

W139 WITHDRAWN. . .

**W140 Effect of transport stress on hair sheep moving from a subtropical to a semiarid climate in north-central Mexico.** S. Franco-Shaffer, R. Batista-Díaz, R. M. Rincon, F. Echavarría, R. Bañuelos, and C. F. Arechiga\*, *UAMVZ-Universidad Autonoma de Zacatecas, Zacatecas, Mexico.*

A decline in sheep-wool prices has shown the establishment of alternative ovine productive systems as hair sheep in arid environments. The purpose of present work was to evaluate the effect of transport stress on hair sheep (Black-belly X Pelibuey) exposed to a trip along 200 km during 3 h in a van vehicle, moving from a subtropical to a semiarid climate, with an altitude variation from 1,380 to 2,153 m passing into a maximum of 2,480 m above the sea level. The study included 6-months old hair ewes (n = 35), randomly allotted into 2 groups: 1) Control Group (i.e. without transportation, n = 18); 2) Transport Group (n = 17). Blood samples were obtained every hour just before and during transportation of the ewes included in both groups, to determine serum levels of cortisol, sodium (Na) and potassium (K). Once the ewes arrived to the semiarid environment, blood samples were taken every 3 h during 72 h. Transported hair ewes had shown greater serum levels of cortisol than non-transported ewes (i.e., control ewes) (2.53 vs 0.96 mg/L; P < 0.001). A greater difference was immediately shown after the first hour of transportation (3.11 vs 1.10 mg/L) but a statistical difference remained during the 3 h trip (P < 0.001). Sodium (Na) levels, decreased in transported ewes (P = 0.06). A greater decrease of Na was shown during the first hour of transportation. Serum potassium (K) levels showed no statistical difference within 3 h of transportation (P > 0.10). In conclusion, hair ewes exposed to transport stress had shown greater serum levels of cortisol and lower levels of sodium, primarily during the first two hours of transportation, while no difference was found on serum levels of potassium (K).

**Key Words:** Hair sheep, Transport stress, Cortisol

**W141 Effect of pre- and post-mating FGA-intravaginal sponges on estrous synchronization and embryo recovery in hair ewes.** E. Avila-Hernandez<sup>2</sup>, H. Rodriguez-Frausto<sup>1</sup>, R.M. Rincon<sup>1</sup>, J.J. Chavez<sup>1</sup>, R. Bañuelos<sup>1</sup>, and C. F. Arechiga\*<sup>1</sup>, <sup>1</sup>*UAMVZ-Universidad Autonoma de Zacatecas, Zacatecas, Mexico.*, <sup>2</sup>*FMVZ-Universidad Autonoma de Nayarit, Nayarit, Mexico.*

Intravaginal sponges containing fluorogestone acetate (FGA) were used before and after mating in hair ewes. Pubertal hair ewes (n=20) with an age of 5.5 mo and average body-weight of 21.1 2.3, were randomly distributed in a 2x2 factorial design (n=5/group). First, duration of FGA treatment (12 vs 6 d) was evaluated for estrous synchronization, according to a established protocol reported by Rangel, 1999 (i.e., sponge FGA 0-12d; d 10, 500 IU eCG; d 12, 75 mg PGF2 $\alpha$ ; d 13 & 14, natural breeding or insemination), and was compared to a shorter protocol including a FGA exposition of 6 d only (i.e., sponge FGA 0-6d; d 4, 500 UI eCG; d 6, 75 mg PGF2 $\alpha$ ; d 7 & 8, natural breeding). Secondly, after natural breeding with hair rams, it was determined the effect of a FGA sponge from d 1 to 7 post mating on embryo collection. The effect of FGA on reproductive tract for 12 d increases the number of ewes showing estrus (12 d=100% vs. 6 d=70%), as well as number of embryos collected from hair ewes using FGA for 12 d compared to 6 d (30 vs. 9 embryos) (P<0.05). However, hair ewes exposed to FGA for 12 d showed a greater number of embryos when no FGA sponge was used compared to the FGA treatment after mating (no FGA=18 vs. FGA=12 embryos). Embryo collection efficiency (%) [(total number of embryos collected/total number of corpora lutea) x 100], was 20% greater when FGA was used after mating (i.e., 75 vs 55%; FGA12d/FGA post mating vs. FGA12d/No FGA post mating, respectively). In conclusion, a FGA-sponge treatment for 12 d increases estrous synchronization of hair ewes and FGA treatment post mating (d 1-7) tended to increase embryo-collection efficiency.

