ABSTRACTS

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Postweaning growth performance in Spanish, Boer × Spanish, and Boer × Angora goat kids

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Postweaning performance, apparent total tract nutrient digestibility, and plasma metabolite profiles of growing Spanish (S), Boer × Angora (BA), and Boer × Spanish (BS) castrates were investigated. The experiment was conducted over two 8-wk feeding periods: 78 S, 20 BA, and 30 BS were used in the first 8-wk period and 18 kids per genotype were used in the second 8-wk period. Kids were weaned at 8 wk of age and fed a commercial goat starter diet (25% CP, 2.71 Mcal/kg DE, 35%NDF, and 18% ADF) ad libitum. Feed intake was recorded daily and BW at 2-wk intervals. Digestibility was measured in wk 17 to 18 by weighing and sampling of offered feed, feed refusals, and feces for a period of 5 d. Boer × Angora and BS castrates had greater ($P < 0.001$) initial and final BW than S (7.3, 7.2, and 6.6 ± 0.2 kg; 24.4, 25.2, and 19.5 ± 0.25 kg, for BS, BA, and S, respectively). Final BW of BA was greater than BS ($P < 0.03$). Average daily gain (154, 161, and 117 ± 5.6 g/d), DM intake (646, 683, and 522 ± 21.5 g/d) and gain:feed (263, 261, and 235 ± 8.0 g of BW gain/kg of feed consumed) were also greater ($P < 0.05$) for BS and BA versus S, respectively. Averaged daily gain, DM intake, and feed:gain were similar ($P > 0.05$) between BA and BS. Body weight and DM intake increased ($P < 0.001$) linearly and quadratically over time; the rate at which BW and DM intake changed over time was greater ($P < 0.001$) for Boer crosses than S. Average daily gain increased linearly ($P < 0.001$) while feed efficiency decreased ($P < 0.001$) linearly and quadratically over the 16 wk feeding period. Genotype had no effect ($P > 0.05$) on digestibilities of dietary DM, OM, CP, or gross energy (687 ± 1.4%, 70.6 ± 1.3%, 69.9 ± 1.4%, and 69.3 ± 2.4%, respectively). Genotype also had no effect on plasma concentrations of total protein, glucose or NEFA ($P > 0.05$). However, BA had greater ($P < 0.05$) concentrations of plasma urea N compared with S and BS (25.5, 19.6, and 21.3 ± 1.0 mg/dL, respectively). Under intensive management, the use of Boer bucks as terminal sires has the potential to produce crossbred kids which grow faster and achieve heavier BW as compared to fullblood Spanish goat kids.

Carcass characteristics and composition for Spanish and Boer crossbred goat kids

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Eighteen Spanish (S), Boer × Angora (BA), and Boer × Spanish (BS) castrates were used to investigate the effects of genotype on carcass characteristics, body composition, and distribution of carcass tissues. Kids were offered ad libitum a concentrate diet (25% CP, 2.71 Mcal DE/kg, 35% NDF, and 18% ADF). Animals were slaughtered at 212 ± 5 d of age. Carcasses were eviscerated, hung for 72 h at 5ºC, weighed, and split. The left half was fabricated into seven primal cuts. The right half and noncarcass components were individually ground and analyzed for DM, ash, CP, and fat. Live body weight (BW), empty BW, hot carcass weight, and dressing percentage were similar ($P > 0.05$) among genotypes (32.4, 30.1, and 25.4 ± 2.1 kg; 27.5, 27.7, and 23.3 ± 3.0 kg; 15.0, 14.1, and 11.9 ± 1.0 kg; and 50.6, 51.2, and 51.6 ± 1.3% of empty BW for BS, BA, and S, respectively). Boer × Spanish had greater ($P < .005$) bone:lean ratio than either BA or S (0.45, 0.50 and 0.50 ± 0.01, respectively). Genotype had no effect ($P > 0.05$) on carcass scores, backfat thickness, or *longissimus* muscle area. Internal fat was not affected by genotype ($P > 0.05$), averaging 1.94 ± 0.3 kg (7% of empty BW). Chemical composition of the carcass, noncarcass and the empty body were similar among genotypes (57.6 ± 1.5%, 17.6 ± 1.4%, and 20.2 ± 0.5%; 55.6 ± 1.7%, 19.5 ± 1.5%, and 19.0 ± 1.1%; 57.1 ± 1.4%, 16.8 ± 1.1%, and 21.1 ± 0.7% for moisture, fat, and protein, respectively). The proportions of separable lean and fat in the primal breast, rack, loin, shank, and flank were similar ($P > 0.05$) among genotypes (averaging 42.3 ± 3.2 and 29.0 ± 3.6%; 43.6 ± 2.2 and 14.5 ± 2.0%; 56.2 ± 1.8 and 17.5 ± 1.6%; 64.9 ± 0.9 and 5.5 ± 1.1%; 60.1 ± 4.0 and 39.9 ± 4.0%, respectively). Lean composed a greater ($P < 0.05$) proportion of the cut in both BS and S than in BA in the primal shoulder(61.6, 63.5, and 58.0 ± 0.9%, respectively). Boer crosses had a lower ($P < 0.05$) proportion of bone than S in the primal leg (22.5, 23.8, and 26.5 ± .92% for BS, BA, and S, respectively). Genotype had no effect on percentage of lean or fat in the primal leg (averaged 66.9 ± 1.8% and 6.83 ± .97%, respectively). Genotype had little effect on carcass characteristics or body composition in growing kids fed a high concentrate diet. Results indicate that Angora producers can as effectively produce goats with a high quality carcass as Spanish producers when Boer buck are used as a terminal sire breed.

