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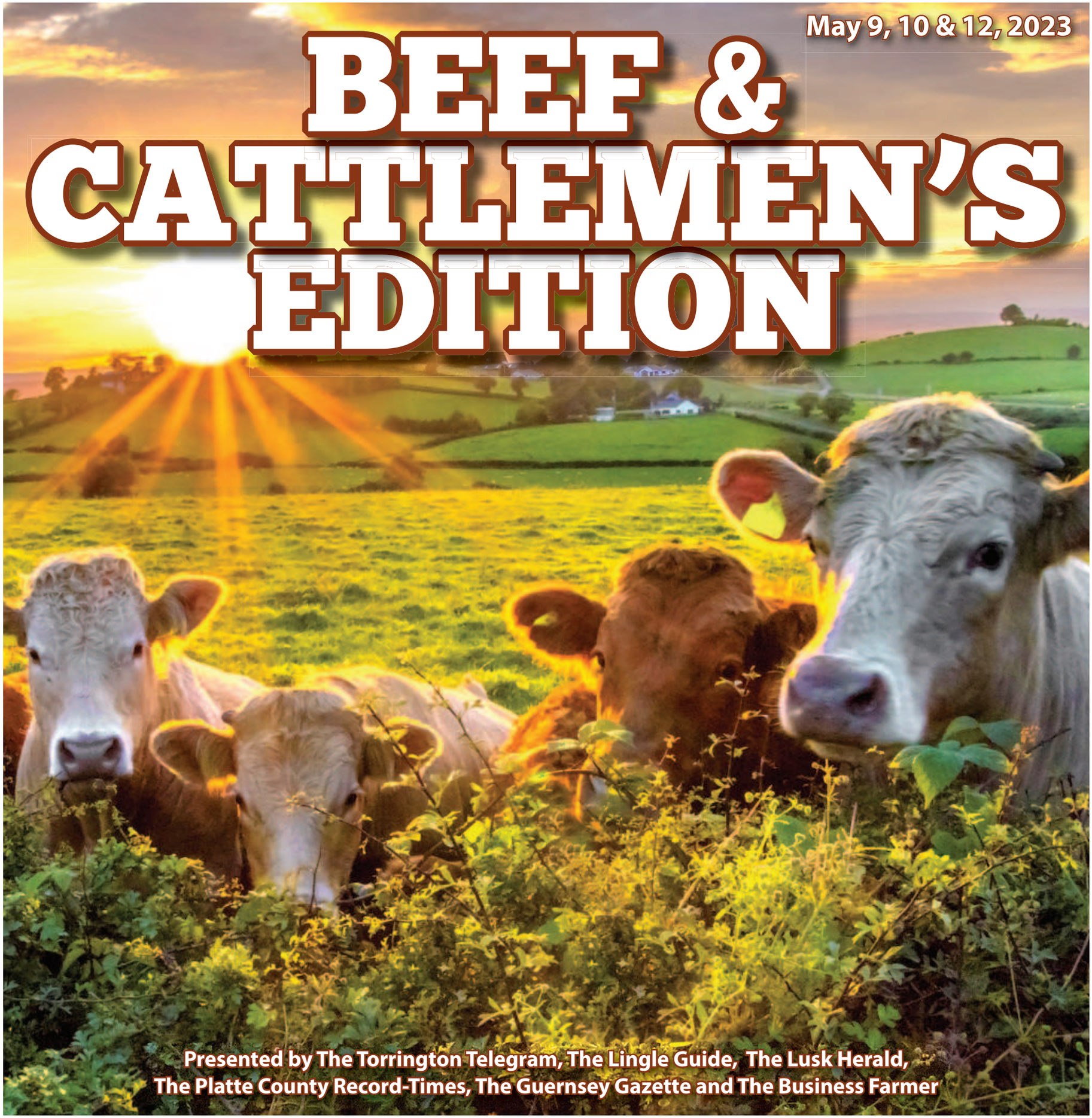

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Grass and rangeland ecosystems

BY SHAUN EVERTSON
Contributing writer

It's early May, and in the wake of a very hard winter the world is greening nicely. Air and soil temperatures are creeping up and prairie, pastures and rangelands of the High Plains are waking up. Grasslands are more interesting than most people think, and vital to both livestock production and the homeostasis of the Earth's biosphere, so let's talk grass.