Estrous synchronization with FGA sponge	FGA 1-7 d post-mating	Percent-age of estrus (%)	No. of corpora lutea per group	Embryo recovery (No. of embryos per group)	Corpora lutea per ewe (mean $\pm$ SD)	Embryos per ewe (mean $\pm$ SD)
FGA 6 d	No FGA	60 %	13	5 (38.5%)	2.6 2.7	1 1
FGA 6 d	FGA	80 %	24	4 (16.7%)	4.8 3.1	0.8 0.8
FGA 12 d	No FGA	100 %	33	18 (55%)	6.6 3.0	3.6 2.1
FGA 12 d	FGA	100 %	16	12 (75%)	3.2 1.3	2.4 3.2

**Key Words:** Hair sheep, Estrous synchronization, Embryo recovery

**W142 Luteal function of pubertal hair ewes exposed to estrous synchronization and laparoscopic insemination in a semiarid climate in north-central Mexico.** A. Muro-Reyes, H. Rodriguez-Frausto, R. M. Rincon, R. Bañuelos, J. I. Aguilera, and C. F. Arechiga\*<sup>1</sup>, *Universidad Autonoma de Zacatecas, Zacatecas, Mexico.*

The purpose of present study was to determine luteal function through 2 weekly measurements of serum progesterone in hair ewes (n=37), exposed to an estrous synchronization program by intravaginal sponges with fluorogestone acetate (FGA) from d 0-12, induction of multiple ovulation with 500 IU of eCG at d 10 and laparoscopic insemination, at their first autumn of life (i.e., reproductive season). 86.5% of hair sheep retained the intravaginal sponge (32/37). 28 ewes with retained sponge and 2 more without retention of the sponge showed estrus (i.e., 30/37; 87.5%). During the period of FGA exposure (12 d), 43.2% of hair ewes (16/37), had serum progesterone (P4) levels greater than 1 ng/ml. The rest, (56.8%; 21/37), had diminished luteal function or were in the follicular phase of the estrous cycle. By the end of the study, total average of serum progesterone was 5.46 ng/ml and serum-progesterone average after laparoscopic insemination was 7.96 ng/ml. 100% of hair sheep showed luteal function after laparoscopic AI. 91.9% (i.e., 34/37) showed estrous cyclicity evidence through an estrous-cyclic pattern of progesterone secretion. There was a conception rate of 10% (3 pregnancies out of 30 inseminations), and a pregnancy rate of 8.11% (3 pregnancies out of 37 ewes included in the study), even though hair ewes had a minimal average daily gain in body weight of 28.7 g/d during the last two months including the experimental protocol. Further research is required for the establishment and implementation of effective protocols for estrous synchronization and laparoscopic artificial insemination in pubertal hair ewes at semiarid climates.

**Key Words:** Hair sheep, Estrous synchronization, Laparoscopic insemination

**W143 Assesment of different extenders for ovine semen cryopreservation.** M. A. Lopez\*<sup>1</sup>, C. F. Arechiga<sup>1</sup>, M. A. Castillo-Pecina<sup>1</sup>, M. Perez<sup>2</sup>, and J. Gutierrez<sup>2</sup>, <sup>1</sup>*UAMVZ-Universidad Autonoma de Zacatecas, Zacatecas, Mexico.*, <sup>2</sup>*FZ-Universidad Autonoma de Chihuahua, Chihuahua, Mexico.*

A first trial was carried out to assess the capacity of five extenders: CY (sodium citrate-egg yolk-fructose); M (skim-milk-fructose); BFS (bovine fetal serum-fructose); SOP (Artificial saliva-Opuntia ficus indica extract-fructose) and AV (aloe vera gel-sodium citrate-fructose); and its combinations in 1:1 (v/v) proportion (better proportion in preliminary investigations), as mediums for ovine sperm subjected to chilling and freezing processes. Sperm motility and viability were evaluated in three periods: After cooling at 5 C, 48 h after freezing and 90 days after freezing. Fifteen extenders and a Tris-based extender as control were tested. CY diluent was superior (P < 0.05) due to its capacity for cell preservation in the three periods. CY combinations had acceptable rates for motility and viability. Although skim milk is used frequently as extender for sperm freezing, in our trial, it demonstrated a capacity of inferior protection, specially during long-periods storage. Egg yolk absence was the limitant factor in extenders that do not contain it, as these extenders had a clearly inferior performance. In a second trial, extenders CY, CY:AV and CY:SOP were selected for validation based in their celular protection capacity, cost and availability. Cooling and freezing process were similar in all senses than in the first trial, but, also

included acrosomal integrity (Giemsa staining) and membrane biochemical functionality (hypoosmotic swelling test). In conclusion, extenders such as CY, CY:AV and Tris-based were equally effective ( $P > 0.05$ ) to preserve sperm motility, viability, acrosomal integrity and functionality of plasma membranes in ovine sperm subjected to chilling and freezing process.

