ANDDA
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The Polled Intersex Gene

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Biochemistry/Biophysics

I'm pretty sure that most everyone who owns dairy goats will agree that disbudding kids is one of those onerous tasks that we all wish we didn't have to do. That may be one reason that the siren song of the entirely polled (hornless) herd is so difficult to escape—oh, the joy of never having to disbud another kid! Sadly, it is not something that can ever be a reality.

The Polled Intersex (PIS) locus has been the subject of considerable scientific study. Both the wild type and mutated sequences have been determined, and it is known that the polled trait is due to a large deletion in an area of goat chromosome 1q43. The mutation is homologous to one in a similar region in humans responsible for a condition called blepharophimosis-ptosis-epicanthus inversus syndrome. It is also now known that the mutations disrupt the transcription of at least 3 genes, including the FOXL2 gene, which encodes a transcription factor required for correct ovarian differentiation.

The polled trait in goats is an autosomal dominant trait in both sexes; in other words, one copy of the gene results in the polled phenotype. However, if a goat is homozygous for (having 2 copies of) the polled allele, the result is either a pseudohermaphrodite (in XX, or what would normally be female, goats) and generally a reduction in fertility in XY, or male goats. Homozygous males usually suffer from a condition called sperm granulomas at a young age, which will generally render them infertile. The absence of correct production of the protein encoded by FOXL2 makes it impossible for a female goat to properly develop a functional reproductive system, and results in various degrees of masculinization of the fetus during development. A goat that is homozygous for the PIS allele cannot produce transcripts from the FOXL2 gene, and cannot develop as a normal female.

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INSIDE THIS ISSUE:

Meeting Topic—Using Dairy Goats to be an AGvocate

By Paul Goodchild, OK Doe K Dairy

I am active in 4-H, with Dairy Goats as my primary project. In addition to Dairy Goats, I also participate in Public Speaking, Science Fair, Photography, and Range and Pastureland. All of my activities center around my main project, and give me a chance to be an AGvocate for dairy animals.

In addition to 4-H, I am also active in speech. This past year I participated in Original Oratory and Expository. Expository is similar to the 4-H Educational Presentation because you can bring in props to demonstrate your topic.

My latest Food theme entry involved my goat Instagram and the Cheeseball she helped make.

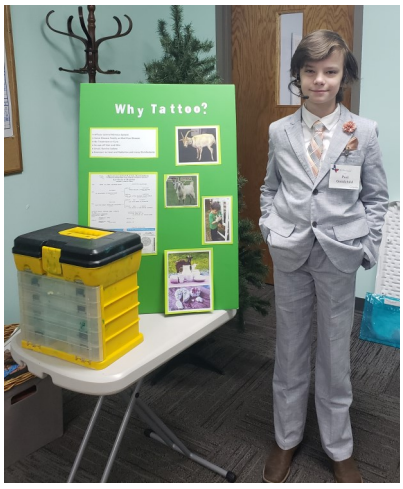
The main topic of my speeches is Identification Laws involving Dairy Goats, specifically tattooing. Using livestock law as a platform gives me an opportunity to educate others about the food on their plate, and how farmers are doing their part to ensure it is safe and nutritious. Most people don't realize you can track an animal from where it was born to the grocery store.

My Science Fair project for the past two years involves researching whether alfalfa pellets are a suitable replacement for alfalfa hay in the Nigerian Dwarf breed. Dairy goat owners on DHI send me their milk test results, along with returning a management questionnaire, so that I can compare and chart differences. There are very few agriculture studies in the Science Fair and mine directly impacts my 4-H project. (If you would like to participate, I would love to include your data!)

Photography is a popular 4-H project in more urban areas. Domestic Animals and Food are two themes in my state where I can use Dairy Goats as a subject. Since I am always taking photos of my goats, I have plenty to choose from when it comes time to enter. My food photos usually involve cheese or ice cream!

The Range and Pastureland contest helps me be a better dairy goat owner. I am learning to identify 74 native and introduced grasses. The contest has both dry and fresh samples of any part of the plant. Learning about grasses will ultimately help me make better decisions with forage, stocking rate, and land use. This is the hardest contest I have ever been in!

