

NAME: _____

Philosophy 1104: Critical Thinking

Final Exam

December 10, 2018

1.30 – 3.25 pm, A346

1. Read the text below and then answer the questions on the next page:

The Stonehenge Bluestone Conundrum refers to the question of how the “bluestones” of Stonehenge in Wiltshire, England came to be there. The bluestones are different from the enormous sarsen stones that everyone associates with Stonehenge, but they pose a bigger puzzle. For, while the sarsen stones weigh up to 50 tons each, they are known to have been quarried just 20 miles away. The source of the bluestones, on the other hand, has been proved by geologists to be a hill called Carn Goedog in the Preseli Hills, which is 190 miles from Stonehenge. How did the bluestones, each 3-6 times the volume of a man and weighing 1-2 tons, make the trip?

Archaeologists have long held that Stone Age people, at around 2300 BC, quarried the stones from Preseli and transported them to Stonehenge, either dragging them on a sled over land or by floating them along the coast as well as bringing them over land. This would have been an immense undertaking, since there are 43 remaining bluestones at Stonehenge, and it is assumed that there were 80 of them originally. There are signs that large bluestones have been quarried at Preseli, and bluestone axe heads have been found in the area.

In 1971, geologist Geoffrey Kellaway published a study in *Nature* suggesting that the Stonehenge bluestones were transported onto Salisbury Plain by the Irish Sea Glacier. Kellaway said that these bluestones were “erratics,” i.e. boulders that had been moved by ice from the west many thousands of years ago and then gathered from across Salisbury Plain by the Stone Age tribesmen to build the monument. Kellaway argued that the traditional theory is unrealistic. “People have loved this story ... all of the heroic ancestors slaving away, collecting up these stones from west Wales and then carrying them all the way to Stonehenge,” he said. “We all love heroic tales, and I think that’s why people have just accepted this. But, if you consider the enormous distance, and rough terrain, it is simply not feasible. Also, there is not a shred of direct evidence, such as written documents or remains of sleds, in support of the human transport idea. The Irish Sea Glacier, on the other hand, could easily have transported such stones from Wales, and according to recent computer modelling would have dumped them close to Stonehenge as the glacier melted.”

In such an event, the archaeologists reply, one would expect to find more bluestones and other glacial erratics near the Stonehenge site, but no such boulders have been found. Would Stone Age communities have collected them all? Also, the glacier theory cannot explain why the Stonehenge bluestones all came from such a small area, nor how they were transported without being broken up and eroded by the ice.

(i) What are the most relevant *data* (i.e. observations) mentioned in the passage? (Here you can include facts that seem to be firmly established on the basis of data.) [4]

1. There are 43 bluestones at Stonehenge, weighing 1-2 tons each, in good condition.
2. The bluestones came from Carn Goedog, 190 miles away, where evidence of ancient stone working exists.
3. There are no glacial erratics near the Stonehenge site.
4. There are no written records or other direct evidence of human transport
5. The (much larger) sarsen stones were brought from 20 miles away.

(ii) Briefly describe the two *hypotheses* mentioned that are proposed to explain these data. [4]

1. The bluestones were transported from Carn Goedog to Stonehenge by Stone Age people.
2. The bluestones were brought near to Stonehenge by the Irish Sea Glacier, and collected from there by Stone Age people.

(iii) Which theory is more rational to accept, based on the information given in the passage? (Be sure to consider both the plausibility and empirical adequacy of each hypothesis.) [8]

The glacier theory is supported mostly by the (alleged) implausibility of the human transport theory. It does seem implausible that such large stones could be moved so far using primitive tech. Although the much larger sarsens were moved 20 miles, still a substantial distance, so it doesn't seem impossible.

The human transport theory does predict the data better though, especially the single source of all the stones. Humans would do that, but a glacier wouldn't be picky. The sizes of the stones is also unlikely for glacier transport. The argument about "no direct evidence" for human transport looks like a fallacious appeal to ignorance, as such materials wouldn't survive 4,000 years in a damp climate.

