complicated by the fact that goat dietary preferences are affected by previous animal experience, availability of alternative species, season of the year and the soil/environment that the plant is growing in. Therefore, information on goat dietary preferences may not apply to a specific case due to the aforementioned factors. Also, since plant preference is affected by season of year or stage of plant growth, the time of grazing can be important. However, if goats consume the target species, it is only a matter of time until the species is controlled because weeds and brush are not very tolerant of defoliation and require long rest periods to restore root carbohydrates. If goats do not consume the target species, animals which do consume the species may be brought in to train naive animals. Recent research shows that cattle may be trained to eat certain weeds and it may be possible to use similar techniques to train goats to consume the target species. We have observed goats consuming novel species when forage became limiting, but goats have also been observed to starve rather than eat some species. Goats may be more interested in a plant the second year they are exposed to it and research indicates progeny may consume more of a target species than their dams if availability is high when they are young. We have observed breed differences in the ability to graze. Goats consume many brushy and weedy species, but it takes good management to utilize this attribute effectively and profitably for weed and brush control.

Key Words: Behavior, Goats, Vegetation management

59 Utilization of goats for rejuvenation, reclamation and land cleaning. A. Peischel*, *Tennessee State University*, *Nashville*.

The goat is an extremely agile, gregarious and opportunistic creature. It is the ability of management, through innovation and creativity, to successfully use those characteristics for the enhancement of lands. The management goal encompasses use of all ecosystems, biological and environmental, with success centering on flexibility of management plans and the ability to re-plan. To accomplish this, biodiversity must be maintained, the physiology of plants and soil understood along with the ability of man to make environmental, economical and socially sound decisions. Goats, under control are being used to enhance land productivity and encourage vegetative biodiversity. Energy is universal and can be used, stored, concentrated or spread with the primary source being the sun. To use the natural energy flow efficiently, it is vital to control: the time of grazing/browsing, the area to be grazed/browsed, the season of grazing/browsing, the plant specie to be grazed/browsed and the goat(s) that are being used for land management. The use of goats in vegetative management takes on many diverse avenues. They can be used for: noxious weed abatement, rejuvenation of abandoned and eroded lands, edging back of woody and forb species, fire breaking and fuel load reduction, poisonous/toxic plant eradication and enhance timber producing forests through silvopasture and agroforestry techniques eliminating competition of unwanted species. Goats can stabilize stream banks and riparian areas, clean along irrigation ditches, minimize old fence lines, clear farm ponds and create flyways for ducks and geese along with landscaping around homes and land cleaning in citrus orchards, nut farms and vineyards. The management criterion is to never underestimate the nutritional value of plants and vegetative re-growth; encourage a change of regression plant communities into succession plant communities. Biodiversity provides year round selection for goats, avoiding problems such as those associated with monocultures. Goats provide mankind with meat/milk/fibre/skins; products to enhance our lives. The goat is truly an opportunity for man to manage.

Key Words: Goats, Land restoration, Vegetation management

Graduate Student Paper Competition: Northeastern ASAS/ADSA Graduate Competition

60 Milk production of dairy cows fed diets constant or varied in phosphorus content during lactation. J. Elizondo*[1], D. Beegle[1], J. Fergusson[2], and Z. Wu[1], [1]*Pennsylvania State University*, *University Park*, [2]*University of Pennsylvania*, *Kennett Square*.

The current NRC (2001) suggests that diets fed to dairy cows contain high concentrations of P during early lactation and low concentrations of P in late lactation based on milk production. Milk production response to diets containing constant or varied P concentrations during lactation was determined. Thirty multiparous Holsteins were blocked by mature equivalent milk yield and calving date, and assigned to one of three dietary treatments for complete lactation. For the first treatment, the diet was formulated to contain 0.36% P for the entire lactation (constant P, 0.36-0.36-0.36). Treatment 2 included 0.36% dietary P for 30 wk followed by 0.29% P during the last 14 wk (P changed once, 0.36-0.36-0.29). The third treatment consisted of 0.43% P for the first 10 wk, 0.36% P for the second 10 wk, and 0.29% P for the last 14 wk (P changed twice, 0.43-0.36-0.29). Milk yield and milk component production did not differ among treatments. Keeping dietary P concentration constant or varying the concentration once or twice during lactation did not affect milk production.

