Goat Newsletter

Cooperative Extension Program
Langston University

The Newsletter of the E (Kika) de la Garza American Institute for Goat Research *Winter 2019*

From the Director's Desk

Winter is always a busy time for us. In addition to continuing research experiments, we start to prepare for the new year. Over the years, one of our primary funding sources has been the USDA/NIFA 1890 Institution Teaching, Research and Extension Capacity Building Grants (CBG) Program and winter is when researchers develop new proposals for submission or refine previous submissions to the 1890 CBG. The USDA agency overseeing the 1890 CBG is the National Institute for Food and Agriculture, which "administers federal funding to address the agricultural issues impacting people's daily lives and the nation's future." The 1890 CBG allows the 1890 land-grant universities to strengthen teaching, research and extension programs in agricultural sciences. I know that I have mentioned this before but the 1890 land-grant universities, of which Langston University is a member, arose from the Second Morrill Act of 1890. This Act brought African-American universities into the land-grant system. After the Civil War, African-Americans were not allowed to matriculate into universities in the South and therefore, universities were established for the education of African-Americans. If you wish to learn more about 1890 system history, a good primer can be found at https://www.1890foundation.org/history-of-land-grant-universities.

This October, NIFA moved from its headquarters in Washington, DC to Kansas City, MO. U.S. Secretary of Agriculture Sonny Perdue announced the relocation to improve USDA's ability to attract and retain highly qualified staff, to place these important USDA resources closer to many of our stakeholders, and to benefit from significant savings on employment costs and rent. I hope that this move will be seamless and will not interrupt the 1890 CBG program.

In November, Ms. **Farida Belkasmi** returned to Mohamed el Bachir El Ibrahimi University in Algeria. Ms. **Belkasmi**, a Borlaug fellow, was undergoing training in hair sheep nutrition at Langston University and is being mentored by Dr. **Arthur Goetsch**. You can read more on page 2.

We are making good progress on several other research projects. Drs. **Goetsch** and **Luana Ribeiro** are making progress on a saline water project, Drs. **Ryszard Puchala** and **Yoko Tsukahara** are making progress on a project to update the Langston Interactive Nutrient Calculators (LINC) system, and Dr. **Terry Gipson**, Mr. **Marcio White**, and Mr. **David Lechner** are making progress on the development of drones for livestock management.

On the Extension side, Dr. **Roger Merkel** is conducting focus group meetings for a project to develop MoodleBox learning systems.

I hope your 2020 will be good.

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Ms. Farida Belkasmi - Borlaug Fellow

Ms. Farida Belkasmi, an USDA Borlaug Fellow, was at Langston University from August until November 2019 for training in research methodologies. Ms. Belkasmi's mentor was Dr. Arthur Goetsch and her research project was entitled "Effects of the nutritional plane before and after breeding on reproductive performance of ewes and ewe lambs of different hair sheep breeds."

When a person applies for a Borlaug Fellowship, he/she must draft a Plan of Study. If the applicant is chosen for a Fellowship, then his/her Plan of Study is disseminated to U.S. universities, and those universities with the personnel and facilities necessary for the Fellow's training submit a Letter of Interest to host the Fellow. USDA then matches the Fellow with the "best fit" university. Ms. Belkasmi's original title for her Plan of Study was "Investigation of factors affecting body reserve mobilization and their impact on ewe reproduction and lamb growth performances in low input production system of Algerian semi-arid region." As one can see from the two titles, Ms. Belkasmi's Plan of Study and Dr. Goetsch's Letter of Interest were very compatible and USDA assigned Ms. Belkasmi to Langston University.

Ms. Belkasmi's specific objective for her Plan of Study was the "investigation of factors affecting body reserve mobilization and their impact on ewe reproduction and lamb growth performance raised in low input production systems in semi-arid region in Algeria." On page 4, you can read a background on the country of Algeria. The specific objective of Ms. Belkasmi's research project at Langston University was to "determine effects of different nutritional planes before and after breeding on performance (body weight, conception, embryo mortality, litter size and birth weight) of ewes and ewe lambs of different hair sheep breeds and compare various means of assessing the

Ms. Belkasmi (center) with Dr. Tsukahara (left) and Dr. Ribeiro (right) visiting a USDA research station in Arkansas.

nutritional plane of hair sheep and evaluate their relationships with performance," again, which closely aligns with her original objective.