When it comes to livestock production, whether a herd numbers thousands of head or comprises a single 4-H goat, grass is one of the two most vital requirements for the producer. Without good forage and water, livestock production is simply impossible. Leaving water aside, it follows that grass is so vital to producers that each operation must arm itself with graduate level knowledge of grass in general and an intimate and comprehensive understanding of their owned or leased rangelands.

Nearly all producers possess such knowledge and understanding. They simply wouldn't survive otherwise. But often their knowledge exists as scattered bits of formal and informal information, institutional memory and habit, and the kind of sixth sense developed over years of experience.

Let's take a look at the basics of the High Plains rangeland ecosystem, and in particular, grass.

Our tri-state region of southeast Wyoming, northeast Colorado, and the Nebraska Panhandle is located in the northern High Plains, which is a semi-arid vegetative zone. Characteristics of our climatological/vegetative zone are an annual precipitation total of between 10 and 20 inches, an overnight temperature falloff during the summer months, and a significant annual variation in the timing and quantity of precipitation. The possibility of drought is never far away on the High Plains, and as we've just endured two years of drought, this is a fact we're intimately familiar with.

With grass such an important part of livestock production, it pays to know as much as possible about the rangeland used for the operation. Whether owned or leased, the operator needs to know what's available for grazing, what shape it's in and what its growth characteristics are to make the best short- and long-term use of this vital asset.

This knowledge starts with a basic understanding of what grass is and what it does. Simply put, grass is the major energy source for all terrestrial (land) animals. Grass photosynthesizes carbohydrate from sunlight, atmospheric carbon dioxide and water, storing the energy-dense nutrient in above ground foliage and below ground roots. Grass makes up the base of the terrestrial food pyramid and constitutes the main (or a significant part of) food source of terrestrial herbivores, which are in turn consumed by omnivores and carnivores. It's no exaggeration to say that all terrestrial life is grass fed.

Rangeland is a discreet ecosystem, easily as complex as the most pristine rainforest. Rangeland grasses are unique in the plant world in that their root systems are more extensive than their above ground herbage. In shortgrass rangeland root systems can be five or more feet deep; some tallgrass stands root to a depth of better than 30 feet.

These extensive root systems allow grasses to find and use water and nutrients throughout the soil profile, which helps them survive in dry years and explode with herbage production in wet years. They also anchor soils and provide a rich environment where symbiotic microorganisms thrive and boost soil fertility. Many rangeland grasses reproduce through their root systems as well, pushing rhizomatous stems out beneath the soil from which new plants arise.

Here in the tri-state region, native and reintroduced rangeland grass species include cool and warm season grasses and grass-like plants (sedges). In general, our native rangeland is shortgrass prairie, and reintroduced shortgrass species with a scattering of mid-height grasses.

Sedges are usually the first to green up in the spring, followed by cool-season and then warm-season grasses. There is considerable variation between species and even within species according to location, but most grass growth occurs during 30-60 day rapid growth periods corresponding to the onset of particular air temperatures. In general, maximum growth in cool-season grasses occurs when air temperatures are 65 to 75 degrees, while max growth of warm-season grasses occurs with 90-95 degree air temps.

Such growth characteristics allow range grasses to produce the bulk of their above ground herbage during a relatively short period each year. The staggered peak growth periods between types and species gen-

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A cow grazes with a calf by her side on a ranch near Kimball in early May, 2016. Snow from a recent snowstorm is slowly melting in the background.

