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Name _____

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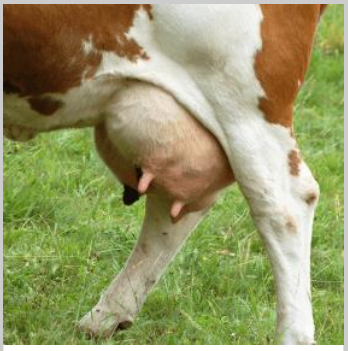
Bovine Somatotropin



Bovine Somatotropin, often referred to as BST, is a hormone naturally produced by a cow's pituitary gland. Using recombinant DNA technology, scientists have discovered a way to synthesize an artificial form of this hormone. The product of this procedure, known as recombinant BST or rBST, is widely used by American dairy farmers to increase the milk production of their cows. Although the use of rBST has been banned in Canada, Australia, New Zealand, Japan, and all countries in the European Union, the U.S. Food and Drug Administration (FDA) ruled in 1993 that it was not harmful and could be injected into cows to improve their milk production. In the United States, the debate continues over whether or not rBST is truly safe for humans and animals. While many claim that the hormone is not only safe, but also provides important economic and environmental benefits for farmers and consumers, a significant contingent of skeptics provides a growing market for dairy products labeled "rBST-free."

Marketed under the name Posilac, rBST works by artificially extending the length of time that lactating cows produce milk. Proponents of the growth hormone claim that cows that have not been treated with Posilac produce an average of eight gallons of milk per day, whereas Posilac-treated cows usually produce nine gallons per day. Supporters also claim that Posilac makes the cows' digestive systems more efficient. According to Monsanto, the company that manufactures Posilac, dairy farmers that inject their cows with rBST can essentially get seven cows' worth of milk from six, thus reducing the amount of food, water, and living space required to raise the cows. Monsanto estimates that, over the course of a year, rBST-injected cows eat more than 3 billion pounds less food than untreated cows. Because they believe that Posilac allows for more efficient milk production, farmers who treat their cows with rBST claim that they save money, and that these savings are passed on to consumers.

In addition to economic advantages, Monsanto also estimates that the use of Posilac benefits the environment.The company claims that for every million cows treated with rBST each year, 6.6 billion gallons of water are conserved. Additionally, Monsanto argues that manure production is decreased by about 3.6 million tons, reducing the chances of runoff getting into waterways and groundwater.

The results of a 2008 study even suggest that the use of Posilac causes a reduction in greenhouse gases. The basis for such a claim is that a digestive bacterium lives in cows' stomachs and causes them to belch methane, a gas that significantly contributes to global warming. If farmers can use fewer cows to produce the same amount of milk, the logic goes, then there will be a reduction in the cow population and thus a reduction in global warming. The study found that for every million cows treated with rBST in one year, greenhouse gas emissions are lowered by 30,000 metric tons. Or, to couch these findings in slightly different terms: if U.S. farmers injected their dairy cows with bovine growth hormone, it would take just 843,000 cows to produce the same amount of milk as one million untreated animals, potentially reducing the global warming impact by the equivalent of 400,000 cars.

When one hears that the use of rBST has been approved by the FDA, that it has economic benefits for farmers and consumers, and that it benefits the environment, it can be hard to understand why so many people are opposed to drinking milk from cows that have been injected with rBST.

Yet skepticism about these claims may well be in order. Many critics have noted that Monsanto has a vested interest in advertising the benefits of Posilac, since it is the company that manufactures it and stands to profit from its widespread use. Proponents of rBST respond to this criticism by pointing

out that the 2008 study suggesting Posilac has environmental benefits was led by scientists at Cornell. But a little digging uncovers the fact that the study was conducted by a scientist, Roger Cady, who is also the rBST technical project manager for Monsanto. In addition, the lead scientist, nutritional biochemist Dale Baumanof Cornell University, has been a paid consultant for Monsanto since the 1980's, though he declined to disclose how much the company has paid him over the years. These conflicts of interest have led people to ask how trustworthy the results of the study actually are.

