

Squamous Cell Carcinoma and Nigerian Dwarf Goats

By Mary Brennan, Herron Hill

After seeing several cases of squamous in related animals in my own herd and doing some informal polling among breeders I knew it seemed clear that there was the possibility of some kind of genetic link in Nigerian Dwarf goats to squamous cell carcinoma. It is very hard to find anyone who has been breeding Nigerians for any length of time who hasn't experienced at least one case of it. Squamous is a type of skin cancer, in Nigerians it is the "under-the-tail" cancer or tailfold cancer that so many herds have experienced. Other animals get squamous in different locations - horses and cattle tend to get "cancer eye," which is squamous in the unpigmented tissue around the eye. Squamous is known to have a genetic component in certain breeds of horses and cattle, as well as in people, but there was no in-depth research being done on it in goats at all. When I heard about the UC-Davis study that demonstrated a clear genetic predisposition to squamous cell

carcinoma in certain lines of Haflinger horses, I approached UC -Davis about what I had seen and the informal polling I had done and they agreed to undertake a preliminary study. The study is not yet funded, it is in the preliminary stages, and still seeking cases of SCC confirmed by biopsy in Nigerian Dwarf goats. If the early results merit it they will write grants to fund a broader study, which is why it is so important to have participants in this first stage. Participating is not difficult, the basic requirements are a case of SCC confirmed by biopsy, some pictures, signed consent, and a dna sample (can be hair or blood.)

How did this study come about and what does it cover? Who/what universities are involved in the study?

This study is in the preliminary stages, and they will still need to write grants to get the funding for a complete study. It is through the Veterinary Genetics Laboratory at UC-Davis in California. Dr. Rebecca Bellone and her team will lead the study. Dr. Phillip Sponenberg, a professor of genetics and diagnostic pathology at the VA-MD Veterinary College at



The ear in this kid shows both pigmented and unpigmented skin, and illustrate how UV rays can penetrate light skinned areas.

Virginia Tech, will also participate. That is an exciting development because he is probably the leading expert in the world on goat color genetics.

(Note: See the October 2020 newsletter for the Goat Color article written by Dr. Sponenberg.)

What do you hope to gain from this study?

From my own experience and from the anecdotal evidence I've gotten from other breeders, I feel fairly confident that there is some genetic predisposition to Squamous Cell Carcinoma in certain lines in the Nigerian breed. Over the years I've gotten public and private messages from people

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Youth at ADGA Nationals





Emily Kern HLFM

- Nigerian Dwarf Youth Embed Premier Junior Champion
- Fifth Senior Management
- Third Senior Showmanship

Cade Cockburn

Cade's Lil Farm

- Nigerian Dwarf Youth Premier Breeder
- Senior Premier Exhibitor of Show
- National Nigerian Dwarf Best Udder
- National Best Udder
- Nigerian Dwarf Youth Premier Best Senior Doe
- Sixth Senior Showmanship
- Third Senior Management



Alicia Bohren Sugarbeet Farm

Third Youth
Senior Judging

Zander Todd Carzan Farms

 Ninth 10 and Under Showmanship



ADGA Nationals



Nigerian Dwarf Senior Doe Champion Wood Bridge Farm 22K Gold

Nigerian Dwarf Senior Doe Reserve: Lil Miss B Haven AlwaysMagical

Nigerian Dwarf Premier Breeder: Lil Miss B Haven

Nigerian Dwarf Junior Doe National Champion: Lil Mtn OA Hosanna Junior National Champion



Nigerian Dwarf Dairy Herd: Agape's Prize

Nigerian Dwarf Production Award: Dill's A Little Goat Farm, GCH Dill's BJ Tricksy 3*M

Photo courtesy of Rachel Jones Burchett







AGS Nationals—Sedalia, MO



AGS CHAMPION: SG Creeping Thyme D Delores Owned by Melissa Schmalhorst, SK Bullnettle

AGS RESERVE: Sandstone Ridge Holly Design Owned by Shawn and Wendy Reeder Wee 3 Farms

Showmanship Question of the Month:

What parts of the body does Dairy Strength cover?



AGS Champion Junior Doe: Wee 3 Farms CA Mera Jade Owned by Shawn Reeder



AGS Reserve junior Doe: American Jewell Coffee Bean Owned by Mary Tyler-Jordan



Best Junior Trio-Wee 3 Farms



AGS Champion Buck: Perfect Time Blues Man Owned by Zoe Cazayoux

AGS Reserve Buck: Parrish Farms PS Snap2lt *B Owned by Jayedynn Parrish



Milk Machine Tune-Up

Susan Tanner, K Bar S Farms

For many of us we are in the full bloom of kidding season. And with that comes the time to start milking some of our does. While there are a select few of us that still do it the old fashioned way; by hand, the rest of dedicated individuals use a machine of some type.