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erally provide a three to four month annual period of lush, palatable and preferred forage for selective grazers, likely as a result of rangeland ecosystem evolution. Peak growth occurs relatively early in the season, and once past this heavy herbage production period, above ground growth slows markedly.

Herbage production and plant growth during peak growth is highly correlated to soil moisture and air temperature. Both are required. Under severe drought conditions grass may remain essentially dormant. If moisture is available, however, peak growth will occur when air temperatures are appropriate and will be limited by moisture availability. In wet years herbage production is surprisingly abundant, in dry years production is sparse at best.

Aside from herbage production, which produces forage grazing livestock, root growth and development is at its highest level during peak growth. With root systems making up the bulk of grass plants, root development is obviously vital to the range ecosystem. Carbohydrates derived from photosynthesis provide the plant with the energy needed for both above and below ground growth. When carbohydrate production is reduced by grazing, the plant diverts energy from root development to herbage production in an effort to capture more sunlight to maintain photosynthetic carbohydrate production. This shift from below to above ground growth has been called root mining. Depending on factors like grazing pressure, soil moisture, and air temperature, root mining can be detrimental to the long and short term health of the plant, and by extension, the range ecosystem. Heavy grazing during drought can debilitate an entire pasture, which may take years to recover. Even modest grazing during peak growth results in some level of root mining. The operator's challenge is to understand his rangeland and livestock as a discrete system and introduce management practices which enhance both profitability and sustainability.

In general, most recommended range management schemes include dividing range into a number of pastures and rotating grazing dates and periods between these pastures from year to year. In a four-year rotation, a particular pasture might be heavily grazed during peak growth one year, rested the next year, then lightly and moderately grazed in the next two years.

Range management plans will necessarily be different for different operations. No two rangeland parcels are alike, weather varies from year to year, and grazing requirements change according to economic and other variables. Designing and implementing a range management plan can be a complex and daunting task, but armed with knowledge and experience, operators can employ powerful strategies to maximize both profitability and sustainability.

In May of 2023, most producers across the region are at or near a decision point regarding this year's grazing plan. It's possible that we'll see adequate spring rainfall going forward. As I write this on May 3 the National Weather Service is predicting heavy thunderstorms tonight and a strong chance of springtime rains over the next week or so. Unfortunately, we've just had a very dry April, and possible future rain hasn't happened yet. Should producers plan on a drought grazing strategy or count on rain? It's a tricky, multifaceted problem, and every producer's situation is different. A couple of things are certain though. Firstly, grazing dry, stressed grass will cause root mining and damage the grassland ecosystem, which could take years to recover. Secondly, this drought cycle will end and the rains will return. It happens time and again, and one only need look to the record to see proof of this. Those who find a way to endure and survive the drought with an intact grassland ecosystem will profit when the rains return. Those who don't might not survive. It's a tough decision.

SHAUN EVERTSON/BUSINESS FARMER

Western wheatgrass greens nicely on a ranch near Kimball Wednesday afternoon. Western wheatgrass is a common cool season grass across the region.

A hypothermic calving challenge

BY SHAUN EVERTSON
Contributing writer

Back in mid-April, 2016, the weather was beautiful. Sunny, calm, warm. Perfect calving weather. Until the April 14 winter storm, that is.

The air temperature hovered in the mid-30's all day and a stinging cold rain was being driven by a chill north wind. The forecast called for worse. The forecast prompted me to bring the cows into a little 10 acre fenced paddock up close to the barn. The north margin of the paddock is lined with sturdy junipers, providing an excellent windbreak and some pretty good shelter from rain and snow.

The decision to bring the cows into the paddock was a little iffy. Or perhaps I should say that the situation didn't provide a clear-cut best solution. On the one hand, our cows are range cows, bred to live and prosper in the particular environment of our ranch. They are well equipped to calve in the outdoors and to care for and nurture their new babies in all weathers. Most of the time the open range is the best place for calving. There's lots of room and nearly limitless options for the cow to choose the best place to have her baby. Most of the time the cow is far better equipped than I to choose her place and to do her nurturing. Most of the time 10 acres is too small and confined.