2. Read the attached essays (by fictional characters) and answer the following questions.

(i) What is Dr. Elpus' main thesis, in his essay? (Use your own words.) [4 marks]

Raw milk is dangerous, no extra health benefits compared to pasteurised. Should be illegal.

(ii) What is Dr. Freer's main thesis, in her essay? (Use your own words.) [4 marks]

Raw milk is reasonably safe, and given health benefits and taste (better than pasteurised) should be legal.

(iii) Describe the essential points of agreement and disagreement between Elpus and Freer, identifying the disagreements as factual, interpretative or evaluative. [4 marks]

Agree: They agree that raw milk has greater risk than pasteurised, and that pasteurisation was initially a good idea. Pasteurisation destroys some proteins and fats that are in raw milk.

Disagree: They disagree whether raw milk is 10x or 100x more risky.
Disagree about health benefits. The disagreement is fundamentally *evaluative*, of course (is it a *good idea* to drink it?) but also interpretative disagreements about the stats.

(iv) Summarise Elpus' arguments for his thesis. [7 marks]

1. Argument from authority of CDC, AAP, consensus that raw milk isn't safe.
2. Appeals to fear and pity, talking about kids getting sick, how bad their parents feel, etc.
3. Some absolute data showing illnesses, hospitalisations and death due to raw milk. Claim of 100x pasteurised risk on a per-serving basis.
4. Listing the nasty bugs in raw milk.
5. Cows are dirty animals.
6. Historically, pasteurisation was followed by greatly reduced disease from milk.
7. The known nutrients in raw milk and pasteurised are mostly the same.
8. CBA: Health benefits of raw are unproved, hence costs outweigh them..
8. 'The only effective way to stop raw milk-associated disease is to stop people from drinking raw milk'.
9. Raw milk is based on a "natural is better" delusion. If natural is better, then eating belladonna (a poisonous berry) should be ok.

(v) Summarise Freer's arguments for her thesis. [7 marks] (*N.B. the answer space is continued on the next page.*)

1. Ad populam. The Europeans allow raw milk.
2. The anti-raw milk stance is propaganda, due to corporations whose business is threatened by raw milk competition. FDA, CDC etc. are on their payroll.
3. Historical decline in milk disease after pasteurisation is mostly due to other causes. (Pasteurisation was necessary once, but no longer.)
4. Risks of raw milk are real, but similar to other foods, and less than the riskiest foods.
5. Claims that raw milk is 100x or 150x more dangerous are conflating raw milk with queso fresco, and conflating legal with illegal liquid milk.
6. Raw milk (+ cheeses) *taste better*. This is a good enough reason to eat/drink it.

7. There is evidence for health benefits, though the extent is uncertain.

(vi) Criticise these arguments, noting any slippery language, unacceptable premises, invalid reasoning, inconsistencies, fallacies, misuse of statistics, faulty analogies, faulty definitions, etc. (*N.B. the answer space is continued on the next page.*) [8 marks]

Elpus:

1. FDA, CDC aren't too strong as authorities, as they're political bodies rather than scientific.
2. The appeals to fear and pity are of course fallacies, unless there is real reason for fear. Comparison with risks from other foods suggests that there is inconsistency here. And listeria-induced meningitis, for example, can't be from raw milk.
3. The number of hospitalisations from raw milk is super low! 66, for the whole USA, in 6 or 7 years? That's tiny!! Basically zero.
4. The 100x comparison is perhaps misleading for the reasons given by Freer. Also other foods should be compared, for context. $100 \times 0 = 0$ after all.
5. Argument from ignorance, concerning health benefits. It looks a little shaky, as so little research has been done. Also the CBA seems to make the fallacy of treating uncertain benefits as zero benefits. And he ignores health benefits of good bacteria, which *are* destroyed by pasteurisation.