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Table 1.

Item	0.36–0.36–0.36	0.36–0.36–0.29	0.43–0.36–0.29	SEM	Constant vs. varied P[1]	P changed once vs. twice[1]
Milk, kg/d	33.3	33.3	36.0	2.2	0.63	0.39
Fat, %	4.24	4.00	4.04	0.21	0.40	0.88
Fat, kg/d	1.454	1.390	1.491	0.086	0.91	0.41
Protein, %	3.08	3.12	3.08	0.05	0.85	0.56
Protein, kg/d	1.074	1.068	1.145	0.063	0.68	0.39
3.5% FCM, kg/d	38.8	37.6	40.5	2.2	0.94	0.35

[1]*P* values for contrasts.

Key Words: Phosphorus requirement , Dairy cows, Milk production

61 Effects of forage source and corn particle size on milk production and composition, nutrient digestibility and ammonia emission from manure in Holstein dairy cows. N. E. Brown*, V. A. Ishler, T. W. Cassidy, K. Heyler, and G. A. Varga, *The Pennsylvania State University*, *University Park*.

A replicated 4 X 4 Latin square design was conducted to evaluate the effects of forage source and corn particle size on cow performance, nutrient digestibility and ammonia (NH_3) emissions from manure. The four treatments were: 1) grass silage (G) with fine (F) ground corn (GF), 2) G with coarse (C) ground corn (GC), 3) alfalfa silage (A) with F (AF) and 4) A with C (AC) in diets for lactating cows. Cows averaged 119 ± 5 d in milk. Diets were formulated to contain approximately 1.5 NE_L Mcal/kg, 16.5% CP, and 32% NDF. Each period lasted 28 d, the final 7 d were used for sample collection of milk yield and components, nutrient digestibility and NH_3 from manure. A photo-acoustic gas monitor was used to record NH_3 concentrations in 20 min intervals from manure samples. Cows fed A had greater dry matter intake (DMI) (P<0.01) compared to cows fed G (27.9 vs. 22.1 kg/d, respectively). The increased DMI for cows fed A resulted in greater (P<0.01) milk yield (MY; 35.3 vs. 30 kg/d) than for cows fed G. MY efficiency was greater (P<0.02) for cows provided G vs. cows fed A (1.43 vs. 1.30, respectively). Corn particle size had no effect on DMI, MY, FCM, or milk yield efficiency. Milk fat, protein and milk protein % were higher for cows fed A vs. G diets. Cows fed G had higher (P <0.08) milk urea N compared to cows fed A. DM digestibility was not affected by forage source but was higher (P<0.02) for F vs. C (58.8% vs. 55.1%, respectively). A greater decrease (P<0.04) in DM digestibility was observed with C for cows on G compared to A (57.4% vs. 56.4%). Fiber digestibility was higher (P< 0.04) for F vs. C (34.7% vs. 29.1%). No differences were observed between forage or corn source on manure NH_3. Results of this study demonstrate that fiber from G is more filling than A resulting in reduced DMI and milk yield. Corn particle size may impact nutrient digestibility and these effects may differ based on forage source.