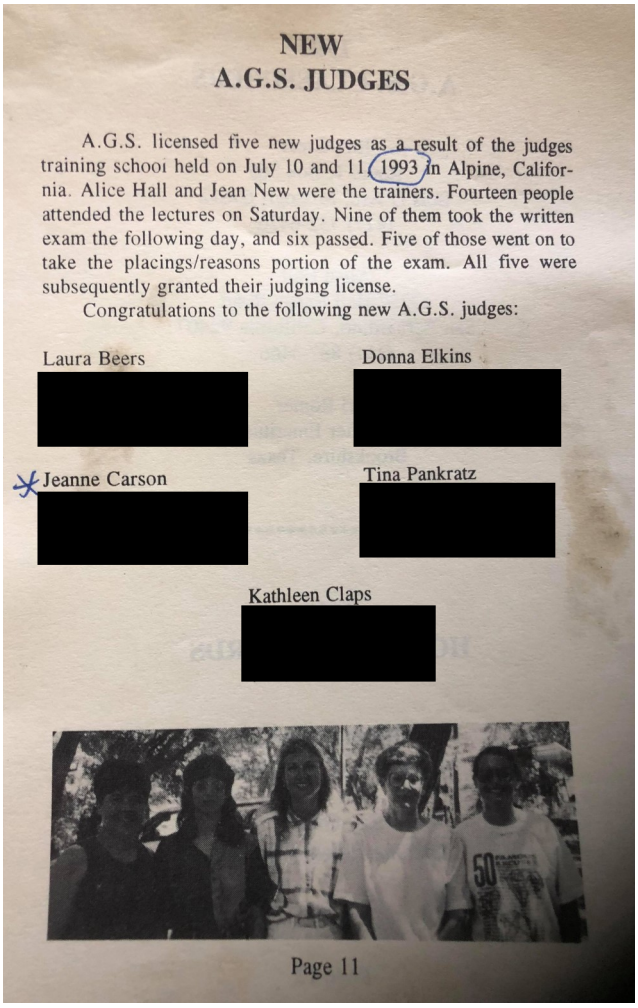
How can Dairy Goats help you be an AGvocate?



There is a range of opportunities to use Dairy Goats to educate others about Agriculture.

Jeanne Carson sent in these wonderful photos of the first Texas show she attended.

Can anyone identify the exhibitors?



NEW
A.G.S. JUDGES

A.G.S. licensed five new judges as a result of the judges training school held on July 10 and 11, 1993 in Alpine, California. Alice Hall and Jean New were the trainers. Fourteen people attended the lectures on Saturday. Nine of them took the written exam the following day, and six passed. Five of those went on to take the placings/reasons portion of the exam. All five were subsequently granted their judging license.

Congratulations to the following new A.G.S. judges:

Laura Beers [redacted]

Donna Elkins [redacted]

Jeanne Carson [redacted]

Tina Pankratz [redacted]

Kathleen Claps [redacted]

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"I went to the Texas show to see Nigerians and purchase some but didn't show there. My wonderful husband surprised me with plane tickets to go to the show. I had recently purchased my first Nigerians."

Jeanne Carson

Stamp Your Style

By Jan Nelson, Buffalo Clover Farm

How long have you owned Nigerians?

Since 1999

What trait(s) did you start breeding for?

It is all about form to function for me. Conformation, conformation, conformation and dairyness. I like to see beautiful high and wide "u" shaped escutcheons with width between the hocks to help showcase socked on udders. Other traits that are important to me are good feet and legs, deep bodied animals, and does that have no issues kidding. Obviously it is important that my animals maintain the breed standard.

How long did it take you to start breeding a style that is now known as Buffalo Clover?

When I started I had several different types, and then when I bred Valentino he was very refined and stood out compared to the rest of the animals. He was very dairy that I was worried he would never beat all the power bucks out there as that was the type that was winning. He was the beginning of the true Buffalo Clover style that you see today!

What do you hope Buffalo Clover animals are known for?

Conformation that will milk and show well!

How have you seen the breed change and grow since you started?

From the pygmy style animals to refined dairy animals.

Who were breeders you looked up to or were mentors when you started?