To achieve this objective, Dorper, Katahdin, and St. Croix ewes were randomly assigned to a Low Nutritional Plane (Low-NP) or High Nutritional Plane (High-NP) treatment. Within breed-treatment group, ewes were randomly assigned to one of 12 pens in the new Small Ruminant Education, Research, and Extension Facility resulting in two pens per breed-treatment combination. For each treatment, straw was offered at approximately 105-110% of consumption. Ewes on the Low-NP were supplemented at 0.125% of body weight with soybean meal to double the dietary protein concentration to approximately 6% and ewes on High-NP were supplemented at 0.25% of body weight with soybean meal and at 0.75% of body weight with ground corn. In a previous experiment, the Low-NP maintained weight and the High-NP gained 10 lbs over an 11-week feeding trial. After 3 months on the NP treatment, rams were introduced to the ewes. Dr. Goetsch and Ms. Belkasmi are beginning to analyze the data.

An integral part of the Fellowship was a trip to become aware of sheep research and farm conditions and production practices in the region. In September, Ms. Belkasmi, Dr. Goetsch, and some of the Institute's Visiting Research Scholars (i.e., Drs. Luana Ribeiro, Yoko Tsukahara, and Wei Wang) first traveled to the USDA Agricultural Research Service (ARS) Small Farms Research Center near Booneville, AR. After Booneville, the group traveled to Monett, MO and first toured a local beef cattle farm. The next day the Dorper sheep farm of Marie Iiams near Jenkins, MO and the Katahdin farm close to Carl Junction, MO of Toni and Kevin Beatty were visited. The team then traveled northwest to Jefferson City, and spent a half-day at Lincoln University. Dr. Tumen Wuliji and the farm managers of the small ruminant units provided overviews of the laboratory facilities, farms, and research program. There was a short trip to a local confinement hair sheep production unit. The last visit was to the Cluck Ranch, which has very large numbers of hair sheep, primarily Dorper, and Spanish goats, with frequent rotation among pastures that are very high in lespedeza. In October, Ms. Belkasmi and Dr. Goetsch attended the World Food Prize Symposium in Des Moines, IA and enjoyed the many sessions on international activities to alleviate world hunger and poverty. Although Ms. Belkasmi's time spent at Langston University was fairly short, it is hoped that everyone involved in the Fellowship gained a great deal of knowledge that will be very beneficial in the future in Algeria and the USA.

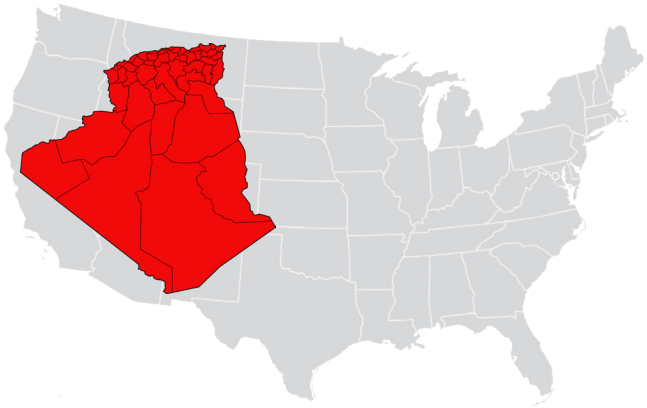
Borlaug Fellows attending the World Food Prize Symposium. Ms. Belkasmi is fourth person from right in the front row (pink headscarf).

Norman Borlaug, Father of the Green Revolution

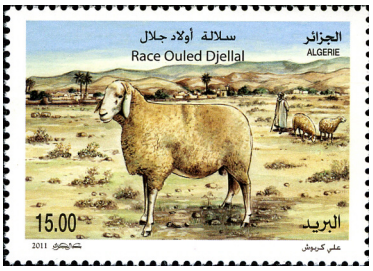
The Borlaug Fellowship Program honors Norman Borlaug, the American agronomist, humanitarian and Nobel laureate known as the "father of the Green Revolution." Since the program's inception in 2004, approximately 800 fellows from 64 countries have participated in the program. Each fellow works one-on-one with a mentor at a U.S. university, research center or government agency, for 8-12 weeks. The U.S. mentor will later visit the fellow's home institution to continue collaboration. Fellows may also attend professional conferences and events within their field, such as the annual World Food Prize Symposium.