**Key Words:** Ram, Semen, Freezing

**W144 Evaluation of synchronized-ovulation (Ovsynch) schemes to be implemented in programmed breeding of hair sheep.** B. I. Camargo-Salcedo<sup>2</sup>, Y. Garcia-Guevara<sup>3</sup>, H. Rodriguez-Frausto<sup>1</sup>, R. M. Rincon<sup>1</sup>, J. I. Aguilera<sup>1</sup>, R. Bañuelos, and C. F. Arechiga\*<sup>1</sup>, <sup>1</sup>Universidad Autonoma de Zacatecas, <sup>2</sup>Universidad Autonoma de Nayarit, <sup>3</sup>Universidad Autonoma de Guerrero, Mexico.

The purpose of present work was to evaluate the effect of three schemes to synchronize ovulation in hair ewes to be included in programmed breeding using natural mating with hair rams. The study included 30 pubertal hair ewes of 5.5 mo of age and 20.7 kg. of average body weight randomly allotted in three groups. Ewes were sampled twice a week for serum progesterone determination by radioimmunoanalysis. Results have shown that an Ovsynch protocol complemented with a FGA sponge from d 0-7 and a ECP injection previous to mating, had a greater proportion of estrus and mating (9/11 ewes; 81.2% estrus and mating). However, when ECP was not included in the protocol (i.e., Ovsynch + FGA), a lower number of hair ewes showed estrus and were mated (5/11ewes; 45.5% estrus and mating), and even more when the Ovsynch protocol was used (i.e., no FGA sponge, nor ECP) (0/11ewes; 0% estrus and mating). The number of corpora lutea was 8, 11 and 12 for groups 1, 2 and 3, respectively. In conclusion, a greater number of hair ewes are mated by hair rams when the Ovsynch protocol is complemented with a FGA sponge and a ECP injection. We imply that a regular Ovsynch protocol is not recommended to be used for natural breeding. Synchronized Ovulation Schemes

		Group 1	Group 2	Group 3
Day	Hour	Ovsynch	Ovsynch + FGA	Ovsynch + FGA + ECP
0	22:00	GnRH	GnRH + FGA	GnRH + FGA
7	22:00	PGF2a	PGF2a (FGA release)	PGF2a (FGA release)
9-11	08:00	Mating	Mating	Mating
9	22:00	GnRH	GnRH	GnRH + 2 mg ECP

GnRH: 0.1 mg Gonadorelin. Fertagyl (Intervet de Mexico, Edo. de Mexico, Mex.). PGF2a : 37 mg Cloprostenol. Proslvin C (Intervet, Edo. de Mexico, Mexico). FGA: 40 mg Fluorogestone Acetate; Chronogest (Intervet, Edo. de Mexico, Mexico). ECP: 2 mg Estradiol Cipronate. ECP (Pharmacia & Upjohn, Mexico, D.F.). Hormones were generously provided by Intervet de Mexico S.A. de C.V., through Drs. Garcés-Yepez and Ramirez Martin del Campo.

**Key Words:** Hair sheep, Synchronized ovulation, Programmed breeding

**W145 Estimation of the supply of metabolizable protein in diets consumed by grazing sheep in a semiarid region of North Mexico.** A. S. Juarez-Reyes\*, J. Arzola-Nevarez, G. Nevarez-Carrasco, and M. A. Cerrillo-Soto, Universidad Juarez del Estado de Durango. Durango, Dgo. Mexico..