My mentor was David Millison of Woodhaven Farms.

The top competition when I started was Kelleye Bussey of (TX) Twincreeks, Valerie Russel of Piddlin Acres, David Millison of Woodhaven Farms and Sunni Florence at Flat Rocks.

Who were your foundation animals?

- Five Alarm Sophia - Some notable offspring: CH/PGCH/MCH AGS Buffalo Clover Valentino ++B +S - LA: EEE 91, GCH/PCGH Buffalo Clover Chianti

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1*M - LA: VEEE 90 and CH Buffalo Clover Monte Carlo - LA: EEE 91

- GCH Woodhaven Farms Krugerrand who was the sire of two of my top does PGCH Buffalo Clover Mandy and GCH/PCGH Buffalo Clover Chianti 1*M - LA: VEEE 90
- Woodhaven Farms Bertha VaNation who was the dam of Woodhaven Farms Patriot who later sired PGCH Buffalo Clover Princess *D - 5 x GCH Senior Doe, 4 x RsCH Senior Doe, 7 x Best Udder, 2010 ADGA National Show: TOP 5 in 5-6-year-old class, 2008 NDGA National Champion Sr Doe.

Then later in my breeding career top honors goes to my man CH/PGCH/MCH AGS Buffalo Clover Valentino ++B +S - LA: EEE 91 who has went on to sire nearly 15 finished Champions, multiple Superior Genetics as well as does that have been on ADGA's Top 10 and Elite list!

Also recognized are:

- Kae Bar Te CAD Coupe +B who went on to sire some of my top does SGCH Buffalo Clover Delta Dawnn 1*M - LA: EEEE 91, GCH Buffalo Clover Sangria 2*M - LA: VEEE 90 and CH Buffalo Clover Pink - LA: EVEE 90 as well as multiple other finished Champions!
- PGCH Buffalo Clover Princess *D - 5 x GCH Senior Doe, 4 x RsCH Senior Doe, 7 x Best Udder, 2010 ADGA National Show: TOP 5 in 5-6-year-old class, 2008 NDGA National Champion Sr Doe. Her most notable offspring are SG Buffalo Clover Lady Diana 2*M and GCH Buffalo Clover Queenie 2*M.
- SGCH Buffalo Clover Delta Dawnn 1*M - LA: EEEE 91 when crossed with my Valentino gave me FIVE finished Champions! It was definitely a magic cross! They include: GCH Buffalo Clover Vieux Carve' 2*M - LA: VEEE 90, CH Buffalo Clover Mardi Gras - LA: VEEE 90, CH Buffalo Clover Huey Long *B, GCH Buffalo Clover Delta Alluvium 2*M - LA: VEEE 90 and GCH Buffalo Clover Katrina 2*M
- GCH/PCGH Buffalo Clover Chianti 1*M - LA: VEEE 90 who is the dam of GCH Buffalo Clover Sangria 2*M - LA: VEEE 90 and CH Buffalo Clover Pink - LA: EVEE 90 as well as CH Buffalo Clover Cabernet.
- SG Buffalo Clover Lady Diana 2*M who is the dam of GCH Buffalo Clover Patches 3*M - LA: EEEE 91 and CH Buffalo Clover VAL Fergie.

How does it feel to have a nationally-recognized sire?

That is an interesting question because I've never looked at him as more than "my boy." He helped evolve my herd in so many ways. He was just my good old man!

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For new breeders, what would be your advice on stamping their style on their herd?

Having the patience to wait (even 3-5 years) to see what develops - it is going to take time to develop consistency! It also takes time to figure out which lines work together to continue that consistency. I have learned to give FFs a chance if I like enough of her to stay.

Anything else we should know that I haven't asked?

Just keep on keeping on! Remember to be patient and let your goats mature and develop - some are slower to mature and if you give up too soon you might miss something great!

Another piece of fun trivia is that Valentino was out of a first freshener! Don't get hung up on other people's rules and goals, but trust your gut and do what works for you!

