

**A Winter Urea Story-With Apologies to Charles Dickens**  
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It had been 10 long years since Jacob Marley, Ebenezer Scrooge's fertilizer plant partner, had died. Ebenezer had bought out Marley's share of the business from Jacob's relatives and had run the plant ever since. It was the first of December and the weather in his part of North Dakota had dropped below zero every night for a week. The ground was hard and there were a couple inches of newly fallen snow on the ground. More snow was forecast in a few days. Before closing, Ebenezer had talked to his floater-driver, Bob Cratchet, about applying urea tomorrow morning on his fields. He explained that urea prices were high, but prices would likely be higher in the spring and supplies might be tight. He might as well apply the urea now while they had more time. Anyway, nothing bad could happen could it? It was too cold for the urea to volatilize.

As he drove into his lane, Ebenezer reached for the garage door opener and though for a horrifying moment that he saw the face of Jacob where the button used to be. Blinking hard, he forced himself to look again and the face was gone. "No more sauerkraut at lunch for me anymore," he thought out loud.

It was late when he arrived at home. You would think this time of year would be less busy, but end-of-the year sales were important to next year's spring business, and his farmer clients had money to spend before year's end. He watched some TV, had some ice cream and started to get ready for bed. Suddenly, a loud noise, like the jangling of chains came from what could have been the basement, if the house actually had one, which it didn't, and out of the closed door appeared the ghost of Jacob Marley, trailing calendars, file cabinets and hundreds of soil thermometers!

"WOE IS ME, and WOE IS YOU!" he wailed. "I have suffered these 10 years past because I talked people into putting urea onto frozen soil, and now I have this one chance to save you from my fate", he cried.

"Jacob, what are you talking about? And what are you doing with pulling all that garbage behind you?" asked Ebenezer, quite in awe and fear of this eerie spectacle.

"I talked our customers into applying ammonia and urea too early in the fall, and putting urea on frozen soil. I thought more about getting the order and getting the fertilizer orders out of the way than I did about the consequences. So I am doomed to be burdened with these tools that could have increased my customers' nitrogen efficiency forever! Calendars, file cabinets full of Extension circulars, and soil thermometers. Things I ignored in life! Woe is me!" Jacob wailed.

"Now you are thinking about talking your customers into applying urea again on frozen ground." Jacob continued. "To help you, I am summoning three Spirits, starting tonight to help you onto the right path. Expect the first when the clock tolls one." Then he disappeared.

Ebenezer was stunned. He stood where he was shaking, not believing what he just experienced. He went into the bathroom and took a shower. He looked all over the house, and finally decided he had dozed off after the ice cream and had a nightmare. He went to bed and after much tossing and turning fell asleep.

But he suddenly awakened to the sound of his alarm clock radio. He reached over to turn it off and to his surprise, it was one o'clock. He jumped out of bed and almost ran over what appeared to be an old farmer in bib overalls!

"Who are you?" Ebenezer asked.

"I am the ghost of winters past," the Spirit replied.

"Whose past?" Ebenezer asked.

"North Dakota's past," said the Spirit. "Hold onto my arm and we'll take a little trip." Ebenezer held onto the Spirit's arm and was whisked onto what appeared to be a NDSU Experiment Station.

"Where are we?" Ebenezer asked.

"We are at the Carrington R & E Center in 1995. It's late November, and the soil is just frosted in the morning. See? The researcher is applying urea to some of the plots. It will rain tomorrow and the rain will gently wash the urea into the soil," said the Spirit.

"Watch now, and time will move forward," the Spirit added.

With that, day and night whirled quickly before Ebenezer and Spirit again and again, and when it stopped, he saw the researcher again out in the plots, adding urea onto areas in the plots with about 4 inches of snow. It was very cold.

"It is about 3 weeks later. It's December now. The nights have been below zero for over a week and the ground is very frozen. Now the researcher is applying urea to certain plots. Does this look familiar to you?" asked the Spirit.

Ebenezer didn't say anything, but thought to himself that it looked very familiar indeed. In fact, he planned to do it again just as soon as he woke up from this stupid dream!

Time again whirled by, days and nights cycled like strobe lights at the fair. When they stopped, the snow was thicker and harder. "It's a little warmer, though, thank goodness," Ebenezer thought. The researcher was again out in the field.

"The snow is thicker, it's March and the ground hasn't thawed since it first froze last December," said the Spirit.

"A person would have to be crazy to apply urea in snow this deep," said Ebenezer.

"Yes, he would," replied the Spirit.

Time again passed by, not as many cycles now, and when they stopped, the researcher was nowhere to be seen. It was warmer, and the snow was rapidly melting.

"Why are we stopping here?" asked Ebenezer.

"Look at the water in the fields," explained the Spirit. See how the water pools in areas in the field and look closely at how the water slowly trickles from the plots to ponds and even into the road ditch. The ponds in the fields aren't there because the snow falls or blows into those places. The water is there because it slowly runs there during snow melt. The water cannot penetrate the frozen soil, so the water, along with any urea applied during the winter, easily runs off. The urea doesn't stay where it is applied and is free to move with the water."

"That's nonsense!" exclaimed Ebenezer. "Urea is attached to the soil and can't move. Besides, how can we get all of our work done in the spring if we have thousands of more acres to handle that we normally apply in the winter? Aren't we doing the farmer a favor by saving money on the cost of their urea?"

“I think someone hasn’t been reading his Extension circulars,” said the Spirit. “This study that we just witnessed was finished up a few weeks from now with a urea application made just prior to seeding wheat. The wheat was seeded and grown to maturity. When it was harvested, the wheat fertilized in November yielded similar to the April seeding application, and proteins were also similar. But the two applications made on frozen ground made nearly 20 bushels per acre less grain and had almost 2 points less protein.”