Effects of age of Boer × Alpine wethers on growth and carcass traits

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Fourteen Boer × Alpine wethers (14 ± 0.6 kg initial BW) were used to determine effects of age on feed intake, growth, and carcass traits. From 14 to 31 wk of age (Phase 1), all wethers consumed ad libitum a 20% CP diet; wethers raised to 50 wk of age consumed ad libitum a diet with 16% CP from 38 to 50 wk (Phase 2). Dry matter intake and BW gain were greater ($P < 0.01$) in Phase 1 than in Phase 2 (DMI: 1.27 vs 1.18 kg/d; ADG: 225 vs 118 g/d). The ratio of ADG to DMI also differed ($P < 0.01$) between phases (0.18 in Phase 1 vs 0.10 in Phase 2). Dressing percentage (50 vs 56%), percentage of carcass fat (16.2 vs 20.1%), and the lean to bone ratio (2.45 vs 2.77) were lower (*P* # 0.05) at 31 vs 50 wk of age. Leg cut percentage (31.1 vs 28.4%), carcass bone percentage (24.0 vs 20.6%), and backfat thickness (0.44 vs 0.30 cm) were greater (*P* # 0.05) at 31 than 50 wk and longissimus dorsi area (14.5 vs 18.0 cm^2) was greater ($P = 0.06$) at 50 wk. Carcass lean percentage (58.2 vs 57.1%) was similar ($P > 0.10$) between ages. In conclusion, these results depict substantial decreases in ADG and efficiency of feed utilization when Boer × Alpine wethers were reared to 50 wk vs 31 wk of age, which must be compared with magnitudes of change in carcass traits such as dressing percentage, lean meat percentage, leg cut percentage, and longissimus dorsi area when determining optimal slaughter age.

Nutritional flushing to increase ovulation and kidding rate in Spanish meat goats

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Prebreeding supplementation was used to study the effect of flushing on ovulation and conception rate and litter size. Multiparous Spanish does were divided into four groups of 24 animals based on previous litter size, BW, and body condition score (avg 2.3). Treatments included long term energy (LE; 40 d, 0.25 kg corn-based supplement), short term energy (SE; 20 d, 0.25 kg corn-based supplement), short term protein (SP; 20 d, 0.25 kg supplement with 20% menhaden fishmeal), and an unsupplemented control (C). All does consumed millet hay (6.6% CP) ad libitum throughout the study. Does were weighed and body condition scored prior to breeding, and does from each treatment were randomized to one of three bucks for breeding. All does received 0.25 kg of corn-based supplement for the first 3 wk of breeding. Corpus lutea, pregnancy status, and litter size were determined by ultrasound. Flushing with protein (SP) increased body condition prebreeding more than C, with LE and SE being intermediate (0.57, 0.30, 0.38, and 0.39; $P < 0.10$). However, flushing did not increase ($P > 0.5$) fetal number or ovulation rate (1.59, 1.74, 1.88, 1.78; 2.45, 2.17, 2.21, and 2.29 for LE, SE, SP, and C, respectively). Conception rates were greater than 92%. Neither body condition, body weight, nor change in body condition or body weight were associated with fetal number. These nutritional flushing treatments did not improve ovulation rate, conception rate, or litter size of Spanish does.