Freer:

1. The ad populum has some force, but every country has blindspots, and allows certain things that they probably shouldn't. Europeans are food fanatics, so it may be impossible to ban even dangerous foods.

3. Good point about other things that have changed since 1938.
4. Comparison of risks to other foods seems cogent, though no doubt the comparisons are cherry picked (highest risk).
5. The taste argument is cogent.
6. Discussion of health benefits is balanced and reasonable.

Raw Milk is Dangerous

by Dr. Evan Elpus

While I was down in the US recently, I discovered that one of the great debates going on that country is whether producers should be allowed to sell unpasteurized “raw” milk. Raw milk has become the fad *du jour* with advocates claiming that it is both safe and good for you. Sadly, neither point is true.

To understand the debate we have to go back to the beginning of pasteurization, a simple and effective technique invented by one of the greatest scientists of modern times, Louis Pasteur. By heating milk to 72°C for 15 seconds you kill the pathogens in it, making it safe to drink. Back in 1938, before pasteurization of milk began to become mandatory across North America, 25% of US foodborne outbreaks were from raw milk. Today we are enjoying the benefits of Pasteur’s breakthrough, with only about 1% of foodborne illness being from dairy. Do we really want to turn back the clock on such a phenomenally successful public health intervention?

The main theme of the raw milk lobby is that raw milk is totally safe, when the right precautions are taken, and that the only bacteria in raw milk are the “good” bacteria that assist with digestion. In fact, pasteurization is applied to milk specifically because it isn’t safe and often transmits disease, even when it looks, smells and tastes perfectly normal. Cows aren’t like cats, constantly cleaning themselves. They’re very dirty animals who wallow in their own filth, and so milk often contains cow faeces. As a result it is laced with a whole rogues gallery of nasty bugs, the “big

four” being *Listeria monocytogenes*, various kinds of *Salmonella*, *E. coli* O157:H7 and *Campylobacter jejuni*, any one of which can be fatal. Milk can also be contaminated when the cow has a sickness, such as mastitis, which may display no obvious symptoms.

Sadly, some parents even advocate giving raw milk to their children as ‘health food’. If they had seen what I’ve seen, namely a small child developing meningitis from a *Listeria* infection, they would sing a different tune. If children knew that raw milk might make them very ill, cause them to lose their kidneys or even kill them, would they choose to drink it? Children trust us to protect them, keep them safe, yet children are often fed toxic raw milk by parents. Parents who have lived through the experience of watching their child fight for their life after drinking raw milk now say that it’s just not worth the risk.

In one recent *E. coli* outbreak in Tennessee, nine children got sick from drinking tainted raw milk. Five of them were hospitalized and three developed severe kidney problems, according to state health officials. I wonder how their parents felt? Nor are such incidents rare. Between 1998 and 2005, the USA had an estimated 39 disease outbreaks due to raw milk, causing an estimated 831 illnesses, 66 hospitalizations and 1 death. On a per-serving basis, raw milk is about 100 times more dangerous than pasteurized milk.

Given these scientific facts, it’s no wonder that John Sheehan, director of the Food and Drug Administration’s Division of Dairy and Egg Safety, says that drinking raw milk or eating raw milk products is, “like playing Russian roulette with your health”. Dr. Adam Langer, in a peer-reviewed article,

published in *Emerging Infectious Diseases* (March 2012) writes that, “Consumption of nonpasteurized dairy products cannot be considered safe under any circumstances.” The American Academy of Pediatrics, in a 2013 policy statement, advises pregnant women, infants and children to drink only pasteurised milk, and supports a federal ban on raw milk sales. *Expert mainstream medical opinion is completely united in its condemnation of raw milk.*

The first claim of the raw milk lobby, that raw milk can be made safe if suitable safeguards are in place, is therefore total nonsense. The only effective way to stop raw milk-associated disease is to stop people from drinking raw milk, so it needs to remain illegal here in Canada. In fact, there should be more resources devoted to enforcing this law.

