

TECHNICAL BULLETIN

DAIRY



NUTRITIONAL BENEFITS OF LIQUID SUPPLEMENTS FOR BIRD'S NEST DRY COW DIETS

Bird's Nest Dry Cow Diets are bulky, high forage diets – dietary energy is from corn silage, with little or no grain fed. These diets contain 6-12 lbs/day of low quality forage such as straw, corn stover, or grass hay, to dilute the dietary energy content. Research has demonstrated that preventing energy over consumption during the dry period improves post-calving dry matter intake, milk production, and energy balance (Dann, et. al 2006). Liquid supplement inclusion within a Bird's Nest Dry Cow diet provides nutritional benefits to improve rumen microbial growth and utilization of dietary forage.

Grow Rumen Microbes!!

Available fiber, which is the basis for Bird's Nest diets, does support rumen microbial growth. However, due to its structure, it is very slowly fermented by rumen microbes. Available fiber does not provide enough energy to fuel maximal microbial growth to fully release nutrients in the fiber. As a result, other more quickly available carbohydrate (CHO) sources such as sugar must be added to the rumen environment! Sugar in molasses-based liquid supplements provides energy to fuel microbial growth and VFA release, as shown by the below data:

Item	Molasses, % DM		
	0	3	6
Rumen Ammonia, mg/dl	7.58	7.05	6.50
Total VFA, mM	112.1	117.9	116.3
Purine Derivatives, mmol/d	529	601	541

(Broderick & Radloff, 2004)

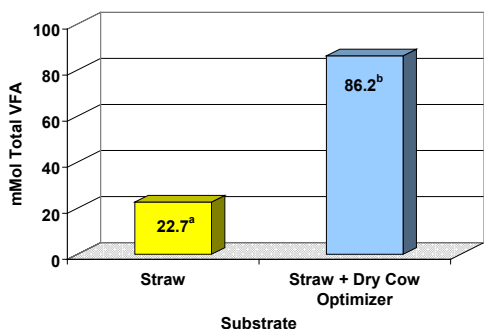
In addition to providing sugars to supply energy to rumen microbes, liquid supplements also contain degradable protein which is used by rumen microbes as a nitrogen source. Degradable protein in liquid supplements is in natural and non-protein nitrogen (NPN) forms. Cane molasses, condensed whey, and corn steep liquor ingredients contain natural protein, while ammonium polyphosphate and urea provide NPN. Rumen microbes utilize amino acids and peptides from natural protein sources, and NPN is transformed to ammonia for use by the rumen microbes. Providing an NPN source is beneficial in high-forage Bird's Nest diets, since fiber digesting bacteria require ammonia as their nitrogen source!!

Research has demonstrated that low quality forage utilization is improved through liquid supplement provision. Sugar and protein in the liquid supplement provide quickly available energy and nitrogen to stimulate rumen microbial growth and improve forage digestibility and intake. In a study by Bowman et al. (1995), 2 and 3 year old beef cows grazed native rangeland and consumed a free choice liquid supplement (28.5% CP) during late fall in Montana. Researchers reported 36% and 49% improvement of 48 h forage in situ DM and NDF disappearance, respectively, for the supplemented cows ($P < 0.01$). Consequently, forage intake increased 49% for cows consuming liquid supplements, compared to unsupplemented cows ($P < 0.01$). Fueling microbial growth by liquid supplement provision in a high forage diet keeps microbial populations young, growing, and efficient, and ensures that more microbes are available to digest forage. The resulting improvement

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in forage digestibility helps prevent excessive rumen fill from limiting consumption of free-choice low quality forage. This is especially important in a Bird's Nest dry cow diet, when the goal is to provide ad libitum access to a high-roughage diet while ensuring consistent daily intakes of roughages, essential nutrients and additives.

Through in vitro testing, QLF Dry Cow Optimizer has been shown to improve VFA production when incubated



Note 1: In Vitro DVRAMM Data (Courtesy of Diamond V Mills)

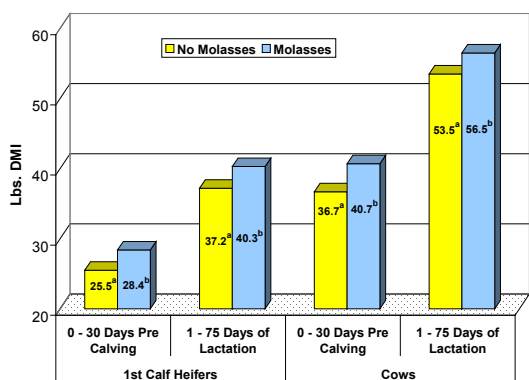
Note 2: Total VFA mMol with different superscripts significantly different at P<0.05

Note 3: QLF Dry Cow Optimizer is 22% CP (19% ECP-NPN) and 27% Total Sugar

Improve Milk Production!!

Besides enhancing rumen fermentation, molasses-based liquid supplements fed during the dry period can have positive effects on dry matter intake. Kansas State University research has shown that molasses fed during the dry period significantly improved dry matter intake before and after calving for both heifers and mature cows. Milk

yield after calving was also significantly improved for mature cows d 1-75 lactation (108.5 vs 99.0 lb/d for cows fed molasses and no molasses, respectively). Molasses was incorporated into the far off dry period ration at 3.2% of dry matter, and 3.3% of dry matter in the close-up ration.



Note 1: Dry Matter Intake within animal group and period, with different subscripts are significantly different at P<0.001.

(Miller et al. 2005)

In a second study, cane molasses was fed at 3.3% of DM in the far-off period, 3.6% of DM in close up period, and 1% of DM in lactation ration. Cows that received molasses in the pre-calving diet had significantly increased dry matter intake in the close up period (30.0 lb/d vs. 26.7 lb/day P=0.002) and after calving (58.4 lb/d vs. 51.4 lb/d P=0.08) compared to control cows, respectively. Energy-corrected milk production was also significantly increased in molasses-supplemented cows (Johnson & Miller, 2007).

QLF offers products specifically for the dry period that may be incorporated into Bird's Nest dry cow diets. QLF Dry Cow Optimizer 20 is designed to be fed in a TMR, and provide all supplemental macro & microminerals and vitamins. QLF Dry Cow Optimizer 20 contains 27% total sugar and 20% crude protein, to stimulate microbial growth. Custom Dry Cow Optimizers are also available. QLF Super Dry Cow 24 may be fed free choice or in a TMR, and provides all supplemental microminerals and vitamins. QLF Super Dry Cow 24 contains 36% total sugars, and 24% crude protein.

Including a molasses-based liquid supplement within a Bird's Nest Dry Cow Diet provides nutritional benefits which, when combined with proper feeding management help enhance success of a Bird's Nest Dry Cow Ration approach. Liquid Supplements also provide valuable physical benefits for Bird's Nest Dry Cow Diets; please see QLF Technical Bulletin TB4314 for additional details.