Effects of dietary protein and ruminally protected betaine or choline on productivity of Angora doelings

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Thirty Angora doelings (22 ± 2 kg initial BW, 6 mo) were used in an experiment with a 2 × 3 factorial arrangement of treatments to investigate the effects of dietary protein level (9 and 15% CP, 2.4 Mcal/kg ME) and supplementation with ruminally protected choline (6 g/d) or ruminally protected betaine (6 g/d) or control (no supplementation) on ADG and mohair growth. Goats were housed in pens (seven or eight per pen) and given ad libitum access to the diet using electronic feeders for 120 d. There was a dietary protein × supplement interaction ($P < 0.05$) in ADG. Animals fed 9% CP-control and 9% CP-choline diets had lower ($P < 0.001$) ADG (46.7 and 52.1 g/d) than ones consuming the 9% CP-betaine diet (78.8 g/d). There were no differences in ADG ($P > 0.26$) among animals fed 9% CP-betaine, 15% CP-control (74.8 g/d), 15% CP-betaine (83.8 g/d), or 15% CP-choline (85.0 g/d) diets. Neither DMI nor mohair growth were affected by dietary treatments ($P > 0.05$). It is suspected that increased ADG with betaine supplementation of this low protein diet was due to the additional methyl groups, which can be used for homocysteine remethylation and carnitine synthesis (lipid transporter). Supplementation with ruminally protected betaine may be useful to increase efficiency of utilization of poor quality, low protein diets.

Supplementation of perennial cool season pastures with ruminally undegradable protein for spring kidding Angora does

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Lactating Angora does have demonstrated increased milk and mohair production in response to increased dietary protein. The effects of feeding a ruminally undegraded protein (RUP) supplement on mohair production and kid and doe BW gain were studied in a 4 × 2 factorial arrangement replicated twice. Forages were wheat, 'Jose' tall wheatgrass, 'Paiute' orchardgrass, and 'KY 31' tall fescue pastures (0.3 ha). Forage availability was maintained at approximately 1,500 kg/ha by the put-and-take method using three does and their kids per pasture as testers. Grazing was initiated March 18 and terminated May 14 on wheat pastures and May 28 on other pastures. Does kidded March 20 to 25. Blood and ruminal fluid samples were obtained 3 and 6 wk post-kidding. Does received either 200 g/d of a corn-based supplement (8.8% CP) or 200 g of a corn-based supplement containing 20% Menhaden fishmeal (19.2% CP) as a source of RUP. Does grazing wheat pasture gained more ($P < 0.05$) BW than those grazing fescue with orchardgrass and wheatgrass being intermediate ($P > 0.10$; 45, -67,9, and -32 g/d, respectively; SE = 44). Kids on fescue pastures gained less weight than kids on other forages (123 vs 186 g/d; $P < 0.05$). Doe and kid BW gain, mohair production as well as blood metabolite concentrations were not affected by RUP. Blood urea N concentration was lower 6 wk post-kidding than at 3 wk (22.2 vs 17.8 mg/dL; $P < 0.001$). Milk urea N was greater for orchardgrass compared with other grasses (26 vs 21 mg/dL; $P < 0.10$) with blood urea N following a similar trend. Glucose and NEFA concentrations were greater ($P < 0.001$) at 6 wk post-kidding than at 3 wk (44.9 vs 51.8 mg/dL; 247 vs 339 FEq/L, respectively). The nutritive value of fescue was lower than for other cool season species tested. Supplementation of cool season forages with RUP did not improve BW gain or mohair production.

Effect of eu-, hypo- and hyperthyroidism and bst on mohair growth, ADG, and hormone status

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Forty-eight Angora goats (24 wethers and 24 doelings; 5 mo old; 16 ± 0.5 kg initial BW) were used in an experiment with a 2 × 3 factorial treatment arrangement (n = 8) to evaluate two levels of recombinant bST (0 and 100 µg/d) and three thyroid hormone statuses (euthyroid, hypothyroid, and hyperthyroid) on ADG and mohair growth. The bST was a slow release zinc-based suspension designed to sustain delivery of bST over a 14-d period. Hyperthyroidism was maintained by treatment with thyroxine (T_4; 150 µg/kg BW/d) and hypothyroidism by treatment with propylthiouracil (6 mg/kg BW/d). The experiment that consisted of a 2-wk pre-treatment period and 8 wk of bST treatment was performed during the summer (July to September). Goats were given ad libitum access to a mixed diet (15.0% CP; 2.34 Mcal/kg ME; DM basis) and were housed in raised, individual indoor stalls under ambient lighting. There was an interaction between bST and thyroid hormone status ($P < 0.01$) in plasma T_4, triiodothyronine (T_3) and insulin-like growth factor I (IGF-I). Hypothyroid-bST and hypothyroid-control animals had highest ($P < 0.01$) concentrations of plasma T_4 (38.6 and 38.0 µg/dL, respectively) and T_3 (406 and 385 ng/dL, respectively). No differences were observed between euthyroid-control, euthyroid-bST, and hypothyroid-bST animals in plasma T_4 (11.1, 11.5, and 9.8 µg/dL, respectively) or T_3 (232, 251, and 226 ng/dL, respectively). The hypothyroid-control group had the lowest ($P < 0.01$) concentration of both T_4 (5.1 µg/dL) and T_3 (144 ng/dL). Increased plasma IGF-I ($P < 0.01$) was observed in euthyroid-bST (1,080 ng/mL) and hypothyroid-bST (1,028 ng/mL) animals; however, hyperthyroid-bST animals had plasma IGF-I concentrations similar to those observed in euthyroid-control, hypothyroid-control, and hyperthyroid-control groups (78, 74, 74, and 78 ng/mL, respectively). The ADG for hyperthyroid goats (11.3 g/d) was lower ($P < 0.01$) than for hypothyroid and euthyroid goats (72.4 and 72.6 g/d, respectively). Mohair production was higher ($P < 0.01$) in hyperthyroid goats (0.13 g/100 cm^2/d) than in hypothyroid and euthyroid goats (0.10 and 0.10 g/100 cm^2/d, respectively). Strong interactions exist between growth and thyroid hormones in the body; however, manipulation of their status had a very limited effect on productivity of Angora goats.