The second major claim of the raw milk people is that raw milk is healthier for you, since pasteurization damages the milk and removes its health benefits. Well, first off, you don’t need milk *at all* to be healthy. Milk consumption is rare in large parts of Asia and Africa, and the people there do just fine without it.

But the main point to make is that US tests have shown that the nutrients in raw and pasteurized milk are the same. Milk is a good source of calcium (and in Canada of Vitamin A and D because it is added to milk by the government to prevent deficiency). However, these vitamins and minerals aren’t going to be affected by temperature changes, and so pasteurizing the milk will have no effect. Most expert organizations agree that, apart from a change in the flavour, there is little difference between raw and pasteurized milk. Certain natural proteins and fats, present in raw milk, are

destroyed by pasteurization. However, no benefits of these natural factors have been clearly demonstrated in evidence-based studies and, therefore, they cannot outweigh the risks of raw milk consumption.

Raw milk enthusiasts make a number of other claims that raw milk will boost your immune system. Believe me when I say that if there were a way to “boost your immune system” we would be giving it to chemotherapy patients and those with HIV rather than wasting our time with this debate. The argument centers on the fact that raw milk contains leucocytes and other immune components that will help your immune system. Leucocytes, a.k.a. white blood cells, are the cells that fight off infection. Unfortunately, any leucocytes in milk came from the cow, and a cow’s leucocytes won’t do you any good. In fact they could theoretically do some harm because a cow’s leucocytes see your cells as foreign and would attack them (a concept in medicine we see in transplant patients called graft-versus-host disease). However, in the concentrations observed, they are unlikely to do much good or harm.

Clearly, the people advocating raw milk will try to capitalize on the growing “natural is better” delusion that grips our society. If people really believe that, then perhaps they should feed their children fresh yew or belladonna berries? It’s important to ask anyone that extols the virtue of raw milk if they have any financial interest in its sale, which of course they always do. So when it comes to raw milk, remember why we started pasteurizing it in the first place, because if we forget our history we will be doomed to repeat it.

Legalise Real Milk Now!

by Dr. Anita Freer

Canada's ban on the sale of fresh, real milk is a ridiculous infringement of our precious civil liberties, and cannot be justified scientifically. For one thing, Canada is the only G8 country to completely outlaw sales of real milk. The EU allows it, with proper regulation. It's also legal in most US states. If the ultra-regulated and safety obsessed Europeans don't see a problem with real milk, then how bad can it be?

Of course the corporate agri-businesses in North America, who indirectly control such government groups as Health Canada, the FDA and the CDC, will tell you that "raw" milk is pure poison. Naturally, with the billions they're making off their dead, scalded milk they don't want any competition from the live stuff! They will say that, after pasteurisation was introduced, disease outbreaks from milk declined enormously, and this is technically true. However, they forget to mention all the other things that have changed since 1938, such as testing cows for disease and culling infected animals, testing the milk for bacteria, improved hygiene during milking, and mechanical refrigeration. Pasteurisation is given the credit for health benefits that were largely due to other improvements, and these have in fact made pasteurisation unnecessary today.

The scaremongers will also go on about the deadly bugs in real milk, and list outbreaks of disease in recent years, but they never put these figures into a proper context. Of course there's *some* risk to drinking real milk, as no food is completely safe. Even pasteurised milk recently caused 1644 illnesses in a single outbreak. And the most frequent cause of food-borne illness in the

USA is ... green leafy vegetables! Do we regard fresh spinach and kale as dangerous? Do we insist that they be cooked and canned for safety's sake? Of course not – the absolute risk is small, and easily outweighed by the health benefits of eating the fresh stuff.

Now it is true that milk, like spinach, is safer to eat after it's been cooked. Farmers make mistakes, and over the past decade drinking real milk has caused an average of about 120 reported illnesses per year, including 11 hospitalisations. There's been 1 death (total) from real milk in that time. Based on recent estimates of 3% of Americans drinking real milk regularly, a real-milk drinker's average chance of getting sick is about 1 in 94,000 per year. This is about 10 times the reported rate of illness (per person) from pasteurised milk.