Algeria: Sheep Country

Algeria is a country in northwest Africa and is the largest country in Africa at 919,595 square miles. This is approximately the same area as the mountain west states of the United



States. Algeria is bordered on the north by the Mediterranean Sea, on the east by Tunisia and Libya, on the south by Niger, Mali, and Mauritania, and on the west by Morocco. The Atlas Mountains divide Algeria into two unequal parts. The northern, smaller part is known as the Tell and has a moderate Mediterranean climate. The much larger southern part is predominated by the Sahara desert. The Tell accounts for approximately 15% of the land area but 90% of the nearly 35 million inhabitants. The area just south of the Tell is the Algerian steppe (grasslands), which is more than 75 million acres and constitutes a buffer zone between the Tell and the Sahara desert. The steppe is rich is grasses and forages, thus, providing good grazing lands for livestock. The predominant livestock species are sheep and the steppe is known as "sheep country" with more than 18 million sheep. Algeria has many local sheep breeds but a single breed, Ouled-Djellal, accounts for more than 63% of the Algerian sheep population. The Ouled-Djellal was introduced by the Romans in the fifth century. The Ouled-Djellal is a wool breed and produces a carpet-grade wool, but is primarily raised for meat. The rams are horned and the ewes are polled (hornless). Both sexes are uniformly white. Adult rams average 180 lbs and ewes 110 lbs. The Ouled-Djellal is a medium-framed breed with rams averaging 33 inches in height at the withers and ewes, 29 inches. The ewes are fairly good milkers and generally raise twins. The Ouled-Djellal are well suited to the Algerian steppe and can walk long distances for extended periods of time. Other Algerian sheep breeds include the Hamra, Rembi, and Taâdmit, which are wool breeds. The Sidaoun is a hair-sheep breed and is raised predominately by the Tuareg in the south. The D'man is classified as a mixed hair-wool sheep breed.

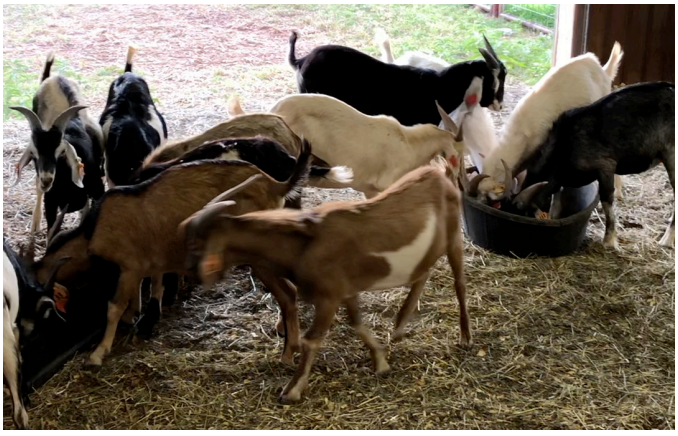


Algerian postage stamp honoring the Ouled-Djellal.

Ouled-Djellal ram (source: Wikipedia, used with permission)

Kiko Buck Test - Feedlot

In the last newsletter, we reported on the pasture phase of the Kiko Buck Performance Test. In early August 2019, 156 bucks were moved into the feedlot (confinement) phase of the test, which occurred in the testing facility (barn) at Langston University. Initially, the bucks adapted well to the automated feeders and then disaster struck. On the fourth day in the barn, feed intake dropped markedly. On the fifth day, we noticed diarrhea in some of the pens and treated 19 bucks with a Pepto-Bismol-like product and then the next day, 60 bucks were treated for diarrhea. The bucks seemed to recover but they decreased feed intake a couple of days later. We first thought that the problem was the feed and shut down the automated feeders and switched to a different feed in troughs. We sent feed samples to Oklahoma Animal Disease Diagnostic Laboratory (OADDL) for mycotoxin analysis. No significant levels of mycotoxins were found in the feed. After one week in the barn, the first buck died but this buck had been sick on pasture and had not responded well to previous treatments. This first buck was quickly followed by three more bucks. The following day, all bucks were treated for coccidia and with thiamine as directed by our attending veterinarian. Eventually over the course of the next few days, all bucks were treated with a long-lasting antibiotic and an analgesic. After this blanket treatment, the farm crew stated that all the bucks looked better and we thought the issue had been resolved. However, one buck died shortly after the blanket treatment. The farm crew commented that the buck was standing with his head up just an hour before he died. Initially, and in consultation with our attending veterinarian, we thought the problem was coccidia and treated as such. Preliminary necropsy results seemed to eliminate coccidiosis, enterotoxemia, and Pasteurella pneumonia and suggested that acidosis could be involved. However within the week, more bucks succumbed to this mysterious illness.