In addition to these conflicts of interest, critics of the recent study charge that it was based on a faulty premise: that there is an increase in feed efficiency. The study assumes that Posilac increases the ability of individual cows to produce more milk from the same amount of feed, but the FDA has ruled that this is not actually the case. And if the FDA ruling suggests that the use of Posilac does not necessarily increase the efficiency of milk production, what does this imply about the touted economic benefits for farmers and consumers? So perhaps the evidence claiming that rBST benefits the environment and the dairy economy is not so conclusive after all.

But the heart of the debate is not whether the use of rBST has environmental or economic benefits, but whether there are valid health risks associated with treating cows with it. The National Institute of Health has concluded that milk from rBST-treated cows is essentially the same as that of untreated cows, and the FDA has concluded that it has no legal basis to require special labeling of food products derived from rBST-treated cows.However, the FDA did find evidence in submitted clinical trials that rBST-treated cows have a slightly increased incidence of mastitis, an udder infection that is treated with antibiotics. This raises concerns that antibiotic treatments for mastitis could lead to increased antibiotic residues in milk and the evolving resistance of bacteria to the drugs.
Furthermore, some skeptics argue that the FDA is a notoriously overworked, understaffed organization without high credibility among consumers. For these non-believers, the FDA stamp of approval means very little.

Like so many modern controversies, the dilemma over bovine growth hormone stems not from a dearth of information on the part of consumers, who seem relatively well informed, but from a fundamental difference in people's underlying beliefs. Depending on whether a person believes that reduced farm costs will translate to reduced prices for consumers, the argument about Posilac's economic benefits can be either convincing or suspect. And depending on whether or not a person believes that a scientist's corporate affiliations can taint his or her research, the results of a study can be either trusted or dismissed. Depending on whether a person views the FDA as a reliable governmental agency or as an organization with a poor track record for consumer advocacy, the FDA's approval can be either noteworthy or meaningless. Although there is plenty of information about rBST available, the one thing missing from the debate is the highly valuable test of time. It may be that, just as with cigarettes or radiation, we cannot know the true health risks of this practice for years to come.

1) The primary purpose of the passage is to

A. argue that potential health risks trump economic or environmental benefits when it comes to the use of rBST

B. inform readers of the history of rBST use in American dairy farming

C. examine both sides of the controversy over rBST

D. provide support for the idea that rBST is safe and beneficial

E. encourage readers to do their own research about the safety and effectiveness of rBST

2) Which of the following statements from the passage reveals the author's bias?

A. "Although the use of rBST has been banned in Canada, Australia, New Zealand, Japan, and all countries in the European Union, the U.S. Food and Drug Administration (FDA) ruled in 1993 that it was not harmful and could be injected into cows to improve their milk production."

B. "According to Monsanto, the company that manufactures Posilac, dairy farmers that inject their cows with rBST can essentially get seven cows' worth of milk from six, thus reducing the amount of food, water, and living space required to raise the cows."

C. "Proponents of rBST respond to this criticism by pointing out that the 2008 study suggesting Posilac has environmental benefits was led by scientists at Cornell."

D. "Furthermore, some skeptics argue that the FDA is a notoriously overworked, understaffed organization without high credibility among consumers."

E. "It may be that, just as with cigarettes or radiation, we cannot know the true health risks of this practice for years to come."