Protein systems developed in the last decades permit allocate more precisely the nutrient supply. An accurate understanding of the quality of the forage consumed by grazing animals is necessary to alleviate nutritional constraints. The objective of this study was to determine the metabolizable protein content originated from the energy and protein of the diet using the French PDI protein system. Three criollo sheep (BW = 52±6.6) fitted with rumen and esophageal cannulae belonging to a flock of 100 animals were used. The animals grazed on a zone with low grass covering and scattered semisucculent trees. Mean rainfall was 450 mm. Extrusa and rumen fluid samples were collected from August to December 2002. Data used to fit the PDI system were: dietary CP content, *in situ* degradability of CP (5g DM were placed in nylon bags and incubated in sheep fed alfalfa hay and a commercial concentrate (70:30) for 0, 3, 6, 12, 24, 48, 72 and 96 h), organic matter fermented

in the rumen (estimated from the digestible organic matter) and the digestibility of the feed protein in the small intestine (from tables provided in the literature). Data was analyzed using a randomized block design (Proc GLM, SAS). Escape protein was different between months ( $P < 0.05$ ) with a mean of 53 g/kg DM. Data indicate that the potential production of microbial protein originated from dietary nitrogen is higher (mean = 89 g/kg DM) ( $P < 0.05$ ) than originated from dietary energy (mean = 29 g/kg DM) which leads to a mean of metabolizable protein (escape + microbial protein from dietary energy) content of 82 g/kg DM. It is concluded that the forage consumed by sheep require a supply of energy to alleviate the unbalance with protein during the rainy season.

Months	escape	Microbial from dietary N*	Microbial from dietary E*	Escape + microbial from dietary N*	Escape + microbial from dietary E*
August	60 <sup>a</sup>	123 <sup>a</sup>	29 <sup>ab</sup>	183 <sup>a</sup>	89 <sup>a</sup>
September	51 <sup>b</sup>	110 <sup>b</sup>	26 <sup>bc</sup>	161 <sup>b</sup>	77 <sup>b</sup>
October	60 <sup>a</sup>	70 <sup>d</sup>	33 <sup>a</sup>	130 <sup>c</sup>	93 <sup>a</sup>
November	64 <sup>a</sup>	50 <sup>e</sup>	22 <sup>c</sup>	114 <sup>d</sup>	89 <sup>a</sup>
December	30 <sup>c</sup>	90 <sup>c</sup>	34 <sup>a</sup>	120 <sup>cd</sup>	64 <sup>c</sup>
Mean	53	89 <sup>a</sup>	29 <sup>b</sup>	141 <sup>a</sup>	82 <sup>b</sup>
SEM	2.53	2.29	2.06	4.10	3.17

<sup>a-d</sup> Means within columns with the same superscript do not significantly differ ( $P < 0.05$ ).

\* g/kg DM

**Key Words:** Sheep, Grazing, Metabolizable protein

**W146 Effects of the energy source (rendered beef fat or sugar cane molasses) on performance in lambs of hair sheep breeds fed whole rations.** J. A. Chavez, I. Martinez, F. M. Loya, E. G. Cienfuegos, J. C. Martinez, and A. Gonzalez\*, Agronomia, Universidad Autonoma de Tamaulipas.

The effect of the energy source (rendered beef fat, BF or sugar cane molasses, SCM) was measured on the productive performance of ewe (n = 52) and ram (n = 51) lambs of hair sheep breeds, such as the Saint Croix (SC, n = 28), Pelibuey (PB, n = 34) and Blackbelly (BB, n = 41), fed whole rations. After an adaptation period of 14 days, all lambs were weighted every 14 days, until the end of the trial. All lambs were identified, and received ivermectin and ADE, B complex; one half of the lambs on each sex-breed-ration group were treated with nandrolone decanoate (ND). The lambs were distributed by ration, breed and sex into 12 lots. Three rations were used, BF, SCM and control, rations were formulated to contain 14.7 and 3.08 Mcal/kg of feed. A GLM procedure of SAS was used to evaluate the effects of sex, rations and breeds and of the initial weight as covariable, and its interactions, on daily gain (DG) and final weight (FW). The DG was affected ( $P < 0.01$ ) by sex and diet. The DG was greater ( $P < 0.05$ ) in the males (158.5 g) than in the females (118.4 g), the DG for the rations were 150.2, 127.1 and 135.9 g for BF, SCM and control, respectively. The breed did not affect DG, the average for breeds were 148.2, 141.3 and 129.0 g for SC, PB and BB lambs, respectively. The interaction sex x ration was significant ( $P < 0.01$ ). Similar results were observed with FW, sex, diet and initial weight affected this variable. The average FW was 28.0 4.9 kg, ram lambs were heavier (by 4.52 kg), than the ewe lambs. The breed did not affect FW, the average for the breeds were 26.9, 28.1 and 28.6 kg, for the SC, PB and BB, respectively. Treatment with ND did not affect DG. Results indicated that BF and SCM are alternative sources of energy and can be used to feed lambs of hair sheep breeds, without affecting their performance.