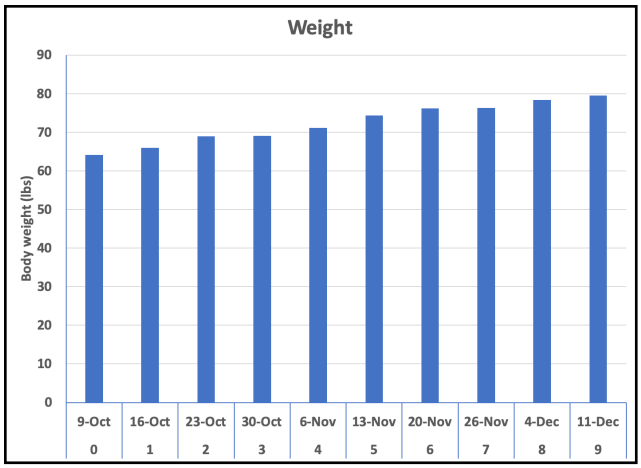


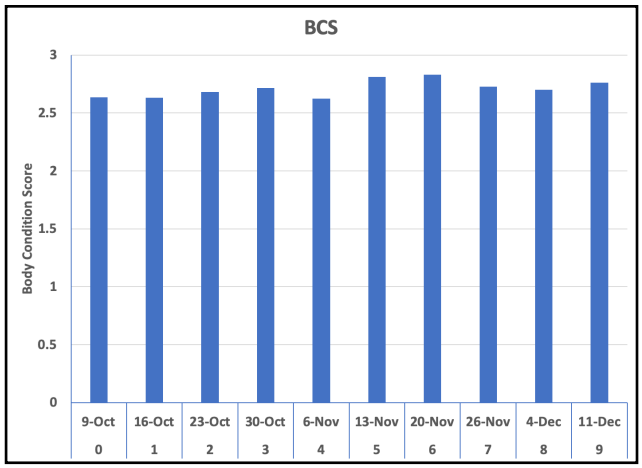
Heaviest bucks, which were largely unaffected by the mysterious illness, eating from troughs after the episode.

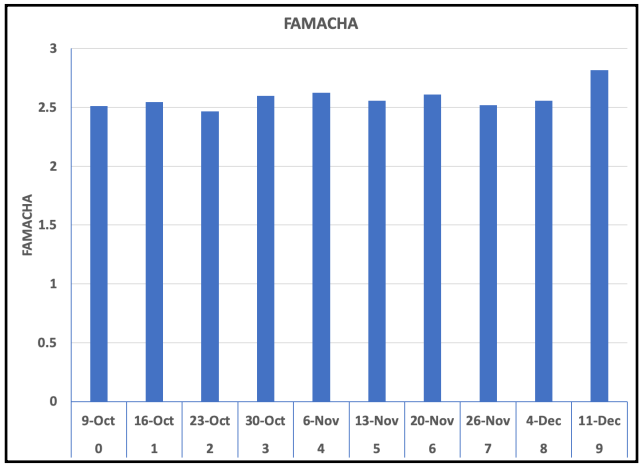
We sent 10 bucks to OADDL for necropsy. The OADDL reports were inconclusive. The first report focused upon acidosis; however, we were skeptical of this diagnosis because the bucks did not experience a "grain overload." The feed intake had actually declined prior to the deaths. The second and third necropsy reports stated, "Do to circumstances within this accession and other accessions, the Salmonella is considered a secondary (but significant) etiology" and the primary cause is unknown.

