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Research Roundup: Almond Hull Usage on California Dairies

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Ed DePeters – UC Davis Department of Animal Science

We surveyed members of the California chapter of the American Registry of Professional Animal Scientists (ARPAS) to better understand almond hull usage in dairy rations.

Why almond hulls? Almond production in California for 2018 is estimated to be 2.3 billion pounds of kernels (nuts). On average, crop yield is made up of 27% nuts, 19% shells, and 54% hulls. For the 2018 crop that will translate into 4.6 billion pounds of almond hulls, much of which will be fed to dairy cattle. The acreage of almond orchards is increasing so the future is more and more almond hulls. Anatomically, if you think of a peach, the flesh part of the peach that is eaten is the hull of the almond. Almond hulls are low in crude protein, but they are high in sugar, which makes them an excellent source of energy for lactating dairy cattle. We are working with the California Almond Board to evaluate the quality of almond hulls produced in California as well as how much almond hulls can be fed in lactating cow diets.

An electronic survey was emailed to the entire California ARPAS membership list. Forty-two surveys were returned by 40 nutritionists and two feed suppliers. The total number of potential returned surveys is hard to gauge, as an unknown percentage of ARPAS members do not formulate rations. Selected results are presented below.

Table 1. Amount of almond hulls fed in lactating cow rations.

	Avg. lbs/day/cow	Maximum lbs/day/ cow	Maximum % a. hull in diet
Minimum	1	2	0.8
Maximum	10	18	30.0
Average	5.1	10.2	15.3
STD	1.6	2.9	5.8

The majority of respondents considered almond hulls both a forage and concentrate (n=30), as compared with solely a forage (n=12) or concentrate (n=0). How almond hulls were viewed in the ration did not change when asked about different breeds (Holstein vs. Jersey). When formulating growing rations, almond hulls were treated as both a forage and concentrate (n=26), compared with solely a forage (n=12) or a concentrate (n=4), and responses were similar for dry cow rations (both = 26, forage = 13, concentrate = 3). Most respondents (62%) said that changes in almond hull price affected how the hulls were used in the ration formulations.

Sixty-seven percent of respondents expressed concerns when feeding almond hulls to lactating cows; the most commonly expressed concerns were quality related to the amount of stick and shell contamination. This contamination contributed to concerns about consistency of the hull product. Only 20% of respondents did not test almond hulls, while frequency of testing for the remaining 80% varied from every load, to once a year, to only when problems arise.

You will hear more about our almond projects in future issues of the California Dairy Newsletter.

Reno-bound: Western Dairy Management Conference (WDMC)

Deanne Meyer Livestock Waste Management Specialist UCD Department of Animal Science

Come one, come all. Held in odd years, this year's conference program is phenomenal. The conference committee put our heads together to come up with what we think is our best program to date. There are many meetings prior to the start of the conference. Monday starts the week off with a full day (9:00 a.m. to 4:30 p.m.) on Genomic Revolution: The Next 10 Years. The morning will focus on the vision of the industry in 2029 and future changes resulting from genomics. The afternoon is all about the use of big data and how to deal with it. Registration for this pre-conference session is separate from the main conference.

On Tuesday morning, the Platinum Sponsor Pre-Conference Sessions will occur. Most producers check-in at the registration desk and pick up the WDMC credentials prior to attending these workshops.

On Tuesday afternoon, the main conference will kick-off. The plenary session has Chris Koch, Charlie Arnot, UC's own Alison Van Eenennaam, and former Secretary of Agriculture, James Vilsack. Great topics include: Who's driving the bus and where's it headed? Dairy---Where Biological and Social Sciences Meet, Global Demand for US Dairy, Tariffs and the next 5%.

On Wednesday, the sessions will have two panels, one on advanced manure treatment techniques and one discussing how to get and maintain high pregnancy rates. Topics also include camera placement to protect your dairy (eyes in the sky are important), economics of beef semen, irrigation do's and climate smart dairy.

By Thursday, we'll be down to one room. Topics include: labor training and use of standard operating procedures, use of robotic milking machines, prudent use of antibiotics. Presentations will be made about farm labor and immigration, legal aspects of big data, nitrogen management and the producer/nutritionist relationship.

One of the great opportunities at this conference is the networking. As always, lunches, breaks and evenings provide ample opportunity to reconnect with old friends and/or make new ones. For more information check out the program http://wdmc.org/

US Holstein Association Funding Heat Tolerance Research - Volunteers Needed

Anna C. Denicol, University of California-Davis Department of Animal Science

The University of California, Davis and the University of Florida are doing a joint project with the slick gene to increase heat tolerance in Holstein cows. Cows carrying the dominant version of the gene have short, sleek hair coats and maintain lower body temperature during heat stress. Previous work at the University of Florida indicated that slick Holstein cows calving in the summer had lower decreases in milk yield compared to non-slick cows.

California participants needed:

We are looking for 2 California Holstein herds with a herd size of 2,000 milking cows or more. The target is to breed 250 multiparous cows using semen from slick Holstein bulls during the months of February/March 2019 and another 250 inseminations during September/October 2019. This allows us to test the benefit of the slick gene by producing calves born in winter (November/December 2019) and summer (June/July 2020).

