

Teaching Cows to Eat Canada Thistle

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Training Materials:

- Horn, whistle, or other to use as the “Come and Get It” Signal
- 1 supplement tub per every 3 animals (cattle). If you’re training livestock other than cattle let me know and I’ll help you with this.
- Training Feed Options - feel free to choose 8 different kinds of feeds from the examples below. You’ll need 1 fifty lb bag per 25 animals. Buy one additional bag of one of these feeds to use when mixing with weeds. I usually use wheat bran. I recommend including one feed that has molasses as one of the ingredients. That ensures that your animals are familiar with it so if you decide you want to use molasses when you introduce weeds, they will know what it is and be interested in it.

Wheat Bran, Alfalfa Pellets, Cracked Corn, COB (Corn Oats & Barley with molasses), Soy Meal, Hay cubes, Rolled Barley Crimped/steamed/Rolled oats, beet pulp pellets or shreds, cottonseed meal, millet, Dairy cow feed concentrate, etc.

If your cattle are not allowed to have any grain at all during their lifetimes, here are some alternatives that work well for training:

Cut up Apples, carrots, potatoes and other veggies you might have a surplus of, hay cubes, alfalfa pellets, beet pulp pellets, range cubes, sprouted peas, pelleted grass (they have a lot of varieties in California, so check with your local feed co-op)

Need more suggestions? Get ahold of me and we’ll talk it through!

- Gloves
- One large jar of molasses from the grocery store. We might use this for training, and if not, you can use it for ginger molasses cookies (recipe included)
- Hedge clippers for weed clipping. Some folks prefer to use an electric or gas-powered weed trimmer. If you’ve got it use it! Whatever makes it easy for you is my motto! :-)

Prepping for Training

Training Area

I prefer training in pasture because then I don't have to feed or water my trainees. Any size pasture will do if your animals are already used to coming to the sound of a horn, or the sight and sound of your truck or 4-wheeler. Choose a pasture that already has some of the target weed in it. Make notes or take pictures of where these plants are using the instructions from the "Repeat Photography" chapter in the book. By knowing where the weeds are and having a record of what they look like, you'll be able to tell when trainees begin eating the weed, so that you can move on to another one, or end the training early.

Choose a pasture that is easy to drive to so that you can haul your grain and tubs. It doesn't really matter where in the pasture you train your animals. For most trainings I feed at the same location every time, but in one case I wanted to teach trainees to come to the honking horn, so I moved the feeding location a little bit each day, and then called them to it with the honking horn.

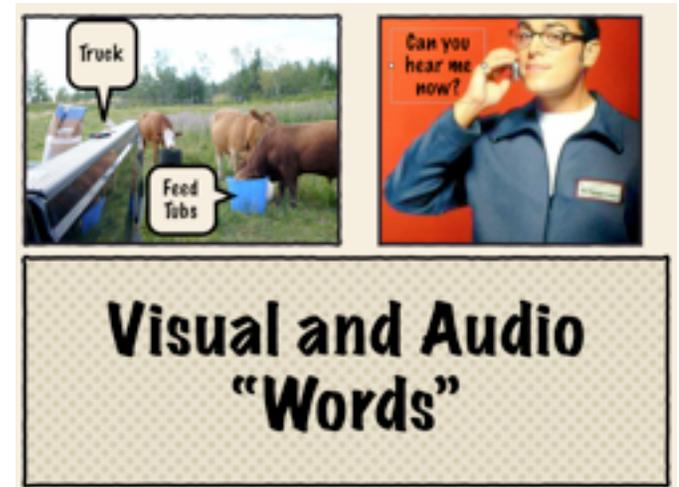
If you decide to train in dry lot be sure to continue to provide your trainees with their normal ration throughout the training session. The training feeds are nothing more than a snack and we don't want your trainees to ever go hungry.

"Come and Get It!" Signals

The whole training process is about developing a routine that helps trainees to think of "new" as "normal." To create the routine do the same thing in the same way every time you come to feed your trainees their "snacks." Based on the snack feeding sights and sounds, your trainees will begin to expect that every time they see those cues, they will be getting something good to eat.

It's just like Pavlov's dog. Pavlov noticed that his dog drooled when being fed. He began ringing a bell before feeding the dog. In a short time, the dog associated the ringing bell with being fed, so it would drool whenever the bell rang.