On the other hand, sometimes the weather is bad enough that the cow and calf might need help. Most of the time they won't, even when the wind is driving a stinging cold rain. The calf will be born, get up and nurse, get its metabolism going, and do quite well. It'll look miserable and awful, and it would be for a human, but it's par for the course for a cow and calf.

But sometimes, for some reason, the calf gets on the backside of the energy curve. Even in fine weather it's a bit touch and go at the very start. After all, calves are born with almost zero energy reserve. Basically just enough to get up and nurse and to start metabolizing their first meal of colostrum. Colostrum is loaded with energy, and that first meal is almost always enough to light them off properly.

When it's cold and wet out the margin is razor thin. If the calf starts losing body heat faster than it can generate it, it's on the wrong side of the energy curve. Body heat is obviously harder to maintain the colder the air temperature. Calves are born wet, and a saturated hair coat provides almost no insulation to maintain body heat. A belly full of colostrum will almost always provide the energy margin needed to quickly dry the inner hair coat, where most of the insulating happens, and the cow's tongue is a remarkably effective towel. But when there's a stinging cold rain driven by the

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SHAUN EVERTSON/BUSINESS FARMER

A cow and her hypothermic calf in the middle of a spring snowstorm on a ranch near Kimball in April, 2016. The calf would have expired shortly without human intervention.

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wind, heat can easily flee the calf's body faster than it can be generated.

Calf 616 was born at 3 p.m. He was a lively bull calf and was up and nursing within minutes. When I checked him at 4 p.m. he was fine. At 6 p.m. he wasn't. For some reason the cow had taken him out of the lee of the junipers and into the middle of the paddock. The wind was howling a gale and the rain was turning to snow. The calf was sprawled flat out in the snow, all but unresponsive. The inside of his mouth was cold as ice. He was on the wrong side of the energy curve, hypothermic, and not long for this world.

This is why I'd brought the herd into the confines of the paddock. Just in case a cold, wet calf found itself on the wrong side of the energy curve. I scooped him up and put him in the back of the pickup. I took him to the house and marched through the kitchen, interrupting the nice supper Mom and Dad were sharing with my brother, his wife, and my sixteener niece Julia. The calf and I headed for the stairs to the basement.

I started a tub of warm water running and checked the calf's core temperature. It was 94 degrees. Bad, but in a good way. It should have been about 101-102, so it was very low, but 94 isn't that bad. If there was nothing else wrong with him we'd be okay. Otherwise he was still breathing but nearly unresponsive. He really was a bag of rapidly cooling jello; flat out and limp, hardly moving on his own volition. He wasn't even shivering.

When hypothermia begins to set in, one of the first responses is shivering. Shivering is muscle activity, and muscle activity produces heat. It's a good response. It's not always a perfect response. Shivering produces heat but also gets blood flowing near the skin where a cold wind will wick heat away instantly. When the core temperature begins to drop the body begins to shut down peripheral circulation, shunting blood flow to the core in a last, valiant effort to stay alive. But out in the open, cold and wet, with a sharp wind blowing, life can gutter out in minutes.

I got the calf in the tub of 110 degree water and he started to come around pretty quickly. Within a few minutes he began shivering. Good sign. I mixed up a couple of quarts of freeze dried colostrum and got a pint or so into the calf's belly via a stomach tube.

Within about 20-30 minutes his core temperature came up to normal, and as his gut began to digest the colostrum all that lovely energy began to flow. I took him out of the tub and started to towel him off. To my delight he immediately struggled to his feet, instinctively searching for an udder and sustenance.

I had a calf bottle filled with warm colostrum, and that was close enough. In a remarkably short time he polished off the balance, tail wagging like mad, and was ready to get on with the rest of his life.