GCH Buffalo Clover Valentino ++B +S

SGCH Buffalo Clover Delta Dawnn 1*M

GCH Buffalo Clover Chianti 1*M

GCH Buffalo Clover Patches 3*M

Getting the Most Bang From Your Buck

By Brandon Leigh, Blue Mountain Genetics

- *What is the most important thing you can do over the summer to prepare to collect your bucks in the fall?*

The best thing to do during the summer (or simply year-round) to prep bucks for breeding season is to just keep up with their health! Make sure they have good access to quality water, hay, feed, minerals, vitamins, etc. Reproductive health (and especially viability for collection) can be largely affected by mineral imbalances and vitamin deficiencies, so keeping the bucks just as healthy as the does is key! I recommend testing water supply for mineral content and regularly supplementing with ADE vitamins (without selenium just preceding and during breeding season).

Note: See the June 2020 Issue for Water Testing information.

- *How important is it for a buck to be used to leading when being collected?*

It is very important for a buck to not only be used to breeding on a lead, but to be used to breeding a doe that isn't

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Toxic and Nuisance Plants—Foxtail

By Youth Member, Paul Goodchild, OK Doe K Dairy Goats

There are two different plants known as foxtail, and both are nuisance plants. The first is *Hordeum Jubatum,* also known as Squirreltail Grass, Wild Barley, or Skunktail; the second is *Seratia Lutescents*, also known as Yellow Bristle Grass or Pigeon Grass.

Hordeum Jubatum is a native, perennial grass found throughout the U.S. This tall, wiry weed has tiny teeth on flowering spikes.

Seratia Lutescents appears similar to Timothy grass except it is an annual.

The "tail" part of the both plants can be dangerous to livestock, as well as guardian dogs. The seed has barbs that curve inward, making them difficult to remove. These barbs embed in the ears, neck, face, nose, mouth or in between a dogs toes, causing abscesses, ulcers possible blindness and the inability to eat.

Photo of *Hordeum Jubatum* courtesy of Clare Staveley, Curbstone

More Info: Hordeum Jubatum and here
Seratia Letescents and here
Cheatgrass, a similar weed

POLLED—(Continued from page 1)

The question of whether it is a good idea to breed polled to polled comes up on social media fairly frequently. Inevitably, one or more people will volunteer that they have bred polled to polled with no ill effects, even multiple times. I usually respond that it is pretty much a matter of the devil being in the statistics. Assuming that both polled parents are heterozygous (having only 1 copy each of the polled allele), statistically 50% of their offspring will be polled, and also carry a copy of the normal horned allele; 25% will be horned, and 25% will be homozygous for the polled trait. Of these, half will be female and be pseudohermaphrodites, and the other half will be XY males. So right away we see that the intersex trait only occurs on average in 12.5% of births, a rate that can easily result in the luck of the draw allowing multiple litters to be born with no intersex kids. In addition, to complicate things even further, the XX PIS goat can have a significant degree of female to male sex reversal, which can result in misidentifying PIS animals as males at birth.

I usually point out to people that as long as the reality of how the PIS allele works is understood, the choice of whether to breed polled to polled or not is fairly easy. When breeding polled to polled over time you can expect 50% fertile polled offspring, 25% fertile horned offspring, and 25% non-breeding animals. When breeding polled to horned, you get 50% polled, 50% horned, and 100% healthy fertile offspring. To me that's an easy choice. Of course, the math would be different if one of the parents were actually both homozygous for polled AND fertile—as might be possible, for example, if the polled buck were still young and fertile even though homozygous polled. I have challenged many individuals over the years to present to me a fertile doe who might be presumed to be homozygous polled, as shown via many breedings with horned bucks that produce nothing but polled offspring. I have not ever been presented with such a creature, and honestly, I don't believe it is possible.

There is a lot of scientific literature available on this topic, but much of it is behind academic journal paywalls. One such that is not and is pretty readable (and includes some nice illustrations) is available here:

https://www.researchgate.net/publication/267327837_Polledness_intersex_syndrome_in_goats_-_molecular_and_histological_aspects

Support Your Friendly Neighborhood Dung Beetle

By: Hannah Bella

Common dewormers such as ivermectin may reduce dung beetle and other soil-building insect and annelid populations when used to treat goats and other grazing livestock. A study published in Nature (1) shows what organic and holistic livestock experts have noted anecdotally for years- that the use of ivermectin in grazing livestock leads to lower dung beetle populations. Other studies show negative impacts of other conventional dewormers on soil insect populations (2).