Sometimes much higher figures are quoted, such as real milk being 100 or even 150 times as dangerous as pasteurised, but these numbers include people getting sick from unregulated Mexican-style *queso fresco*, sometimes referred to as "bath tub" cheese due to the informal, unsanitary conditions under which it's made. This cheese is often made from unpasteurised milk, but it makes little difference since contamination usually occurs later in the process anyway. They use other statistical tricks like lumping legally-produced real milk together with unregulated, uninspected black-market milk, which is much less safe.

So, real milk is 10 times as dangerous as pasteurised, but the absolute annual risk is still extremely small. Every year, 48 million Americans (about 1 in 6) get sick from eating food. The comparison with pasteurised milk is misleading, since pasteurised milk is actually one of the safest foods out there. It's much more dangerous to eat leafy vegetables, fish and shellfish,

poultry, eggs and meat – especially sliced deli meats and hot dogs.

Let's make this comparison with reference to the various bacteria that can infect all kinds of food. *Listeria* has caused disease from people eating *queso fresco*, but there are no known cases of *Listeria*, *zero*, from drinking real milk in the last 40 years. The *Campylobacter* risk is not zero, but it's still 10-100 times lower than with home-cooked chicken. *E. coli* 0157 causes a diarrheal illness with dehydration and cramps and can cause bloody stools. In more serious cases, the infection can cause a type of kidney failure called HUS, which can be fatal. However, the risk of HUS is 7-34 times lower with real milk than home-cooked hamburger patties, and 6-28 times lower than leafy greens consumed at salad bars.

As with any food, the risks of real milk have to be balanced against its benefits. The first of these is simple and uncontested: it tastes better than cooked milk. Cheeses made with real milk (which are also very safe when properly aged) taste better as well. For many gourmands, the taste factor alone makes the very slight added risk of real milk well worth it.

The other reason people will pay extra for real milk is for health reasons. Although this is very controversial in the medical community, thousands of real milk users will swear that it has great benefits. The story of Michelle Peters of North Aurora, IL is fairly typical. Mrs Peters has a son with Asperger's and ADHD. After starting to drink real milk, the boy became more focused, alert, and able to sit still and make eye contact. He stopped flapping his hands. When they stopped giving the boy real milk, his symptoms returned. Then, once back on the milk, he improved again. Early in the 20th century the use of real milk to treat

disease was common and mainstream, used (for example) in the famous Mayo Clinic to treat diseases ranging from cancer to weight loss to chronic fatigue.

These benefits haven't received much scientific scrutiny in recent decades, beyond some recent studies finding a strong protective effect against allergies and asthma in young children, published in *The Lancet* (2001) and the *Journal of Allergy and Clinical Immunology* (2014).

Unfortunately most medical research is funded by drug companies, as it's needed to get their own products onto the market. Hence the benefits of real milk generally aren't scientifically proven, but that doesn't mean they don't exist.

We do know that pasteurisation destroys whey proteins, some vitamins (B2, B12, C, E, folic acid), healthy fats like Omega 3 and CLA, carbohydrates like lactose and oligosaccharides, and good bacteria. Now the mainstream doctors will say that these none of the nutrients has any significant health benefit, at least in the doses found in raw milk. However, this judgement is not based on actual experiments with people drinking milk, but is a theoretical belief, based on the old nutritional paradigm where single nutrients are assumed to work in isolation. This is gradually being replaced by the 'whole systems' nutritional paradigm that recognises synergy between nutrients working together, like parts of a complex machine.

Current evidence does not support a ban on real milk sales in Canada. In my view there are better grounds for an official recommendation in favour of real milk, as there is with fresh vegetables. In any case, consumers should have legal access to fresh, real milk that is properly regulated and inspected.