3) According to the passage, supporters argue that Posilac is beneficial to the environment because

I. farmers who use Posilac require fewer natural resources to maintain their cows
II. dairy farms that employ Posilac contribute less to global warming
III. cows treated with Posilac produce less waste

A. I only

B. II only

C. I and II only

D. II and III only

E. I, II, and III

4) The author apparently believes that

A. more economical milk production for dairy farmers translates to cheaper milk for consumers

B. Monsanto is a corrupt corporation that falsifies research to increase its profits

C. rBST provides no more health risks that the naturally-produced BST

D. there are valid reasons to question the advertised benefits of Posilac

E. the FDA is not a credible organization

5) In paragraph 4, the author mentions that Roger Cady and Dale Bauman are affiliated with Monsanto in order to

A. emphasize the reality that studies are often funded, at least in part, by corporations

B. highlight a potential conflict of interest

C. argue that Monsanto does quality research using scientists at top universities

D. suggest that more scientific research is needed to assess whether rBST is safe for humans

E. criticize Monsanto for using money to lure scientists away from academic institutions

6) The author concludes the passage by

A. convincing consumers that rBST is actually more likely to be harmful than harmless

B. arguing that fundamental differences in beliefs mean that the controversy over rBST will never be resolved

C. suggesting that consumer advocacy groups have deceived people into thinking that rBST is far more harmful than it actually is

D. claiming that the debate over rBST does not really matter, since people will likely not know all of the implications of its use until far into the future

E. contextualizing the debate over rBST within the realm of modern life, where people have plenty of information but do not necessarily know or agree on the truth

7) As used in the final paragraph, which is the best synonym for **dearth**?

A. emptiness

B. burden

C. disagreement

D. deficiency

E. concern

8) According to the author, the most important aspect of the debate over rBST is the

A. health risks

B. credibility of the FDA

C. economics

D. questionable validity of Monsanto's findings

E. environmental benefits

9) Do you believe Posilac should continue to be legal in the United States? Why or why not? Support your argument using evidence from the passage.

Answers and Explanations

1) C
Core Standard: Integration of Knowledge

The purpose of a passage is directly related to its content. In paragraph 1, the author states that some people believe rBST is safe and even beneficial to the economy and the environment, whereas others remain skeptical. In paragraphs 2 and 3, the author identifies the benefits of rBST, according to its proponents. In paragraphs 4, 5, and 6, the author identifies possible problems with the claims that rBST is safe and beneficial, according to its opponents. In the final paragraph, the author notes that a fundamental difference in underlying beliefs may be what causes people to take different sides in the controversy. Since the author presents both sides of the controversy without explicitly arguing for one position, we can determine that the primary purpose is to examine both sides of the controversy over rBST. Therefore **(C)** is correct.

The author implies that, for those who oppose rBST, potential health risks trump its economic or environmental benefits, but he or she does not argue this position. This eliminates **(A)**.

The passage does provide some information about the history of rBST use in American dairy farming, but this is intended as background information rather than the main purpose of the passage. This means **(B)** is incorrect.

While paragraphs 2 and 3 provide support for the idea that rBST is safe and beneficial, the rest of the passage is devoted to questioning those claims, so **(D)** is incorrect.

The author does not encourage readers to do their own research about the safety and effectiveness of rBST, so **(E)** is incorrect.

2) E
Core Standard: Integration of Knowledge

Throughout the passage, the author maintains a fairly neutral attitude toward the subject of rBST. He or she presents the benefits of rBST according to its proponents, and then presents the reasons why skeptics are dubious about these claims. However, in the final paragraph, the author reveals a subtle bias against rBST. In the final sentence, the author writes: “It may be that, just as with cigarettes or radiation, we cannot know the true health risks of this practice for years to come.” While the author ostensibly claims that we do not really know yet whether rBST is safe or not, he or she also groups rBST with cigarettes and radiation, two substances that were initially considered harmless but later found to be very toxic. By linking rBST with these two substances in our minds, the author portrays it as potentially unsafe. This choice of examples reveals a slight bias against rBST. If the author had not linked rBST with substances so notorious for their toxicity, then he or she would have maintained a more neutral attitude to the subject. Therefore **(E)** is correct.

The other statements all contain facts or reported opinions by different groups, such as “proponents” or “skeptics.” None of these statements reveals a bias on the part of the author, so choices **(A)**, **(B)**, **(C)**, and **(D)** are incorrect.

