

## Week 1: Cookies

The following recipe is a great alternative to commercial horse treats. It was even tested at Equi-Analytical lab and is extremely low in starch and simple sugars, with an NSC of 2.4.

### LOW STARCH APPLE CINNAMON HORSE TREATS

#### Ingredients:

- 1 lb. bag of ground flaxseed
- ½ cup Unsweetened applesauce
- 2 tbs. Cinnamon
- 2 cups hot water

#### Directions:

Preheat oven to 350 degrees. Dump flaxseed into mixing bowl. Add Cinnamon; mix. Add applesauce, then HOT water. Initially mix with rubber spatula, then use your hands until the dough is smooth.

Cover cookie sheet with parchment or wax paper. (Do NOT use cooking spray.) Place dough on paper covered cookie sheet to evenly cover it. The thinner you spread the dough, the crunchier your horse cookies will be. Cut the dough into squares BEFORE baking; this allows them to come apart easily after baking. They are difficult to cut apart once baked.

Place in preheated oven and bake at 350 degrees for 60 minutes for chewy cookies, and 75 minutes for crunchy cookies. After that, turn off the oven and let them sit in the warm oven for another 30 minutes.

The cookies shrink during baking. Once cool, they break apart easily. Store in a baggie or plastic container in the refrigerator so they will not mold if not eaten quickly. (Thinner, crunchier cookies are less apt to mold.)

## Week 2: Forage vs Concentrates, and Processing

### Welcome to week two of BRAY's feeds and feeding series!

Please remember: this is a general guide to help you make informed decisions when navigating the aisles at your local feed store; as always, if you have a question about feeding your specific donkey or are concerned about their health you should speak to a qualified equine veterinarian to tailor a plan specific to your animal. With that being said, let's get into it!

**Concentrates:** Concentrates refer to livestock feeds that are rich in energy and/or protein but low in fiber, such as corn, soybean meal, oats, wheat, etc. Concentrated feeds are colloquially referred to in most of the equine world as "grain". These include pelleted equine feeds like SafeChoice or Strategy, as well as all stock feeds like COB mix or Sweet 10, or simply whole grains like oats or barley.

**Forage:** Forage refers to plants or plant parts other than separated grains fed to or grazed by domestic animals. Forage may be fresh, dry or ensiled (e.g., pasture, green chop, hay, haylage). Most equines in Arizona receive their daily forage as either hay (cut, dried, and cured), or pasture (actively growing grasses and plants).

**Binders:** Many processed or pelleted feeds will use “binders” such as molasses to keep the pellets together, and increase palatability (flavor). It is important to look at the ingredients statement on your bag of feed to see what may be used as a binder to ensure you’re not adding unneeded sugars and concentrates to your donkeys’ diet; many grass hay pellets use molasses as a binder, but some do not.

**Processing:** Animal feeds may be processed in many ways, and for several reasons; usually either as a way to ensure safe storage in order to retain nutrition and prevent spoiling —most often seen in baled hay, or to make a product more easily and efficiently digested, thereby reducing waste. Increasing digestibility is typically done through processes that increase the surface area of a feed, which allows for gut bacteria to break down the feed more quickly. Think of it like this: a piece of sugar rock candy will dissolve in a cup of hot tea much more slowly than granulated sugar. In fact, you’re much more likely to see chunks of sugar still remaining in the bottom of your tea cup, undissolved, if you sweeten your tea with rock sugar rather than granulated sugar. In the same way, one kernel of corn is more quickly digested if ground into cornmeal as opposed to as a whole kernel because cornmeal will have more surface area for bacteria to begin the digestion process. As many of us know, it’s not atypical to see whole, unprocessed grains pass through to manure fully undigested.

It is important to understand the various ways feeds can be processed to ensure the safety of your long ears.

Types of processing commonly seen in Arizona are:

- Hay: herbage, and especially grass, mowed and cured for fodder. We will discuss hay in more detail next week, but most of us are familiar with our dried hay bales from which we feed our donkeys.
- Silage/haylage: Feed preserved by anaerobic fermentation. Silage and haylage is most often used for dairy cattle in Arizona, although you may see plastic wrapped bales of haylage marketed toward horses at your local feed store. The fermentation process helps to break down and “pre-digest” some of the plant materials in the feed so the animals may more efficiently digest plant structures such as cellulose.
- Rolling or steam flaking: these methods are both designed to make grains more digestible. By rolling them flat with rollers or using steam to soften and split the pericarp (outside shell), you increase the surface area for gut microbes to digest the grains, as well as allow them access to the more digestible inner portions of the grains. You may be familiar with this process when considering rolled oats, like you may use to make oatmeal, versus whole oats.
- Grinding: grains and seeds can be ground to increase digestibility. After grinding they may be left as-is such as ground flax, or extruded into a pellet, either on their own, like rice bran pellets, or mixed with other grains and products, such as the above-mentioned SafeChoice and Strategy.
- Chopping: hay products may also be chopped to increase digestibility and make for easier storage. You will most often find chopped hay either in plastic wrapped small bales, or extruded into pellets or cubes. Many donkey owners are familiar with alfalfa cubes and grass or alfalfa pellets, which are often used as training treats and rewards.