Effect of ruminally protected choline on productivity of Angora goats

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Twenty-five Angora wethers (29 ± 6 kg initial BW and > 1 yr of age) were used to evaluate effects of ruminally protected choline (PC) on BW gain, blood metabolites, and mohair production. Animals were randomly allocated to five treatments and had ad libitum access to 55% concentrate diet (oat-based, 13% CP) for 90 d. Treatments were 1, 2, and 3 g/d of PC, 3 g/d of unprotected choline (UP), and no added choline (control). In situ ruminal disappearance of PC was 7%, whereas disappearance of UP at 2 h was complete. Total tract digestibility of PC was 56%. Dry matter intake and feed efficiency were similar among treatments ($P > 0.10$). Body weight gain for 3 g PC was greater ($P < 0.05$) than for the control and UP. No difference in grease fleece weight was observed among treatments. Mohair diameter differed ($P < 0.05$) between UP and PC and between UP and 3 g PC. Ruminal VFA concentration was higher for 3 vs 1 ($P < 0.01$) and 2 g PC ($P < 0.07$). The molar percentage of butyric acid was lowest for 3 g PC ($P < 0.05$). Plasma protein concentration was higher ($P < 0.05$) for 2 g PC than for C, UP, and 1 g PC. Plasma cholesterol concentration for the control was lower ($P < 0.05$) than for 2 and 3 g PC. The level of NEFA in plasma was decreased by PC supplementation ($P < 0.05$). In conclusion, supplementation of growing Angora wethers with 3 g/d of protected choline increased ADG without change in DMI, but had no effect on mohair growth or quality. Effects of PC on plasma NEFA and cholesterol levels suggest altered lipid metabolism.

Effects of ruminally protected choline on productivity of Angora goats

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Twenty-five Angora wethers (29 ± 6 kg initial BW and > 1 yr of age) were used to evaluate effects of ruminally protected choline (PC) on BW gain and mohair production. Animals were randomly allocated to five treatments and had ad libitum access to 53% concentrate diet (oats based, 13% CP) for 90 d. Treatments were 1, 2, and 3 g/d of PC, 3 g/d of unprotected choline (UC), and no added choline (control). In situ ruminal disappearance of PC was 7%, whereas disappearance of UC at 2 h was complete. Total tract digestibility of PC was 56%. Dry matter intake, BW gain, and feed efficiency were similar among treatments ($P > 0.10$), although numerically BW gain was 7, 13, and 17% greater for diets with 1, 2, and 3 g/d of PC compared with the control diet (83, 88, 91, 71, and 78 g/d for 1, 2, and 3 g/d PC, 3 g/d UC, and control, respectively; SE 18.5). Mohair growth (monthly patch samples) was similar among treatments ($P > 0.10$). Numerical differences among treatments in BW gain warrant further investigation of potential effects of PC on productivity of Angora goats.

Effects of recipient breed on birth and weaning weight and wool follicle numbers of Merino lambs born by embryo transfer

