



Department of Extension
Animal Sciences and Natural Resources

COOPERATIVE EXTENSION SERVICE • VOLUME 80 • February, 2023

Artificial Intelligence and What it Might Mean for Current Affair
Topics in Agriculture

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Since November 2022, a new artificial intelligence platform has taken the internet by storm. ChatGPT (openai.com) is a “trained model which interacts in a conversational way” to answer questions posed by users. The technology can write programs, generate art, and infinite other applications. This new model is easy to use and can synthesize responses from millions of internet sources. Interestingly, the conversational platform doesn’t simply copy and relay information, but rather searches, interprets, and writes a response. In other words, the program takes large amounts of data and computing techniques to make predictions and string words together in a meaningful way. The long-term potential benefits are truly mind boggling and it appears we are on the cusp of something transformational in how we interact with technology. From custom programming to digital art and precision agriculture, the possibilities are truly endless.

However, with any new technology, there are also limitations and potential pitfalls. Since artificial intelligence relies on the body of work on the internet, it begs the question: how does the new platform handle controversial or unproven topics? Agricultural production practices and impacts are often misrepresented by those with anti-agricultural agendas and echoed by mass media. An example of this is beef’s impact on global greenhouse gas emissions which is often cited at 14.5% or more. The reality is that the hard-working ranchers in the United States produce approximately 20% of the world’s beef and only contribute about 0.4% of global greenhouse gas emissions. Because many of the false narratives are frequently regurgitated by a seemingly endless number of main press news sources, this article explores how artificial intelligence may impact the dialogue surrounding controversial topics related to agriculture and compare that with a noncontroversial topic that is much more grounded in fact. The first part of the article will demonstrate the responses ChatGPT generates when asked various questions about artificial meat and environmental impacts of beef production. The second article will demonstrate ChatGPT’s ability to describe cold stress in beef cattle. Some editing was done for the latter to make the article easier to read, but ChatGPT’s writing is designated in italics throughout. The questions that were used to generate the article about cold stress are listed at the end.

Overall, ChatGPT synthesized reasonable recommendations and dialogue when discussing cold stress in beef cattle. This indicates that it does well with fact-based and noncontroversial information.

When challenged with some of the questions relating to current affairs in beef production, the narrative seems to default more towards the anti-agriculture messaging. At times, the program appeared to contradict itself and almost always followed a positive statement regarding the beef industry with a “however” followed by a negative statement. Interestingly fact-based and noncontroversial topics rarely if ever generated a “however” followed by negative comment. ChatGPT developers acknowledge that the program will fill “gaps” with information that may or may not be true, and currently there are no methods, other than the user, to check the accuracy of the responses generated by ChatGPT. Inevitably ChatGPT or similar programs will be heavily utilized in the not-too-distant future. As demonstrated below, increased use of these programs may pose a risk to exacerbate spreading of false or misleading information as it relates to agriculture production. On the other hand, ChatGPT’s ability to synthesize useful fact-based information is quite impressive. At least in the short-term, artificial intelligence will still rely on human interpretation and quality control but may be a mechanism to quickly spread misinformation. Agriculture producers, industry, and academia should monitor this new technology and how agriculture messages are being relayed. Though this article only explored ChatGPT’s ability to discuss agriculturally important topics, it is equally clear that these new artificial intelligence tools are significant advancements in our ability to utilize and interact with technology to improve agriculture in a variety of ways.

ChatGPT’s Responses to Current Affairs

Question/Statement: It is possible alternative meat could have more harmful environmental impacts than traditional meat.

***Response:** It is possible that alternative meat products could have more harmful environmental impacts than traditional meat, depending on the specific production methods used. For example, if the alternative meat is produced using intensive industrial methods, it could lead to similar environmental problems as traditional industrial agriculture, such as deforestation, greenhouse gas emissions, and water pollution. Additionally, the use of genetically modified organisms (GMOs) and other inputs such as pesticides and herbicides could also have negative environmental impacts. However, it is worth noting that alternative meat products made from plant-based ingredients and produced using sustainable methods could have a lower environmental impact than traditional meat.*

Question/Statement: What about compared to sustainable meat production?