The visual cues for this training will be you, the vehicle you drive, and the feed tubs you use. The audio cues will be your voice, if you call the cows, or your horn if you honk it. I highly recommend honking the horn as you are driving to the feeding location because as soon as they hear it they switch flips in their heads, and they get excited about the upcoming snack. Honk early and often. Early on I honk while trainees are eating from the tubs to ensure that they make the connection between the sound and "good things to eat."



Know Your Plant

Thistle (*Cirsium arvense*)

Our History With the Plant

Our relationship with Canada thistle is quite long. In 1573, Sir Anthony Fitzherbert, who wrote the very first farming manual published in English wrote, "that thistyll was one of the wedes that greue mooste." (Evans) As far back as 1753, Carolus Linnaeus, who developed the first weed classification system, wrote "It is the greatest pest of our fields." (Darlington) In fact, An old common name for Canada thistle was "Cursed thistle." Still, even Linnaeus admitted that it may have some value in the way he classified thistles into three groups: the holy thistles *carduus* and *Cirsium*, named for their use as medicinal herbs 2000 years ago, and they were considered edible, the *Sonchus*, or sow thistles, and the *Centaurea* or starthistles. (Mitich)

Our current common name for this plant doesn't reflect its actual origin. Canada thistle is native to Europe and Asia, where it is called Creeping thistle and was likely brought to North America in crop seed in the 1600s. (Elpel) It spread rapidly, resulting in legislation to control it in Vermont by 1795, and in New York in 1831 (Mulligan). It was so common in Canada by the 1800s that people assumed it was indigenous, which is probably how it got the name we use for it now. By 1865, the plant had become such a problem to farmers, that Canada enacted the first legislation for eradication of a weed: The Canada Thistle Eradication Act of 1865. By 1868 the state of Iowa wrote its own legislation declaring: "...that if any resident owner of any land in this state after having been notified in writing of the presence of Canada thistles on his or her premises, shall permit them or any part of the root to blossom or mature, he or she shall be liable to a fine of five dollars and cost of collection for each offense." (Hartzler)

Today, Canada thistle is naturalized throughout the world and is considered an invasive species in the United States, New Zealand, Australia, Canada, Brazil and the United Kingdom. (Wikipedia) In 1966 scientists found that it was beginning to develop a resistance to 2,4-D, the herbicide most commonly used at that point.

Nutrients

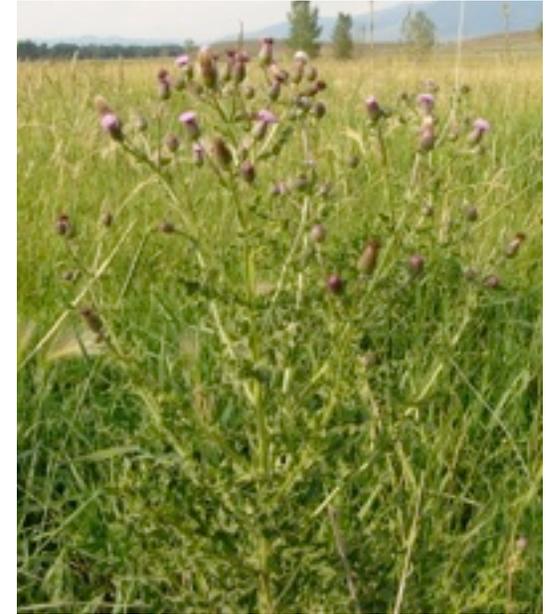
Canada thistle is very nutritious, and is most often compared to alfalfa. A breakdown of its crude protein was provided by Oregon State University (Peters).

Spring: 21% Crude Protein

Summer: 13% Crude Protein

Fall: 12% Crude Protein

Such high protein values make it quite palatable all season long. Animals should especially like it in the summer when grasses are beginning to dry and are losing their protein values.



Toxins:

This is one of the easiest plants to teach cows to eat, and I have trained hundreds of cows to eat it since 2004. No Canada thistle-eating cow has ever suffered an illness or injury as a result of grazing this plant, but that's because I have taken the necessary precautions to make it safe.

Canada thistle is a nitrate accumulator and in 2004, when I first decided to train cows to eat it, I was dismayed to find it listed under "Plants Causing Sudden Death" in [A Guide to Plant Poisoning of Animals in North America](#) (Knight et al). Fortunately, the author went on to explain how nitrate poisoning occurs, and how it can be prevented.