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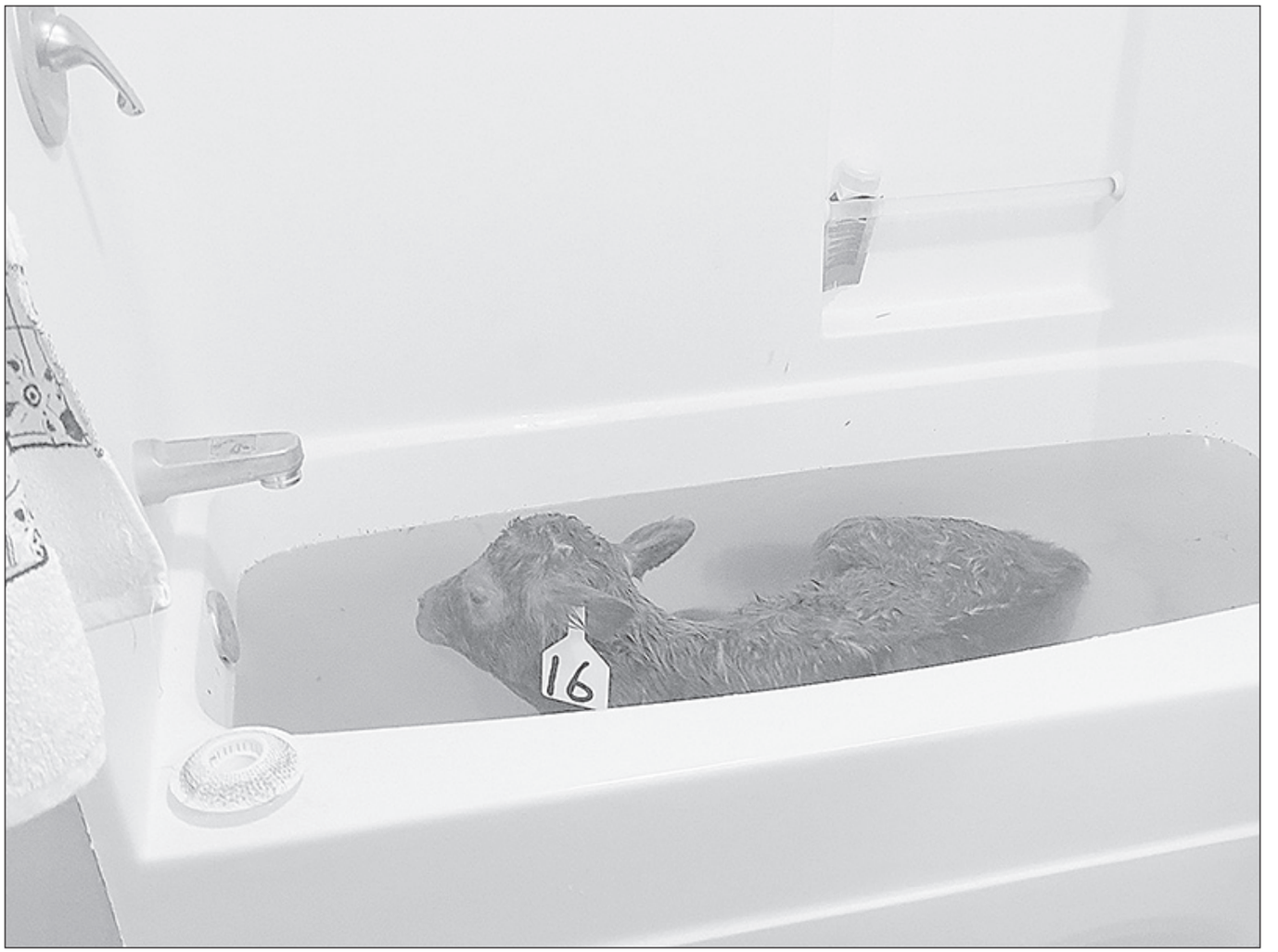

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A hypothermic calf begins to perk up in the warm water of a ranch house bathtub in April, 2016.

