practices from seed to the supermarket. Industrial farming practices have been implemented through the feed crops grown for the dairy cows, through the manipulation of dairy cows through artificial hormones and large scale confinement centers as well as the technology used for retrieving milk from a dairy cow or producing meat to be sold across America. All of the processes relating to the production of either dairy or meat from a dairy cow adversely affect the natural world, animals and human society.

Environment - use sub-headings to consider different aspects of the environment.

Post 1950, modern industrial factory farm production of dairy and beef directly contributes to the major environmental issues facing the world today. Virtually, every aspect of production relating to the modern dairy industry has been altered to increase milk and meat production. The environment has been directly impacted by three significant factors: the crops made to feed dairy cows, the waste produced by the dairy cows and the production of both milk and hamburger meat made from dairy cows. All three factors affect the quality of land, air and water in the immediate farm environment with far reaching and lasting consequences to United States as a nation.

Before the 1950s, local and sustainable farms fed grass to dairy cows, a cow's natural diet. Pasture feeding was the standard. However, the shift away from small dairy farms to industrial farms eliminated the possibility of pasture feeding. Farms switched to confinement feeding systems. A confinement feeding area corrals large quantities of factory animals on cement or dirt grounds, with feeding troughs surrounding the perimeters of the space. Without the possibility of pasture feeding, the industry has imposed unnatural diets on dairy cows. For economic reasons corn and soybeans and most unnaturally, animal byproducts are fed to dairy cows. Cows are by nature vegetarians and not biologically equipped to digest meat products. Since the 1930's agribusinesses have engineered and developed specialized varieties of different types of seeds genetically modified organisms, commonly referred to as GMOs (Pollan 23). Varieties of GMO corn are created in a laboratory altering its DNA. GMO seeds produce relatively high annual yields. These new types of corn and soy seeds are designed to grow more efficiently, that the dairy industry has determined it is cheaper to feed cows corn rather than their natural diet of grass (*Food Inc.*).

High quantities of fertilizers, pesticides and fuel are required to grow these innovative seeds ("Sustainable"). Nitrogen, phosphorous and potassium are the main ingredients in inorganic fertilizers. These chemicals seep into the water and deplete oxygen levels creating eutrophic, or dead zones in rivers, lakes and oceans. Eutrophic areas are created by excess nitrates and phosphates in the water which creates excessive growth of algae, which depletes available oxygen for aquatic life ("Eutrophication"). "The nitrogen runoff has created a "hypoxic" or dead, zone in the Gulf of Mexico that is as big as the state of New Jersey – and still growing" (Pollan 34).

disrupts
pesticides

Moreover, inorganic fertilizers have affected America's soil. Chemical fertilizers are responsible for the process of acidification (Rutherford 297). Soil acidification reduces the soil pH levels, which depletes nutrient rich topsoil. This has long-term effects not only on the soil, but on the crops as well. Although the artificially grown feed crops have higher crop yields per acre and have an overall greater output, these feed crops are not able to maintain the same levels of production for long periods of time (Pollan 25). It is only a matter of decades before the soil become infertile and the industry must relocate which results in deforestation. "Every eight seconds an acre of land is cleared to grow crops to feed confined animals in factory farms" (Gannon 37). It is clear that the impact of inorganic methods to produce feed crops affects the soil in such a way that it is unsustainable and damaging to the natural world.

— situation
can be
manipulated
by humans

The fertilizers also adversely affect air quality. Nitrogen emissions from crop fields contribute to global climate changes and greenhouse gases. Animal urine and manure release, methane, ammonia and other noxious chemicals into the atmosphere and are directly responsible for increased global warming (Singer 60). "The EPA attributes manure management as the fourth leading source of nitrous oxide emissions and the fifth leading source of methane emissions" (Hribar). Nitrous oxide and methane emissions are 23 to 330 times more potent as greenhouse gases than carbon dioxide, highlighting the impact the farming industry on the air quality in the United States. (Hribar).