***Response:** Alternative meat products produced using sustainable methods, such as plant-based meat made from non-GMO ingredients grown on regenerative farms, could have a lower environmental impact than traditional sustainable meat production. For example, traditional sustainable meat production still requires the use of land, water and other resources to raise and feed animals. Additionally, even sustainable farming methodologies will generate some greenhouse gases emissions. On the other hand, plant-based meat products require less land, water, and energy to produce and generate fewer greenhouse gas emissions. However, it is worth noting that alternative meat production methods are still being developed and studied, and more research is needed to fully understand the environmental impact of alternative meat products in comparison to sustainable meat production.*

Question/Statement: Most of the land used for cattle production cannot be used to grow crops and is largely not used for anything else.

Response: It is true that much of the land used for cattle production is not suitable for crop cultivation and may not be used for any other purpose. This land is often characterized as rangeland, grassland, or pastureland, and is typically found in regions with low precipitation or poor soil quality. While these areas may not be suitable for crop production, they can support grazing animals such as cattle. However, the use of this land for cattle production can have negative environmental impacts, such as soil erosion, loss of biodiversity, and increased greenhouse gas emissions. Additionally, overgrazing and poor land management practices can lead to desertification, making the land even less productive.

Question/Statement: Grazing cattle on rangelands can also be beneficial.

Response: Grazing cattle on rangelands can have both positive and negative impacts on the environment. When managed properly, grazing can help maintain the health of rangeland ecosystems by promoting biodiversity and preventing the encroachment of invasive plant species. Grazing can also help control wildfire risk and improve soil health by stimulating the growth of beneficial plant species and reducing the build-up of dead plant material.

However, when not managed properly, grazing can lead to overgrazing, which can cause soil erosion, loss of vegetation, and declines in biodiversity. It can also lead to desertification, a process where an area becomes progressively drier and less able to support plant and animal life.

In summary, properly managed grazing can be beneficial for rangelands, but it is important to ensure that the number of animals grazing on a given area is appropriate for the carrying capacity of the land, and that grazing is rotated among different areas to prevent overgrazing.

Question/Statement: Eating beef is bad.

Response: Eating beef can have negative impacts on health and the environment. Beef is high in saturated fat, which can increase the risk of heart disease and stroke if consumed in excess. It is also a major contributor to greenhouse gas emissions, deforestation, water pollution, and land degradation. Beef is a significant source of methane, a potent greenhouse gas, and the production of beef requires large amounts of land, water, and other resources. Additionally, the clearing of forests for beef production contributes to deforestation and loss of biodiversity.

However, it is worth noting that the impact of beef production can vary depending on the specific farming practices used. For example, grass-fed beef, which is produced using regenerative farming practices, can have a lower environmental impact than conventionally produced beef and may also be healthier as it has a better ratio of omega-3 to omega-6 fatty acids.

It is important to consider the environmental and health effects of the foods we eat and make informed choices that align with our values and goals.

Cold Stress in Beef Cows

Written? by ChatGPT and Edited? by Craig Gifford. (Frankly, since this is largely written by a computer program, I'm not exactly sure how to cite this.)

Cold stress in beef cows can have a significant impact on the health and productivity of the animals. Cold temperatures can cause animals to expend extra energy to maintain their body temperature, which can lead to decreased feed efficiency and weight gain. Additionally, cold stress can increase the incidence of respiratory and other health problems such as hypothermia, frostbite, and pneumonia.

Cold weather can have a significant impact on cows, both in terms of their physiological and behavioral responses. Cows must expend additional energy to maintain their body temperature in cold weather. This can lead to increased energy requirements and a greater risk of weight loss. Cold weather can weaken the immune system, making cows more susceptible to disease. Cold weather can cause cows to develop metabolic disorders such as ketosis and fatty liver. These disorders can lead to decreased feed efficiency, reduced milk production, and reproductive problems. Cold weather can cause cows to reduce their activity levels and spend more time standing or lying down. This can lead to decreased feed intake and reduced milk production. Cold, dry air can cause respiratory issues such as pneumonia, bronchitis, and chronic obstructive pulmonary disease. Cold weather can negatively affect reproductive performance in cows, especially during the early stages of pregnancy. Cold stress can cause decreased conception rates, increase embryonic loss and reduce fetal growth rate. Cold and wet conditions can lead to increased incidence of hoof problems such as digital dermatitis and foot rot.