Key Words: Grass silage, Alfalfa silage, Ammonia emission

62 Withdrawn by author.

63 Accelerated calf growth: When does it make sense? D. Berthiaume* and J. Smith, *University of Vermont*, *Burlington*.

Scientific evidence is lacking on which to base recommendations of the age at which feeding levels should be increased to maximize gains without compromising health in milk-fed calves. In this experiment, growth and health response of Holstein heifer calves fed different types of milk replacer (MR) at different feeding rates were determined. Calves (n=30) weighing 40-50 kg at birth were randomly assigned to 1 of 5 treatments. Treatment 1 were control calves fed MR containing 20% Crude Protein (CP) and 20% fat, offered 0.272 kg Dry Matter (DM) 2 times per day reconstituted to 12.5% w/w. All other treatments were fed a 26% CP, 18% fat MR. There were 3 levels of milk replacer fed twice per day: 0.272 kg reconstituted to 12.5%, 0.408 kg reconstituted to 14.7%, and 0.544 kg reconstituted to 16.1% w/w. Calves were initially fed 0.272 kg per feeding. Amounts fed were increased to level 2 on d 3, 10, 14, or 3 for treatments 2, 3, 4, and 5, respectively and to level 3 on d 7, 14, 21 and 7 for treatments 2, 3, 4, and 5 respectively. Treatments 1-4 received free choice starter grain from 3 d through weaning; treatment 5 did not receive starter until 21 d of age. During wk 5 all calves were offered 0.272 kg DM once per day and were weaned at 42 d of age. Weights and hip heights were measured weekly for 8 weeks. Body temperatures, respiratory scores, and fecal scores were recorded daily. Blood samples were obtained at birth, 24, 48, and 96 h after colostrum feeding, and weekly thereafter for 8 wk and analyzed for immunoglobulins, nonesterified fatty acids and β-hydroxybutyrate. Although ADG through wk 8 were not different among treatments, days scouring were affected by treatment.

Table 1. Treatment Results

Treatment	1	2	3	4	5	*P*-value
Total MR						
DM intake, kg	44±1.3	77±2.0	71±3.2	66±7.5	77±6.8	<0.001
Total starter						
DM intake, kg	40±6.1	37±4.5	40±5.9	40±2.8	29±7.1	.029
ADG, kg/d	0.6±.10	0.7±.09	0.7±.12	0.7±.07	0.6±.12	.347
Days Scouring	6±2.3	5±2.9	10±2.9	7±3.5	7±3.1	.001

[1]- Fecal scores ranged from 1=solid to 4=liquid [*]- A score 3+ was considered scouring

Key Words: Calf, Growth, Protein

Graduate Student Paper Competition: National ADSA Dairy Foods Division

64 Fatty acid composition and thermal properties of lipid from milk and butter from lactating Holstein cows fed a supplemental lipid either high or low in palmitic acid. M. K. Beam*[1], L. W. Lassonde[2], B. C. Veltri[1], S. J. Taylor[1], R. Jimenez-Flores[2], and E. J. DePeters[1], [1]*University of California*, *Davis*, [2]*California Polytechnic State University*, *San Luis Obispo*.

Milk fat offers new roles as a functional-food ingredient in many foods. Modification of the fatty acid (FA) composition of the triacylglycerol (TG) and phospholipid (PL) components impacts the nutritional value and physio-chemical properties of milk lipids. The objectives were to determine the impact of feeding either a low (LP) or a high (HP) palmitic acid supplemental fat to lactating cows on the (1) FA composition of lipids in milk fat and the subsequent butter and buttermilk and (2) thermal properties of the butter. Multiparous (8) and primiparous (4) Holstein cows were used in a cross-over design. Diets were similar in composition with the only difference the supplemental fat included at 2% of diet dry matter used to alter the palmitic acid intake of cows. The HP supplement was Energizer-RP10, and the LP supplement was yellow grease. Milk yield did not differ, but dry matter intake tended (P < 0.06) to be lower for HP (24.8 kg/d) than LP (25.1 kg/d). Yields of 4% fat-corrected milk (44.1 vs 41.2 kg/d) and fat (1.8 vs 1.6 kg/d) were significantly greater for HP than LP. Changes in the FA composition of TG and PL occurred. C16:0 in TG was higher for HP than LP (41.9 vs 28.2 g/100 g fat) while C18:1 *cis* was lower (18.1 vs 23.1 g/100 g fat). Total C18:1 *trans* was lower for HP (2.63 g/100g fat) than LP (4.82 g/100 g fat). Buttermilk PL was high in unsaturated FA. Butter from each cow was noticeably harder when cows were fed HP than LP. Textural analysis found that anhydrous milk fat (AMF) from HP was harder at both ambient and 10°C temperatures than AMF from LP. Diet of the cow can be used to modify the FA composition of the TG and PL components of milk lipids as an approach to enhance milk fat's potential role as a functional-food ingredient.

Key Words: Fatty acid, Milk fat, Palmitic acid