The second factor which contributes to environmental damage is the considerable amount of waste dairy cows produce in the confinement living spaces. Dairy cows are put on specialized feeding plans to make them as fat as possible in order to make as much milk and meat as possible. An average dairy cow eats 30 pounds of corn and soybeans

everyday ("Environment). Logically what goes in must come out. Cows urine and manure create a tremendous amount of waste within the industrial farms. Animal manure is most commonly placed in pits called "lagoons" by the industry. The lagoons are capable of holding millions of gallons of manure and waste, however leaking "lagoons"

contaminates waterways, the atmosphere and the soil surrounding the facility

("Environment). It has been noted that, "Dairies are the single largest source of water pollution... massive discharges of dairy waste that literally cauterize waterways and kill fish... we are in the process of losing one of the most marvelous and diverse aquatic ecosystems in the world." (Robbins 247). These factories are responsible for killing hundreds of thousands of fish and other aquatic animals. The improper management of waste has also resulted in air pollution and has caused significant fly problems in near by towns; it has also caused odor problems (Hribar). On sustainable and organic farms, the manure from a cow nourishes the soil however when thousands of dairy cows are confined in a factory farm their waste is in excess and not in balance with the environment rather than nourishing the environment, it depletes it.

The third factor, which contributes to today's modern issues of global warming and material depletion, is the process of the production of both meat and milk from dairy cows. Meat and dairy production both require substantial amount of fossil fuels to produce. According to Worldwatch Institute "American feed (for livestock) takes so much energy to grow that it might as well be a petroleum byproduct." (Robbins 267).

Large quantities of water are required for the production of meat as it takes approximately "2,500 gallons of water to produce one pound of meat" ("How Much"). It is clear that producing both meat and milk are unsustainable as the resources of fossil

optional
para

very
important
issue needs
expanding

interesting
quote

fuels, water and soil that are utilized to produce the products are much greater than the output of food produced.

Efforts in the doc would benefit from being divided up into clear sub-sections. You don't discuss problems of pesticides use in food production

Animals

Overall good range of issues/problems raised

The image of a 1950's American agrarian farming practices are still used today, to market products like milk and beef. The packaging shows a picturesque farm on the western plains where the cows look happy, eating grass, under the sun and clear blue sky. The American public is deliberately kept in the dark from knowing the conditions under which dairy cows are treated by the dairy industry, most still believe that the dairy cows are treated as they are on organic farms. In the United States today, it is illegal to publicize any photographs or show videos that reveal the conditions inside the slaughterhouses (*Food Inc.*). The American public is kept unaware of the facts behind the industrial food chain and still believes that their food is produced under the agrarian food model.

Since the 1950s, the dairy industry has grown tremendously. The demand for U.S. milk has grown not only domestically but also globally, due to their cheaper prices and successful marketing campaign. With this increase for demand, dairy cows have been pushed by the industry to produce as much milk as possible. "In 1967, a typical cow produced less than 9,000 pounds of milk per year. Today, a cow averages close to 16,000 pounds of milk" (Marcus 126). The fact that a modern day dairy cow can produce nearly double of what a dairy cow could produce fifty years ago shows the achievements the dairy industry has accomplished. This however, does not come without stress on the industrial dairy cows.

Dairy cows are manipulated by the dairy industry to produce more milk through synthetic hormones called bovine growth hormones or rBGH (RBGH). Approximately 25% of all milk coming from cows in the United States is injected with bovine growth hormone (Robbins 362). In a natural situation, cows produce enough milk to feed one or two calves. But in today's dairy factories, they actually produce 20 times that amount (Robbins 206). These synthetic growth hormones have been known to develop an udder disease called mastitis, hoof diseases, open scores, and internal bleeding (sustainable vs. Industrial); mastitis, which a severely painful inflammation of the udder, "afflicts more than one in five cows" (Marcus 127). The dairy cows are also systematically given antibiotics to ward off infections such as mastitis and other diseases. The quantities of antibiotics given to livestock exceed those given to people in the United States. "Antibiotics administered to livestock in the United States annually for purposes other than treating disease: 24.6 million pounds" (Robbins 141). A portion of these administered antibiotics are given regularly to dairy cows. Like the pesticides and fertilizers, these antibiotics seep into the water and soil through urine and manure from the dairy cows ("Antibiotics") *potential illness*

Contrary to the popular belief, dairy cows do not produce milk regularly throughout their lives. Instead, they only produce milk when pregnant with a calf. To make dairy cows constantly producing milk, the industry artificially inseminates dairy cows to give birth to around three to six calves in their lifetime. "On average, U.S. dairy cows deliver a new calf every thirteen months" (Marcus 129). Artificial insemination and synthetic growth hormones keep modern day dairy cows on the brink of serious illness. In fact, tens of thousands of dairy cows in the United States suffer from protein loss that

they are unable to stand. These cows are referred to as "downers" by the industry and although a veterinarian could nurse these dairy cows back to health, the industry writes them off as caring for the cow would be a financial loss. As it is a law that an animal can be slaughtered so long as it is breathing when killed, the downed cows are often dragged to the slaughterhouse to be made into low grade hamburger meat as their bodies have been worked too hard that their muscles cannot be processed into a higher quality meat (Marcus 129).