3) E
Core Standard: Key Ideas and Details

In paragraph 2, the author writes: “According to Monsanto, the company that manufactures Posilac, dairy farmers that inject their cows with rBST can essentially get seven cows’ worth of milk from six, thus reducing the amount of food, water, and living space required to raise the cows.” This means that supporters argue that Posilac is beneficial to the environment because farmers who use it require fewer natural resources to maintain their cows. This supports **option (I)**.

In paragraph 3, the author writes: “The results of a 2008 study even suggest that the use of Posilac causes a reduction in greenhouse gases. The basis for such a claim is that a digestive bacterium lives in cows’ stomachs and causes them to belch methane, a gas that significantly contributes to global warming. If farmers can use fewer cows to produce the same amount of milk, the logic goes, then there will be a reduction in the cow population and thus a reduction in global warming.” This tells us that supporters argue that Posilac is beneficial to the environment because dairy farms that employ it contribute less to global warming. This supports **option (II)**.

In paragraph 3, the author writes: “Additionally, Monsanto argues that manure production is decreased by about 3.6 million tons, reducing the chances of runoff getting into waterways and groundwater.” This tells us that supporters argue that Posilac is beneficial to the environment because cows treated with it produce less waste. This supports **option (III)**.

Therefore **(E)** is correct.

4) D
Core Standard: Integration of Knowledge

Throughout the passage, the author presents both sides of the controversy over rBST in a fairly neutral manner. However, in paragraph 4, after identifying the benefits of rBST as advertised by its supporters, the author writes: “Yet skepticism about these claims may well be in order.” He or she goes on to explore possible conflicts of interest for the scientists leading the recent study, as they are both paid by Monsanto, the manufacturer of Posilac. In paragraph 6, the author writes that although the FDA has approved the use of Posilac, “the FDA did find evidence in submitted clinical trials that rBST-treated cows have a slightly increased incidence of mastitis, an udder infection that is treated with antibiotics. This raises concerns that antibiotic treatments for mastitis could lead to increased antibiotic residues in milk and the evolving resistance of bacteria to the drugs.” Because the author does not dismiss the concerns of the skeptics, and even slightly endorses their skepticism by writing that it “may well be in order,” we can infer that the author apparently believes that there are valid reasons to question the advertised benefits of Posilac.

Therefore **(D)** is correct.

The author states that supporters of rBST claim that more economical milk production for dairy farmers translates to cheaper milk for consumers. However, the passage does not provide information to suggest that the author believes this to be true. This eliminates **(A)**.

While some may conclude from the information provided that Monsanto is a corrupt corporation that falsifies research to increase its profits, the passage does not provide information to suggest that the author believes this to be true. This means **(B)** is incorrect.

The author does not indicate in the passage that he or she believes rBST provides no more health risks that the naturally-produced BST. This makes **(C)** incorrect.

Though the author states that some skeptics argue that the FDA is not a credible organization, the author does not endorse this position. Therefore **(E)** is incorrect.

5) B
Core Standard: Integration of Knowledge

Paragraph 4 concerns the "skepticism about [the] claims" that Posilac is safe and beneficial. The author notes that "Monsanto has a vested interest in advertising the benefits of Posilac, since it is the company that manufactures it and stands to profit from its widespread use," but that supporters of rBST claim that the 2008 study was not done by Monsanto. Then the author mentions that Roger Cady and Dale Bauman, the lead scientists in the study, were in fact paid by Monsanto. Since these scientists received money from a corporation that stands to profit from the results, the author states, "These conflicts of interest have led people to ask how trustworthy the results of the study actually are." From this we can infer that the author mentions that Roger Cady and Dale Bauman are affiliated with Monsanto to highlight a potential conflict of interest. Therefore **(B)** is correct.

The author does not discuss how studies are generally funded, so **(A)** is incorrect.