The problem with nitrate accumulators is not the nitrate itself, but the chemical process that takes place in the rumen. Nitrate is reduced in the rumen in a series of steps from nitrate to nitrite to ammonia and finally to microbial proteins. It is the nitrite in this step that causes poisoning if it accumulates in large amounts. When the animal has carbohydrates in its rumen, nitrates are more rapidly converted to ammonia and proteins, preventing the potential for nitrite accumulation. (Cite Knight) Researchers have also found that rumen microbes can adapt to nitrate processing over a period of 5 to 7 days of slow introduction to nitrate accumulating plants. (Knight et al; Waller) So the best thing to do, when working with ruminants on nitrate accumulating plants like goldenrods and Canada thistle, is to allow the rumen microbes time to adjust to nitrates in plants by feeding just a little at a time and providing plenty of variety in pasture.

This plant is the reason that my original training process included molasses. According to Knight, "when carbohydrates such as corn and molasses are present in the rumen, nitrates are more rapidly converted to ammonia and microbial proteins without the accumulation of nitrite." When I first began feeding Canada thistle to my trainees I mixed it with corn and a molasses based vitamin product. Since they were familiar with corn and molasses, I knew it would encourage them to try the weed, while at the same time providing them with important protection.

PRECAUTIONS:

- Never put animals in a solid stand of this plant. They must have other forage to mix with it to prevent poisoning.
- Give rumen microbes time to adjust to this plant. Introduce the food in small amounts over a period of 5 to 7 days.
- Don't put hungry animals into a field that is largely made up of this weed. Make sure that they have a full-stomach when moving to a new pasture with large stands of Canada thistle. This will ensure that they have the necessary carbohydrates in their rumen to aid the rumen microbes in breaking down nitrate.

Experience Training and in the Field

In training I collect whole stems of this plant and then chop it into cow-bite-size pieces (about 6 inches long). Cows take to this weed readily, and seem to need very little training practice before they are ready to head to pasture. For example, cows learning to eat this weed in Oregon in 2010 began eating Canada thistle in pasture immediately after eating it from tubs.



Both butterflies and cows like Canada thistle

Initially animals begin by eating the tops of the thistle. They also seem to prefer the older, coarser stemmed thistle plants over the newly emerged sprouts, though they will eat all ages. Over the course of a summer, animals trained to eat Canada thistle learn to graze it to the same level as they graze grasses, and generalize to other thistle species such as musk and bull thistle.

Related Plants

Cows trained to eat Canada thistle chose to add bull and musk thistle to their diets when in pasture.

Grazing Management:

Canada thistle is a perennial plant that has a vigorous and spreading root system making it more difficult to control whether with grazing or herbicide. It flourishes in disturbed areas and when other forages are grazed exclusively. (cite Elpel)

If your objective is to reduce this plant, manage your animals to graze it early and often. Researchers suggest beginning grazing when rosettes first appear. Research also indicates that topping or grazing the plant stimulates new growth. The plant must be grazed repeatedly to weaken nutrient transfer to roots and reduce its ability to regrow. Shoot populations can be reduced to very low levels by regular, short-term, rotational grazing. (cite) Animals should be moved from a pasture when necessary to protect preferred species, and returning to regrow new Canada thistle sprouts if grazing will not harm preferred species.

Our work at Grant-Kohrs Ranch and at 6 different ranches in the Ruby and Madison Valleys in 2008 demonstrated that trained cattle will graze this plant throughout the grazing season, that they will eat stemmier plants with equal gusto, and that they will graze it to the same height as the grass in the pasture. Ranchers in other areas have indicated that this kind of repeated grazing has eradicated Canada thistle from their pastures (Dennis Neal pers com).

Because I know that Canada thistle is a good forage, I have managed it as a forage in my own goat pasture. Since my pasture is only about an acre and a half and I only have two goats, the pasture is divided into three sections. I move the goats from section to section to maintain grasses and Canada thistle health. The patch of Canada thistle never blooms, but never disappears, so that my goats always have access to this high protein plant.