A State Veterinarian from the Oklahoma Department of Agriculture visited the facility and spent several hours investigating and then quarantined the facility for PPR (Peste des Petits Ruminants), which is a viral disease found in Africa and Asia but not North America. Samples were sent to the Plum Island Animal Disease Center, which is part of Homeland Security and the nation's premier laboratory on animal diseases. Plum Island was not able to identify anything related to national biosecurity issues and after a week the quarantine was lifted. One week after the initial death, the illness left as quickly as it came and only one more buck died before the end of the test. Unfortunately, a high mortality was experienced during the confinement phase and even more unfortunate, the cause of the illness was never determined although Salmonella was, and still is, the primary suspected culprit.

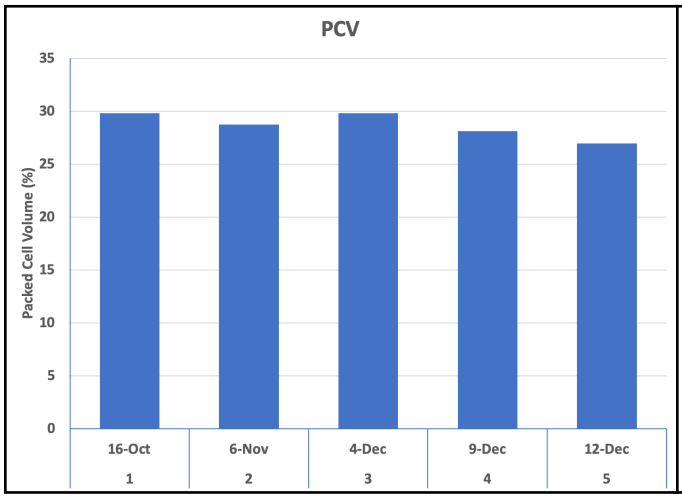
Lightest bucks, which were largely unaffected by the mysterious illness, eating from troughs after the episode.

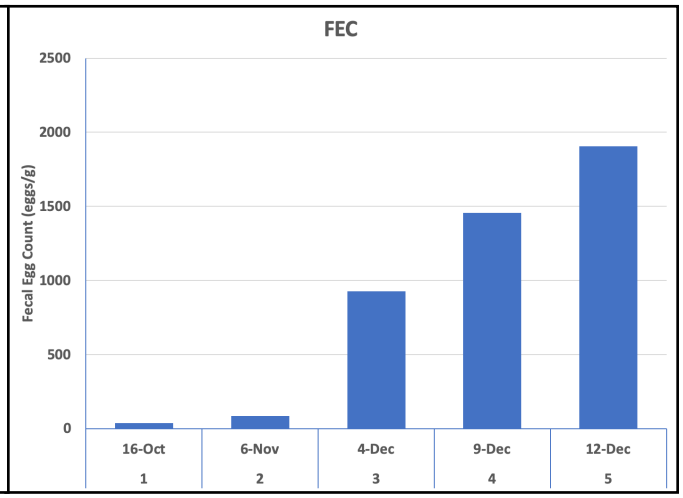






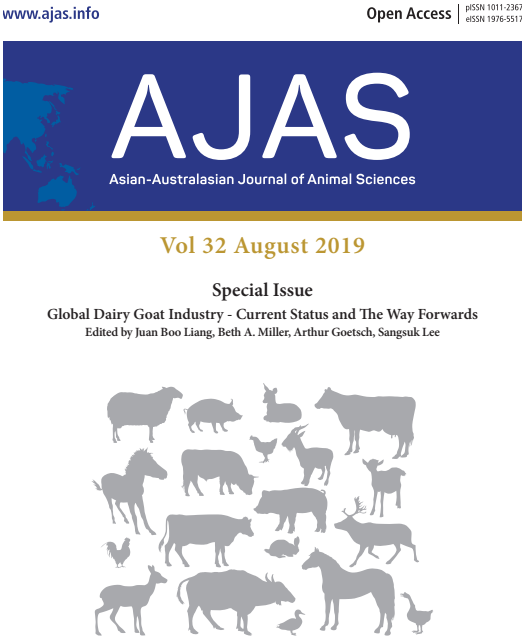
After lifting of the quarantine, several breeders elected to remove their bucks from the test and 77 bucks remained for the conclusion of the test. The remaining bucks were given time to recover and the test resumed on October 9. Body weight changes can be seen in the graph above. ADG for the nine-week test averaged 0.20 lb/day with a range of 0.42 to -0.02, with only one buck actually losing weight. Both body condition score (BCS) and FAMACHA score tended to remain stable during the test (graphs top right and right); however, FAMACHA increased sharply on the last sampling period. The increased FAMACHA was the direct result of the artificial challenge initiated on November 5. On that day, each buck received 7,000 stage 3 (L3) *Haemonchus contortus* (barberpole worm) larvae. Fecal egg counts (FEC) and corresponding packed cell volume (PCV) were taken on October 16 and November 6 to ensure that bucks were relatively worm free following a regime to eliminate all worms, which was successful as you can see from the FEC graph (lower right). Following the artificial challenge, FEC increased sharply and PCV deceased slightly. For the final FEC sampling, bucks ranged from 0 eggs per gram (epg) to 9,800 epg. Eighteen bucks had a FEC less than 500 epg (indicating a high level of resistance), 10 bucks in the range of 500 to 900 epg, 20 bucks in the range of 1,000 to 2,000 epg, and 29 above 2,000 epg. This is valuable genetic information for breeders desiring to improve resistance to internal parasites. This inaugural Kiko Buck Performance Test was challenging but hopefully future tests will be uneventful like the previous 10 meat goat performance tests.