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Everyone was amazed. "That calf was dead when you brought it in!," said niece Julia. Well, he'd been heading in the wrong direction, but hadn't gone too far down that path, so the warming and colostrum had seemed to work miracles.

Make no mistake, he was crashing when I decided to intervene. But all he needed was a little externally applied energy, a belly full of internally applied energy, and about 45 minutes. None of that was available in the paddock though. It was a narrow escape.

I took him out to the barn and put him down. I turned on the lights and left the door open to the corral, and the gate of the corral open to the paddock. With any luck his mom would find him in the night and all would be well.

I was, however, concerned about the possibility of breaking the cow's maternal bond. You just never know how they'll react. From her perspective he'd flopped over and stopped behaving like she expected him to, then he just disappeared. In warming him in a tub of water, I'd also washed away his scent -- scent that cows use in part to identify their calves. Would she find him? Would she recognize him? Would she continue to nurture him? Only time would tell. In the meantime, he was warm and dry and out of the snow.

I worried about the calf all night. I'd done all I could for 616, and his fate was now in nature's hands.The sun finally came up on a nasty morning. Thirty degrees, wind still howling, snow still snowing. Snow and slush and ice everywhere. Interstate closed. Visibility was about a quarter-mile. The cows and calves were surviving the weather just fine.

The hypothermic calf was fine, and his mom had found him. Everything looked just about perfect, but I wasn't convinced we were out of the woods. By late morning the calf's mom had left the barn while the calf stayed behind. He was still there in the afternoon. Every time he caught sight of me he perked up and came running.

As it turned out, he'd bonded with me, and not with his real mom. As far as he was concerned, he got born, a lot of crazy-cold-bad-scary stuff happened, and the next thing he knew he was warm, dry, safe, and a human was giving him the milk and attention he needed.

As far as the calf's mom was concerned, something crazy-cold-bad-scary had happened to her calf. He flopped over and stopped moving, then the noisy-drivey thing appeared in a cloud of brilliant light and the person-thing stomped around in the snow, making rude noises. When the person-thing and noisy-drivey thing went away, her calf had disappeared. So she went looking, and she looked everywhere, for hours. Finally, she found something in the barn that looked like her calf, and sounded like her calf, but didn't smell like her calf. She tried and tried to figure it out, but she couldn't. And when she saw that the calf in the barn was bonded with the human, she knew it wasn't her calf. So she went looking again.

What to do?

Now this is a curious thing. It's very endearing when a calf bonds with you. It's a lovely feeling to see them perk up and come running, to have them nuzzle you and follow you around. It makes you feel like you've accomplished a good thing. And you have, but you're not done yet. you have to break that incorrect bond, and reestablish the correct bond. Which is tricky.

I got the calf's mom into the squeeze chute, then spent about five minutes reintroducing him to his mom's udder. He caught on pretty quickly, which was a very good sign, but he kept abandoning the udder and turning back to me, looking for the bottle. Eventually he ended up with a full belly. I let the cow out of the chute and kicked the pair over to the east corral. I hoped that the calf would now begin to see the cow as his mom and go to her for sustenance when his tummy started to growl. It probably wouldn't be that easy, but I'd give it a couple of hours and see what happened.

I got on with the day, which included a half-dozen new calves being born.

