Research Note

DRY COW ACCEPTANCE OF LIQUID SUPPLEMENTS BASED ON SYNERMAX® WITH ADDITION OF AN ANIONIC SALT[1,2]

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Feeding recommendations for dairy cows approaching parturition and subsequent lactation (transition cows) specify a low and preferably negative dietary cation-anion difference (DCAD) to foster metabolic acidosis and elevate the blood calcium level, via enhanced parathyroid hormone receptor recognition, thus helping to prevent milk fever (Oetzet, 2002). To achieve this DCAD adjustment anionic salts are often fed to mutiparous cows in high-producing herds during the last 3 wk prior to calving. However, these salts tend to cause palatability problems when added, for example, to concentrate mixtures. Liquid supplements based on the local pharmaceutical coproduct SynerMax® having an estimated DCAD on the dry basis of about -77 meg/100 g (M. Murphy, University of Illinois, unpublished data), resulting from a high sulphate content (Abbott Laboratories, 2000), could be useful in this regard. Such liquid supplements might also serve as carriers for added anionic salts. As a first step to pursue this possibility we tested the acceptance by dry cows of mixtures of SynerMax®/cane molasses in two different proportions with and without anionic salt addition.

Eight non-lactating cows of the Lajas Experiment Station herd that were not more than 5 mo pregnant at the start, were used to compare four treatments consisting of liquid supplements containing SynerMax® and cane molasses in the proportions 80:20 and 90:10 without and with addition of the anionic salt calcium chloride. This compound was chosen because of its cost and ready availability. Daily from about 14:00 to 07:00 (17 h overnight) the cows were maintained in spacious individual concrete-floored pens, which were arranged in two back-to-back rows of four pens each. Each pen had a watering trough and a plastic feeder for liquid supplements mounted on an elevated metal frame, which was located in the area under a sheet metal roof to prevent rain from falling into it. During the interval from 07:00 to 14:00 h (7 h) the eight animals grazed together in a 2.5-ha paddock, a sward of mixed tropical grasses that provided adequate forage for restricted grazing at this stocking rate from May to July.

During a 7-d preliminary period, the cows became accustomed to the experimental routine and the liquid supplements. The latter were prepared at 2- or 3-d intervals by weighing and pouring into a large bucket the two liquids, SynerMax® and molasses, then mixing them thoroughly with a portable high-speed electrical blender. In the case of

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[2]Trade name used only to provide specific information. Mention of a trade name does not constitute a warranty of equipment or materials by the Agricultural Experiment Station of the University of Puerto Rico, nor is this mention a statement of preference over other equipment or materials.

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treatments 2 and 4, the indicated weight of calcium chloride was first dissolved in a minimum volume of water and then blended into the other two previously mixed ingredients. Each offering of liquid supplement was left in place for 2 or 3 d, except for one span of 4 d during the adjustment phase of experimental period 1. After the said exposure times, each feeder and its contents were reweighed for calculation of liquid consumption. Fresh material was then prepared for the next offering. The plan was to allow ad libitum consumption of liquid supplements, but sometimes the offerings were consumed completely; thus maximum voluntary intake might not have been reached. The experiment consisted of four periods, all of which were of 14 d except period 2, which lasted only 11 d. In the successive periods the adjustment phase was of 7, 5, 6 and 6 d; the comparison phase of 7, 6, 8 and 8 d. The experiment ended in mid July.

Each cow received each treatment once during the trial. A pair of cows followed each of the four treatment sequences 1-2-3-4, 2-3-4-1, 3-4-1-2 and 4-1-2-3. Within each pair one animal was housed in one of pens 1 through 4, and the other in pens 5 through 8. Liquid supplement intake was the only response variable studied. The data were analyzed according to a single 4×4 latin square design with cow-pairs constituting the experimental units. The analysis of variance involved three degrees of freedom (df) for each of the factors: periods, treatments and cow-pairs, and 6 df for the error term. The treatments df were used to make three orthogonal specific contrasts: higher vs. lower proportion of molasses in the mixtures (treatments 1 + 2 vs. 3 + 4), without vs. with anionic salt addition (1 + 3 vs. 2 + 4), and the interaction (1 + 4 vs. 2 + 3).

Mean overall liquid supplement intake was 2.51 kg per head daily. Mean intakes for the successive periods were 2.68, 2.74, 2.58 and 2.04 kg. There is no apparent explanation for the decrease observed in period 4; in any case the variance due to periods did not approach significance ($P > 0.10$). Animals constituted the main source of variation. Individual cows ranged in liquid supplement intake from 1.58 to 4.13 kg, whereas cow-pairs, ranged from 1.90 to 3.12 kg. The variance due to this source approached significance ($P < 0.10$). Table 1 shows that the individual treatment means ranged from a minimum of 2.33 (treatment 3) to a maximum of 2.74 kg (treatment 2). Variances due to treatments in general and to the specific contrasts were small. Although not significantly different, the 20% molasses supplements were consumed in somewhat greater quantity (0.24 kg), and with less variation (see standard errors) than those of 10% molasses; supplements with addition of calcium chloride were ingested in slightly larger amount (0.11 kg) than those without this addition.

TABLE 1. *Daily intake of liquid supplements and of added anionic salt per treatment.*

Treatment	SynerMax®: Molasses Proportions	Anionic Salt Addition	Liquid Supplement Intake (kg)	Treatments Contrasts		Calcium Chloride Intake (g)
				20 vs. 10% molasses (kg)	Without vs. with anionic salt (kg)	
1	80:20	No	2.52 ± .41[1]			
2	80:20	Yes	2.74 ± .29			137
3	90:10	No	2.33 ± .39			
4	90:10	Yes	2.40 ± .30			120
Difference				0.24 NS[2]	-0.11 NS	17 NS

[1]Standard error.
[2]Not significant.

In treatments 2 and 4 mean daily intake of added anionic salt was 137 and 120 g, respectively (Table 1). A paired t test indicated that this 17-g difference was not significant. Our goal was to obtain a daily intake of at least 115 g of calcium chloride to provide an anionic dose of not less than 1.5 equivalents, based on an equivalent weight of the salt of 73.5 g (Oetzel, 2002). This dose level was achieved in six out of eight cows in treatment 2 and four out of eight cows in treatment 4. The same individuals tended to be low consumers of both of these liquid supplements and the anionic salt they contained. The range of individual animal daily intakes of calcium chloride was from 64 to 198 g and from 70 to 206 g in treatments 2 and 4, respectively.

Both SynerMax®/molasses combinations tested in this experiment had good animal acceptance and the addition of 5% calcium chloride to these liquid supplements caused no loss of acceptance. Offering this type of supplement appears to be an effective method of achieving the desired level of anionic salt intake on average, but variability among individual cows must be taken into account. Further testing is also needed in cows close to parturition, as these can be expected to have a reduced appetite (NRC, 2001) and might possibly be more sensitive to addition of anionic salts.

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