Making Lemonade

Don't let your livestock eat all of this. It can be a tasty forage for you too. We've found numerous recipes using this plant. Here's one from wildflowers-and-weeds.com:

Pam Sherman of Boulder, Colorado shared this recipe for Canada thistle with the Plants for a Future database: "I pick them in quantity when the plant is under 1 foot tall, then rinse them to remove dirt and bugs. I find that rinsing (under a stream of water) tends to disable the prickers to a noticeable extent. I cut the plant's stem with scissors via gloved hands, but rinse the leaves with bare hands. Then I cook them in water or stock (the latter is tastier) and the prickers are fully disabled. I then puree the leaves with a good quantity of milk (or milk substitute), season to taste with onion, garlic, salt, etc. and have a cream soup. I also put it in quiche or savory pancakes. I tell my friends I'm serving them something special, but don't say what until after they have tasted it and have exclaimed how good it is. You do NOT have to remove the prickers by hand from the raw plant, so it is not a fiddly process. It's a great green vegetable source." (cite Elpel)

From Plants for a Future we found these medicinal uses:

The root is tonic, diuretic, astringent, antiphlogistic and hepatic. It has been chewed as a remedy for toothache. A decoction of the roots has been used to treat worms in children. A paste of the roots, combined with an equal quantity of the root paste of *Amaranthus spinosus*, is used

in the treatment of indigestion. The plant contains a volatile alkaloid and a glycoside called cnicin, which has emetic and emmenagogue properties. The leaves are antiphlogistic. They cause inflammation and have irritating properties. (cite Plants for a Future)

Citations

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Other Resources

This training process was based on decades of research by Dr. Fred Provenza and his colleagues at Utah State University. Visit <http://behave.net> for more on behavior principles, journal articles, and other related projects.

Choose Your Trainees

I typically train no more than 50 cow calf pairs or 50 heifers, but you may work with fewer. You can choose fewer, but remember that you're using competition and herd behavior to accomplish your goals, so it's best to have at least a dozen trainees. Things that might influence which animals you choose to train include where they're located in relationship to your work or home, how you separate your herd into groups, and who is available to train your animals.

Training

I think you'll be more comfortable with the training if you've read the chapter starting on page 61, "Step 3: Making the Unfamiliar Seem Familiar." It will give you additional background in the science behind how this works and examples from my own experience training animals. I've outlined the process below including examples of what can be fed, something about the food, what you can expect from your animals and things you can do if things aren't going quite according to plan. It is just fine to substitute other feeds for the ones I've selected. I'm just looking for different flavors, smells and textures so that they have lots of good experiences with new things.

Be sure to pick the same time morning and afternoon, and use your "Come and Get It!" signals to let the animals know that something good is coming. Have fun with the training. This may sound a little strange, but I find that when I'm having a good time and feeling positive, the animals are easier to work with and more willing to try what I'm bringing them.

Day	Feeding	Qty	Food	About the Food	Trainee Behavior	Trouble Shooting
1	AM	3	COB (Corn, oats and barley with molasses. Usually considered a horse feed)	I like to feed something that I can build off of for the subsequent feedings. Here they are being introduced to three different grains as well as the molasses. In subsequent feedings when I give them each grain singly, they will find it somewhat familiar so they'll be ready to try it.	If your trainees are familiar with supplement tubs, it may not take them long to come to the tubs and test what you've give them. Don't be concerned if they don't eat everything immediately. Some herds try a little, then walk away. This lets their internal feedback system work, telling them that the food is good.	Don't pour out what they don't finish. Just add the next feed in with it. They will eat it eventually
	PM	3	Crimped oats	This introduces a new food with the same familiar flavor to help them make the transition.	Most trainees will come easily to the tubs. They may still be cautious about trying the new food.	If you notice that trainees are still afraid of the tubs or are not trying any of the food, put some hay in the tubs. This helps them understand that the tubs are for food.
2	AM	3	Cracked Corn	The corn is familiar from the day before so they should be willing to try this.	Trainees should be coming to the tubs easily now.	Different groups react differently to foods. Some groups are more cautious than others. I never worry if they're not finishing their foods at this point.
	PM	3	Rolled Barley	This is only day two and we're still transitioning them to new feeds. They should recognize this from the morning of Day 1.		
3	AM	3	Alfalfa Pellets	This is a whole new shape and texture. It may smell a little familiar to them.	I have found that pellets can cause animals to walk from tub to tub looking for something better. If the cows don't eat, this well it's a good thing because the calves will get a good taste of what's in the tubs.	
	PM	3	Soybean Meal	This is going to be very unfamiliar to them, but at this point they are getting accustomed to new things. One of the nice things about this one is the floury texture. It will stick to their noses, so they'll have to try it. I find they eat this very well.	This is about the time that your trainees are getting used to the routine and to having you arrive and bring them something good. I sometimes find my trainees waiting for me the afternoon of day 3. They should be coming readily to the tubs and sticking their noses in.	Every once in a while I find that trainees aren't being as "excited" about the foods as I'd like. They hang back or only a few try the tubs. I think this is highly unlikely with your trainees. But if you see this happening, reduce the number of tubs available to increase the amount of competition.