On a sustainable and organic farm, dairy cows can live up to twenty-five years, but in an industrial farm the average life span of a dairy cow is between four and five years (Marcus 127). "Forty percent of dairy cows are lame because of intensive confinement filth, strain of being almost constantly pregnant, and giving milk" ("Cow's Milk). Approximately 90% of all calves born in industrial dairies are taken away from their mothers within their first 24 hours of life, causing distress for both mother and calf. Dairy cows are capable of feeling depression, stress, anxiety and despair (Marcus 126). The majority of male calves are sent to the veal industry where they are chained to tight wooden crates, to never see sunlight, denied solid food or the freedom to walk. They live an institutional life until they are large enough for slaughter (Robbins 186). The female born calves are destined to endure the same laborious life like their mothers; worked to produce unnatural quantities of milk and then processed into hamburger meat.

Issue of ethics?

Humans

The bovine growth hormones have proven to not only seriously harm industrial dairy cows, but also the men, women and children whom purchase and consume the dairy products. Twenty five percent of the industrial dairy cows are injected with rBGH and of the billions of gallons produced annually; a substantial amount of milk that is being sold to consumers. Traces of rBGH and antibiotics linger in the milk and have consequences to those whom drink it. Scientists have discovered that the rBGH is absorbed across the intestinal wall as well as the bloodstream. It has been found that rBGH may contribute to breast cancer, colon and prostate cancer (Epstein). Bovine growth hormone has caused much speculation and controversy concerning human health and safety that the European Nation and Canada have banned bovine use in their dairy industries. Humans, like all mammals are designed to stop drinking milk after breast-feeding. In fact, humans are the only species to drink milk in adulthood and from another species than their own. Milk is fattening and is designed to grow an eight-pound newborn into a 24-pound child (Freedman 55). Milk has also shown to do little to prevent osteoporosis and has been linked to a host of problems such as acne, obesity, allergies, poor immune function, headaches, indigestion, heart disease and diabetes (Freedman 59). It is clear that the public is misinformed about the health benefits of drinking milk by the dairy industry with their widely popular "Got Milk?" campaign. Milk provides little calcium to those that drink it, and the benefits are small compared to the negative health factors (Fuhrman 178).

The human cost, other than the population that eat and drink milk and meat, are the employees working for the industry. "In 1998, an estimated 30% of American meat

packing plant workers sustained a work-related injury or illness" (Slaughterhouses).

Common impacts on meat packing workers are back problems, torn muscles, pinched nerves and more drastically broken bones, and severed fingers or even limbs. The dairy and meat industry have kept the conditions their employees develop away from the American public by hiring illegal immigrants, mainly from Mexico. Without legal status, these employees are paid little and cannot form unions or speak about the conditions in the slaughterhouses. These employees have limited rights and are at risk for deportation.

The meat industry is not held responsible or questioned for hiring these illegal immigrants by either the police or government officials (*Food Inc.*). In conclusion, the dairy industry undermines the health of both their consumers and producers.

you need to
substantiate
such
statements

- but what about
health gains for
this reliable food
supply?

Analysis

It is well documented that the dairy and meat industry harm the environment, and the welfare of both humans and animals. Now the question is, why is the United States government allowing this to continue and why is there so little objection to the way food is being produced in America? American food production shift from agrarian to industrial production is a relatively new practice. The idea of putting a factory system into the production of food originated from fast food companies in the 1930's (*Food Inc.*). In order to sell food at a cheap price, large corporations started producing in bulk to achieve economies of scale, thus starting the factory system of food production and the idea of large corporations responsible for the food provided to the American public. Rendering the sustainable and organic means of production unable to compete. The reason why this has happened without speculation is that the very same people managing the large corporations such as Monsanto, and the dairy industry have close ties or even hold positions in the United States government. Clarence Thomas, a Supreme Court justice, was an attorney for Monsanto corporation and wrote the very laws that permitted major corporations like Monsanto to dominate the agricultural industry by implementing genetically modified organisms and making it illegal for ordinary farmers to save seeds. In the last 25 years, the United States government has been dominated by the very corporations that the government is meant to be regulating (*Food Inc.*). This has allowed for a relatively easy and silent switch from organic to industrial means of food production. There has also been a deliberate veil between the consumers and the food they eat. Few Americans know where and how his or her food is being produced. This is because the government has made it illegal for American consumer food products to be

how do you
know
this?