### **How do I use this to make a feeding plan?**

As donkeys are incredibly efficient with their feed, and most domestic donkeys are more sedentary than their wild relatives have evolved to be, donkey owners generally want to do the opposite of most livestock owners and feed our donkeys as *inefficiently* as possible. This means minimizing concentrated feeds and heavily processed feeds, like grains and pellets, and seeking out forages with low nutritional density like grasses and straw. Of course the one rule of animal feeding is that not all animals are the same, so while the vast majority of domestic donkeys do best on limited grasses and clean straw for browsing, there will be times your animals may need additional nutrition and/or calories. These instances may include: during times of very cold weather, while pregnant or nursing, while growing, or when being worked heavily. Additionally, some animals may simply have a particularly fast metabolism and require additional feed. In these instances you may choose to ask your vet for feeding guidance to ensure your animal is getting a properly balanced ration for their needs.

## Week 3: Hay

HAY there! Hay, it's not just for horses! It is for donkeys, mules, and hinnys too! But what TYPE?

Yes, what TYPE - it is a common misconception that "hay" refers to a specific forage for hoofstock, when actually, as we discussed last week, hay is better described as a process. In fact, some of the most popular choices for equine hay in our area are typically not even the same class of plant: Alfalfa is a legume. Bermuda grass is, what else? A grass. And oat hay is from a cereal grain. When you say that you "feed only hay" you're simply saying you feed a dried forage and no concentrates.

The definition of hay is: herbage, and especially grass, mowed and cured for fodder.

In order for a green crop to become hay it must undergo three steps:

1. cutting
2. drying (curing)
3. storing (baling, pellets, etc)

Those of you doing research into donkey diets will often see it mentioned that donkeys and donkey hybrids should be fed "low quality hay and forage." Please note when this is stated the authors mean the hay and forage is a plant or plant part that is naturally low in nutrients, NOT that your long ears can or should be fed hay that's dusty, moldy, or full of weeds. If you note your hay is dusty, moldy, weedy, or contains debris or plant matter that could injure your donkey (like goat heads, burrs, foxtail, excessive trash, or toxic or unidentified plants), discard the hay and do not feed it to your animals or use it for bedding.

### Hay vs Straw

In order for a crop to become "hay" it has to go through the following steps: cutting, drying, and typically baling. However, the timing of these steps is important! For cereal grains such as wheat, barley, or oats, what is commonly referred to as wheat hay, barley hay, or oat hay would typically be the grasses cut and dried *before* the plant produces seeds (concentrates). This will cause the hay to retain a higher level of nutrients. If the crop is allowed to mature further, until the grains have had a chance to develop and ripen, the resulting forage (sans grains) is typically referred to as wheat, barley, or oat straw, is considered a byproduct of grain production, and will have a lower nutrient density than the wheat, barley, or oat hay, as most of the nutrition from the plant will have been stored in the grains.

In Arizona, there are two contenders for the most popular hay in the equine world: bermuda grass hay and alfalfa hay. However, there are many other types of hay such as: timothy grass, orchard grass, clover, teff grass, sudan grass, wheat, rye, oat, triticale, fescue, brome, and bluegrass. BUT! Not all of these are a suitable, or even safe, choice for donkeys. Next week we'll talk more about specific types of hay and their nutrition.

## Week 4: Types of Hay

Last week we explained that “hay” is not a specific feed but rather better described as a process. This week we’re going to break down common types of hay produced for livestock, their nutrients, and what it all means for your long ears.

When selecting a hay type for your long ears there is a lot to consider, but keep in mind: nutrient dense feed requires less volume and donkeys are extremely efficient at processing nutrients from the feed they consume; and don’t forget straw is in a class of its own.

Hay can be broken down into two main types: legume or grass. Of course there are mixes of the two also available in nearly any combination of hay you can think of.