Day	Feeding	Qty	Food	About the Food	Trainee Behavior	Trouble Shooting
4	AM	3	Wheat Bran	This has the same floury texture as the soybean meal. Cows seem to love this one.	They should be fighting over the tubs at this point.	
	PM	3	Hay Cubes	I like to feed something difficult to chew just before starting on weeds to give them the idea that some things take a little more effort than others, but that they're still good to eat. After all, some weeds could be more difficult to wrap a tongue around than grass, but they're still tasty!	This is another good opportunity for your calves to get some training. Cows may drop hay cubes or not finish them so that calves can bat clean up.	

Starting on Weeds

You will only be feeding weeds once a day. This schedule shows feeding weeds for 3 days. But you may not have to feed weeds that long. I have learned to look at the weeds in pasture as soon as I start feeding weeds to my trainees. I've found that many start eating the weed in pasture after trying it only once or twice from the tubs. When you see bitten of Canada thistle plants in your pasture, you can stop training. If you're unsure, continue through the third day of training.

If you want to train cows to eat another weed, you can add that to the tub as soon as you're done with Canada thistle. If it's another thistle or a plant that has a growth form similar to Canada thistle, don't bother training them to eat it. They will begin to eat it in pasture on their own. I used to train as many as three weeds at a time, but now days, I only do one. Then I send my trainees to pasture where they will introduce themselves to new weeds on their own. If I find that they are not eating something I know is safe for them, I bring out a few tubs, and cut some weeds and put them in the tubs. Since the tubs mean "good things to eat," the trainees check out my offering, eat it and then begin eating it in pasture.

Gathering Weeds

Gather the parts of the target weed that cows would most likely graze. I generally begin by cutting long sections of the plant, and then I chop them into about 6 inch lengths in the tub. This gives them “bite-size” pieces. I’ve found when I leave them longer, they stems tend to catch on other stems, the cows pull everything out of the tub, and then most of my carefully prepared weed salad gets dropped on the ground.

The easiest way to gather weeds is to take the two tubs you’re going to fill out to an area with lots of your target weed. Don’t gather the weeds from the pasture where you cows are training. We want to leave those weeds there for them to practice on. When I work with another person it generally takes us no more than 30 minutes to fill two tubs for 50 trainees.



Two full tubs for 38 bison heifers. This is really enough for 50 trainees. For your 90 trainees, loosely fill 2.5 tubs.



This is a tub of late season diffuse knapweed, wheat bran and a little barley. This gives you an idea of how few weeds you have to pick. You’re just giving trainees a “taste” of the weed.

Mixing the Weeds

Distribute the weeds evenly among your tubs. Pour wheat bran on top of the weeds. Because it is so fine, it will fall to the bottom if you just shake the tub a bit. Some of it will stick to your weeds, some will just hit the bottom and stay there. It’s good either way. The point of using the wheat bran, or any food added to the weeds, is to get the cows to put their heads into the tubs so we can create a “feeding frenzy.” Some cows may only eat bran, but others will grab weeds, either because they want to, or because they want to be sure they get their share of whatever everyone is fighting over.

What about molasses?

If you are nervous when you begin to feed weeds, your trainees will read it in your body language and they’ll be slower to try the weed. If you’re at all nervous, pull out that jar of molasses and drizzle some on the weeds or on the bottoms of the tubs. Then you’ll be good to go.

Will it Work?

The funny thing is that every time I do this, I ask myself this same question. I know the science, I know why it works, I know that the weeds are edible, but there is always a part of me that still wonders if it will work. I’ve trained cows to eat really spiny thistles, and very low-nutrition, late-season diffuse knapweed. Even when I thought it wouldn’t work, it worked. And every time it just tickles me to no end. I hope you’ll have that same feeling!

Every once in awhile I've had to make adjustments to the weed feeding portion of the training to match the needs of my students. I've included those suggestions here. I've tried to include every option I can think of. But don't worry. If the cows don't go for it immediately, we can talk things over on the phone and I'm sure that they'll eat these weeds in the end.