It could be the Simple Pulse, Capralite, or even one that you have possible put together with hoses, air compressor, and buckets. Whatever brand you may have, it is always a good idea to do a pre -season milk check on the machine before you really start to get into the milking full time.

Hoses-you should look for tears in them and moisture from hanging all winter. Also check for debris, such as spider webs and dead flies. Maybe even straw if you left them in the barn. If they happen to have some foreign object in them, use some water to flush it out or try an air hose with an attachment on the end to blow air thru it. Either way, you need to unplug the line and make sure that it is good and dry before you attach to the machine, so no back flow goes into your pump.

Once you have them good and clean, you need to attach them to your pump and listen for any air leaks.

Pulsator-hopefully you cleaned out the machine after last season and everything is working as planned. But occasionally there is debris stuck in the pulsator. The sound from the pulsators should be regular. When noise is abnormal look for damaged/split rubber pulse tubes particularly at the nipples on the claw, or faulty pulsators. If there is any abnormality check pulsation of liners with thumbs. Listen for the rocking as you turn it on, you may possible need to add a drop of oil to it.

Claw-inspect your teat cups for cracks, debris, and of course, bugs. Over the winter they seem to find the little hiding spots that we don't want them in. If you dis-assembled your teat cups from the claw. Make sure that they are clean and free of debris and that the liners go back in completely.

Vacuum pump-most of the vacuum pumps are totally incased and really do not need much maintenance. Make sure however that you have the proper oil level to the fill line. Do not go over as you could blow the vacuum seal in the pump and then it will need to be repaired. As well as have oil spilling out un-necessarily.

Vacuum regulator and gauge-these should be fitted into place. You are going to make sure that there are no leaks of air coming out of the fittings before you place any equipment onto your doe. Make sure that the right amount of air is being distributed thru your system before placing on the doe. If need be re-adjust the screw.

Hopefully after you have made your check-up everything is in good working order. This will make for a good milking season.

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who have a mother and daughter, or two sisters, or three different generations, or a sire and granddaughter with SCC, quite a few occurrences of multiple cases of SCC in related animals. To me an ideal outcome of the study would be that they were able to find a genetic link and develop a test for it, as Dr. Bellone and her team have done for Haflinger horses, where they discovered that there was a mutation in certain sire lines within that breed that made them much more susceptible to SCC. But if there is no genetic link, it would be good to know that definitively as well.

This study seems to be specific to ND – do other breeds (ie saanens) not encounter Squamous Cell Carcinoma?

Yes, they definitely do. And even if they do discover a genetic predisposition in Nigerians and a way to test for it, lightcolored goats with pink tails of all breeds will still get cancer, just as Haflingers without the mutation still get cancer. Just hopefully not at this very high rate. A genetic predisposition would be an important factor, but it wouldn't explain all cases of SCC.

I think I read 15 samples are needed. Why is that number important?

I'm not exactly sure -I do know that they need a certain number of affected and a certain number of control animals to make meaningful comparisons as they analyze the DNA.



Testing on this suspicious growth in a wether returned negative for SCC. It turned out to be a benign skin issue that is clearing up with treatment.

When submitting a sample, is there a questionnaire (ie feed protocol, number of animals, etc)

No. At this stage to participate in the study you need a case of SCC that has been confirmed by biopsy -



10-yea-old doe with a confirmed slow-growing case that was diagnosed at 9-years-old.

you will need to provide a copy of your biopsy report, which most vets will email you - you need pictures of your animal along with pedigree information, you need to sign a consent form, and you need to be able to provide DNA. Which means the animal still has to be alive. But if you have had an animal with confirmed SCC who has passed away – obviously you can't provide a hair sample in that case, but they would still welcome the other information because it might prove useful later on in the study. I would really strongly encourage people to participate if they can and to please feel free to contact me with any questions, or to visit our new FB group (<u>https://www.facebook.com/</u> groups/388781719212604/). There is also more information on my web site,

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<u>www.herronhilldairy.com</u> – click the 'squamous' link. It would be especially helpful to hear from breeders who have had more than one confirmed case in related animals.

What are treatment options?

This is a very good question. It used to be that there really wasn't any treatment. Options are still limited, but there are some treatments now and the best outcomes are going to come when it's caught early. So it's good to be keeping an eye out for it in your animals with pink or partly pink tails especially. Some vets have used laser treatment, there are also cryogenic or freezing treatments, and recently vets have started prescribing some anti-tumor topicals like imiquimod. The key is catching it early and being educated on what your options are. If you see something you don't like or something that looks suspicious, get a biopsy.