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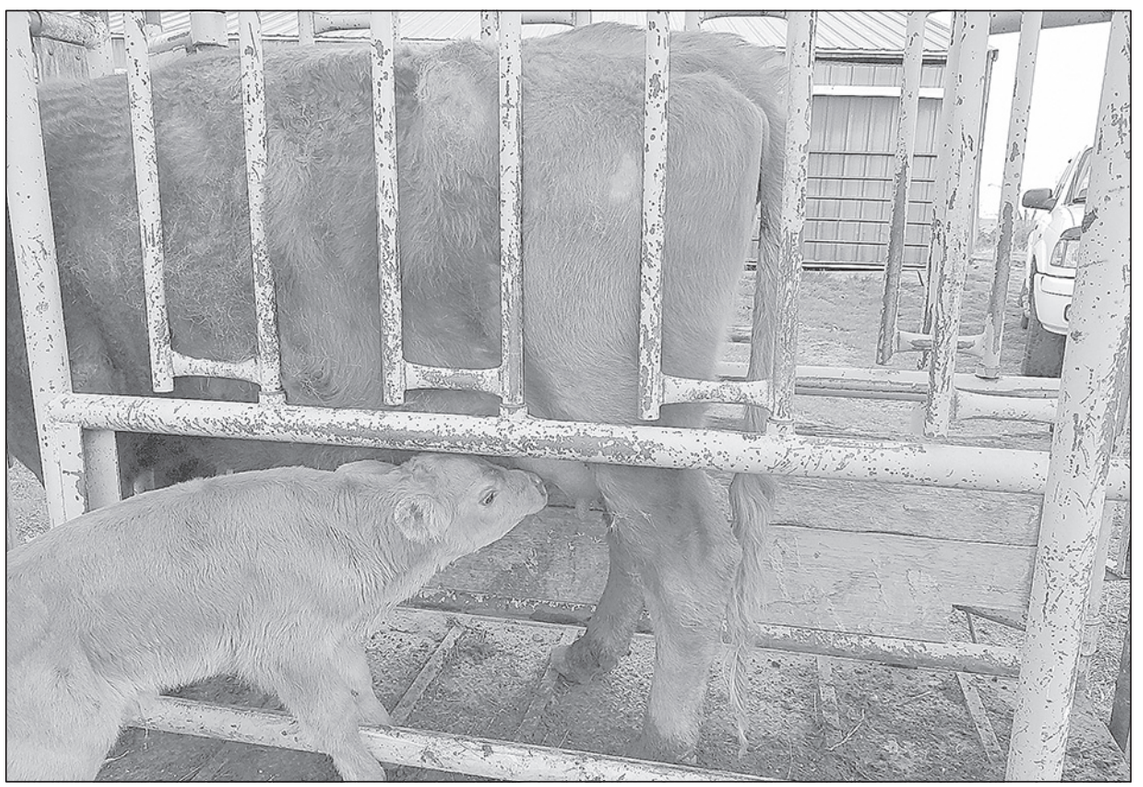

SHAUN EVERTSON/BUSINESS FARMER

A calf which nearly died from hypothermia nurses from his mom in a ranch chute near Kimball in April, 2016. After rebonding with the cow the pair rejoined the herd and all was well.

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By evening the calf hadn't quite figured it all out. He scampered up to the gate where I stood on the other side, bawling for his supper. Sigh.

I put the cow back in the chute and gave the calf another lesson. It was clear that I'd have to put the pair in a small pen and let proximity work its magic. The east corral was just too big for proper re-bonding. The calf was considerably more persistent in nursing than he'd been in the morning, which was a good sign, and hopefully two meals of his real mom's milk would begin to change his scent to something she would more easily accept. When he finished I put the pair into the small pen and left them alone.

When I checked in the morning the re-bonding seemed to be taking place. I let the pair out of the small pen and watched them for a while. The calf seemed to be a bit indecisive, looking at me, then his mom, then back at me, seemingly trying to figure out the solution to his dilemma. Finally he turned to his real mom and began nursing. Bingo.

I opened the gates but left the pair to their own devices in the corral. When they were ready they'd find the open gates and make their way back to the herd.

I spent the balance of the morning tagging new baby calves. When I finished several hours later I noticed that the pair had rejoined the herd, and the calf was nursing his real mom.

Just another day of wonder in the ranching world.