Day	Feeding	Qty	Food	About the Food	Trainee Behavior	Trouble Shooting
5	PM Feed at the same time you normally would have in the afternoon.	1/2	Wheat Bran w/ Canada thistle	Wheat bran sticks to the weeds, making it a good, familiar additive for the transition to weeds. Leave the tubs with the weeds until you return the next day.	Trainees usually mill about a bit more when they are first trying weeds. They don't finish the weeds immediately, and sometimes they don't finish them at all. This is normal. Even with the wheat bran, this is a big change from anything else we've asked them to try and they have to have time to let their feedback mechanisms work. If you see one cow eating the weed, you've got it made. She'll be back the next day for more, and the others will follow her lead. Calves will likely come in after the cows have had a chance at the tubs and they will try whatever is left. Watch for calves eating and Moms returning to try based on what the calves are doing.	They often grab the weed and drop it on the ground near the tub or tip the tub over. I usually pick up the weeds and throw them back in the tub before I leave, so I can get them to eat as much as possible.
6	PM	1/4	Wheat Bran w/ Canada thistle	Reduce the amount of wheat bran in preparation for the next day's plain weed feeding.	They should eat most of what you give them today.	If you find a lot of yesterday's weeds laying on the ground, you can pick them up and put them back in a tub to get a better idea of what your animals are eating. Then throw them out. We only want our trainees eating the best and juiciest parts of the weed so they will have only good experiences with it.

7	PM		Plain Canada thistle		They should eat most of what you give them today.	<p>You can feed plain weeds more than once if you're not satisfied with your trainees' first attempt.</p> <p>This is where the molasses might come in. All we want them to do is stick their heads in the tubs. Sometimes I run into trainees who won't stick their heads in the tubs at this stage. So I feed them the target weed one more day. To make sure they stick their heads in the tubs, I spritz a little bit of watered down molasses in the bottoms of the tubs before I add the weeds. This has always done the trick.</p> <p>To make it easy for you, just pour a little molasses straight from the jar into the tubs. I kind of drizzle a string of it over the bottom for best effect.</p>
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Grazing the Weeds in Pasture

I used to build training pastures to put trainees into after they've completed the training process. Of course that was a little bit of work, and went against the whole point of what we're doing: to make it easier for you to manage your weeds. So now I pay attention to changes in the pasture weeds based on my photos and in pasture observations. Walk around and look for evidence of bitten off plants. Look closely, keeping in mind that this could make the difference between having to build more temporary electric fencing or not. Use the pictures you took before the trainees arrived in pasture to help you find where your target weeds are.

Do you see thistles that look like they're slightly bent over instead of standing up straight? This shows that your trainees have been wrapping their tongues around the plants in an effort to bite them. Sometimes I have to part the grass and look down to see the remains of little stems of my target weeds. It's worth it if I don't have to build more electric fence! :-)

It also helps to watch the cows themselves. I like to go see the cows when they're busiest grazing and just walk quietly among them to see what they're eating. Doing this, I've learned that they begin trying the target weeds a little at a time. With thistles, they start with the flower heads or blooms, and then move to the larger leaves at the bottom of the plant. This is what my 110 pairs were doing in Montana when I left in mid-July. When I returned a month later, they were grazing the Canada and musk thistle to the same level as the grass. If letting them take that much time to learn works well for your operation, then I would let them take the summer to learn, and save myself some time and labor.

We can talk about your observations of what your animals are doing in pasture to help us decide whether or not we need to build a trial pasture. My goal will be saving you as much training time as possible.

Molasses Cookies - Brenda Hall's Mom's recipe from Allrecipes.com

I never cared for molasses until I started training cows to eat weeds. Now these are my favorite cookies. I try to bring them to the ranchers I'm working with to make the training process fun for everyone. Use up your leftover molasses and enjoy!

Ingredients

3/4 cup margarine, melted
1 cup white sugar
1 egg
1/4 cup molasses
2 cups all-purpose flour
2 teaspoons baking soda
1/2 teaspoon salt
1 teaspoon ground cinnamon
1/2 teaspoon ground cloves
1/2 teaspoon ground ginger
1/2 cup white sugar

Directions

1. In a medium bowl, mix together the melted margarine, 1 cup sugar, and egg until smooth. Stir in the molasses. Combine the flour, baking soda, salt, cinnamon, cloves, and ginger; blend into the molasses mixture. Cover, and chill dough for 1 hour.
2. Preheat oven to 375 degrees F (190 degrees C). Roll dough into walnut sized balls, and roll them in the remaining white sugar. Place cookies 2 inches apart onto ungreased baking sheets.
3. Bake for 8 to 10 minutes in the preheated oven, until tops are cracked. (Note: if you want very chewy cookies, bake for fewer minutes, pull them out and leave them on the racks to cook a bit longer before moving to wire racks.) Cool on wire racks.