Dewormers contaminate soil and water when grazing animals are wormed. The wormer passes through the digestive tract and is deposited onto pasture inside the manure. In nature, dung on top of pasture is a rich food source for dung beetles and other soil decomposers. They quickly bury all they can, removing poop from the pasture surface, aerating the soil, and eating what they can (often destroying pathogens in the process). When dung beetles and other decomposing insects handle and eat the dung, they also handle and eat the drugs in the dung. This can kill them, or it can poison and weaken them but allow them to recover.

Why does this matter? Who wants dung beetles around? Dung beetles have long been known to have positive ecosystem benefits (3), but now there is evidence that healthy dung beetle populations reduce the prevalence of E. coli in the soil(4). E. coli is a group a bacteria which includes the shiga-toxin producing O157:H7 strain. This is big news for raw milk drinkers and producers, as E. coli O157:H7 has caused some of the worst cases of illness related to raw milk consumption. More dung beetles means less E. coli, which means safer milk from our goats. It also means safer goat-manure compost for our gardens.

Overall, we're learning healthier soil leads to healthier animals- including the human animal who drinks milk. To avoid damaging our soils and native insect populations (including those earthworms aerating the soil and filling it with rich worm castings), parasite control programs should aim for control without unnecessary dosing. This also helps prevent parasite resistance to wormers, keeping them effective for future goat keepers. More info can be found through the American Consortium for Small Ruminant Parasite Control (wormx.info), and through studying the FAMANCHA system (https://web.uri.edu/sheepngoat/famacha/).

(1) Verdú, J., Cortez, V., Ortiz, A. *et al.* Low doses of ivermectin cause sensory and locomotor disorders in dung beetles. *Sci Rep* **5,** 13912 (2015). https://doi.org/10.1038/srep13912

(2) Lumaret, Jean-Pierre, Rombke, Jorg et al. "Antiparasitics and Their Effect on Soil and Dung Fauna." Presentation. International UBA Workshop "Pharmaceuticals in Soil, Sludge, and Slurry." Dessua. 18-19 June 2013. https://www.umweltbundesamt.de/sites/default/files/medien/376/dokumente/lumaret_presentation.pdf

(3) Jones, Matthew S., Snyder, William E. "Dung Beetles: How to Identify and Benefit from Nature's Pooper Scoopers." Article. eOrganic. 12/29/2017. https://eorganic.org/node/23262

(4) British Ecological Society. "Food safety: Dung beetles and soil bacteria reduce risk of human pathogens." ScienceDaily. ScienceDaily, 19 March 2019. <www.sciencedaily.com/releases/2019/03/190319083915.htm>.

BUCKS (Continued from page 7)

on the move. If you can practice jumping a buck on a doe that's immobilized, as opposed to letting them run free with the does, it can greatly improve their willingness to jump for collection.

- *Do you need to bring your own doe to a Collection?*

I recommend that every person bringing a buck to collection be prepared to bring a doe in heat, in case the host is not providing one OR if the provided does are not "hot" enough to entice the bucks to jump. Normally, at least two people attending prepare a few does each to ensure there are enough to cover the collection day. All in all, the more does, the merrier!

- *What is the biosecurity process during a collection?*

As far as biosecurity, we are as strict or lenient as the customers want to be. There are customers who share does for jumping different bucks and those who don't. Generally, the same sorts of unwritten rules that apply at a show apply at collection. As for the doe stand we use, it can be disinfected between does if the owners desire.

- *Do you give a semen analysis? If so, what motility do you like to see?*

I analyze semen fresh as well as post freeze/thaw using an iSperm analyzer. If fresh semen doesn't have at least 65% motility, we won't go forward with processing unless the owner specifically requests an exception to policy. Data from my 2020 route shows that most fresh semen generally rates between 65-80% motility. Once semen is processed and frozen, we thaw between one and three random straws from the lot, and analyze using the iSperm to get the final resulting motility and concentration numbers. We are aiming for a concentration of 100-150 million cells per mL and at least 50% motility—which provides "good" conception rates, according to the research published at Cornell. Conception is absolutely possible at lower numbers, but there are a LOT of variables that contribute, not just semen viability. While we want every buck's semen to freeze well, not all samples make it through to an acceptable level.