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One hundred and eighty-three embryos were collected from 29 donor Merino ewes and transferred as either a single or twins into Merino (MR), Coopworth (CR), and Romney (RR) recipient dams. A total of 107 lambs were weaned from these implants. A control group (MN) of 24 naturally conceived single and twin lambs were included for progeny comparisons. Data were analyzed by GLM procedures. Birth weight was 4.2, 4.4, 4.4, and 4.0 kg (SED 0.2) for MN, MR, CR, and RR, while weaning weight was 25.6, 30.4, 27.6, and 28.9 kg (SED 1.1), respectively. Follicle fiber area was measured 232, 243, 256, and 253 Fm^2 (SED 12) for MN, MR, CR and RR at birth, and 218, 203, 216, and 207 Fm^2 (SED 16) at weaning, respectively. Follicle fiber diameter at birth was 16.7, 17.2, 17.7, and 17.6 Fm (SED 0.4) for MN, MR, CR, and RR, while fiber diameter of wool samples at birth was similar for all groups (16.5 ± 0.3 Fm). The range in wool fiber diameter was less at weaning (19.8 to 21.7%) than at birth (24.7 to 26%). Fiber curvature of MN at birth was 107^{B}C, which was greater ($P < 0.01$) than for other groups (95 for MR, 96 for CR, and 96 for RR, respectively; SED 3.2). Follicle density was 121, 122, 118, and 114 (SED 10) per mm^2 for MN, MR, CR, and RR groups at birth, and 107, 114, 116, and 109 (SED 8) per mm^2 at weaning, respectively; both variables were similar among treatments. Follicle fiber diameter at weaning were 16.5, 15.9, 16.3, and 16.1 Fm (SED 0.6) for MN, MR, CR, and RR, respectively, while corresponding wool fiber diameter at weaning was 16.3, 16.1, 16.0, and 16.0 Fm (SED 0.4) at weaning. Lambs of RR and CR were heavier ($P < 0.05$) at weaning than those of Merino (recipients or naturally bred) dams. These results suggest that crossbred dams improve weaning weight of lambs born to embryo transfers but do not effect wool follicle characteristics of Merinos.

Effect of selection for fleece weight on live weight, reproductive performance and wool characteristics in mixed age Romney

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Data were collected from 3,525 mixed age Romney ewes over 11 years of production, either fleece weight-selected (HF) or control (RC). Data were statistically analyzed by least-squares analysis of variance. The model included year, flock, and age of ewe, with older ewe classes (6 and above) combined. The HF ewes were ($P < 0.001$) heavier than RC for autumn, winter, and spring weights. Greasy fleece weight and yield, clean fleece weight, and fiber diameter were 4.61 kg (SE 0.09), 78.6% (SE .3), 3.59 kg (SE 0.04), and 40.3 Fm (SE 0.2) for HF compared with 3.82 kg (SE 0.10), 78.3% (SE 0.4), 3.03 kg (SE 0.06), and 39.3 Fm (SE 0.3) for RC ewes. These differences were highly significant ($P < 0.001$) except for yield. There was no difference in wool brightness (Y: 61.4 vs 61.6; SED 0.2), but yellowness (Y-Z: 5.4 vs 4.5; SED 0.2) was greater ($P < 0.001$) for HF ewes. Significant ($P < 0.01$) differences existed between flocks in ovulation rate (1.80 vs 1.73; SED 0.03), number of lambs born per ewe lambed (1.63 vs 1.56; SED 0.02), number of multiple births per ewe lambed (60% vs 54%; SED 2%), and number of lambs weaned per lamb born (1.15 vs 1.12; SED 0.01). These results indicate that a selection for fleece weight as a single trait enhances fleece weight, live weight, ovulation rate, fiber diameter, and fleece yellowness.

Energy expenditure of Angora goat does during the late trimester using the doubly-labelled water technique

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The double-labeled water (DLW) technique was used to compare CO_2 production and energy expenditure (EE) of non-pregnant (NP) (31 ± 0.9 kg BW; n = 4) and pregnant (PREG; single fetus) Angora goat does (32 ± 3.1 kg BW; n = 4) for 10 d (130 ± 1 to 140 ± 2 d) in the late trimester of pregnancy. Animals were housed individually in metabolism crates. Diets for PREG and NP were 2.62 and 2.48 Mcal/kg DM of ME and 80.4 and 76.9 g/kg DM of metabolizable protein, respectively; DMI was greater ($P < 0.01$) for PREG (932 ± 47 g/d) than for NP (564 ± 7 g/d). After determination of baseline plasma isotope levels, does were infused into the jugular vein with $^2H_2{}^{18}O$, providing 200 mg ^2H and 250 mg ^{18}O/kg BW for NP and 250 mg ^2H and 300 mg ^{18}O/kg BW for PREG. Isotopic estimates were performed at 6 h post-infusion and at 2- to 4-d intervals. The ^2H and ^{18}O dilution spaces were calculated using the multi-point model, and isotopic estimates of ^2H_2O and $H_2{}^{18}O$ fluxes were corrected for isotope losses in feces and methane (^2H) and products of gestation (^2H and ^{18}O). Fiber growth rate (g/d) was determined from a mid-side patch sample extrapolated to whole-body production, and energy expended on mohair production (EE_{moh}) was calculated as 10.95 kcal ME/(g d^{-1}). In NP, maintenance EE (EE_m) was assumed to be total DLW-derived EE (TEE) - EE_{moh}. Energy expended for pregnancy (EE_p) was similarly assumed to be TEE - EE_{moh} - EE_m. Ratios of isotope distribution spaces (N_D/N_O) for NP (1.043 ± 0.013) and PREG (1.029 ± 0.012) were acceptable, and kid birth weight (3 ± 0.1 kg) was similar to that of the main herd (2.9 ± 0.1 kg; n = 33). The EE_m for NP was 98.4 ± 3.8 kcal ME/(kg $BW^{0.75}$ d^{-1}). Fiber production and diameter were lower ($P < 0.05$) for PREG (5.5 ± 0.8 g/d and 31.4 ± 1.3 Fm, respectively) than for NP (11 ± 1.1 g/d and 37.1 ± 1.8 Fm, respectively). The EE_p for PREG was 65.2 ± 13.6 kcal ME/(kg $BW^{0.75}$ d^{-1}). In conclusion, pregnancy suppressed mohair production and elevated whole-body energy expenditure to approximately 1.67 times that for maintenance.

