

was used for nutrient balances. Silages and hays were based on NRC nutrient composition. Concentrate feeds and mineral mixes samples were taken in each farm and analyzed for DM, N, P and K. A multiple regression analysis was carried out to study the main dietary variables related to N metabolism that can explain efficiency of N utilization (ENU). The model included $ENU = \text{Feed Conversion (FC), CP\%, and required, supplied and balance (supplied - required) of CP, RDP, RUP, and MP. Dietary contents (averages} \pm \text{SD) of CP (N} \times 6.25), \text{ P and K were: } 17.0\% \pm 1.19; 0.44\% \pm 0.07, \text{ and } 1.53\% \pm 0.25, \text{ respectively. Results are presented in Table 1. ENU was significantly correlated (P} < 0.001) \text{ with CP balance (R}^2 = 0.649) \text{ and FC (R}^2 = 0.645). \text{ Compared to RDP, RUP and MP variables, CP explained better ENU variations}$

Table 1

		Average/farm SD		Min	Max
FCM3.5%†	kg/cow/d	30.9	5.31	18.9	45.1
FC	kgFCM3.5%/kgDMI‡	1.41	0.17	1.10	1.88
ENU	kgNmilk/kgDMI	0.26	0.03	0.20	0.34
N excretion d	g/cow/d	447	71.9	261	600
P excretion g	g/cow/d	46	15.8	15	89
K excretion g	g/cow/d	136	52.0	-63	334

(†)Fat Corrected Milk 3.5%; (‡)DMI=Dry Matter Intake; (d)N Excretion=0.90*N intake-89; (g)Excretion=Total Dietary Supply-Total Absorbed Required

Key Words: Dairy Cows, Nutrient Balances, Feed Conversion

W253 Manure production of heifers fed diets varying in forage, grain, and byproduct content. S. R. Hill*, K. F. Knowlton, R. E. James, R. E. Pearson, G. Bethard, K. P. Pence, and S. W. Wilson, *Virginia Polytechnic Institute and State University, Blacksburg.*

The objectives of this study were to evaluate the effect of varying feed intake and proportions of forage, grain, and byproducts on growth and excretion of urine, feces, and nitrogen in growing heifers. Holstein heifers (n=18) confirmed pregnant were grouped by due date and fed one of three diets for the last 16 weeks of pregnancy. Diets were high forage, fed ad libitum (HF); byproduct-based, fed ad libitum (BP); or low forage, fed at 75% of ad libitum (LF). Diets were designed to supply the same quantities of phosphorus, nitrogen, and metabolizable energy. Total collection of feces and urine was conducted in weeks 4, 8, 12 and 16. The HF ration was 85% forage, 13.7% CP, and contained orchardgrass hay, corn silage, corn grain, soybean meal, and a vitamin-mineral pre-mix. The BP diet was 60% forage and 14.0% CP, with 50% of the grain mix replaced with soybean hulls and cottonseed hulls. The LF ration was 60% forage, 17.8% CP, and fed at 75% of ad libitum. All data was analyzed using the PROC MIXED procedure of SAS with repeated measures (collection week). As intended, heifers fed HF and BP had greater DMI than the heifers limit-fed LF and there was no effect of diet on average daily gain or BW. Intake and digestibility of N was lower in heifers fed HF and BP than heifers fed LF. Fecal N excretion was higher in heifers fed HF and BP compared to those fed LF. Mean feces excretion on both wet and dry basis were highest in heifers fed HF, but heifers fed LF excreted more urine than those fed HF or BP. Despite differences in urine output, diet had no effect on urea N excretion. Heifers fed the LF ration excreted more total manure and urine per kg of BW compared to heifers fed BP and HF. Observed manure and urine excretion from heifers fed LF was greater than current ASAE values, while heifers fed HF excreted less manure and urine than predicted. Heifers achieving similar rates of gain from diets differing in forage, grain and byproduct content excreted widely varying quantities of manure.

Key Words: Manure Excretion

Women & Minority Issues in Animal Agriculture

W254 Heritability and permanent environmental effect for fleece quality assessed by an ancient Tzotzil indigenous evaluation system. H. Castro-Gómez¹, G. Campos¹, R. López¹, R. Perezgrovas², and H. Castillo-Juárez³, ¹Universidad Nacional Autónoma de México, Ciudad Universitaria, México, ²Universidad Autónoma de Chiapas, Chiapas, México, ³Universidad Autónoma Metropolitana-Xochimilco, Calzada del Hueso, México D.F.

The Tzotzil indigenous population living in the mountains of Chiapas (Mexico) obtains up to 36 % of its income from sheep-derived activities. In 1991 a breeding program, where the selection of sheep includes an ancient indigenous criteria for fleece quality, was introduced. This breeding program is supervised by the Teopisca Sheep Center from the Autonomous University of Chiapas. It uses empirical criteria from Tzotzil shepherdesses and formal quantitative fleece-quality and -production traits. The aim of this study was to estimate the heritability (h^2) and the permanent environmental effect (c^2) of fleece quality based on the indigenous grading system (FQ) where FQ depends on the visual and tactile evaluation of fleece volume, staple length, and the amount of coarse-long fibers within the double-coated fleece. This evaluation results in a quantitative discrete measure for FQ ranging from 1 to 4. The percentage of inbred

animals within the flock, and the mean inbreeding coefficient of inbred sheep were established. We used 2255 FQ records from 886 animals from the three color varieties of the wool sheep locally named Chiapas Blanco, Raza Café, and Chamula Negro. Feeding of the animals is based on an extensive grazing system in the highlands covered by native vegetation, and a supplement of corn fodder during the winter. Shearing is made twice a year. Fleece gradings were made from February of 1998 to February 2004. Heritability and c^2 were estimated using an animal model that included shearing number, year-season of shearing, sex, and fleece color as fixed effects. The pedigree file included 935 sheep. Heritability (s.e.) for FQ was 0.31 (0.05) and c^2 (s.e.) was 0.11 (0.04). A likelihood ratio test showed that the permanent environmental effect was statistically significant ($P < 0.05$). The breeding values for FQ ranged from -0.79 to 0.61. The percentage of inbred animals was 1.82, these with an inbreeding mean of 13.97 %. It is concluded that the empirical fleece-quality grading system shows a moderate genetic variation and hence it may be successfully included in the breeding programs.

Key Words: Fleece Quality, Genetic Parameters, Indigenous Women