The author does not argue that Monsanto does quality research, only that the research that might appear independent is in fact affiliated with Monsanto. This makes **(C)** incorrect.

The author does not discuss whether more scientific research is needed to determine the safety of rBST in this paragraph. Therefore **(D)** is incorrect.

Although some might believe that Monsanto's funding of the study constitutes using money to lure scientists away from academic institutions, the author does not imply that this is the case. This means **(E)** is incorrect.

6) E
Core Standard: Integration of Knowledge

The author begins the final paragraph by stating: "Like so many modern controversies, the dilemma over bovine growth hormone stems not from a dearth of information on the part of consumers, who seem relatively well informed, but from a fundamental difference in people's underlying beliefs." The author then gives three examples of how people's beliefs can shape the way they interpret information, causing different people to interpret the same information very differently. Finally, the author suggests that "although there is plenty of information about rBST available, the one thing missing from the debate is the highly valuable test of time" and that "perhaps we cannot know the true health risks of this practice for years to come." In the conclusion, the author suggests that merely having information about a controversy may not be enough for people to discern the truth, and also that this is a common problem for "modern controversies."

In other words, the author contextualizes the debate over rBST within the realm of modern life, where people have plenty of information but do not necessarily know or agree on the truth. Therefore **(E)** is correct.

The author's tone in the final paragraph is reflective rather than convincing, as he or she considers the larger world within which the rBST debate takes place. The author does not try to convince consumers that rBST is more likely to be harmful than harmless. This eliminates **(A)**.

Although the author does suggest that fundamental differences in beliefs underlie the controversy, he or she does not imply that the controversy will never be resolved. Instead, the author speculates that we may not know the truth until more time has passed. This means **(B)** is incorrect.

The author does not suggest that consumer advocacy groups have deceived people into thinking that rBST is far more harmful than it actually is, so **(C)** is incorrect.

The author does state that people will likely not know all of the implications of rBST use until far into the future, but he or she does not conclude from this statement that the debate does not really matter. This eliminates **(D)**.

7) D
Core Standard: Craft and Structure

Dearth (*noun*): an inadequate supply; scarcity; lack.

In the final paragraph, the author writes: "Like so many modern controversies, the dilemma over bovine growth hormone stems not from a dearth of information on the part of consumers, who seem relatively well informed, but from a fundamental difference in people's underlying beliefs." From this we can understand that consumers do not suffer from "a dearth of information," because they are "relatively well informed," so the dilemma comes from something other than not having enough information. If consumers who have a lot of information do not suffer from a *dearth* of information, then we can infer that they do not suffer from a lack of information. This means that *deficiency* is a good synonym for dearth. Therefore **(D)** is correct.

Emptiness means the state of containing nothing or being vacant. Although this meaning is similar to deficiency, the word dearth implies having an insufficient amount, not necessarily having nothing. This eliminates **(A)**.

Burden means hardship or weight. The author discusses the amount of information that consumers have, not whether the information is difficult to bear. This means **(B)** is incorrect.

Disagreement means a difference of opinion. Although the author states that people have a difference of opinion about fundamental beliefs, he or she does not discuss a disagreement about the information. Rather, the author discusses on the amount of information consumers have. This makes **(C)** incorrect.

Concern means worry or anxiety. While some consumers have concerns about rBST, in this context the author discusses the amount of information that consumers have, not the concerns they have about this information. Therefore **(E)** is incorrect.

8) A
Core Standard: Key Ideas and Details

In paragraph 6, the author writes: “But the heart of the debate is not whether the use of rBST has environmental or economic benefits, but whether there are valid health risks associated with treating cows with it.” This means that the author believes that the most important aspect of the debate, or what is most central to the debate, is the health risks. Therefore **(A)** is correct.

Although the author discusses all of the aspects listed in choices **(B)**, **(C)**, **(D)**, and **(E)**, he or she does not indicate that any of them are the most important. Therefore they are incorrect.