**Key Words:** Hair sheep breeds, Energy source, Lamb performance

**W147 Feed efficiency, growth rates, carcass evaluation and sensory evaluation of lambs of various hair x wool sheep crosses.** T. D. Bunch\*, R. C. Evans, S. Wang, C. P. Brenard, D. R. Whittier, and B. J. Taylor, Utah State University, Logan, Utah, USA.

Feed efficiency, growth rates, carcass evaluation and sensory evaluation were compared in six lambs from each of the following genotypes: St. Croix hair sheep, St. Croix x wool sheep, Callipyge wool x St. Croix, Dorper hair sheep x St. Croix, Dorper x wool, Callipyge wool x wool, and wool x wool. The general linear model (GLM) ANOVA procedures and

Fisher's LSD multiple-comparison test were used to determine the differences among genotypes. Feeding efficient varied from 5.20 to 6.87, with the highest feed efficiency in St. Croix lambs. Standardized daily live weight gain ranged from 0.34 to 0.55 kg, with the highest rate of gain in the Callipyge wool x St. Croix lambs. Whole sale weight (kg) was the highest in the Callipyge wool x wool (19.26) and lowest in the St. Croix (15.38). Quality grade among the seven genotypes of lambs ranged from 5.5 to 7.6, with the St. Croix and St. Croix x wool lambs having the higher values. The highest value for the percent wholesale

body weight was observed in the Callipyge wool x wool (64.1) while the value for St. Croix was the lowest (55.6). Percent loin eye of carcass weight was the highest in the Callipyge wool x wool (4.5) and the lowest is the St. Croix (3.0). The overall sensory acceptance rating was the highest in the St. Croix (6.8) and the lowest in the Callipyge wool x wool.

**Key Words:** Carcass evaluation, Feed efficiency, Sheep

## Beef Species: Beef cattle performance and genetic relationships in the feedlot

**W148 Genetic relations among carcass fat, tenderness, and age at slaughter in beef cattle managed under a constant finishing program.** T. L. Fernandes<sup>\*1</sup>, J. W. Wilton<sup>1</sup>, I. B. Mandell<sup>1</sup>, and C.J.B. Devitt<sup>2</sup>, <sup>1</sup>University of Guelph, Department of Animal and Poultry Science, <sup>2</sup>Beef Improvement Ontario.

Objectives were to estimate genetic parameters on carcass fat traits, tenderness at 7 days of aging (Angus x Simmental cows), and age at slaughter. Data on 744 crossbred animals from 3 research herds, fed at the Elora Beef Research Centre. Each year throughout the five-year period, the cattle were fed either a high-energy diet from start to finish or a haylage based diet the first 112 days and then a high-energy diet. All animals were targeted to finish at a constant backfat thickness of 8 mm, as determined by ultrasound measurements taken every 28 days. Forty sires were included, with a range of 8 to 34 progeny per sire. Carcass fat traits included: subcutaneous fat % and intermuscular fat % as measured from a rib section dissected into lean, fat (subcutaneous, body cavity, and intermuscular fat), and bone. Subcutaneous fat (SUBQ) % and intermuscular fat (INTER) % were calculated as percentages of overall rib weight. Chemical fat was determined by ether extraction of the dissected lean. Marbling score was determined subjectively. Tenderness was measured using Warner-Bratzler shear force with samples aged for 7 days. A multiple trait model was used to analyze the data with the model including regression on breed proportion, the covariate carcass backfat, fixed effects of herd of origin and contemporary group (year, nutritional treatment, and sex), and the random effect due to animal. Heritability estimates were 0.42, 0.44, 0.23, 0.53, 0.22, and 0.22 for marbling, SUBQ %, INTER %, chemical fat, shear force and age at slaughter, respectively. The genetic correlation between marbling score and chemical fat was 0.90 indicating that subjective marbling score is a good indicator of intramuscular fat. Marbling had a genetic correlation of -0.08 with shear force, and 0.02 with INTER. Selection for marbling should not affect carcass quality for tenderness and intermuscular fat.

**Key Words:** Beef, Meat-quality, Selection methods

**W149 Effects of growth promotant (Revalor-G) implantation on feed efficiency and meat quality in Korean native cattle.** S. Sun<sup>\*1</sup>, B. Ahn<sup>1</sup>, K. Myung<sup>1</sup>, Y. Cho<sup>2</sup>, and K. C. Olson<sup>3</sup>, <sup>1</sup>Chonnam national Univeristy, Gwangju, Korea, <sup>2</sup>National Livestock research Institute, Namwon, Korea, <sup>3</sup>University of Missouri, Columbia, MO.