Digestibility of Water Oak and Shining Sumac leaves fed to Alpine goat wethers

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Eight Alpine wethers (60.6 ± 2.43 kg BW) were randomly assigned to consume, free-choice, either Shining Sumac or Water Oak leaves as a sole diet. Leaves were collected and dried prior to feeding. A 14-d adaptation period was followed by a 4-d total fecal and urine collection. Chemical composition (%) of the fed tree leaves revealed similar levels of OM and N with higher concentrations of cell wall fractions, NDF and ADF, in Water Oak (OM 94 vs 96, NDF 55 vs 31, ADF 26 vs 35, and N 1.42 vs 1.54 for Shining Sumac and Water Oak, respectively). Body weight of wethers differed between treatments although, this difference did not affect DM intake (BW 64.3 vs 55.8, $P < 0.10$; DMI 60 vs 66 g/kg $BW^{.75}$, $P > 0.10$, for Shining Sumac and Water Oak, respectively). Daily intakes of DM (1.35 vs 1.35 kg), OM (1.29 vs 1.3 kg), ADF (0.38 vs 0.43 kg), and N (18.3 vs 22.6 g) were similar between treatments ($P < 0.10$). However, NDF intake was lower ($P = 0.002$) in goats fed Shining Sumac than in those consuming Water Oak (0.42 vs 0.75 kg). Daily fecal output of all components with the exception of N was higher ($P < 0.05$) in Shining Sumac- than Water Oak-fed goats. Differing fecal outputs, coupled with similar intakes of DM, OM, and ADF led to lower apparent digestibilities (%) of these components in Water Oak-fed animals (DM 82 vs 71, OM 83 vs 72, ADF 75 vs 44, for Shining Sumac and Water Oak, respectively). The higher NDF intake and fecal output for the Water Oak treatment led to NDF digestibility similar to that for Shining Sumac (70 vs 63% for Shining Sumac and Water Oak, respectively). Nitrogen digestibility was similar between treatments (64 vs 56% for Shining Sumac and Water Oak, respectively). In conclusion, the higher OM digestibility by goats of Shining Sumac than Water Oak implies that goats consuming Shining Sumac would have a better ability to maintain and(or) increase BW gain or body condition.

Effects of milk replacer feeding level on Alpine kid performance

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Seventy-nine Alpine kids (35 female and 44 male) were used to determine effects on ADG of milk replacer (MR) consumed ad libitum (AS/AV) or with restricted consumption of volume alone (AS/RV) or of volume and solids (RS/RV). Kids began the 8-wk experiment at 3 to 9 d after birth (3.5 ± 0.11 and 3.9 ± 0.08 kg initial BW for females and males, respectively). A commercial MR was fed twice daily. The AS/AV kids received ad libitum access to MR with 18% DM. The RS/RV kids received 18% DM MR, with ad libitum access in wk 1 and approximately 90, 80, and 70% of consumption by AS/AV kids in wk 2, 3, and 4 to 8, respectively. The AS/RV kids received ad libitum access to 18% DM MR in wk 1, thereafter receiving a similar quantity of solids as AS/AV kids and limited volume or water, with a MR DM concentration of 20, 22.5, and 25.7% in wk 2, 3, and 4 to 8, respectively. Milk replacer DMI was 231, 223, and 197 g/d in wk 1 to 4 (SE 7.1) and 276, 260, and 228 g/d (SE 8.2) in wk 5 to 8, and water intake was 1,050, 802, and 899 g/d (SE 30.7) in wk 1 to 4 and 1,258, 846, and 1,039 g/d (SE 32.8) in wk 5 to 8 for AS/AV, AS/RV, and RS/RV, respectively. Gain of BW was least ($P < 0.07$) among treatments for RS/RV in wk 1 to 4 (146, 131, and 118 g/d, SE 5.9) and 5 to 8 (137, 140, and 115 g/d, SE 7.2, for AS/AV, AS/RV, and RS/RV, respectively). However, sex influenced ($P = 0.05$) treatment effects on ADG in wk 1 to 8 (female: 129, 120, and 117 g/d and male: 155, 151, and 116 g/d for AS/AV, AS/RV, and RS/RV, respectively; SE 7.2). Treatment did not affect BW gain in the subsequent 4-wk period after weaning ($P > 0.10$). In conclusion, restricting intake of fluid or water alone in MR did not enhance ADG of Alpine kids, and lower growth potential of female vs male kids may lessen susceptibility to effects of limited MR DMI.