marked with labels informing consumers on whether or not the products are produced by genetically modified organisms, or where their beef comes from. It is all deliberately shielded from the consumers. America is also based on a system where fast food and unhealthy foods cost less than organic and nutritious foods. Major corporations have set up the system like this where profits are key and they set their products to be cheaper than organic products. That is why at McDonalds a customer can buy a hamburger for a dollar but cannot buy a pound of broccoli for the same price (*Food Inc.*). Large corporations have also poured millions and even billions of dollars into marketing their food products as healthy and necessary for consumers to live a healthy life style. The dairy industry is a perfect example with their "Got Milk?" campaign with countless celebrities and even presidents promoting milk as a healthy and necessary beverage. It is by no mistake that the American food system is the way it is. Money and profits, efficiency of production and public conception, and the government's support for the food corporations are what have ensured little controversy and debate over the food system instilled today in America.

Could sustainable and more ethical farming methods meet demand?

Analysis section presents only one viewpoint and is limited to one reference source

You need to provide a more objective analysis considering both viewpoints.

Solutions and Conclusion

The first step towards a shift away from the current industrial dairy farming practices to a system more respectful to the environment: air, land soil, human health and wellbeing and animal welfare will come about through awareness and a clear presentation of the facts behind the current dairy and meat system. Without proper access to the details involved in the production of the industrial food chain, Americans cannot make informed choices regarding the food they choose to consume. The government supports and funds through subsidies, using taxpayers' dollars, the major corporations that produce food (Pollan 32). Until citizens make the connection between their diet, dollars and the environment, change seems unlikely.

Encouragingly, the demand for organic food products is the "fastest growing" segments in the food industry with an annual growth of 20% (*Food Inc.*). Obesity and diabetes levels in the United States are at an all time high, with approximately 50% of minorities in Americans struggling with diabetes, more and more people are realizing the benefits of organics and healthy food (*Food Inc.*) If the public were made aware of the impacts their food choices have on the environment, animals and themselves it is almost certain there would be a revision of the factory farm methods from the scrutiny over the chemicals used for the feed crops, the antibiotics and growth hormones injected into the dairy cows, and the unscientific myths about the health benefits of eating and drinking both meat and milk. Eating a plant-based diet has a significantly lighter impact on the environment than an omnivore's diet. Eating a plant-based diet saves substantial amounts of water, petroleum, grain for feed crops, and leaves a smaller carbon footprint in the environment (Robbins 255-268). If Americans ate less meat, consumed more vegetables

and fruits and bought locally or organically one could predict that the environment would improve. Additionally, this would also contribute to preventing obesity or lowering the levels of obesity across the country, reducing obesity related disease such as diabetes and heart disease, to name a few. To make the change in the system towards a more organic and sustainable approach, inevitably more Americans would have to consume less meat and animal by products and evolve towards a more plant based diet. With feed crops grown for industrial animals, traditional and organic farming practices could be implemented on a larger scale. "There would be less erosion, less potential for ground water contamination, less movement of nitrates on the soil profile and no possibility of synthetic residues in crops" (*One man*). Organic farming also would have the same profitability levels or even higher with organic practices (*One Man*). Of course this is a very idealistic approach for solutions concerning the methods of food production, however, in the long run the method being used today in America is not sustainable. With finite resources of soil, water, petroleum and the obesity and diabetes becoming epidemic in the United States this method will not last. No one can tell when the switch will be made, but one this is for sure, organic means of production will be the solution for the major environmental issues facing America today. With an increasing population and the finite resources available for the production of food, new and innovative solutions are sure to address these important concerns.

debatable

11-2

Would food demand be met without intensive farming?
Discuss more fully environmental management of farms by management of manure, fertilizers etc to reduce detrimental effects

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Overall a very interesting account, raising a large range of key issues. Some aspects of your argument need to be more fully balanced - provide a more objective discussion.

C-2 need it from both viewpoints
D-3 good
E-2 need to substantiate some statements
F-0 no evaluation of resource materials
G-3
I-3
K-2