Temperature, humidity, and wind interact to impact cows. The lower the temperature, the more energy cows must expend to maintain their body temperature. In extremely cold temperatures, cows may not be able to maintain their body temperature, which can lead to hypothermia and death. Low humidity levels can cause the air to feel colder than it is, as the air can't hold as much moisture. This can increase the amount of energy cows must expend to maintain their body temperature. High humidity can also cause a cow's coat to become wet, which can lead to decreased insulation and increased heat loss. Wind increases heat loss by removing the warm air layer close to the cow's body. Wind chill, which considers both the temperature and wind speed, can make the air feel much colder than it actually is. This can lead to increased energy expenditure and a greater risk of hypothermia. When temperature, humidity and wind interact, the combined effect can be more severe than the sum of each factor alone. For example, a temperature of -20°F with a wind speed of 15 mph and a relative humidity of 50% can have a wind chill temperature of -44°F. This can be extremely dangerous for cows and can lead to decreased feed intake, reduced milk production, and increased susceptibility to disease.

Cows lose energy through a variety of physiological processes. Cows require energy to maintain basic bodily functions such as circulation, respiration, digestion, and metabolism. Cows also lose energy through thermoregulation, the process by which they maintain their body temperature. In cold weather, cows must expend additional energy to keep warm, and in hot weather, they must expend energy to cool down. They also lose energy through physical activity such as walking, grazing and rumination. Lactating cows lose energy through milk production. Milk production requires a large amount of energy, and lactating cows have higher energy requirements than non-lactating cows. Cows lose energy through the process of reproduction, including pregnancy and lactation. These processes require a significant amount of energy to support the growth and development of the fetus or the production of milk. Cows can lose energy due to stressors such as disease, poor nutrition, and

poor living conditions. Stress can cause cows to lose weight and condition, which can affect their overall health and productivity.

The amount of energy a cow expends to maintain body temperature in cold weather can vary depending on factors such as the cow's size, body condition, and production status. However, research suggests that a cow can spend a significant amount of energy in extremely cold weather, such as 0° F, just to maintain body temperature. One study found that a cow in moderate body condition expends approximately 20-25% more energy in -20°F weather than in mild weather. This equates to an additional 2-3 Mcal of energy per day, which is a significant increase in energy expenditure. Another study found that a lactating cow in good body condition can expend up to 1.5 Mcal of energy per day just to maintain her body temperature in subzero temperatures. This is equivalent to approximately 15-20% of her total energy requirements. It's worth noting that these are estimates, and the actual energy expenditure will depend on the specific conditions the cow is exposed to. Factors such as wind speed, humidity, and the cow's ability to access shelter can all affect the amount of energy a cow expends in cold weather. Additionally, the studies cited here are based on research done in specific conditions and may not be generalizable to all situations.

One of the main ways to reduce the effects of cold stress in beef cows is through appropriate housing. Cows should have access to a sheltered area, such as a barn or other type of structure, that is well-insulated and ventilated to help maintain a consistent temperature. Insulation can be provided by using materials such as straw, sawdust, or wood shavings as bedding. The barn should also have adequate ventilation to prevent the buildup of moisture and ammonia, which can cause respiratory problems. In addition, the barn should be designed to protect cows from wind and precipitation.

Another important factor is the provision of adequate amounts of feed and water. Cows that are under stress due to cold temperatures will require more energy to maintain their body temperature, and therefore may need more feed than normal. Feed intake can be increased by providing a balanced ration that is high in energy, protein, and minerals. Additionally, the cows should have access to clean, unfrozen water always. This can be achieved by using heated water troughs or installing windbreaks around water sources. There are several factors to consider when determining how much to supplement beef cows during the winter months. Some key considerations include:

Body condition: Cows that are in good body condition heading into the winter will have a better chance of surviving cold temperatures and will require less supplementary feed than cows that are in poor condition.