Defleecing effects of mimosine on cashmere of Spanish goats

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Ten 2-yr-old Spanish wethers (59.2 ± 2.01 kg BW), with primary follicle activity less than 50% and secondary follicle activity greater than 90% on December 19, 1997, were used to determine effects of 2-d intravenous infusion of mimosine on follicle activity (FA) and blood mimosine concentration. Goats were divided into two groups based on primary FA and BW; primary and secondary FA on d 0 were 43 ± 7.8% and 83 ± 7.6%, respectively. Jugular infusion began on January 8, 1998; one group was infused with mimosine at 120 mg kg BW^{-1} d^{-1} and the other received saline (0.9%; wt/vol). Blood mimosine concentration in goats infused with mimosine was 84 ± 9.3, 101 ± 20.8, 122 ± 9.1, 143 ± 21.2, and 173 ± 20.1 Fmol/L at 5, 20, 25, 30, and 48 h after infusion started and 60 ± 22.1 Fmol/L 6 h after infusion ceased. On d 4, all five goats infused with mimosine exhibited shedding; whereas, controls were not observed to shed at any sampling day (i.e., 0, 4, 12, and 20 d after the start of infusion). Cashmere shedding score (5-point scale determined by ease of hand-plucking: 1 = no shedding, 5 = high degree of shedding) on d 4 was greater for mimosine goats than for controls (2.0 vs 1.2; $P < 0.001$), and shedding score for goats receiving mimosine differed with time (i.e., 2.0 on d 4 vs 4.2 on d 12; $P < 0.01$). Primary and secondary FA on d 4 were similar between treatments ($P > 0.10$); however, secondary FA on d 12 was lower ($P < 0.01$) for mimosine than for control goats (6.8 vs 67.7%). Also, secondary FA for mimosine goats on d 12 was lower ($P < 0.01$) than on d 0 (99.0%), 4 (98.3%), and 20 (99.5%). In conclusion, 2-d intravenous infusion of mimosine at 120 mg kg BW^{-1} d^{-1} in the winter induced cashmere shedding in Spanish goats, with only a short-term decrease in secondary FA, indicating potential use of mimosine for cashmere harvest.

Effects of change in dietary forage level on dairy goat performance

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Thirty-one Alpine does and 31 doelings (52 ± 1.62 and 34 ± 0.86 kg, respectively) were used to determine effects of dietary levels of forage and ruminally undegraded protein (RUP), and change in forage level, on early lactation performance. Goats began a 2-wk covariate period at 3 to 9 d after parturition, then were assigned to treatments: 80 = 80% forage diet; 80R = 80 with RUP; 40 = 40% forage diet; 40R = 40 with RUP; A = 80 in wk 1 to 3, transition to 40 in wk 4 to 5, and 40 in wk 6 to 16; and AR = 80R in wk 1 to 3, transition to 40R in wk 4 to 5, and 40R in wk 6 to 16. Diets were formulated at 17.5% CP; for 80R and 40R, equal CP was supplied by blood, fish, and feather meals, substituting for 67% of soybean meal CP. Overall, parity did not interact with dietary treatment ($P > 0.10$). Milk production was greater ($P < 0.05$) for 40 and 40R than for 80 and 80R and influenced ($P < 0.05$) by RUP in wk 1 to 3 and 4 to 5 (wk 1 to 3: 2.51, 2.74, 2.72, 3.33, 2.44, and 2.54 kg/d; wk 4 to 5: 2.52, 2.73, 3.13, 3.59, 2.56, and 2.62 kg/d; wk 6 to 16: 2.18, 2.33, 2.85, 3.11, 2.54, and 3.01 kg/d for 80, 80R, 40, 40R, A, and AR, respectively). Dietary treatments had little or no effects on milk fat and lactose levels; however, forage level influenced ($P < 0.05$) milk protein concentration (wk 1 and 3: 2.99, 2.99, 3.25, 3.11, 2.98, and 3.13%; wk 5: 2.81, 2.72, 2.91, 2.86, 2.76, and 2.94%; wk 7, 11, and 15: 2.48, 2.51, 2.86, 2.69, 2.74, and 2.68% for 80, 80R, 40, 40R, A, and AR, respectively). In conclusion, milk production and protein concentration were greater with 40 vs 80% forage throughout the 16-wk early lactation period, although RUP impacted milk production only in the first segment. Changing dietary forage level in early lactation of dairy goats did not influence subsequent production.