- *What is the percentage of successful breeding with AI?*

There are so many factors that play into AI success rates, it's very difficult to give an accurate percentage to success rates. People who know their does' cycles and are comfortable with the procedure can get 75%+ rates, and those who aren't will generally have a lower success rate. Practice and paying attention to the does' cycles will obviously improve rates over time.

- *What is the best way to store semen so that it is usable for a long time?*

The only way to safely store semen for future use is in a liquid nitrogen bath. You can either store your semen at a facility (or in a friend's tank!) where you rent space, or you can purchase your own nitrogen tank and keep your straws in it. There are advantages and disadvantages to both—needing to have your personal tank filled with liquid

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nitrogen every 2-3 months may or may not outweigh the convenience of having the semen available any time, or vice-versa.

- *What are the benefits of AI over live cover?*

The advantages of AI over live breeding really boil down to cost and selection. It's typically going to be much less expensive to purchase 5 or 10 straws of semen than it is to purchase and care for a buck. You may also not be able to purchase a buck that has just the lines you're looking for, while there may be semen available that does. Obviously, you only get so many chances to breed with AI when you only have a limited number of straws, while having a buck on property allows for many more chances to successfully breed.

- *Do you use electroejaculation or a doe in heat for Collection Day?*

I don't use electroejaculation, but studies have shown there can be a negative affect on semen when compared to using a jump doe and an artificial vagina (AV). Having a couple does ready to stand for collection is key!

- *Do dewormers or medications affect sperm?*

Dewormers and medications can absolutely affect sperm motility and morphology, so we generally recommend not dosing the animal with anything (that can be avoided—keeping a buck alive is obviously more important than a successful semen collection) within 8-12 weeks of collection.

- *What qualifications should you look for in a processor?*

For customers selecting a processor, they should make sure the collector analyzes fresh semen, offers objective numbers for post thaw motility and concentration, has transparent policies, and is easy to work with. At the end of the day, it really comes down to customer preference and collection location/schedules. I've analyzed semen from various collectors and various bucks, and from what I've seen, all of the larger names floating around the community are putting up quality semen that will settle does.

- *What type of investment and is it worth it to put with a company to sell/distribute for you?*

I can't speak for the pricing of other companies, but for Blue Mountain Genetics, it is $225 for 30 straws, and $5 per straw after that. The deposit is $100 per buck, $25 of which is applied to the final collection invoice. The complete pricing structure is found on my website or I can send it as well, if you need the complete pricing schedule.

I take 25% of gross sales of semen that I'm marketing, and the other 75% is

paid to the owner the January after payment is received. I don't charge for

storage at this time, but I only keep semen for marketing in my tanks.

I deliver the semen anywhere along my route, and accept shippers to my home location any other time throughout the year.

Recipe of the Month

Microwave Chocolate Molten Mug Cake

By: Dawn Robnett, Mesquite Valley Farm

INGREDIENTS:

¼ cup all purpose flour

¼ cup sugar

2 TBS unsweetened cocoa powder

½ tsp baking powder

Pinch of salt

3 TBS unsalted butter, melted

3 TBS goat milk

1 egg

¼ tsp vanilla extract

1oz chocolate broken into pieces

1 TBS water

INSTRUCTIONS:

In a 2-cup capacity microwave safe mug/bowl mix the first 5 ingredients until blended. In a separate bowl, mix melted butter, milk, egg & vanilla. Mix until well blended then add to dry ingredients and mix until you have a smooth cake batter. Place chocolate pieces in the center of the batter. Do not push chocolate down, it will sink as it bakes. Drizzle the water on top of the batter. Cook in microwave for 1 minute 15 seconds or until the cake rises to the top, the edges loo set but the surface of the center looks slightly wet and shiny. Do NOT overbake to ensure that the center will be saucy. Let cool for about 5 minutes.

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PROMOTING THE NIGERIAN DWARF BREED SINCE 1996

Editor:
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