The objectives of this study were to examine improving feed efficiency and meat quality by implantation of growth promotant in Korean native cattle. Fourteen steers (Korean beef cattle, BW 250+10kg, 14-month-old) were randomly assigned to either a control and implanted group. Steers were castrated at 3 months of age. Growth promotant (Revalor-G, 120 mg TBA + 24 mg estradiol benzoate) was implanted subcutaneously in the ear of seven steers at 15 months old. Animals were managed in a feedlot unit and slaughtered locally. Concentrate ration was fed 1.5kg per animal per day from 14 to 20 months, and then fed at 1.0kg per animal per day from 21-28 months of age. Rice straw was fed ad libitum. The implanted group was slaughtered at 24 months old (BW 638±14kg) and the control group was slaughtered at 28 months old (BW 635±17kg). Live weight was measured every 60 d and feed consumption was calculated daily. Daily weight gain and feed consumption were increased 53.3% and 18.9%, respectively, but feed requirement was decreased 22.6% by growth promotant implantation ( $P < 0.05$ ). Plasma glucose content was enhanced, but urea-N was diminished by treatment. Also, serum cholesterol level was decreased significantly ( $P < 0.05$ ) by the treatment. Carcass weight and yield grade were slightly increased in treatment group. These results indicated that growth promotant implantation improved daily weight gain and feed efficiency, but meat quality was decreased in Korean native cattle.

**Key Words:** Korean native cattle, Growth promotant, Meat quality

## Ruminant Nutrition: Dairy and Beef

**W150 Ruminal and intestinal protein digestion of tropical alfalfa and corn silage measured by mobile nylon bag technique in steer.** A. Taghizadeh, M. Danesh Mesgaran<sup>\*</sup>, R. Valizadeh, and F. Eftekhari Shahroodi, *Ferdowsi university, Mashhad, Iran.*

The ruminal and intestinal disappearance of dry matter (DM) and crude protein (CP) of tropical (Iranian) alfalfa and corn silage were measured in three steers (370±16), with ruminal and intestinal canulae, using mobile nylon-bag technique. The experimental samples, 18 replicates, were placed in nylon bags (3 x 6 cm, pore size 47µm), then incubated in the rumen of steers for 12 h prior to being inserted into the intestine. Dry matter and crude protein disappearances in the rumen, intestine and total tract were calculated as the difference between the each nutrient in the intact feeds and the remaining after incubation in the rumen and intestine. The disappearance of DM in the rumen, intestine and total tract for alfalfa and corn silage was 410 and 380, 190 and 460, 540 and 810 g kg-1, respectively. The disappearance of CP in the rumen, intestine and total tract for alfalfa and corn silage was 510 and 290, 730 and 890, 870 and 730 g kg-1, respectively. The results of intestinal and total tract DM disappearance of alfalfa were significantly different from the corn silage data ( $p < 0.05$ ). The alfalfa CP disappearance in the rumen, intestine and total tract was significantly higher compared with corn silage ( $p < 0.05$ ). The disappearance results of DM and CP of al-

alfa and corn silage may related to the growing condition, species and conservative processing.

**Key Words:** Dry matter, Nylon bag, Intestine

**W151 Influence of low-level protein supplementation on forage intake, diet digestion and selection by beef steers grazing tallgrass-prairie range during the fall.** D. A. Llewellyn<sup>\*</sup>, R. C. Cochran, T. T. Marston, C. G. Farmer, and T. A. Wickersham, *Kansas State University, Manhattan.*

An experiment was conducted to evaluate the effect on forage utilization of providing a limited quantity of a high-protein (45.5% CP, DM basis) supplement to beef cattle grazing tallgrass-prairie during the fall period. Sixteen ruminally fistulated Hereford x Angus steers (BW = 259 kg) were blocked by weight and randomly assigned to one of two treatments (i.e., fall supplementation or no fall supplementation) in a two-period study to evaluate the effect of low-level supplementation on forage intake and digestion during September and November. Within each treatment, four steers were used for measuring diet selection (by ruminal evacuation) and four were used for total fecal collection (via fecal bags). Each period consisted of a 15-d diet adaptation, a 4-d diet sample collection period, and a 6-d period in which total feces production was measured. The diet to feces ratio of the internal marker acid detergent insoluble ash was used to calculate diet digestibility and this