Forage impact on subsequent finishing performance of wethers

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High-forage diets are often consumed ad libitum (ALI) in a growing phase, followed by ALI of concentrate-based diets (CBD) during finishing. Splanchnic tissue energy use relative to absorbed energy is greater for ALI of forage-based diets than for limited intake or ALI of CBD (Goetsch, 1998). Sainz et al. (1995) observed lower live weight gain and efficiency of feed utilization during finishing for beef steers that previously consumed forage ad libitum compared with steers given restricted access to CBD. The proportion of the finishing period during which energy use was influenced by greater liver and stomach protein mass observed at the end of the growing phase (Sainz and Bentley, 1997) is unknown. If appreciable, a short period of limit-feeding CBD after growing phase ALI of forage might avert or lessen high energy use by splanchnic tissues during finishing. Hence, objectives of this experiment were to determine effects of ALI of forage (long-stemmed alfalfa hay) or restricted intake of CBD (80% concentrate) on subsequent finishing performance with ALI of CBD.

Forty-eight wethers (9 months of age; 28.6 ± .40 kg initial live weight; 16 St. Croix and 32 St. Croix × Romanov) were used in the 14-wk experiment. Treatments were ALI of CBD for 14 wk (AC); ALI of forage for 8 wk followed by 6 wk ALI of CBD (F-AC); restricted intake of CBD for 8 wk followed by 6 wk ALI of CBD (LC-AC); and 6 wk ALI of forage followed by 2 wk restricted intake of CBD then 6 wk ALI of CBD (F-LC-AC). Transitions from forage to CBD occurred in 1 wk or less. At the beginning of wk 9 and end of wk 14, shrunk body weight and body composition (via urea dilution) were determined.

Factors responsible for improved performance in wk 9-14 for F-LC-AC compared with F-AC are unknown and deserved of study. Nonetheless, a more rapid decrease with time in energy use by splanchnic tissues relative to absorbed energy for F-LC-AC after forage and(or) limited CBD consumption than for F-AC after ALI intake of forage is possible, which encompasses potential influences of changes in the quantity of nutrients absorbed and physical characteristics of digesta.

In conclusion, growing phase restricted intake of CBD may affect subsequent performance with ALI of CBD differently than ALI of forage. A period of restricted intake of CBD following growing phase ALI of forage could offer potential to improve later performance with ALI of CBD.

Performance by wethers during a 14-wk growing-finishing period

Item	Week	Treatment AC	LC-AC	F-AC	F-LC-AC	SE
DMI (g/d)	1-6	1465[c]	791[a]	1127[b]	1131[b]	29.2
	7-8	1707[c]	893[a]	1216[b]	1139[b]	41.0
	9-14	1571	1511	1443	1583	62.5
	1-14	1545[c]	1114[a]	1275[ab]	1326[b]	42.4
LWG (g/d)	1-6	277[b]	75[a]	53[a]	59[a]	18.0
	7-8	239[c]	124[b]	154[b]	27[a]	21.3
	9-14	191[a]	274[b]	178[a]	289[b]	14.9
	1-14	235[c]	167[b]	121[a]	153[ab]	11.7
LWG:DMI (g/kg)	1-6	189[b]	94[a]	47[a]	53[a]	12.5
	7-8	139[b]	139[b]	126[b]	24[a]	14.6
	9-14	122[a]	182[b]	123[a]	182[b]	6.8
	1-14	152[c]	150[c]	95[a]	115[b]	4.9
Accretion						
Protein (g/d)	9-14	16.5	19.0	16.7	17.6	2.00
Fat (g/d)	9-14	84[a]	151[bc]	115[ab]	168[c]	10.1
Energy						
Kcal/d	9-14	884[a]	1522[bc]	1178[ab]	1674[c]	92.0
Kcal:Mcal MEI	9-14	194[a]	345[b]	286[b]	363[b]	21.7

DMI = dry matter intake; LWG = live weight gain; MEI = metabolizable energy intake.

[a,b,c]Within a row, means lacking a common superscript letter differ ($P < 0.05$).

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