Legume hay includes alfalfa and clover. When compared to grass hay, legumes are higher in protein, energy, calcium and vitamin A; ultimately they’re considered nutrient dense hay. Per pound legume hay offers more calories than grass hay.

Alfalfa is the most well known legume hay and one of the most common types of hay available in Arizona. Alfalfa hay has to be fed with some care because of its high calcium level in relation to phosphorus. It is known for a high protein content (ranges from 15% to 22%).

Donkey owners are typically counseled to not feed alfalfa hay. As with many feeding guidelines, it is slightly more nuanced than that: for the vast majority of domestic donkeys, their nutritional requirements are best met with grass hays and straw, while possibly including a ration balancer to fill in any nutritional gaps. However some owners may choose to safely include very small amounts of alfalfa in their animal’s diet, for instance when using occasional alfalfa or alfalfa blend pellets for a high reward training treat. Others may have been instructed by their vet to feed limited alfalfa as a portion of their animal’s ration if they are underweight, working particularly hard, in the latter stages of pregnancy or nursing, growing, or in especially cold climates. Owners who have obese animals (in the United States donkeys are MUCH more likely to be obese than underweight) or animals who are prone to metabolic disorders such as founder and laminitis should carefully avoid alfalfa altogether as it can exacerbate these issues.

Clover is another legume hay, though typically it is mixed with other hay types in a bale. Like alfalfa it has a high protein range, however, caution needs to be used with clover as it is prone to mold more than other hay and can cause excessive slobbering in some animals. Like alfalfa, donkey owners should likely avoid feeding clover unless they have been instructed to do so by their veterinarian as in most cases it is too nutritionally dense.

Grass hay includes bermuda, timothy, orchard, teff, brome, bluegrass, oat, rye, sudan, triticale, and fescue. Grass hays are less nutritionally dense than legumes, higher in fiber, and typically what is recommended for donkeys as a main part of their diet. However, not all of these grasses are suitable or safe for donkeys. Sudan, rye, and fescue are typically avoided as they can come with some dangers, which we will discuss next week.

The most common grass hay available in Arizona is bermuda. This grass grows extremely well in the Southwest and is most common for Arizona donkey owners to feed, alongside straw. It has a protein content generally around 6%-11%, and is generally low in sugars (non-structural carbohydrates, or NSCs)

Teff is also a popular choice, as teff grows well in the desert. Teff, being a warm season grass, will typically be lower in sugars and protein, similar to bermuda grass.

Timothy and orchard are readily available at many feed stores in pellets and compressed bales. These grasses are similarly low in protein, but as a cold season grass they will often be higher in sugars. Of course this means laminitic or animals with metabolic disorders should avoid these choices altogether, and limiting their consumption by healthy animals is generally the safest choice.

What do you do if warm weather grasses are difficult to come by in your area? You have a couple of options to mitigate the sugars that are present in cold weather grasses, but as always, if you are unsure about feeding a particular hay you should consult with your vet:

**Slow feed hay nets:** The slower your animal eats, the better, so all the sugars aren't hitting their system at once. Slow feed nets, such as those on haypillow.com allow for meal time to become an activity that lasts significantly longer than feeding loose hay. You may also choose to mix your hay with straw, either in the nets or loose. Your donkeys will either eat the two forages at once, balancing the high sugars in your hay with the low sugar straw, or they will slow down as they search through the straw to pick out pieces of hay. Much like you do eating M&Ms out of your trail mix.

**Soaking:** submerging your hay in water and leaving it to soak for 30 minutes to two hours, followed by pouring off and discarding the water (your plants may enjoy it), can reduce the sugar content of your hay further. Take caution to not feed soaked hay over sand, as it will cause your donkey to eat sand-coated hay that falls to the ground. If you have a metabolic or laminitic donkey and soaking your hay has been recommended, consider purchasing a stall mat on which to feed. Take care that it is placed in the shade, as afternoon summer sun can cause the black rubber to become too hot for your animal to comfortably stand on.

## Week 5: **DANGER HAY**

Not all hay is good hay, and some hay is good for your other livestock, but not for your donkeys, or some bales in your stack are safe to feed, while others are not. How do you minimize the potential for feeding dangerous hay to your long ears? With information!

It is essential to know the type of hay you are feeding. Some hay may be hazardous to some animals in your herd, but not all of your herd. Fescue, for example, can cause abortion or still births in pregnant jennies. However you can safely feed endophyte-free fescue (although you should be cautious of its higher sugar content). Additionally, some hay, for example sudan, may be safe if grown under certain climate conditions, but can cause cyanide poisoning if stressed by events such as freezing during the growing cycle. Cold season grasses including rye, orchard, and timothy can be especially high in sugars and rye in particular can be problematic for this reason, causing metabolic issues including laminitis. Others, namely legumes such as alfalfa, are not necessarily toxic to your donkeys, but are often too nutrient-dense and overfeeding them can result in founder, laminitis, and obesity.