Six-year-old doe with a suspected SCC that has not yet been confirmed with biopsy.

I've heard this most often affects white or light colored goats - why is that?

Squamous Cell Carcinoma is a skin cancer and it starts in the skin. Usually it won't appear until at least 4 or 5 years old, because it's the result of an accumulation of UV damage to the skin, which is damaged and then damaged again and gradually that damage to the DNA becomes cancerous. As in people, lighter-skinned animals are much more susceptible. White people I think are 22 times more likely to develop skin



Daughter of the 6-year-old doe; early suspicious markings similar to her dam that would need to be watched for SCC.

cancer than black people. In goats, it is not just the pigment in the coat, the pigment in the tail plays a huge role. You can have an animal that is almost all white but has a dark, fully pigmented tail. I have several in my herd. Those animals in my experience just don't get SCC – the pigment acts as a natural sunblock and it's a very effective protection. So that's definitely one big part of it – the color. And there may also be some link to the underlying color patterns, we just don't know. But in general, goats with pink or partly pink tails are susceptible to SCC. Goats with dark tails do not seem to get it, whether or not they are from a line that seems predisposed to it.

That's what made the Haflinger study so interesting to me when I saw it – Haflingers are a color breed of horse – they are all chestnut color with flaxen mane and tail. But despite the fact that they were all the same color, someone noticed that certain lines of Haflingers were getting SCC

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at a much higher rate than Haflingers from other lines. Haflingers get an ocular form of squamous – eye cancer – and when UC-Davis began to study it they discovered a mutation in Haflingers from one line that resulted in these animals having an inability to repair UV damage. So even though they were all the same color and theoretically they all should have the same risk of cancer, the ones with this genetic mutation were more than five times as likely to develop SCC, because their mechanisms for repairing UV damage just weren't working. So they were light-colored, which meant they would accrue more UV damage, but then there was another piece, a genetic piece, that made them incapable of repairing that damage. So cancer was much more likely.

SCC can appear on any unpigmented skin that is exposed to UV rays – in Nigerians it seems almost always to affect the perianal or 'under-the-tail' area. It can also affect ears and udders, but usually in Nigerians it is under the tail. At first it may not look like much, a bit of a waxy raised spot, or a small sore, sometimes it has almost a cauliflower look, a bumpy surface. But it doesn't heal. It gets bigger, and it can also ulcerate and lead to secondary infection. And while it can metastasize in the



Four-year-old with SCC confirmed with biopsy.

late stages, a typical progression might be that it would just get so big that it compresses the goat's vital systems in the area around the tail. Then you really have no choice but to euthanize. It's a devastating disease, and it can be really aggressive, but it can also be fairly slow-growing. Animals tend to be between 4 and about 9 when they first show symptoms, and animals that get it when they are older often seem to get a much slower-growing case, and can live pretty comfortably for a couple of years or even longer. If an animal is older than 9 and shows no signs it is not likely to develop SCC after that age.

Do you see this more often in goats in the Midwest and Southern US (harsher summers)? Or all over?

Squamous would theoretically be more common in hot, sunny places with long summers and lots of sunlight, places like Colorado where the atmosphere is very thin and 300 days of sunshine. But in Nigerians it seems to pop up everywhere. I'm not sure there really has been any kind of definitive study to confirm the prevalence in sunnier climates, but that would make sense.

What "lines" do you see this most often in?

I'm glad you asked that question. One important thing about the study is it is confidential. No individual names of goats or of breeders will be published. In case someone is concerned that somehow they will be labeled a 'cancer herd' or anything like that – that's not going to happen. The information is kept

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Four-year-old doe after cyrogentic treatment and follow up of Preparation H.

confidential, and when you sign your consent form from UC-Davis that's spelled out explicitly.

Having said that, I began looking for answers because three of the first Nigerian does I bought developed SCC. All were from a very reputable West Coast herd, all were really lovely productive animals. And they were all closely related. Then I began to hear from other people who had related animals in their herds develop SCC, so it seemed unlikely to me that there was no genetic link. I thought in the beginning that if I could just piece together the pedigree information from all these animals something would stick out, that there would be one animal that was in all the pedigrees and that would solve the mystery. Something like G6S and Frosty Marvin. Or like Impressive and HYPP.