“I had no idea,” said Ebenezer. “I must have been using my cell phone in the hallway at the Extension meeting I went to that meeting during that presentation! But I still need to get my work done and this is one way I can get it done!”

“So be it,” said the Spirit, “Let’s go to Montana.” And with that, the scene went fuzzy then became a lot more western-looking. “Look at the researchers putting urea on frozen soil in late January”. Their work showed that urea losses from volatilization alone on frozen soils in mid to late winter was as high as 50%!” Ebenezer just shook his head. The Spirit shook his too and Ebenezer again found himself in bed in his room.

“That was possibly the worst dream I have ever had,” said Ebenezer to himself. He turned over and tried to go to sleep. Before he even got comfortable, the radio alarm went off again, and he was confronted by a strange man in a tweed suit.

“Oh Ho!” the man shouted. “Time to get up! I am the Spirit of Winter Present.”

“Can’t I dream about something else? I get enough winter present when I’m awake!” cried Ebenezer.

“Oh Ho! Let’s go! Out in the snow!” the Spirit yelled. With that, they were at the edge of town and Ebenezer recognized the house of Bob Cratchet. Bob was just coming up to the front door carrying a boy that looked to be about 9 years old, who was holding a broken hockey stick. The door opened and Mrs. Cratchet stood looking at them with a concerned look on her face.

“What in the world are you doing carrying Tiny Jim?” she asked.

“Well, Mom,” replied Tiny Jim, “I was playing hockey and I think I sprained my ankle. Dad says it’s going to be OK, though.”

“He took quite a spill and broke his stick at the same time,” added Bob. “If the ankle isn’t better by tomorrow, you might have to take him to the doctor. By the way, it looks like I might spread urea on my fields this weekend, so I will probably be working late.”

“Do you think it’s wise to spread urea on the snow on the frozen ground? It’s really expensive, you know,” said Mrs. Cratchet.

“It’s OK,” said Bob. “We do it every year for some customers and Mr. Scrooge says it’s OK. It must be. He goes to Extension meetings once in a while, so he must know what he’s talking about. Besides, he said that supplies might be tight in the spring.”

Ebenezer started to feel a little anxious about the urea and frozen snow idea. Then he looked around and the Spirit of Winter Present was shrinking.

“What’s happening to you?” Ebenezer asked.

“You don’t expect Winter Present to last forever, do you?” the Spirit squeaked as it slowly shrank into nothingness.

With that, Ebenezer was surrounded by a chill and looking around saw a towering figure dressed in a black bomber hat and a black parka that looked like something out of an arctic nature show.

“Are you the Spirit of Winters Yet to Come?” Ebenezer asked.

The Spirit nodded, and pointed at the Cratchet door. Both the Spirit and Ebenezer walked through the door and stood in the kitchen where Bob and Mrs. Cratchet were sitting. It was late at night.

“We’re really going to have to watch our expenses this coming year. My wheat yields were at least fifteen bushels less than the neighbors and the elevator dock because of low protein was a killer!” said Bob. “The only thing I did differently than the neighbor was that he waited until spring to apply his urea. I thought I was saving money.”

“I never liked the idea of putting on fertilizer on frozen ground,” said Mrs. Cratchet. “I thought Mr. Scrooge had more sense than that.”

“Well it’s done now,” said Bob. “Tiny Jim wanted new hockey skates this year, but I think he’ll have to settle for a hockey stick, instead.”

“And I think I’ll give you an Extension circular so you don’t do anything stupid again!” said Mrs. Cratchet.

Ebenezer and the Spirit floated out of the house into the yard.

“Spirit, are these the things that will happen or the things that might happen?” Ebenezer asked the Spirit. “I’ll change! I won’t ever talk my customers into putting urea on frozen soils ever again!”

With that Ebenezer found himself in his room. He looked at the clock and it was 6AM; time to get ready for work. He turned on the TV and saw that it was the next morning. Excitedly, he dressed and went into the fertilizer plant to work. He got there before Bob Cratchet. When Bob walked in, Ebenezer shouted “What are you doing here this morning? Don’t you know it’s Saturday in the winter? What could possibly bring you out this morning?”

Bob stuttered, “But... I thought we were going to spread urea on my fields today.”

“Are you crazy?” Ebenezer shouted. “The ground is frozen! Where do you think the urea will go when the snow melts? Sideways, most likely, if it ever gets through the snow at all as cold as it is now. Here, look at this data from NDSU. See, it shows that winter urea application on frozen soils resulted in over 20 bushels less wheat and almost 2% less protein compared to a spring application. No, I’m not going to let you put urea on any of your fields until it’s close to spring.”

And Ebenezer was as good as his word. He purchased an extra floater and tender truck to handle the extra spring work, and had to raise his prices a little to pay for the extra steel, but people always said that he looked out for their interests and worked hard to make sure the fertilizer was applied as efficiently as possible.

And when people asked in the winter if putting some urea on the frozen ground was alright, he would point to a chart on the wall:

**Application of urea to frozen soils preceding spring wheat, Carrington, Endres, Schatz and Franzen, winter of 1995-1996.**

| <b>Application timing</b>                    | <b>Yield, bu/a</b> | <b>Protein, %</b> |
|--|--------------------|-------------------|
| Fall applied, incorporated                   | 45.4               | 14.5              |
| Soil frosted, not deeply frozen, November    | 45.8               | 13.8              |
| Soil deeply frozen, December                 | 27.6               | 12.7              |
| Soil deeply frozen, March                    | 33.3               | 13.0              |
| Applied prior to seeding, April incorporated | 49.6               | 14.6              |
| LSD, 5%                                      | 5.0                | 0.5               |