Age and size: younger, smaller cows will require more supplementary feed than mature, larger cows as they have a higher maintenance requirement.

Climate: The severity of the winter weather will also play a role in determining how much supplementary feed is needed. In extremely cold climates, cows will require more feed to maintain their body temperature.

Type of forage available: The quality and quantity of forage available will also be a factor in determining how much supplementary feed is needed. Cows that have access to high-quality forage will require less supplementary feed than cows that have access to lower-quality forage.

Production level: Cows that are in the early stages of lactation or are pregnant will have a higher nutrient requirement and will require more supplementary feed.

To determine the specific amount of supplementary feed needed, it is recommended to work with a nutritionist or veterinarian. They can help you to evaluate the specific nutritional needs of your herd based on the factors listed above and can help you develop a feeding plan that will meet those needs. Additionally, it's important to regularly monitor the cows body condition, weight, and health status to adjust the supplement if necessary. As an example, let's consider a 1200 lb beef cow in moderate body condition that is exposed to cold temperatures during the winter months. Here's a possible feeding plan for that cow:

Forage: The cow should have access to high-quality forage, such as hay, that is free from mold or other contaminants. The cow should be provided with approximately 2% of her body weight in forage per day, which would be 24 pounds of hay.

Concentrate: To meet the cow's energy needs during the cold weather, a concentrate supplement should be provided. This could be a grain-based feed such as corn, barley, or oats. The cow should be provided with 1-2 pounds of concentrate per day, depending on the quality of forage available.

Protein: To ensure that the cow has enough protein to maintain her body condition and support lactation or pregnancy, a protein supplement should be provided. This could be in the form of a protein-rich feed such as distillers' grains, soybean meal, or cottonseed meal. The cow should be provided with 0.5-1 pound of protein supplement per day.

Minerals: To support overall health and fertility, a mineral supplement should be provided. This could be in the form of a loose mineral or a block supplement. The cow should always be provided with access to a mineral supplement.

It's worth noting that this is just an example, and the specific feeding plan for a 1200 lb beef cow in moderate body condition will vary depending on the cow's production status, the quality of forage available, and the severity of the winter weather. It's recommended to consult with a nutritionist or veterinarian to develop a feeding plan that will meet the specific needs of your herd.

There are also several management practices that can help reduce the effects of cold stress in beef cows. For example, cows should be grouped by size and age to ensure that the smaller, younger animals are not overly stressed by the cold temperatures. Additionally, cows should be given additional time to acclimate to cold temperatures before being exposed to extreme cold weather. This can be achieved by gradually decreasing the temperature in the barn or providing additional bedding as the temperature drops. In addition, cow should be regularly checked for signs of cold stress such as reduced feed intake, decreased body condition, and increased respiratory rate. If any of these signs are observed, appropriate action should be taken to provide additional care and treatment.

In conclusion, cold stress can have a negative impact on the health and productivity of beef cows. By providing appropriate housing, adequate amounts of feed and water, and implementing proper management practices, the effects of cold stress can be minimized, and the overall health and well-being of the animals can be improved. Furthermore, regular monitoring and early detection of cold stress symptoms can help prevent severe cases and improve the overall health of the herd.

Questions asked (ChatGPT; openai.com) to generate this article.
Describe cold stress in beef cattle.
How does cold impact cows?
How do you determine how much to supplement cows in winter?
Give an example of supplementing a 1200 lb. cow.
How do cows lose energy?
How much energy can a cow spend per day in 0-degree F weather just to maintain body temperature?

UPCOMING EVENTS



2023 Dairy Consortium

Dates: May 15 – June 23, 2023

Location: Clovis, New Mexico

Registration & Information on Website:

<http://usdetc.tamu.edu>

Registration Deadline: February 26, 2023



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