So I put together my own little database, because ADGAgenetics only goes back to about 2005. And with help I was able to get several thousand foundation animals into this database. But what I discovered when I did that was that there was no "aha" moment, because once you go back a certain number of generations, the

gene pool is very shallow. You will be hard-pressed to find a Nigerian that does not have Pine Cone Valley

Black Satin somewhere in his or her pedigree, usually more than once. Not just animals with SCC but all Nigerians go back to a very few foundation animals. Just as an example, if you look at the <u>pedigree of Goodwood Tom Thumb</u>, the foundation sire of the Rosasharn herd and one of the most important bucks in the breed, Pine Cone Valley Black Satin appears six times top and bottom in his 5-generation pedigree.

I read that it spreads more rapidly on heavy-feed programs, so it would seem likely that this would be more prevalent in show or large dairy herd animals? Does the data back this up?

I have read that more heavily managed animals – grain-fed as opposed to pasture-based – can have squamous that progresses more quickly. But again I'm not aware of any research in goats that would back that up.

Is this usually an issue in larger herds that are not individually fed?

I have not seen that.

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Is this mainly a doe issue or do you also see bucks with this issue?

Both. I have definitely heard of many more does than bucks but I think that is more a function of dairy herds having a very high proportion of does to bucks.

Do you know if MUN numbers can indicate a possible issue?

I'm not aware of a connection.

If C:K ratios are off, would that possibly be a cause?

There seems to be general agreement that SCC is caused by an accumulation of UV damage. Although certainly there could be other contributing factors. In Haflingers they found SCC to be more prevalent in geldings, which suggests that hormones – or lack of hormones – might play a role. So anything is possible.

How does one test an animal for SCC?

By biopsy. The vet will take a biopsy – usually what's called a punch biopsy – and send it to a veterinary pathologist who will review it and make a diagnosis.

What else that I should know and didn't ask?

Inbreeding rates in Nigerians are high, and it's not something I think a lot of people are aware of, because many people rely on ADGA genetics for their COI information. The information there is inaccurate, because for most Nigerians there aren't ten full generations of ancestors in the database, since Nigerians only entered ADGA in 2005. So the COI numbers you get there tend to be lower, sometimes much lower, than a true 10-generation COI would be. This is particularly important for Nigerians because they are a purebredonly breed. There is no way to breed outside blood in. We don't want a situation like what has happened with some purebred dogs, where they are susceptible to all kinds of ailments because of the generations of inbreeding. Over half of all golden retrievers die of cancer, for example. An increased incidence of cancer is one of the known results when populations become too inbred.

Resources:

Facebook group for <u>Nigerian Dwarfs and SCC</u> Information on my web site - <u>www.herronhilldairy.com</u> and click the 'squamous' link The <u>Haflinger Study</u> and <u>Haflinger Test</u> at UC-Davis <u>Does My Goat Have Skin Cancer? - YouTube</u>



Four-year-old doe with confirmed SCC.



This doe had cancer under her tail over 5 years, then it suddenly spread to her hip joint and mammary system. The owner reported that from the time a golf ball size lump was visible on the udder to the time she was almost lame was about 3 months.

INAUGURAL YOUTH

CONTEST!

Check the ANDDA

Discussion page for

details!

We're on the web www.ANDDA.org



PROMOTING THE NIGERIAN DWARF BREED SINCE 1996

> Editor: Karen Goodchild OK Doe K Dairy Goats

Please let us know if you have a comment or article idea!

Recipe of the Month Haystack Mountain Chevre Cheesecake

By: Dawn Robnett, Mesquite Valley Farm

To keep with our recent Chevre theme, the following dessert recipe comes from Longmont's Haystack Mountain Goat Dairy but was submitted by our member Melanie Bohren of <u>Sugarbeet Farm</u>. Enjoy!

Crust:

- 1 1/4 cups graham cracker crumbs
- 1/4 cup sugar
- 4 tablespoons melted butter

Filling:

- 12 ounces Haystack Boulder Chèvre
- 12 ounces cream cheese
- 3 cups dairy sour cream
- 1 1/2 cup sugar
- 3 eggs

Zest and juice of 2 lemons Zest and juice of 1 orange

To make the crust, combine graham cracker crumbs, sugar and butter and press into a 9- inch springform pan. Bake at 350 degrees for 10 minutes or until crust sets up. To make the filling, combine the chèvre, cream cheese, sour cream, sugar, eggs, and the zest and juice of lemon and orange, then cream in mixer until fluffy. Pour gently into pre-baked crust and bake at 275 degrees for two hours until puffed and cooked in center. Let it cool completely before removing from pan. Refrigerate for several hours prior to serving. Plate with fresh berry compote, lemon curd or cajeta.