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Cottonseed Good Deer Feed, Vet Says More Study Needed

by COLLEEN SCHREIBER | Jun 11, 2020

By Colleen Schreiber

KINGSVILLE — Whole cottonseed has long been a go-to supplemental feed for white-tailed deer. However, one veterinarian researcher says more study is needed.

That was the gist of the message offered by Dr. Clay Hilton, DVM, at the Caesar Kleberg Wildlife Research Institute's Deer Associates annual gathering here earlier this year. In addition to being a veterinarian, Hilton, who also has degrees in wildlife science, is the director of veterinary technology at Texas A&M University-Kingsville where he plays an integral role in the various wildlife related research projects.

Hilton told those in attendance that there are a lot of reasons why whole cottonseed makes a lot of sense. For one, it's readily available in Texas. Another huge benefit is that it has limited appeal to non-target species.

"Those flippin' raccoons walk right by a cottonseed feeder," Hilton quipped.

Another positive is that the deer self-limit consumption and even more important, perhaps, is that nutritionally whole cottonseed is a "thing of beauty". It is highly digestible; it has loads of protein and plenty of fiber to keep the GI tract running properly, he said. Also, it has high fat levels which provides necessary energy.

In fact, nutritionally, whole cottonseed is far better than corn, Hilton said. Where it really shines is when it comes to protein, fiber and fat content at 23, 17-20 and 23 percent, respectively, compared to 10, 7 and three percent for corn.

"Do you really want to throw corn out when you're trying to rebuild a deer's nutritional levels?"

Other pluses for whole cottonseed are that it's relatively easy to store, is relatively weather resistant and is relatively cheap.

That said there are some downsides to whole cottonseed, Hilton told the group. For example, it can't be purchased in 25 pound bags; typically it has to be purchased by the trailer load, sometimes more than one at a time. Some make it available in 250 pound bags, but the bags have to be filled typically by the buyer. Add to that the labor required to fill the feeders.

However, what's most concerning Hilton said is gossypol toxicity. Gossypol, a yellow oily pigment found primarily in the oil glands in the leaves of the cotton plant as well as the seeds, is a toxin with a mildly bitter taste.

Monogastrics are the most susceptible to gossypol poisoning. Chronic exposure, meaning small amounts over a long period of time, will kill pigs, for example, said Hilton. Chronic exposure symptoms include weakness, labored breathing, frothy salivation, generalized edema and hyperthermia, then seizures and death.

"Death could take weeks or even months," said Hilton.

Acute exposure symptoms include ruptured red blood cells, anemia and then death.

He noted that calves, lambs and kid goats don't yet have a functioning rumen thus they are susceptible to gossypol poisoning. It stands to reason that it could also be toxic to whitetail fawns. He also noted that there have been complications in hunting dogs when dog feed is top-dressed with cottonseed meal in an effort to keep weight on them during the hunting season.

Horses, however, are "uniquely insensitive" but not resistant to gossypol toxicity, he said.

Adult ruminants are "fairly" resistant as well as there are all kinds of compounds, living and non-living in the rumen liquor that can buffer all kinds of things. In fact, a toxic dose in adult ruminants is six to seven times less than what it is for pigs. Hilton added that toxicity in adult ruminants may be different for different species and for different sizes of those species. However, once an adult ruminant is intoxicated the symptoms are the same.

Also, he said there is reduced fertility across species for monogastrics as well as ruminants, though monogastrics don't typically live long enough for the problems to surface.

"It doesn't do good things to fertility in general, and the worst part is the animal doesn't look sick, so we don't know when their fertility has been hammered."

Researchers found that in male cattle, goats, fallow deer and red deer, some of the fertility issues with respect to gossypol toxicity is that it increased sperm abnormalities, reduced sperm motility and reduced scrotal circumference. Also, testosterone was suppressed.

Hilton also said that it is not just a male thing. Researchers detected negative effects on the uterus and a reduction in female hormone production. Additionally, they found that bovine embryos were misshapen if they grew at all; a lot of them died, he said.

If cottonseed is going to be used in a feed, the legal limit for whole cottonseed is 5000 milligrams per kilogram of gossypol. Once it's milled into feed the legal limit drops down to 500 milligrams per kilogram though he reminded that the limit is even less for animals that are more sensitive because of their size or because they're functional monogastrics.

Given that, Hilton said one of his concerns is that even though a test may say that a load of whole cottonseed passes in terms of appropriate gossypol levels, those levels are not equally distributed in a load. Additionally, it's not known how those levels change the longer it sits.

With respect to whitetails, one study done at CKWRI found that they will consume up to 40 percent of whole cottonseed in their daily diet before self-limiting. Furthermore, researchers found that after five weeks 93 percent of the gossypol was eliminated from their body. He acknowledged that what's not really known is how the other seven percent might possibly affect the deer.

There are also a host of other questions that need to be answered he told the group. Those other things include the effects of weathering on nutrients as well as the level of aflatoxins and ochratoxins, also the effects on growth and development of fawns and the effects on hormone production in bucks and does.

"We know it shuts down hormone production, but we don't know for how long," said Hilton. "Let's say some bucks get exposed to a whole lot of gossypol and their fertility goes down but then it filters out. Did it do anything to the tissues? Are there any long term effects to the tissues that makes sperm cells? Does it do anything long term to the tissues that makes testosterone? We don't know."

Hilton also said he's interested in learning more about the impacts of gossypol on fetal development and the effects on antler development, as well as the short and long-term effects on semen quality.

CKWRI hopes to get started answering some of those questions in short order.

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