Two bulls will be used:

- Slick-Gator Lone Ranger (HOUSA000144046164); NM$ 592 – conventional semen (125 inseminations per season)
- Slick-Gator Blanco (HOUSA000144046155); NM$ 320 –sexed semen (125 inseminations per season)

The project will pay for the semen, and both bulls need to be used equally each week.

The project also pays to genotype heifers born from the trial.

What we're measuring: performance of calves and growing heifers including health, growth and reproduction, and milk production of the first lactation. During the summer, we will measure body temperature, respiration rate, and sweating rate in the calves/heifers – this will take about one week. Compliance and excellent record keeping is fundamental since we need to rely on each dairy's records to evaluate the animals.

Please contact Dr. Anna Denicol at acdenicol@ucdavis.edu if you're interested in having your herd participate in this project.

A Tool to Evaluate the Real Value of Semen

Fernanda C. Ferreira, UCCE Herd Health & Management Economist Specialist

When purchasing semen, producers usually rank bulls based on their predicted transmitting ability (PTA) for different indexes such as lifetime net merit (NM$), cheese merit, fluid merit, etc., depending on their market. In addition to differences in semen PTA, there are also price differences. The difference in semen prices, PTA, and the number of doses of semen necessary to produce a female offspring (sire conception rate) make the decision of choosing the most profitable semen a little challenging.

This article introduces a tool developed by Dr. Albert De Vries which addresses the question of comparing the value of semen from sires with different prices and different genetic merits. The tool allows the user to vary the inputs according to their own reality, providing farmers information on how much they can afford to spend on a dose of semen (which varies from farm to farm), and to compare semen from sires with different genetic merits and prices.

To run the calculations, the user needs to add the conception rate (CR) of the female being inseminated, the sire conception rate, the risk of abortion, and the risk of culling. Once a calf is produced, the risk of death before first calving is also required for the calculations, as the calf must be alive for the genetic merit of the semen to have value. Only female calves benefit from differences in genetic merit, so if sexed semen is used, the probability of getting a female calf increases, and the farmers can account for that in the tool. Dr. De Vries' calculations also consider the NM$ that a superior female passes to her daughters, granddaughters, and all later generations (gene flow), which depends on the number of future female offspring of the daughter.

Finally, it is possible to compare the genetic merit difference of two units of semen, as well as the maximum price a farmer can afford to pay for different sires' semen. This value depends on the CR of the females; better reproductive performance herds can afford to pay higher prices for semen. Other factors can also affect the value of the semen: reliability, response to selection, and the cow cull rate. The NM$ and other USDA indexes are standardized at 2.78 lactations. This corresponds to a cow cull rate of approximately 33%. In California, the average cull rate was 44% for Holstein herds in 2017 (CDFA), which means that on average California cows have fewer lactations to express their genetic merit, and will have fewer daughters, which decreases the value of semen. The tool allows the user to change the cull rate (which will change the average number of lactations of the herd), to have a realistic scenario of their farm.

If you have any questions about the spreadsheet, how the calculations were done, or if you need a demonstration of this tool, please contact Fernanda Ferreira at fcferreira@ucdavis.edu.

The tool is available at the University of Florida website: http://dairy.ifas.ufl.edu/tools/

Spore-forming bacteria cause spoilage and reduce milk shelf life

Daniela Bruno UCCE Dairy Advisor Fresno and Madera Counties

The shelf life of fluid milk at the grocery store is influenced by how raw milk is harvested, stored, and processed. Processing plants pasteurize milk to kill microorganisms. However, spore-forming microorganisms can survive heat treatment and grow. Once these spores germinate into a vegetative cell and begin growing, they may cause spoilage resulting in distension of containers and reduced shelf life. *Clostridium* spp., *Bacillus* spp., and *Paenibacillus* spp. are the main spore-forming species associated with spoilage of fluid milk post-heat treatment. The presence of spore-forming bacteria in milk may also become a food safety concern, especially if *Bacillus cereus,* an important foodborne pathogen, is present. As spores, bacteria can survive in the latent state for years, despite best cleaning, handling, and packing practices.

Where are spores potentially located on farm? Spore-forming bacteria have been recovered at the farm level in feeds (concentrate and silage), hay, bedding, and manure. Spores have also been recovered in milk parlor wash water, milking equipment, milk filters, and towels.

Prevention of spore-forming bacteria requires attentive work. Maintain good on-farm husbandry practices to reduce potential sources of spore-forming bacteria:

1. Frequently clean open lots, freestalls and freestall floors.
2. Use standardized operating procedures for milking cows (every milker).
   a. Good prep routine.
   b. Single service towels or wipes.
   c. Effective teat dip.
3. Keep milk contact surfaces clean of debris.
4. Cool milk as soon as possible.
5. Clean, sanitize and maintain milking equipment daily.
6. Clean milking system and bulk tanks regularly.
7. Regularly clean water troughs.

Dairy product reputation management begins with farm sale of the highest quality milk. Keeping the cows' environment clean and milking time hygiene are important management practices to harvest high-quality milk. Harvesting high-quality milk and cooling it immediately are the first steps in milk's journey to the grocery store. Attention to management is important to improve milk quality and extend product shelf life.