Familiarize yourself with where your hay is sourced. You can find this information by asking your grower, broker or feed store. Once you have identified where your hay is grown you can familiarize yourself with common dangerous or toxic conditions, plants, and pests in the area, and keep an eye out when feeding your animals.. For instance: hay grown in the desert southwest may have a higher chance of containing goathead thorns (which will cause pain to your animals AND cause these noxious weeds to gain a foothold on your property), dodder, or even sometimes oleander leaves, as these are popular for landscaping in hot and arid regions. Meanwhile, pasture grown grasses such as what one may find in Colorado may occasionally have high levels of nitrates due to runoff containing animal waste such as cow manure pooling in certain areas, or could have

become toxic due to growing conditions such as freezing. It's important to note that some of these problems can occur only in some areas of the field, and therefore testing a single bale will not necessarily give you a full picture of the safety of your stack of hay.

Harvesting, handling, and storage can also affect the safety of your hay, and the following are all things to consider when sourcing your hay, as reputable growers will take precautions against their product being adversely affected, and while storing your hay so as to ensure it doesn't spoil:

- When hay is baled before it is sufficiently dried/cured, or if it is rained on after it is cut or baled, it can become moldy and unsuitable for feeding. Take care to cover your hay, either by storing it in a barn or shed with a cover, or by covering it with a plastic tarp when rain is forecasted.
- If your haystack is left for significant periods in sandy areas it may become contaminated with excessive blowing sand or dust. Ideally you choose an area with minimal sand and dust to store your hay, but if this is not an option, tarps or windbreaks made of various materials like plywood or even old, unusable hay bales (placed around your stack, not touching it), may minimize sand contamination.
- Bales on the bottom of a stack will often be contaminated with mold, as moisture on the ground becomes trapped against the bales. Many people will store their hay on pallets to avoid or minimize this.
- If the field where the hay is grown is adjacent to busy roads or highways it may have a higher instance of contamination with trash and litter. Occasional trash, like a paper cup or plastic bag, is to be expected of products grown outside, but you should take care to remove these items before feeding the hay as they can cause choking, impaction, or colic if they are consumed. If your hay routinely has a particularly high occurrence of trash, it may be time to seek another source.
- Hay from fields near forests, woods, or riparian areas may have a higher instance of animal intrusion and therefore a higher chance of said animals (most often rodents, rabbits, snakes, toads, and birds) being baled in the hay. If you find an animal carcass, or portions of a carcass, in your hay, discard the hay immediately surrounding the carcass, as it can be contaminated with any number of illnesses, such as botulism, associated with rot and decay. Take special care, and consider discarding a greater hay buffer, around snakes or toads, as they are often venomous or poisonous and that venom or poison may be on the adjacent hay.
- Green chop hay, which is hay harvested and then fed immediately with no drying, and grass clippings may seem like an easy feed source, but both of these products can cause a number of problems; the moisture can allow the hay or clippings to spoil very rapidly causing various toxicities and colic, and the ease of consumption (your donkeys can grab massive mouthfuls with little resistance) can cause them to rapidly overeat and founder or colic.
- Silage, with its high moisture content, has a higher instance of toxins such as botulinum, if it is not properly stored and fermented.
- Alfalfa, aside from typically being too nutrient rich to be a significant forage source for donkeys, may harbor blister beetles. Blister beetles are an insect containing cantharidin (a burning agent/poison) that causes blistering on human skin, or the muzzles, mouths, and intestinal tracts of livestock that consume them. They tend to seek out alfalfa blossoms as a food source. Blister beetle consumption can cause painful lesions, depression, laminitis, and colic.

Not all of the issues with various hays can be seen with the naked eye, some can only be discovered via laboratory testing, or will be noted after feeding the hay to your animals causes an adverse health event. This is why it's important to know what type of hay you're feeding, to only purchase your hay from a reputable source, and understand the risks of certain types of hay and forage. While seeing 15 bales of hay on Craigslist for sale for \$8 apiece may seem very tempting, you want to ensure you're not putting your animals at risk to save money. Alternately, you may know certain hays come with risks, but you choose to mitigate that through rigorous laboratory testing, or by not feeding that particular hay to at-risk animals.