Research Spotlight

Recent Advances in Dairy Goat Nutrition.



There have been recent advances concerning research of the feeding and nutrition of dairy goats in a wide array of areas. Ruminally emitted methane and supplementary feedstuffs to a lesser extent make appreciable contributions to the carbon footprint of dairy goats, with the former affected by type of production system and associated dietary characteristics. Unique behavior of goats necessitates careful consideration of the nature of confinement facilities to achieve optimal production by animals differing in social hierarchy. Physiological conditions such as nutritional needs and perhaps health status may influence diet selection by goats in both grazing and confinement settings. Some research suggests that low concentrations of protein and fat in milk of high-yielding dairy goat breeds could involve the type and nature of dietary ingredients as influencing end products of ruminal fermentation. With the relationship between milk urea nitrogen concentration and efficiency of dietary protein utilization, through future research the measure may be a useful tool for diet formulation as in dairy cattle. Effects of dietary inclusion of sources of fats and oils vary considerably depending on their nature, as is also true for byproduct feedstuffs and conventional ones being substituted for. Supplementation of dairy goats with sources of polyunsaturated fatty acids can affect oxidative stress and various feedstuffs influence antioxidant status; however, research addressing the significance of such changes under practical production settings would be beneficial.

Goetsch, A. L. 2019. Recent advances in the feeding and nutrition of dairy goats. Asian-Australasian J. Anim. Sci. 32:1296–1305. doi:10.5713/ajas.19.0255.

Recent Advances in Dairy Goat Genetics.

Goats (*Capra hircus*) were domesticated during the late Neolithic period, approximately 10,500 years ago, and humans exerted minor selection pressure until fairly recently. Probably the largest genetic change occurring over the millennia happened via natural selection and random genetic drift, the latter causing genes to be fixed in small and isolated populations. Recent human-influenced genetic changes have occurred through biometrics and genomics. For the most part, biometrics has concentrated upon the refining of estimates of heritabilities and genetic correlations. Heritabilities are instrumental in the calculation of estimated breeding values and genetic correlations are necessary in the construction of selection indices that account for changes in multiple traits under selection at one time. Early genomic studies focused upon microsatellite markers, which are short tandem repeats of nucleic acids and which are detected using polymerase chain reaction primers flanking the microsatellite. Microsatellite markers have been very important in parentage verification, which can impact genetic progress. Additionally, microsatellite markers have been a useful tool in assessing genetic diversity between and among breeds, which is important in the conservation of minor breeds. Single nucleotide polymorphisms are a new genomic tool that have refined classical BLUP methodology (biometric) to provide more accurate genomic estimated breeding values, provided a large reference population is available.

Gipson, T. A. 2019. Recent advances in breeding and genetics for dairy goats. Asian-Australasian J. Anim. Sci. 32:1275–1283. doi:10.5713/ajas.19.0381.

*Editor's Note: These two research articles, as well as many others on dairy goats, can be downloaded from the recent special issue of Asian-Australasian Journal of Animal Science (*https://www.ajas.info/current/index.php?vol=32&no=8&special=Y*)*

All of us at AIGR wish you a Happy (and safe) New Year!

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